Hollandia Dairy CUP Modification

Technical Appendices

Appendix F1

SWQMP

City of San Marcos
PRIORITY DEVELOPMENT PROJECT (PDP) **STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)** **FOR** **Hollandia Dairy Redevelopment** **622 E Mission Road** **San Marcos, CA 92069** **ASSESSOR'S PARCEL NUMBER(S):** **"218-180-048-00"**
ENGINEER OF WORK: ____ **Robert Dentino, PE 45629**

PREPARED FOR:

HOLLANDIA FARMS, INC.
622 E Mission Road
San Marcos, CA 92069
Contact Person: Hank Van Nieuwenhuyzen
Phone: 760-744-3222

PDP SWQMP and PLANS PREPARED BY:

EXCEL ENGINEERING
440 State Place
Escondido, CA 92029
760-745-8118

DATE OF SWQMP:
02/19/2020

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TABLE OF CONTENTS

ACRONYMS

APN	Assessor's Parcel Number
BMP	Best Management Practice
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWQMP	Storm Water Quality Management Plan

PDP SWQMP PREPARER'S CERTIFICATION PAGE

Project Name: Hollandia Dairy Redevelopment

Permit Application Number: CUP 19-0010

PREPARER'S CERTIFICATION

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

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

____

Engineer of Work's Signature, PE Number & Expiration Date

Robert D. Dentino, RCE

____

Print Name

EXCEL ENGINEERING

____

Company

____

Date

Engineer's Seal:

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PDP SWQMP PROJECT OWNER'S CERTIFICATION PAGE

Project Name: Hollandia Dairy Redevelopment

Permit Application Number: CUP19-0010

PROJECT OWNER'S CERTIFICATION

This PDP SWQMP has been prepared for "Hollandia Farms,Inc." by Excel Engineering. The PDP SWQMP is intended to comply with the PDP requirements of the City of San Marcos BMP Design Manual, which is a design manual for compliance with local City of San Marcos and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2015-0100) requirements for storm water management.

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

Project Owner's Signature

Hank Van Nieuwenhuyzen

Print Name

"Hollandia Farms, Inc."

Company

10-23-19

Date

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SUBMITTAL RECORD

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In column 4 summarize the changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments behind this page.

Submittal Number	Date	Project Status	Summary of Changes
1	9/27/19	☑ Preliminary Design / Planning/ CEQA ☐ Final Design	Initial Submittal
2	02/19/2020	☑ Preliminary Design / Planning/ CEQA ☐ Final Design	Report revision based on City review
3		☐ Preliminary Design / Planning/ CEQA ☐ Final Design	
4		☐ Preliminary Design / Planning/ CEQA ☐ Final Design	

ATTACHMENT A
PROJECT ISSUE CHECKLIST

Project Name:			Hollandia Dairy	Project Number(s):	CUP19-0010		
Item	**No.**	**Subject Area**	**Issue, Revision or Information Required**	**Issue Resolution Summary (Include Conditions)**	**Applicant Response**	**Date Identified**	**Date Resolved**
Development Services - Land Development Comments							
5-	0	Informational	Comments provided by Brad Holder, Assistant Engineer. (760)744-1050 x 3250 or bholder@san-marcos.net		understood		
5-	1	Informational: SWQMP	The PDP SWQMP review was limited to reviewing the provided PDP SWQMP report and attachments at the current submittal level (preliminary engineering level). Site design changes as well as the addition of detail and information on future plan submittals may result in additional comments, beyond the comments listed in this plan review, during future plan reviews.	N/A	understood	10/16/19	
5-	2	SWQMP	Form I-3B shall be updated to reflect the location of groundwater as it appears in the submitted geotechnical report. Clarify how design of the proposed detention systems will deal with bouyancy and groundwater infiltration if located below the water table. Appropriate exhibits shall also be updated to reflect correct location of groundwater	Revise the appropriate document and coordinate resubmittal.	Form I-3B is updated to reflect the water table depth. Boring logs show that water table is no shallower than 7' from surface. All pipe IEs are within 7' from surface. Additionally, no ground water was encountered within the northern portion of the project. Thus, no bouyancy calculations are need or exhibits to be updated.	10/16/19	
5-	3	SWQMP	Please update permit numbers throughout the report.	Revise the appropriate document and coordinate resubmittal.	updated	10/16/19	
5-	4	SWQMP	Please include a document date on subsequent submittals.	Revise the appropriate document and coordinate resubmittal.	updated	10/16/19	
5-	5	SWQMP	The Preparer's Certification is not signed by the engineer of work. A signature is required on the PDP SWQMP that will be submitted for approval.	Revise the appropriate document and coordinate resubmittal.	understood	10/16/19	
5-	6	SWQMP	Form I-2: The 50% Rule Block of Form I-2 is not completed accurately. The calculation provided appears to use a pre-project impervious area that is associated with the project limits and not the impervious area of the entire legal property. Please revise the calculation to compare the proposed newly created or replaced impervious area with the existing (pre-project) impervious area within the entire legal property boundary.	Revise the appropriate document and coordinate resubmittal.	updated	10/16/19	
5-	7	SWQMP	Form I-3B : The receiving waters from the project site to the Pacific Ocean are identified; however some of the pollutant(s)/stressor(s) listed in the PDP SWQMP are not consistent with those on the 303 (d) List of Impaired Water Bodies. Please provide the pollutant(s)/stressor(s) consistent with the 303 (d) List of Impaired Water Bodies for each receiving water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable). (https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml) (i.e., San Marcos Creek is listed for DDE, Toxicity, Benthic Community Effects, Indicator Bacteria, Phosphorus, and Selenium; San Marcos Lake is listed for Ammonia as Nitrogen, Copper, Nutrients, and Phosphorus)	Revise the appropriate document and coordinate resubmittal.	updated pollutants, highetst priority pollutant, project site pollutants	10/16/19	
5-	8	SWQMP	Form I-3B: TMDLs / WQIP Highest Priority Pollutant cells are not completed correctly. Please complete these cells to be consistent with the WQIP (per ProjectCleanWater.org: indicator bacteria, nutrients, and sediment).	Revise the appropriate document and coordinate resubmittal.	updated	10/16/19	
5-	9	SWQMP	Form I-3B: Please consult the building plan and determine if the proposed building will have interior floor drains, and if so please identify "Interior floor drains and elevation shaft sump pumps" as a feature of the site on Page 6 of Form I-3B and Block SC-6 of Form I-4. As applicable, please implement source control measures accordingly.	Revise the appropriate document and coordinate resubmittal if applicable.	updated to include floor drains	10/16/19	
5-	10	SWQMP	Form I-4: The SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants Block on Form I-4 is not appropriately completed. Please identify the potential sources of pollutants by placing a check mark in each of the applicable boxes located along the left side of the form. Please ensure that the items selected in the SC-6 Block are consistent with those on Page 6 of 10 of Form I-3B.	Revise the appropriate document and coordinate resubmittal.	updated	10/16/19	

ATTACHMENT A
PROJECT ISSUE CHECKLIST

Project Name:		Hollandia Dairy		Project Number(s):	CUP19-0010		
Item	**No.**	**Subject Area**	**Issue, Revision or Information Required**	**Issue Resolution Summary (Include Conditions)**	**Applicant Response**	**Date Identified**	**Date Resolved**
5-	11	SWQMP	Form I-5: SD-1 Maintain Natural Drainage Pathways and Hydrologic Features is marked as “Yes”; however, Form I-3B identifies that natural hydrologic features do not exist at the project site. If there is a hydrologic feature on-site, the appropriate response for this site design would be “Yes” with the project implementing this site design or, alternatively, selecting “No” with an appropriate justification for why the feature is not being protected. If there are no natural hydrologic features on-site, mark “N/A” and state “none present on-site.”	Revise the appropriate document and coordinate resubmittal.	updated	10/16/19	
5-	12	SWQMP	Form I-5: SD-6 Runoff Collection is selected for implementation on the Form I-5; however, it is not clear where this site design BMP is proposed on the project. Please review Section 4.3 of the BMP Design Manual and revise the plan and/or Form I-5 accordingly. Please note that structural BMPs may not be considered as site design BMPs in the context of a SWQMP.	Revise the appropriate document and coordinate resubmittal.	updated	10/16/19	
5-	13	SWQMP	Form I-5: SD-8 for Harvesting and Using Precipitation is marked as “N/A”; however, there is no justification provided. Please revise the Site Design BMP checklist to select Harvesting and Using Precipitation for implementation and incorporate into the project design or select this site design BMP as "No" and provide an appropriate justification. Please note that the selection of site design BMPs is independent from the selection of structural BMPs. In general, site design BMPs shall be implemented wherever feasible.	Revise the appropriate document and coordinate resubmittal.	updated	10/16/19	
5-	14	SWQMP	Form I-6: The following discrepancies were identified on Form I-6, Structural BMP Summary Information Checklist: - For sites located upstream from a receiving water that is 303(d) listed for a nutrient pollutant and proposing biofiltration (BF-1), the Biofiltration with Nutrient Sensitive Media Design (BF-2) shall also be selected (i.e., both BF-1 and BF-2 shall be selected). This comment appears to be applicable to the checklist for BMP 1. -The checklist for BMP 1 identifies the purpose of the measure as pollutant control only; whereas the SWMM analysis includes BMP 1 as a hydromodification control. -The checklist for BMP 3 identifies the purpose of the measure as pollutant control and hydromodification control. The proposed MWS does not appear to contribute to hydromodification control for the project. Please revise accordingly. Please note that if a detention vault is proposed in series with the MWS, the detention vault shall be considered as aseparate BMP with a unique identification number and checklist. Please revise the checklist accordingly.	Revise the appropriate document and coordinate resubmittal.	- updated. - updated. - MWS is modeled as a part of the hydromodification analysis and works with the detention vault to store the water quality volume. *AKA, the low flow orifice is within the MWS and the backwater is stored in the detention vaults so that it will be forced to be cleaned. Thus, both are important to the hydrmodification system. The detention pipe system is now included as a BMP within the SWQMP writeup.	10/16/19	
5-	15	SWQMP	Attachment 1: The design of the biofiltration BMP is not consistent with the BF-1 Design Fact Sheet Checklist from Appendix E of the BMP Design Manual. Issues of concern related to the BMP Design Fact Sheet Checklist, based on a review of site plans, include but are not limited to the following: - A minimum of 3 inches of well-aged, shredded hardwood mulch is required. - Soil media and planting methods shall meet the BF-2 design criteria. Revise the design of BMPs to meet the design criteria checklist of the BF-1 Biofiltration Design Fact Sheet.	Revise the appropriate document and coordinate resubmittal.	- updated - updated to BF-2	10/16/19	

ATTACHMENT A
PROJECT ISSUE CHECKLIST

Project Name:			Hollandia Dairy	Project Number(s):	CUP19-0010		
Item	**No.**	**Subject Area**	**Issue, Revision or Information Required**	**Issue Resolution Summary (Include Conditions)**	**Applicant Response**	**Date Identified**	**Date Resolved**
5-	16	SWQMP	Attachment 1: The following issues were identified on the DMA Exhibit: -DMA-B is identified as not treated (compensated with additional treated area in DMA-C) in plan view; whereas the summary table identifies DMA-B as draining to a BMP. -There are areas in DMA-C identified as compensation for DMA-B. Please provide the area (sq. ft.) of these compensation areas. Additional, there is a discrepancy between the identified compensation areas on the DMA Exhibit and the areas shown on the plan. Specifically, a portion of the compensation area is identified as a Phase 3 building area on the plan (i.e., identified as a replaced impervious area by the project and thus cannot be part of the compensation area). - Structural BMPs not appropriately shown (identify location, structural BMP ID#, type of BMP, and size/detail) Please revise the DMA Exhibit accordingly.	Revise the appropriate document and coordinate resubmittal.	- summary table updated - compensation area upated to exclude building overhang. The total treatment area of DMA-C is shown (which includes the additional area required to compensate DMA-B). - Exhibit/Sturctural BMPs updated	10/16/19	
5-	17	SWQMP	Attachment 1: No pollutant control calculations are provided for the proposed MWS. In order to demonstrate that MWS have adequate capacity to treat runoff draining to them, please provide Rational Method (Q=CIA) calculations listing impervious area, pervious area, area-weighted Runoff Factor, intensity (0.2), multiplication factor (1.5), resulting flow rate, and the capacity of the selected device for each.	Revise the appropriate document and coordinate resubmittal.	Attachment 1 now contains a write up with supportive calculations for use of the MWS	10/16/19	
5-	18	SWQMP	Attachment 1: The Average Annual Runoff Retention Requirement shall be satisfied for each DMA where non-standard biofiltration BMPs (i.e., MWSs) are proposed. Please demonstrate that retention requirements are satisfied at the individual DMA level. Additional information and guidance has recently been published in the Model BMP Design Manual (available at http://www.projectcleanwater.org/model-bmp-design-manual/). Please note that the annual retention requirement has not changed from the existing requirement, but rather the Model BMP Design Model has been updated to more clearly explain the annual retention requirement and methodology that should be used to demonstrate that a DMA is satisfying the requirement (County methodology accepted by the City).	Revise the appropriate document and coordinate resubmittal.	Retention requirements added to attachmetnt 1e using the county methodology.	10/16/19	
5-	19	SWQMP	Attachment 2: An N-Perv value of 0.1 is used in the pre-developed condition SWMM analysis. The City of San Marcos BMP Design Manual requires that a default N-Perv value of 0.15 for short prairie grass be used or otherwise provide documentation of other surface consistent with Table A.6 of SWMM Manual.	Revise the appropriate document and coordinate resubmittal.	Updated to 0.15 *It should be noted that hydromodification calculations are not required for an entitlement process to the City per submittal requirements	10/16/19	
5-	20	SWQMP	Attachment 2: The post-project SWMM analysis includes storage units for DMA-C and DMA-D; however, no details for the storage devices are shown on the Hydromodification Exhibit. Please provide details of the storage units proposed by the project, including identification, area, depth, and outlet works configuration on the Hydromodification Exhibit and describe these storage units, where applicable, in the PDP SWQMP document (e.g., Form I-6).	Revise the appropriate document and coordinate resubmittal.	Provided	10/16/19	
5-	21	SWQMP	Attachment 2: The berm height for BMP-1 incorporated into the modeling is 8 inches; whereas the pollutant control calculations have the height at 6.4 inches. Please ensure that the BMP geometry is consistent throughout the PDP SWQMP. Please note that the berm height incorporated into the LID Controls of the SWMM analysis shall be the height of the BMP riser above the planted surface of the BMP. If additional storage is to be modeled, it can be modeled using a divider node and storage unit (i.e., storage unit is used to represent the volume above the riser in the BMP). Please revise the analysis accordingly.	Revise the appropriate document and coordinate resubmittal.	Attachement updated	10/16/19	

PROJECT VICINITY MAP

Project Name: Hollandia Dairy Redevelopment

Permit Application Number: CUP 19-0010

Project Vicinity Map

Applicability of Storm Water Best Management Practices (BMP) Requirements (Storm Water Intake Form for all Development Permit Applications) For detailed information please visit: http://www.san-marcos.net/departments/development-services/stormwater/development-planning	Form I-1 [March 15, 2016]
Project Identification	
Project Name: Hollandia Dairy Redevelopment	
Description: A redevelopment project that is divided by 3 construction phases and is approximately 2.4 acres. This project includes: constructing a new utility building, new maintenance building, demolishing the old dairy process replace it with a new dairy process building.	
Permit Application Number (if applicable): **CUP 19-0010**	Date: 04/05/2019
Project Address: 622 E Mission Road, San Marcos, CA 92069	

Determination of Requirements

This form is required as part of the City's application process. The purpose of this form is to identify potential land development planning storm water requirements that apply to development projects.

Development projects are defined as construction, rehabilitation, redevelopment, or reconstruction of any public or private projects. In addition, the identification of a development project, as it relates to storm water regulations, would truly apply to development and redevelopment activities that have the potential to contact storm water and contribute a source of pollutants, or reduce the natural absorption and infiltration abilities of the land.

To access the BMP Design Manual, Storm Water Quality Management Plan (SWQMP) templates, and other pertinent information related to this program please refer to:
http://www.san-marcos.net/departments/development-services/stormwater/development-planning

Please answer each of the following steps below, starting with Step 1 and progressing through each step until reaching "Stop".

Step	Answer	Progression
Step 1: Based on the above, Is the project a "development project" (See definition above)? See Section 1.3 of the BMP Design Manual for further guidance if necessary.	☑ Yes	Go to Step 2.
	☐ No	Permanent BMP requirements do not apply. No SWQMP will be required. Provide brief discussion below. **STOP.**
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, Priority Development Project (PDP), or exception to PDP definitions? **To answer this item, complete Form I-2, Project Type Determination. See Section 1.4 of the BMP Design Manual *in its entirety* for guidance.** **In addition to Section 1.4, please refer to the City's SWQMP Submittal Requirements form.**	☐ Standard Project	Only Standard Project requirements apply, including Standard Project SWQMP. **STOP.**
	☑ PDP	Standard and PDP requirements apply, including PDP SWQMP. **Go to Step 3 on the following page.**
	☐ Exception to PDP definitions	Standard Project requirements apply, and any additional requirements specific to the type of project. Provide discussion and list any additional requirements below. Prepare Standard Project SWQMP. **STOP.**

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

Form I-1 Page 2, Form Date: March 15, 2016		
Step 3 (PDPs only). Please answer the list of questions in this section to determine if hydromodification requirements reply to the proposed PDP. Does the project:		
Step 3a. Discharge storm water runoff directly to the Pacific Ocean?	☐ Yes	**STOP**. Hydromodification requirements do not apply.
	☑ No	Continue to Step 3b.
Step 3b. Discharge storm water runoff directly to an enclosed embayment, not within protected areas?	☐ Yes	**STOP**. Hydromodification requirements do not apply.
	☑ No	Continue to Step 3c.
Step 3c. Discharge storm water runoff directly to a water storage reservoir or lake, below spillway or normal operating level?	☐ Yes	**STOP**. Hydromodification requirements do not apply.
	☑ No	Continue to Step 3d.
Step 3d. Discharge storm water runoff directly to an area identified in WMAA?	☐ Yes	**STOP**. Hydromodification requirements do not apply.
	☑ No	Hydromodification requirements apply to the project. Go to Step 4.
Discussion / justification if hydromodification control requirements do not apply:		
Step 4 (PDPs subject to hydromodification control requirements only). Does protection of critical coarse sediment yield areas apply based on review of WMAA Potential Critical Coarse Sediment Yield Area Map? See Section 6.2 of the BMP Design Manual for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	☑ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. Stop.

No Critical Course Sediment Yield areas found on the site.

<table>
<tr><th colspan="4">Project Type Determination Checklist</th><th>Form I-2
[March 15, 2016]</th></tr>
<tr><td colspan="5">Project Information</td></tr>
<tr><td colspan="5">Project Name/Description: Hollandia Dairy Redevelopment</td></tr>
<tr><td colspan="4">Permit Application Number (if applicable): CUP 19-0010</td><td>Date: 04/05/2019</td></tr>
<tr><td colspan="5">Project Address: 622 E Mission Road, San Marcos, CA 92069"</td></tr>
<tr><td colspan="5">Project Type Determination: Standard Project or Priority Development Project (PDP)</td></tr>
<tr><td colspan="5">The project is (select one): ☐ New Development ☑ Redevelopment</td></tr>
<tr><td colspan="5">The total proposed newly created or replaced impervious area is: 93924 ft² (2.15) acres</td></tr>
<tr><td colspan="5">Is the project in any of the following categories, (a) through (f)?</td></tr>
<tr><td>Yes
☐</td><td>No
☑</td><td>(a)</td><td colspan="2">New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.</td></tr>
<tr><td>Yes
☑</td><td>No
☐</td><td>(b)</td><td colspan="2">Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.</td></tr>
<tr><td>Yes
☑</td><td>No
☐</td><td>(c)</td><td colspan="2">New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses:
(i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) code 5812).
(ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater.
(iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.
(iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.</td></tr>
</table>

Form I-2 Page 2, Form Date: March 15, 2016			
Yes ☐	No ☑	(d)	New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). *Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. See BMP Design Manual Section 1.4.2 for additional guidance.*
Yes ☐	No ☑	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. (ii) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.
Yes ☑	No ☐	(f)	New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction. *Note: See BMP Design Manual Section 1.4.2 for additional guidance.*
Does the project meet the definition of one or more of the Priority Development Project categories (a) through (f) listed above? ☐ No – the project is <u>not</u> a Priority Development Project (Standard Project). ☑ Yes – the project is a Priority Development Project (PDP).			
The following is for redevelopment PDPs only: The area of existing (pre-project) impervious area at the project site is: **593,401** ft^2 (A) The total proposed newly created or replaced impervious area is **93,924** ft^2 (B) Percent impervious surface created or replaced (B/A)*100: **16**% The percent impervious surface created or replaced is (select one based on the above calculation): ☑ less than or equal to fifty percent (50%) – only new impervious areas are considered PDP OR ☐ greater than fifty percent (50%) – the entire project site is a PDP			

Site Information Checklist For PDPs	Form I-3B (PDPs) [March 15, 2016]
Project Summary Information	
Project Name	Hollandia Dairy Redevelopment
Project Address	622 E. Mission Road "San Marcos, CA 92069"
Assessor's Parcel Number(s) (APN(s))	" 218-180-048"
Permit Application Number	**CUP 19-0010**
Project Hydrologic Unit	Select One: ☐ Santa Margarita 902 ☐ San Luis Rey 903 ☑ Carlsbad 904 ☐ San Dieguito 905 ☐ Penasquitos 906 ☐ San Diego 907 ☐ Pueblo San Diego 908 ☐ Sweetwater 909 ☐ Otay 910 ☐ Tijuana 911
Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	The project is located in the Richland Hydrologic Sub Area of the San Marcos Hydrologic Area of the CARLSBAD Hydrologic Unit (904.52).
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	14.37 Acres (625,957 Square Feet)
Area to be Disturbed by the Project (Project Area)	2.12 Acres (92,222 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	2.12 Acres (92,222 Square Feet)
Project Proposed Pervious Area (subset of Project Area)	0.00 Acres (0 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	

Form I-3B Page 2 of 10, Form Date: March 15, 2016
Description of Existing Site Condition
Current Status of the Site (select all that apply): ☑ Existing development ☐ Previously graded but not built out ☐ Demolition completed without new construction ☐ Agricultural or other non-impervious use ☐ Vacant, undeveloped/natural Description / Additional Information: The project site is an existing milk processing complex and food storage. Existing buildings and parking areas area spread out within the borders of the facility. Topography on the site is rather flat ranging from 0.5 to 5% slopes. The area that will be disturbed is an impervious area consist of dairy processing building, food storage, utility building, maintenance building and delivery truck access to the loading dock.
Existing Land Cover Includes (select all that apply): ☐ Vegetative Cover ☐ Non-Vegetated Pervious Areas ☑ Impervious Areas Description / Additional Information: See description under Current Status of the Site
Underlying Soil belongs to Hydrologic Soil Group (select all that apply): ☐ NRCS Type A ☐ NRCS Type B ☐ NRCS Type C ☑ NRCS Type D
Approximate Depth to Groundwater (GW): ☐ GW Depth < 5 feet ☑ 5 feet < GW Depth < 10 feet ☐ 10 feet < GW Depth < 20 feet ☐ GW Depth > 20 feet
Existing Natural Hydrologic Features (select all that apply): ☐ Watercourses ☐ Seeps ☐ Springs ☐ Wetlands ☑ None Description / Additional Information:

Form I-3B Page 3 of 10, Form Date: March 15, 2016
Description of Existing Site Drainage Patterns
How is storm water runoff conveyed from the site? At a minimum, this description should answer: (1) whether existing drainage conveyance is natural or urban; (2) Is runoff from offsite conveyed through the site? if yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site; (3)Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels; and (4) Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations. Describe existing site drainage patterns: (1) The property is a fully developed site such as buildings, access road, parking lots and pavements. The existing drainage conveyance is an urban drainage. (2) There is no offsite runoff conveyed through the site. (3) The runoff flows from northeast to southwest and treated by sand filter before released to a public stormdrain system. (4) There is one outfalls located at the southwest side of the project. Runoff from the parking lots and the roofs area are filtered through sand filter basins and then conveyed through internal storm drain network and then tied into a 30" public stormdrain that is labeled as POC-1.

Description of Proposed Site Development

Project Description / Proposed Land Use and/or Activities:
The project is the construction of a new utility building, a dairy process building, demolish an old dairy process building, maintenance building, pipe bridge, employee welfare area, metal canopy and future dairy process building on a 2.15 acre site over a fully impervious developed area. Improvements also include a new storm drain pipe system which includes stormwater filtration and detention features.

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

- New utility buildings, including boilers, electrical, chillers, and water/air.
- New Dairy process building, including truck receiving, raw tank alcove, raw clip/bulk chemical, process room, process corridor/utility corridor and filler line.
- New maintenance building, including maintenance room, parts storage, laboratory and office.
- Pipe bridge
- Employee welfare area such as: employee locker room, toilets and break room.
- Metal canopy over case return loading dock.
- Future dairy process building and future office
- Sidewalk and parking lots.

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

No pervious area proposed, existing area is fully impervious area.

Does the project include grading and changes to site topography?
☑ Yes
☐ No

Description / Additional Information:

The site will remain largely at the same grade as present and this project is considered to be a redevelopment project.

Description of Proposed Site Drainage Patterns

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

☑ Yes

☐ No

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

Describe proposed site drainage patterns:

The proposed project site drainage conveyance system does not differ much from the existing condition, except the new proposed building and parking lots are directed to detention pipe systems before discharging the storm water to a Modular Wetlands system (MWS). The detention pipe system is sized at a minimum to hold 0.75 DCV upstream of the Modular Wetlands system. The storm water treated in the MWS discharges to a private stormdrain network before ultimately discharges to public stormdrain. Part of the runoff from the proposed building at the southwesterly side of the site is directed to the bio-filtration planter incorporated within the landscaping area and then discharges to the public drain via private storm drain pipes.

Form I-3B Page 6 of 10, Form Date: March 15, 2016
Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply): ☑ On-site storm drain inlets ☑ Interior floor drains and elevator shaft sump pumps ☐ Interior parking garages ☑ Need for future indoor & structural pest control ☑ Landscape/Outdoor Pesticide Use ☐ Pools, spas, ponds, decorative fountains, and other water features ☐ Food service ☐ Refuse areas ☑ Industrial processes ☐ Outdoor storage of equipment or materials ☐ Vehicle and Equipment Cleaning ☐ Vehicle/Equipment Repair and Maintenance ☐ Fuel Dispensing Areas ☑ Loading Docks ☑ Fire Sprinkler Test Water ☑ Miscellaneous Drain or Wash Water ☑ Plazas, sidewalks, and parking lots Description / Additional Information:

Identification and Narrative of Receiving Water and Pollutants of Concern

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

The project is located in the Richland Hydrologic Sub Area of the San Marcos Hydrologic Area of the CARLSBAD Hydrologic Unit (904.52). The project discharges to a public storm drain (southwest of the site) within Richland HSA to the San Marcos Creek, to Lake San Marcos, to the Batiquitos Lagoon and ultimately discharge the Pacific Ocean.

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

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
San Marcos Creek	Bentihic Community Effects, Indicator Bacteria, Phosphorus ,Selenium	Indicator Bacteria, Nutrients
Lake San Marcos	Ammonia (N), Copper, Nutrients, phosphorus, Bacteria	

Identification of Project Site Pollutants*

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

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

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

Form I-3B Page 8 of 10, Form Date: March 15, 2016
Hydromodification Management Requirements
Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)? ☑ Yes, hydromodification management flow control structural BMPs required. ☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides. Description / Additional Information (to be provided if a 'No' answer has been selected above):
Critical Coarse Sediment Yield Areas* ***This Section only required if hydromodification management requirements apply**
Based on the maps provided within the WMAA, do potential critical coarse sediment yield areas exist within the project drainage boundaries? ☐ Yes ☑ No, No critical coarse sediment yield areas to be protected based on WMAA maps If yes, have any of the optional analyses presented in Section 6.2 of the BMP Design Manual been performed? ☐ 6.2.1 Verification of Geomorphic Landscape Units (GLUs) Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite ☐ No optional analyses performed, the project will avoid critical coarse sediment yield areas identified based on WMAA maps If optional analyses were performed, what is the final result? ☐ No critical coarse sediment yield areas to be protected based on verification of GLUs onsite ☐ Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 2.b of the SWQMP. ☐ Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections 6.2.4 and 6.2.5 as applicable, and the areas are identified on the SWQMP Exhibit. Discussion / Additional Information:

Form I-3B Page 9 of 10, Form Date: March 15, 2016
Flow Control for Post-Project Runoff* ***This Section only required if hydromodification management requirements apply**
List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit. There is only one Points of Compliance (POC) for this project. The POC is located at the southwesterly of the site adjacent to Mulberry Drive and E Mission Road corner, specifically is located at the existing manhole and the existing private stormdrain connected.
Has a geomorphic assessment been performed for the receiving channel(s)? ☑ No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐ Yes, the result is the low flow threshold is 0.1Q2 ☐ Yes, the result is the low flow threshold is 0.3Q2 ☐ Yes, the result is the low flow threshold is 0.5Q2 If a geomorphic assessment has been performed, provide title, date, and preparer: Discussion / Additional Information: (optional)

Form I-3B Page 10 of 10, Form Date: March 15, 2016
Other Site Requirements and Constraints
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements. The constraint is the site is rather flat therefore no flexibility to locate the BMP that rely on gravity.
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.

Source Control BMP Checklist for All Development Projects (Standard Projects and Priority Development Projects)			Form I-4 [March 15, 2016]
Project Identification			
Project Name: Hollandia Dairy Redevelopment			
Permit Application Number: **CUP 19-0010**			
Source Control BMPs			
All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the Model BMP Design Manual for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the Model 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?**		
SC-1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-1 not implemented:			
SC-2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented:			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if SC-3 not implemented: There are no proposed outdoor material storage areas for this project.			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if SC-4 not implemented: There are no proposed outdoor material work areas for this project.			

Form I-4 Page 2 of 2, Form Date: March 15, 2016			
Source Control Requirement	**Applied?**		
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented:			
SC-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, 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 and Equipment Cleaning	☐ Yes	☐ No	☑ N/A
☐ Vehicle/Equipment Repair and Maintenance	☐Yes	☐ No	☑ N/A
☐ Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
☑ Loading Docks	☑ Yes	☐ No	☐ N/A
☑ Fire Sprinkler Test Water	☑ Yes	☐ No	☐ N/A
☑ Miscellaneous Drain or Wash Water	☑ Yes	☐ No	☐ N/A
☑ Plazas, sidewalks, and parking lots	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.			

Site Design BMP Checklist for All Development Projects (Standard Projects and Priority Development Projects)	Form I-5 [March 15, 2016]

Project Identification

Project Name: Hollandia Dairy Redevelopment

Permit Application Number: **CUP 19-0010**

Site Design BMPs

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

Answer each category below pursuant to the following.

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

Site Design Requirement	Applied?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☐ Yes	☐ No	☑ N/A
Discussion / justification if SD-1 not implemented: none present on-site			
SD-2 Conserve Natural Areas, Soils, and Vegetation	☐ Yes	☐ No	☑ N/A
Discussion / justification if SD-2 not implemented: The existing site is a fully developed dairy processing area, no natural areas on the site but impervious areas.			
SD-3 Minimize Impervious Area	☐ Yes	☐ No	☑ N/A
Discussion / justification if SD-3 not implemented: The existing site is a fully developed industrial area. No impervious area is added.			
SD-4 Minimize Soil Compaction	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-4 not implemented: The existing site is a fully developed dairy processing area, soil is already compacted.			
SD-5 Impervious Area Dispersion	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-5 not implemented: There are no vegetation area to implement this BMP. Impervious area is directed to a BMP.			

Form I-5 Page 2 of 2, Form Date: March 15, 2016			
Site Design Requirement	**Applied?**		
SD-6 Runoff Collection	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-6 not implemented: Not feasible. Project proposes to create new dairy processing building over existing location. There is no opportunity to retain runoff onsite.			
SD-7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented:			
SD-8 Harvesting and Using Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-8 not implemented: Per form I-7 in Attachment 1c, "Harvest and use is considered to be infeasible"			

Summary of PDP Structural BMPs	Form I-6 (PDPs) [March 15, 2016]

Project Identification
Project Name: Hollandia Dairy Redevelopment
Permit Application Number: **CUP 19-0010**
PDP Structural BMPs
All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s). PDP structural BMPs must be verified by the local jurisdiction at the completion of construction. This may include requiring the project owner or project owner's representative and engineer of record to certify construction of the structural BMPs (see Section 1.12 of the BMP Design Manual). PDP structural BMPs must be maintained into perpetuity, and the local jurisdiction must confirm the maintenance (see Section 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, the project was divided up and evaluated at the DMA scale. Each DMA drains to a Best Management Practice (BMP).*** ***Step 2, For the DMAs that drain to BMPs, the appropriate runoff factors were applied to each area and the required Design Capture Volume (DCV) of each sub area calculated. For this project, Harvest and reuse is not considered feasible.*** ***Step 3, due to the impermeability of the underlying soils, (soil type D), infiltration BMPs are not feasible.*** ***Step 3A&B: for the no infiltration condition leads to section 5.5.3 which is the Biofiltration BMP category. The various sizing methods included in Appendix B.5 were followed and the entire DCV can be treated within the proposed BMPs.*** ***Step 4, Each biofiltration and proprietary biofiltration are designed in accordance with the fact sheet BF-1, BF-2, and BF-3 in Appendix E of the BMP design manual. BF-1 and BF-2 are used for BMP-1. BF-3 is used for BMP2a & 3a. A modular wetland system listed as a detention pond is used as BMP 2b & 3b.The project requires hydromdification controls, so the Biofiltration units accomplish both storm water treatment and flow control mitigation in an integrated design.*** (Continue on page 2 as necessary.)

Form I-6 Page 2 of 6, Form Date: March 15, 2016
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)
(Continued from page 1)

Form I-6 Page 3 of 6 (Copy as many as needed) Form Date: March 15, 2016	
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**	
Structural BMP ID No. 1	
Construction Plan Sheet No. ---	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☑ Biofiltration (BF-1) ☑ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	The Engineer of Work Robert Dentino Excel Engineering 440 State Place Escondido, CA 92029
Who will be the final owner of this BMP?	Hollandia Farms, Inc.
Who will maintain this BMP into perpetuity?	Hollandia Farms, Inc.
What is the funding mechanism for maintenance?	Hollandia Farms, Inc.

Form I-6 Page 4 of 6 (Copy as many as needed) Form Date: March 15, 2016	
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**	
Structural BMP ID No. 2a	
Construction Plan Sheet No. ---	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☑ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	The Engineer of Work Robert Dentino Excel Engineering 440 State Place Escondido, CA 92029
Who will be the final owner of this BMP?	Hollandia Farms, Inc.
Who will maintain this BMP into perpetuity?	Hollandia Farms, Inc.
What is the funding mechanism for maintenance?	Hollandia Farms, Inc.

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

Structural BMP ID No. 2b

Construction Plan Sheet No. ---

Type of structural BMP:

☐ Retention by harvest and use (HU-1)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☐ Biofiltration (BF-1)
☐ Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☑ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

☐ Pollutant control only
☐ Hydromodification control only
☐ Combined pollutant control and hydromodification control
☑ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	The Engineer of Work Robert Dentino Excel Engineering 440 State Place Escondido, CA 92029
Who will be the final owner of this BMP?	Hollandia Farms, Inc.
Who will maintain this BMP into perpetuity?	Hollandia Farms, Inc.
What is the funding mechanism for maintenance?	Hollandia Farms, Inc.

Form I-6 Page 5 of 6 (Copy as many as needed) Form Date: March 15, 2016	
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**	
Structural BMP ID No. 3a	
Construction Plan Sheet No. ---	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☑ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	The Engineer or Record Robert Dentino Excel Engineering 440 State Place Escondido, CA 92029
Who will be the final owner of this BMP?	Hollandia Farms, Inc.
Who will maintain this BMP into perpetuity?	Hollandia Farms, Inc.
What is the funding mechanism for maintenance?	Hollandia Farms, Inc.

Form I-6 Page 5 of 6 (Copy as many as needed) Form Date: March 15, 2016	
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**	
Structural BMP ID No. 3b	
Construction Plan Sheet No. ---	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☑ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☑ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	The Engineer or Record Robert Dentino Excel Engineering 440 State Place Escondido, CA 92029
Who will be the final owner of this BMP?	Hollandia Farms, Inc.
Who will maintain this BMP into perpetuity?	Hollandia Farms, Inc.
What is the funding mechanism for maintenance?	Hollandia Farms, Inc.

Form I-6 Page 6 of 6 (Copy as many as needed) , Form Date: March 15, 2016
Structural BMP ID No.
Construction Plan Sheet No.
Discussion (as needed):

ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Indicate which Items are Included behind this cover sheet:

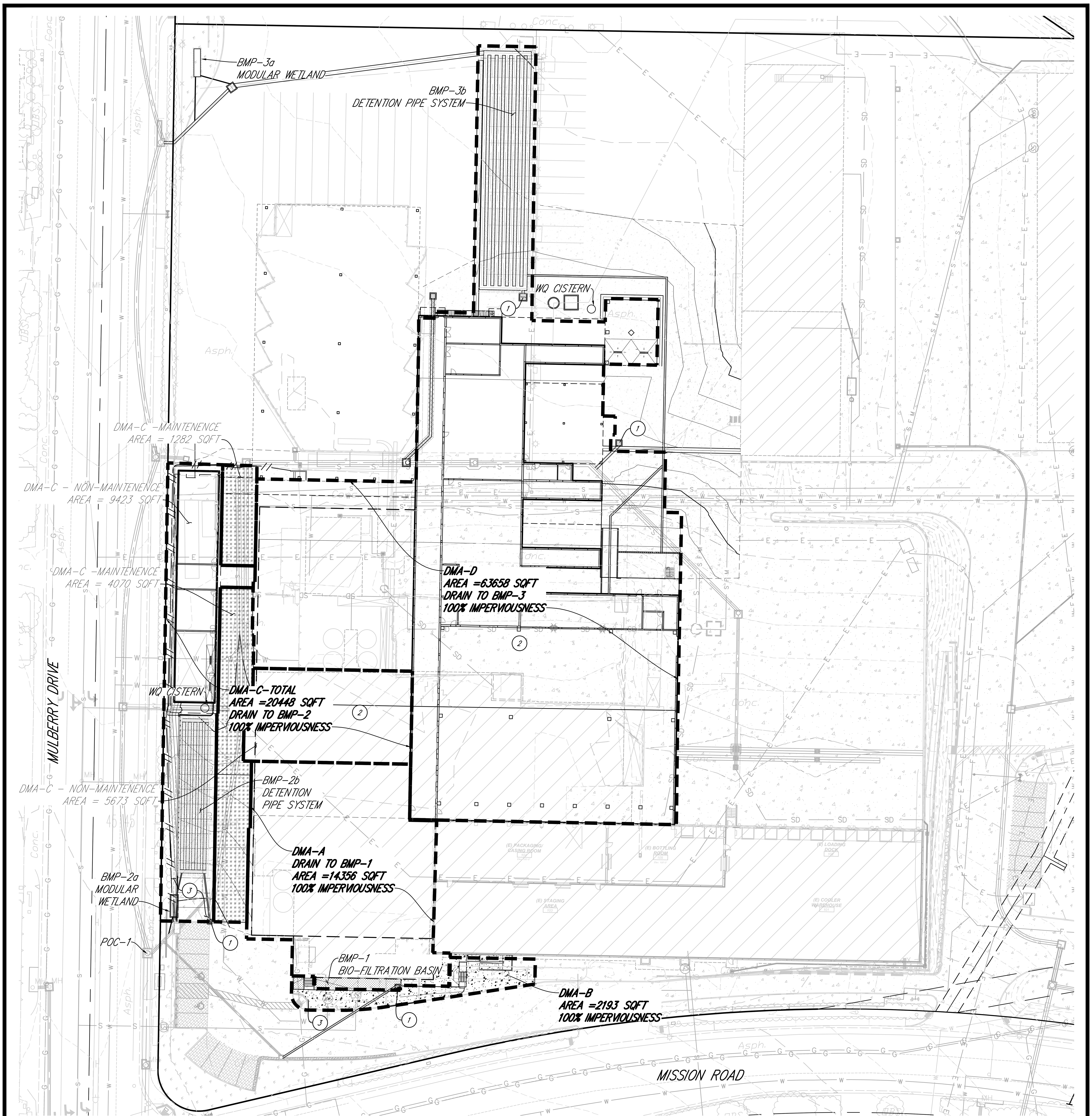
Attachment Sequence	**Contents**	**Checklist**
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☑ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment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

ATTACHMENT 1a

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

The DMA Exhibit must identify:

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



LEGEND

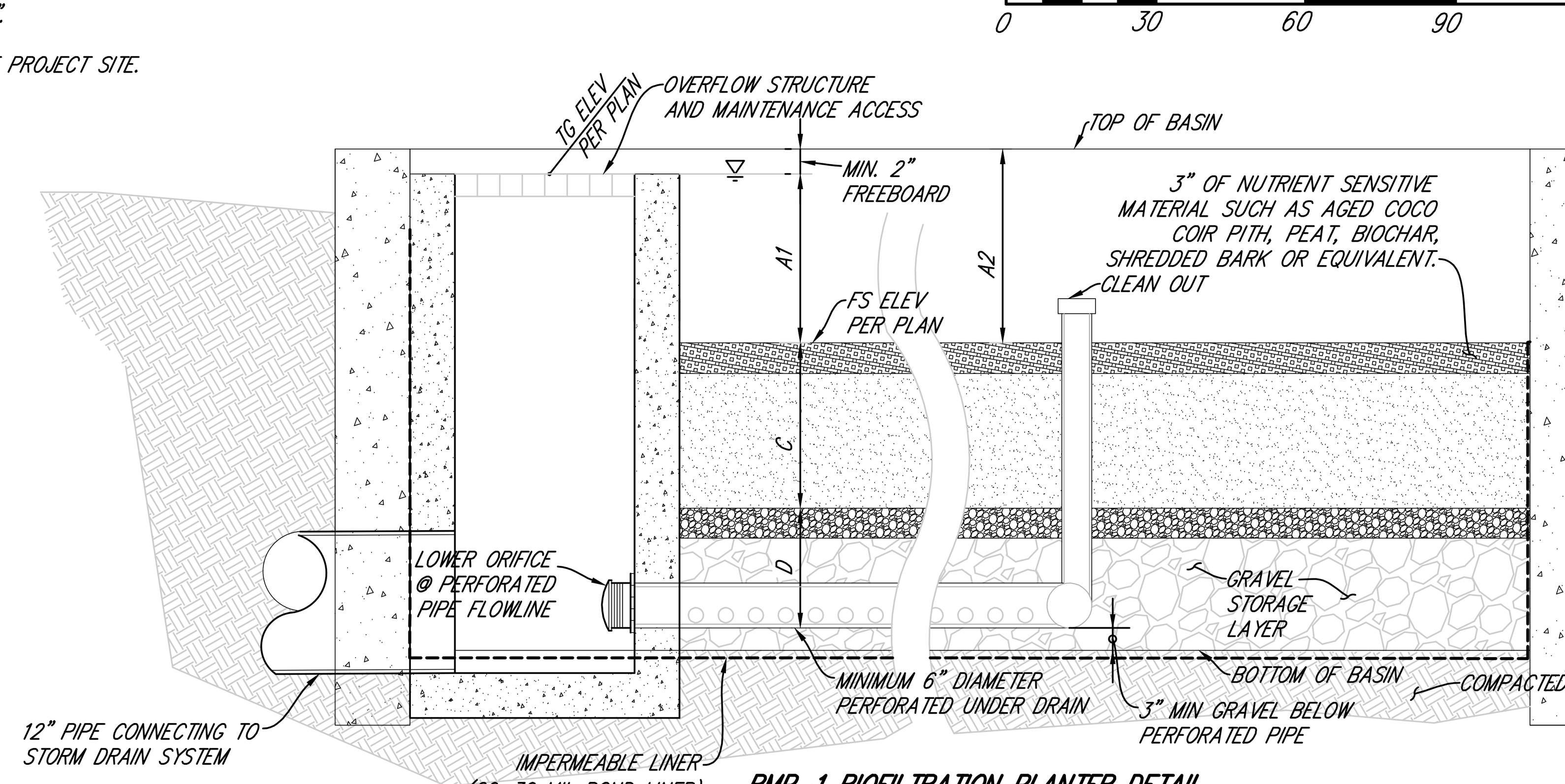
NAME	SYMBOL
EXISTING MAJOR CONTOUR (SURVEYED)	
EXISTING MAJOR CONTOUR (SanGIS)	
PROPOSED MAJOR CONTOUR	
BASIN DELINEATION	
EXISTING DRIVEWAY TREATED IN LIEU OF PROPOSED SIDEWALK IN DMA-B	

NOTES:
1. ADDITIONAL AREA WITHIN DMA-C TO COMPENSATE FOR UNTREATABLE RUN OFF FROM DMA-B.
2. BMP 2b AND 3b ARE DETENTION PIPES THAT ACT AS FOREBAYS FOR HYDROMODIFICATION CONTROL.
3. UNDERLYING HYDROLOGIC SOIL GROUP FOR THIS SITE IS TYPE "D".
4. APPROXIMATE DEPTH TO GROUND WATER IS MORE THAN 20 FT.
5. THERE IS NO CRITICAL COARSE SEDIMENT YIELD AREA WITHIN THE PROJECT SITE.

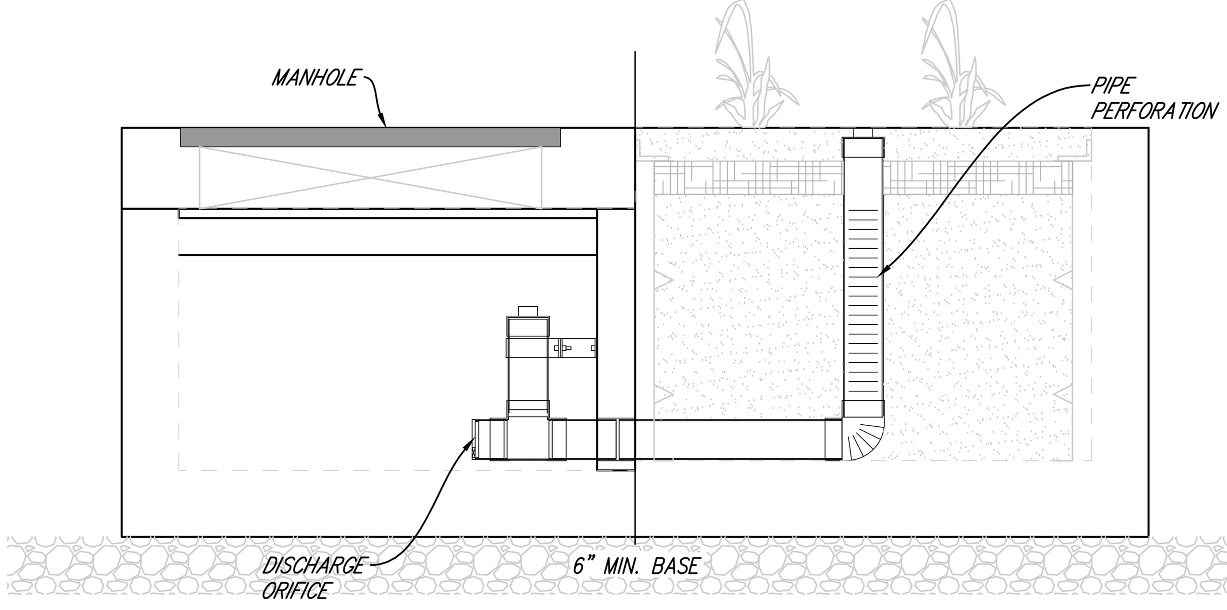
DMA:
UNDERLYING SOIL GROUP: D
APPROXIMATE DEPTH TO GROUNDWATER: 4FT-8FT

SCALE: 1"=30'
0 30 60 90 120

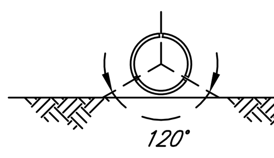
NO.	SOURCE CONTROL BMPs	IMPLEMENTATION
1	INLET STENCILING	MARK INLET WITH THE WORDS : "NO DUMPING! DRAINS TO WATERWAYS"
2	PREVENTION OF ILLICIT DISCHARGES	ALL INDUSTRIAL PROCESSES TO BE PERFORMED INDOORS. NO PROCESSES TO DRAIN TO EXTERIOR OR TO STORM DRAIN SYSTEM.
3	SIDE WALK/PARKING LOT MAINTENANCE	SWEEP REGULARLY TO PREVENT ACCUMULATION OF LITTER & DEBRIS



BMP-1 BIOFILTRATION PLANTER DETAIL
NOT TO SCALE
* NOTE: SOIL MEDIA AND PLANTING METHODS SHALL MEET THE BF-2 DESIGN CRITERIA



BMP-2a AND BMP-3a MODULAR WETLAND DETAIL
NOT TO SCALE



6" PVC PIPE PERFORATION LAYOUT DETAIL
NOT TO SCALE

BIO-BASIN SUMMARY TABLE

BMP ID	SURFACE FOOTPRINT (SQFT)	A1 (INCH)	A2 (INCH)	C (INCH)	D (INCH)	RISER SIZE (INCH)	ORIFICES DIAMETER		IMPERMEABLE LINER
							UPPER (INCH)	LOWER (INCH)	
BMP-1	392	7	9	21	9	24X24	N/A	0.5	YES

* FREEBOARD=A2-A1

MODULAR WETLAND SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT		PROVIDED TREATMENT		ORIFICE OUT (INCH)
				VALUE	UNITS	VALUE	UNITS	
BMP-2a	MWS-L-4-8	606.71	606.21	1495	CF	1692	CF	0.50
BMP-3a	MWS-L-4-6	610.04	609.54	4650	CF	9306	CF	0.69

DETENTION PIPE SYSTEM SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT		PROVIDED TREATMENT		ORIFICE OUT (INCH)
				VALUE	UNITS	VALUE	UNITS	
BMP-2b	N/A	606.84	606.84	1495	CF	1692 CF	CF	N/A
BMP-3b	N/A	610.06	610.04	4650	CF	9306 CF	CF	N/A

SUMMARY OF DMAs

DMA ID NO.	AREA (SQFT)	DMA TYPE
DMA-A	14,356	DRAIN TO BMP
DMA-B	2,193	N/A*
DMA-C	20,448	DRAIN TO BMP
DMA-D	63,658	DRAIN TO BMP

*DMA-B TREATMENT AREA IS INCLUDED IN DMA-C. THUS, DMA-C TREATMENT AREA IS INCREASED BY AT LEAST THE AMOUNT REQUIRED TO BE TREATED IN DMA-B.

HOLLANDIA RE-DEVELOPMENT
DMA EXHIBIT

G:\08\08067\gp\gp10\Storm\rm\SWQMP\Attachment 1\DMA Exhibit.dwg 2/18/2020 10:11 AM ORIGINAL PLOT SIZE: ----

ATTACHMENT 1b

DESIGN CAPTURE VOLUME - PER WORKSHEET B.2-1

				(2A+2B)	(3A+3B)
			BMP - 1	**BMP - 2**	**BMP - 3**
1	85th percentile 24-hr storm depth from Fig. B.1-1 (inch)	d=	0.65	0.65	0.65
2	Area Tributary to BMP (acres)	A=	0.33	0.47	1.46
3	Area Weighted runoff Factor (using App B.1.1 and B.2.1)	C=	0.90	0.90	0.90
4	Street Trees Volume reduction	TCV=	0	0	0
5	Rain barrels volume reduction	RCV=	0	0	0
6	Calculate DCV = (3630 x C x d x A)-TCV-RCV (CUFT)	DCV=	700	997	3100
7	Percent Impervious	%IMP	100%	100%	100%
8	Volume Based DCV * 1.5	1.5*DCV=	1049.27	1495.26	4650.57

0.65 INCHES

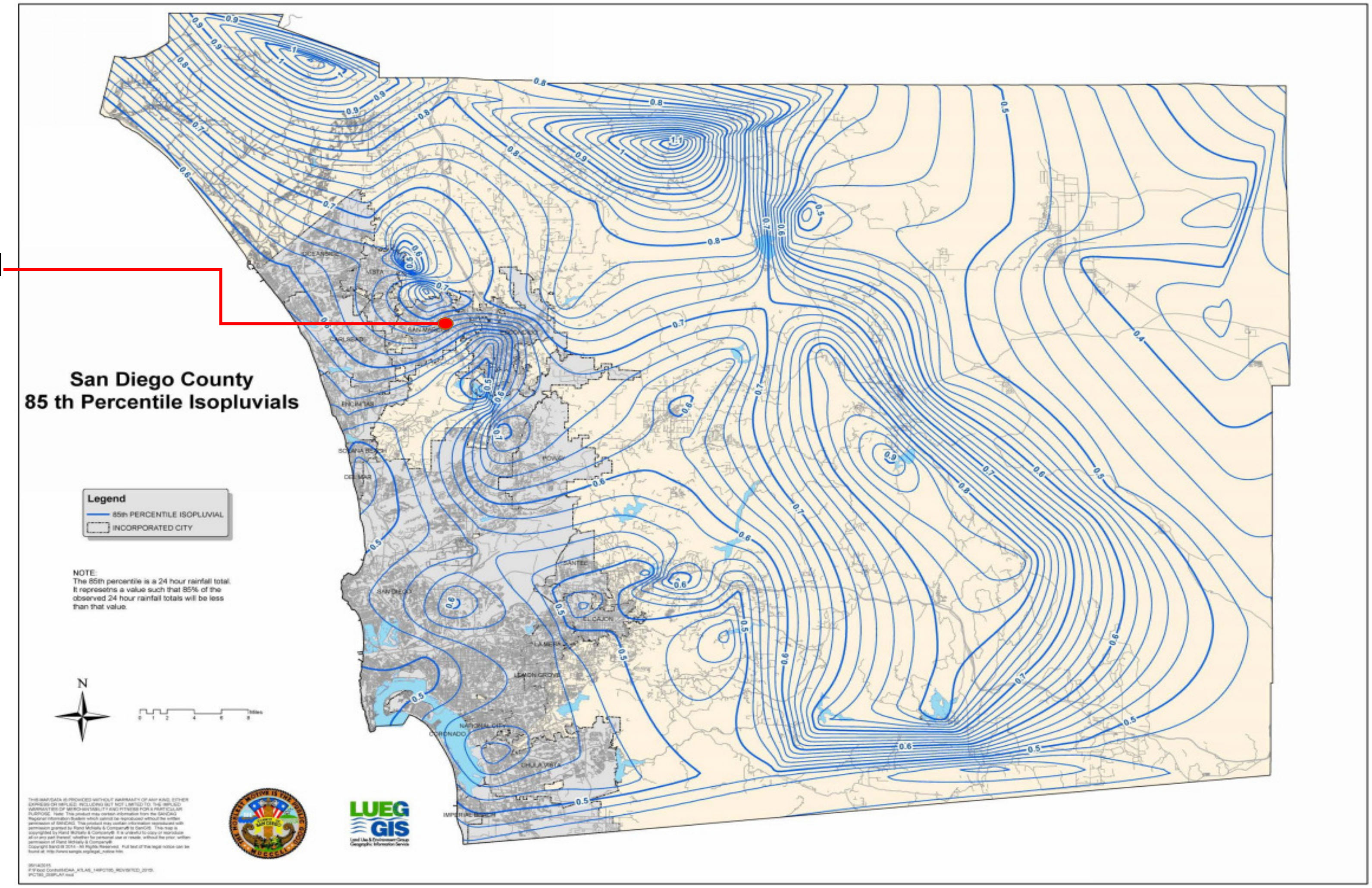


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

ATTACHMENT 1c

Harvest and Use Feasibility Checklist: HOLLANDIA DEVELOPMENT PHASE 3		**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. Flushing: (250 people)x(5.5 gal per capita) = 1375 gallons → (1375 gal)(1.5 days)/(7.48 gal/cu. ft.) = 276 cu. ft. Irrigation: 36-hr Mod. Water per Table B.3-3 = (1,470 gal days/acre)(0.01 acres)/(7.48 gal/cu feet) = 2.03 cu ft. Total Demand = 278 cu. ft.		
3. Calculate the DCV using worksheet B.2-1 DCV = 4,629 (cubic feet)		
3a. Is the 36 hour demand greater than or equal to the DCV? Yes / No ⇨	3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV? Yes / No ⇨	3c. Is the 36 hour demand less than 0.25DCV? 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

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

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	**Yes**	**No**
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: *The infiltration rate of the existing soils for locations P-1 and P-2, based on the on-site infiltration study was calculated to be less than 0.5 inches per hour (P-1=0.00 and P-2=0.01, and inches per hour) after applying a minimum factor of safety (F) of F=2.* Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: *No. See Criterion 1.* Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 2 of 4</th></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>3</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:
Water contamination was not evaluated by NOVA Services.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>4</td><td>Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:
The potential for water balance was not evaluated by NOVA Services.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>Part 1 Result*</td><td colspan="2">If all answers to rows 1 - 4 are “Yes” a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration

If any answer from row 1-4 is “No”, infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a “full infiltration” design. Proceed to Part 2</td><td>Proceed to Part 2</td></tr>
</table>

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

NOTE: "X" FILLED IN BY EXCEL ENGINEERING

Worksheet C.4-1 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:

The infiltration rate of the existing soils for location P-1 and P-2, based on the on-site infiltration study was calculated to be less than 0.5 inches per hour (P-1=0.00 and P-2=0.01 inches per hour) after applying a minimum factor of safety (F) of F=2.

These widespread very low permeability soils and geologic conditions do not allow for infiltration in any appreciable rate or volume.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Criteria	Screening Question	Yes	No
6	**Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:

C2.1 A geologic investigation was performed at the subject site.
C2.2 Settlement and volume change due to water infiltration is possible due to the expansive soils underlying the site.
C2.3 Infiltration has the potential to cause slope failures. BMPs are to be sited a minimum of 50 feet away from any slope.
C2.4 BMPs are to be sited a minimum of 10 feet away from all underground utilities.
C2.5 Stormwater infiltration can result in damaging ground water mounding during wet periods. Due to the low infiltration rates and shallow depths to groundwater, this site is at a high risk.
C2.6 Infiltration has the potential to increase lateral pressure and reduce soil strength which can impact foundations and retaining walls. BMPs are to be sited a minimum of 10 feet away from any foundations or retaining walls.
C2.7 Other Factors: Based on the low infiltration rates, high risk for groundwater mounding, and clayey soils underlying the site, infiltration is not feasibile.

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: *Water contamination was not evaluated by NOVA Services.* Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	**Can infiltration be allowed without violating downstream water rights**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: *The potential for water balance was not evaluated by NOVA Services.* Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 5-8 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**	*No Infiltration*	

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

NOTE: "X" FILLED IN BY EXCEL ENGINEERING

C.5 Feasibility Screening Exhibits

Table C.5-1 lists the feasibility screening exhibits that were generated using readily available GIS data sets to assist the project applicant to screen the project site for feasibility.

Table C.5-1: Feasibility Screening Exhibits

Figures	Layer	Intent/Rationale	Data Sources
C.1 Soils	Hydrologic Soil Group – A, B, C, D	Hydrologic Soil Group will aid in determining areas of potential infiltration	SanGIS http://www.sangis.org/
	Hydric Soils	Hydric soils will indicate layers of intermittent saturation that may function like a D soil and should be avoided for infiltration	USDA Web Soil Survey. Hydric soils, (ratings of 100) were classified as hydric. http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm
C.2: Slopes and Geologic Hazards	Slopes >25%	BMPs are hard to construct on slopes >25% and can potentially cause slope instability	SanGIS http://www.sangis.org/
	Liquefaction Potential	BMPs (particularly infiltration BMPs) must not be sited in areas with high potential for liquefaction or landslides to minimize earthquake/landslide risks	SanGIS http://www.sangis.org/
	Landslide Potential		SanGIS Geologic Hazards layer. Subset of polygons with hazard codes related to landslides was selected. This data is limited to the City of San Diego Boundary. http://www.sangis.org/
C.3: Groundwater Table Elevations	Groundwater Depths	Infiltration BMPs will need to be sited in areas with adequate distance (>10 ft) from the groundwater table	GeoTracker. Data downloaded for San Diego county from 2014 and 2013. In cases where there were multiple measurements made at the same well, the average was taken over that year. http://geotracker.waterboards.ca.gov/data_download_by_county.asp
C.4: Contaminated Sites	Contaminated soils and/or groundwater sites	Infiltration must limited in areas of contaminated soil/groundwater	GeoTracker. Data downloaded for San Diego county and limited to active cleanup sites http://geotracker.waterboards.ca.gov/

ATTACHMENT 1e

Design Capture Volume		Worksheet B-2.1				
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.65	0.65	0.65	inches
2	Area tributary to BMP (s)	A=	0.33	0.47	1.46	Acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.90	0.90	0.90	unitless
4	Street trees volume reduction	TCV=				cubic-feet
5	Rain barrels volume reduction	RCV=				cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV -RCV	DCV=	700	998	3,100	cubic-feet

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs

Category		Simple Sizing Method for Biofiltration BMPs	Worksheet B.5-1 (Page 1 of 2)
		Drainage Basin ID or Name	
	1	Remaining DCV after implementing retention BMPs	700
	Partial Retention		
	2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	0
	3	Allowable drawdown time for aggregate storage below the underdrain	36
	4	Depth of runoff that can be infiltrated [Line 2 x Line 3]	0
	5	Aggregate pore space	0.40
	6	Required depth of gravel below the underdrain [Line 4/ Line 5]	0
	7	Assumed surface area of the biofiltration BMP	392
	8	Media retained pore storage	0.1
	9	Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7	58.8285
	10	DCV that requires biofiltration [Line 1 – Line 9]	641.1715
	BMP Parameters		
	11	Surface Ponding [6 inch minimum, 12 inch maximum]	6
	12	Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations	18
	13	Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area	9
	14	Media available pore space	0.20
	15	Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate)	1.21
	Baseline Calculations		
	16	Allowable Routing Time for sizing	6
	17	Depth filtered during storm [Line 15 x Line 16]	7
	18	Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)]	13
	19	Total Depth Treated [Line 17 + Line 18]	20

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs

Category		Simple Sizing Method for Biofiltration BMPs	Worksheet B.5-1 (Page 2 of 2)
	Option 1 – Biofilter 1.5 times the DCV		
	20	Required biofiltered volume [1.5 x Line 10]	961.8
	21	Required Footprint [Line 20/ Line 19] x 12	563.3
	Option 2 - Store 0.75 of remaining DCV in pores and ponding		
	22	Required Storage (surface + pores) Volume [0.75 x Line 10]	480.9
	23	Required Footprint [Line 22/ Line 18] x 12	437.2
	Footprint of the BMP		
	24	Area draining to the BMP	14349.0
	25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.90
	26	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11)	0.03
	27	Minimum BMP Footprint [Line 24 x Line 25 x Line 26]	387.4
	28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	437.2
	Check for Volume Reduction [Not applicable for No Infiltration Condition]		
	29	Calculate the fraction of the DCV retained by the BMP [Line 9/ Line 1]	0.08
	30	Minimum required fraction of DCV retained for partial infiltration condition	0.375
	31	Is the retained DCV > 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	NO

RETENTION REQUIREMENT

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-A	DMA-C	DMA-D	DMA-B	unitless
	2	85th Percentile 24-hr Storm Depth	0.65	0.65	0.65	0.65	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	14,356	20,448	63,658	2,193	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)					sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)					sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)					sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)					sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)					sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)					sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)					sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)					sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)					sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)					sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)					sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)					sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)					sq-ft
	18	Number of Tree Wells Proposed per SD-A					#
	19	Average Mature Tree Canopy Diameter					ft
	20	Number of Rain Barrels Proposed per SD-E					#
	21	Average Rain Barrel Size					gal
Initial Runoff Factor Calculation	22	Total Tributary Area	14,356	20,448	63,658	2,193	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	unitless
	26	Initial Design Capture Volume	700	997	3,103	107	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	unitless
	32	Design Capture Volume After Dispersion Techniques	700	997	3,103	107	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	unitless
	36	Final Effective Tributary Area	12,920	18,403	57,292	1,974	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	700	997	3,103	107	cubic-feet

RETENTION REQUIREMENT

B.2.2 Step 2B – Infiltration Restrictions

The SWQMP Preparer is responsible for evaluating the infiltration restrictions in Table B.2-1 below and characterizing each drainage area as Restricted or Unrestricted for infiltration.

Restriction elements are divided into Mandatory Considerations and Optional Considerations. Mandatory Considerations include elements that may pose a significant risk to human health and safety. These elements must always be evaluated and discretion regarding the setbacks is not permitted. Optional Considerations include elements that are not necessarily associated with human health and safety, so analysis is not mandated through this guidance document.

Analysis of these elements is outside of the scope of typical geotechnical engineering investigations; therefore, it is the responsibility of the SWQMP Preparer to perform this evaluation. If a geotechnical engineer is consulted to complete this portion of the analysis, additional discretion on the mandatory considerations may be permitted if supported by the geotechnical reporting.

Table B.2-1: Infiltration Restrictions

Restriction Element		Is Element Applicable? (Yes/No)
Mandatory Considerations	BMP is within 100’ of Contaminated Soils	NO
	BMP is within 100’ of Industrial Activities Lacking Source Control	NO
	BMP is within 100’ of Well/Groundwater Basin	NO
	BMP is within 50’ of Septic Tanks/Leach Fields	NO
	BMP is within 10’ of Structures/Tanks/Walls	NO
	BMP is within 10’ of Sewer Utilities	NO
	BMP is within 10’ of Groundwater Table	YES
	BMP is within Hydric Soils	NO
	BMP is within Highly Liquefiable Soils and has Connectivity to Structures	NO
	BMP is within 1.5 Times the Height of Adjacent Steep Slopes (≥25%)	NO
	County Staff has Assigned “Restricted” Infiltration Category	NO
Optional Considerations	BMP is within Predominantly Type D Soil	YES
	BMP is within 10’ of Property Line	YES
	BMP is within Fill Depths of ≥5’ (Existing or Proposed)	NO
	BMP is within 10’ of Underground Utilities	NO
	BMP is within 250’ of Ephemeral Stream	NO
	Other (Provide detailed geotechnical support)	N/A
Result	**Unrestricted**. None of the restriction elements above are applicable.	
	Restricted. One or more of the restriction elements above are applicable.	YES

RETENTION REQUIREMENT

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	Units
Basic Analysis	1	Drainage Basin ID or Name	DMA-A	DMA-C	DMA-D	DMA-B	unitless
	2	85th Percentile Rainfall Depth	0.65	0.65	0.65	0.65	inches
	3	Predominant NRCS Soil Type Within BMP Location	D	D	D	D	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	unitless
	5	Nature of Restriction	Soil Type	Soil Type	Soil Type	Soil Type	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.005	0.005	0.010	0.005	in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	1.5%	1.5%	1.5%	1.5%	percentage
	12	Fraction of DCV Requiring Retention	0.01	0.01	0.01	0.01	ratio
	13	Required Retention Volume	7	10	31	1	cubic-feet

RETENTION REQUIREMENT

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	i	Units
BMP Inputs	1	Drainage Basin ID or Name	DMA-A	sq-ft
	2	Design Infiltration Rate Recommended	0.000	in/hr
	3	Design Capture Volume Tributary to BMP	700	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated	unitless
	5	Is BMP Impermeably Lined or Unlined?	Lined	unitless
	6	Does BMP Have an Underdrain?	Underdrain	unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard	unitless
	8	Provided Surface Area	388	sq-ft
	9	Provided Surface Ponding Depth	7	inches
	10	Provided Soil Media Thickness	21	inches
	11	Provided Gravel Thickness (Total Thickness)	9	inches
	12	Underdrain Offset	3	inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	0.50	inches
	14	Specialized Soil Media Filtration Rate		in/hr
	15	Specialized Soil Media Pore Space for Retention		unitless
	16	Specialized Soil Media Pore Space for Biofiltration		unitless
	17	Specialized Gravel Media Pore Space		unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	cubic-feet
	19	Ponding Pore Space Available for Retention	0.00	unitless
	20	Soil Media Pore Space Available for Retention	0.05	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	unitless
	23	Effective Retention Depth	2.25	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.10	ratio
	25	Calculated Retention Storage Drawdown Time	120	hours
	26	Efficacy of Retention Processes	0.12	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	85	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	615	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.0110	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	1.23	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	1.23	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	7.36	inches
	34	Ponding Pore Space Available for Biofiltration	1.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.20	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	unitless
	37	Effective Depth of Biofiltration Storage	13.60	inches
	38	Drawdown Time for Surface Ponding	6	hours
	39	Drawdown Time for Effective Biofiltration Depth	11	hours
	40	Total Depth Biofiltered	20.96	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	923	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	678	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	462	cubic-feet
	44	Option 2 - Provided Storage Volume	440	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	0.95	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	**0**	cubic-feet

7.0 STORMWATER INFILTRATION

7.1 Overview

Based upon the indications of the field exploration and laboratory testing reported herein, NOVA has evaluated the site as abstracted below after guidance contained in the latest edition of the City of San Marcos BMP Design Manual (hereafter, 'the BMP Manual').

Section 3.4 provides a description of the field work undertaken to complete percolation testing. Figure 3-1 depicts the location of the testing. This section provides the results of that testing and related recommendations for management of stormwater in conformance with the BMP Manual.

As is well-established by the BMP Manual, the feasibility of stormwater infiltration is principally dependent on geotechnical and hydrogeologic conditions at the project site. In consideration of the negligible infiltration rates and the increased risk of geotechnical hazards as a result of stormwater infiltration (see Section 7.2 and Section 7.3), NOVA concludes that the site is not feasible for development of permanent stormwater infiltration BMPs.

This section provides NOVA's assessment of the feasibility of stormwater infiltration BMPs utilizing the information developed by the field exploration described in Section 3, as well as other elements of the site assessment.

7.2 Infiltration Rates

7.2.1 General

The percolation rate of a soil profile is not the same as its infiltration rate ('I'). Therefore, the measured/calculated field percolation rate was converted to an estimated infiltration rate utilizing the Porchet Method in accordance with guidance contained in the BMP Manual. Table 7-1 provides a summary of the infiltration rates determined by the percolation testing.

Table 7-1. Infiltration Rates Determined by Percolation Testing

Boring	Approximate Ground Elevation (feet, msl)	Depth of Test (feet)	Approximate Test Elevation (feet, msl)	Infiltration Rate (inches/hour)	Design Infiltration Rate (in/hour, F=2*)
P-1	+611.3	5	+606.3	0.01	0.00
P-2	+616.1	5	+611.1	0.02	0.01

Notes: (1) 'F' indicates 'Factor of Safety' (2) elevations are approximate and should be reviewed

with F = 2*
0.02/2 = 0.01

with F = 2*
0.01/2 = 0.005

7.2.2 Design Infiltration Rate

As may be seen by review of Table 1, a factor of safety (F) is applied to the infiltration rate (I) determined by the percolation testing. This factor of safety, at least F = 2 in local practice, considers the nature and variability of subsurface materials, as well as the natural tendency of infiltration structures to become less efficient with time. The calculated infiltration rates after applying F = 2 are I = 0.00 and I = 0.01 inches per hour for P-1 and P-2, respectively.

Figure 4-3. Unit 2 Older Alluvium (Qoa)

4.2.3 Groundwater

<u>Static</u>

Groundwater was encountered in the borings at depths of 4 feet to 8 feet below ground surface, about El +606 to +608 feet msl.

<u>Perched</u>

Infiltrating storm water from prolonged wet periods can 'perch' atop localized zones of lower permeability soil that exist above the static groundwater level. Localized perched groundwater conditions may also develop once development completes and landscape irrigation commences.

No perched groundwater was observed during the work reported herein.

4.2.4 Surface Water

No surface water was evident on the site at the time of NOVA's subsurface exploration. NOVA did not observe any visual evidence of seeps, springs, erosion, staining, discoloration, etc. that would indicate recent problems with surface water.

3.0 SUBSURFACE EXPLORATION AND LABORATORY TESTING

3.1 Overview

Four (4) hollow-stem auger borings were drilled on March 9 - 10, 2019. Six (6) cone penetration test soundings ('CPT', after ASTM 5778) were completed on March 9. Two percolation test borings ('P-1' and 'P-2') were drilled on March 10 at the location of prospective stormwater management BMPs. Percolation testing was completed on March 10. Samples collected from the engineering and percolation test borings were returned to NOVA's materials laboratory for inspection and testing.

Figure 3-1 depicts the locations of the separate elements of the subsurface exploration. Plate 1, provided immediately following the text of this report, depicts the above information in larger scale.

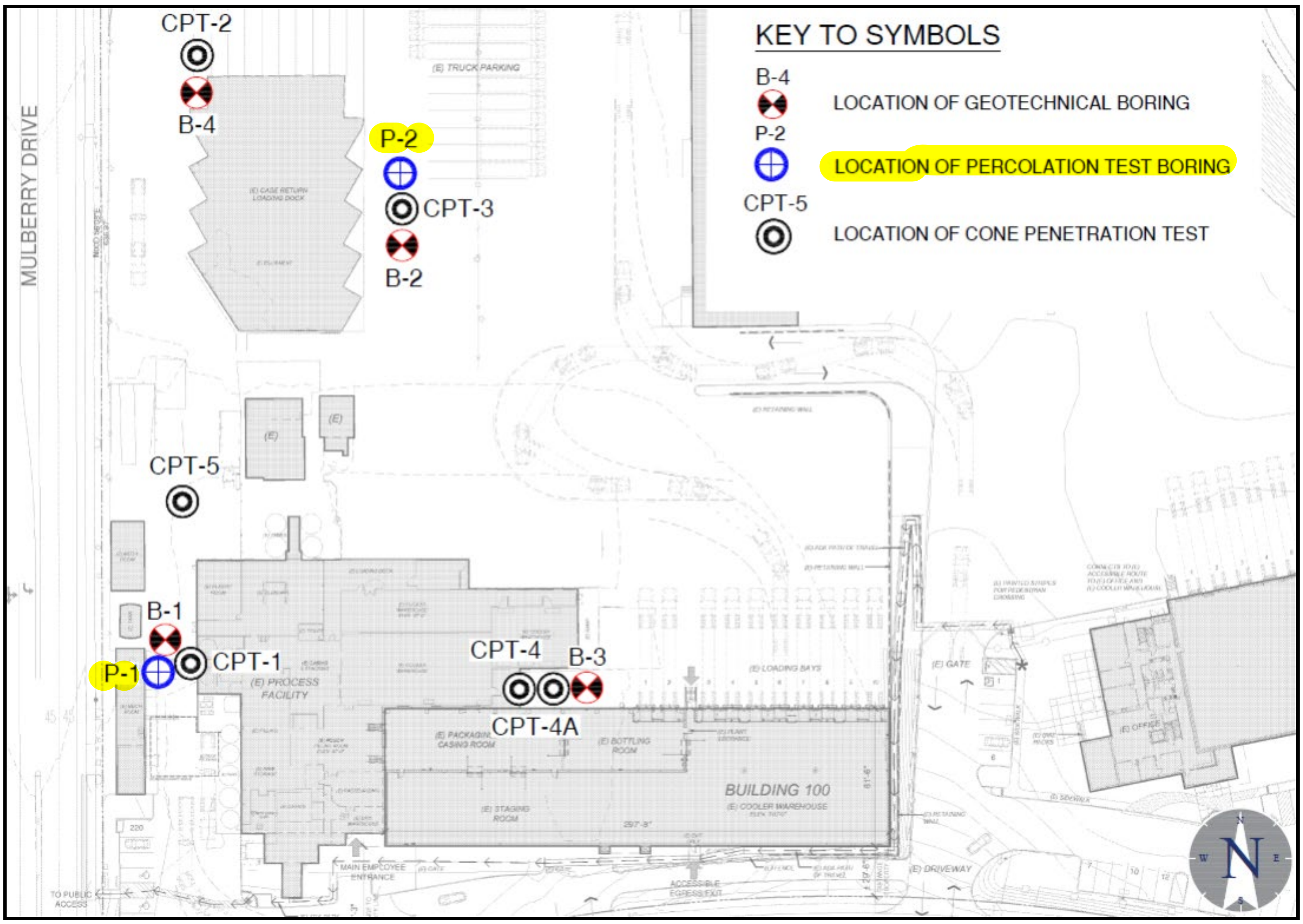


Figure 3-1. Location of the Engineering Borings, CPT Soundings and Percolation Test Borings

The following subsections describe the subsurface exploration and related laboratory testing.

E.7 HU-1 Cistern

MS4 Permit Category
Retention
Manual Category
Harvest and Use
Applicable Performance Standards
Pollutant Control Flow Control
Primary Benefits
Volume Reduction Peak Flow Attenuation

Photo Credit: Water Environment Research Foundation: WERF.org

Description

Cisterns are containers that can capture rooftop runoff and store it for future use. With controlled timing and volume release, the captured rainwater can be used for irrigation or alternative grey water between storm events, thereby reducing runoff volumes and associated pollutants to downstream water bodies. Cisterns are larger systems (generally>100 gallons) that can be self-contained aboveground or below ground systems. Treatment can be achieved when cisterns are used as part of a treatment train along with other BMPs that use captured flows in applications that do not result in discharges into the storm drain system. Rooftops are the ideal tributary areas for cisterns.

Typical cistern components include:

- Storage container, barrel or tank for holding captured flows
- Inlet and associated valves and piping
- Outlet and associated valves and piping
- Overflow outlet

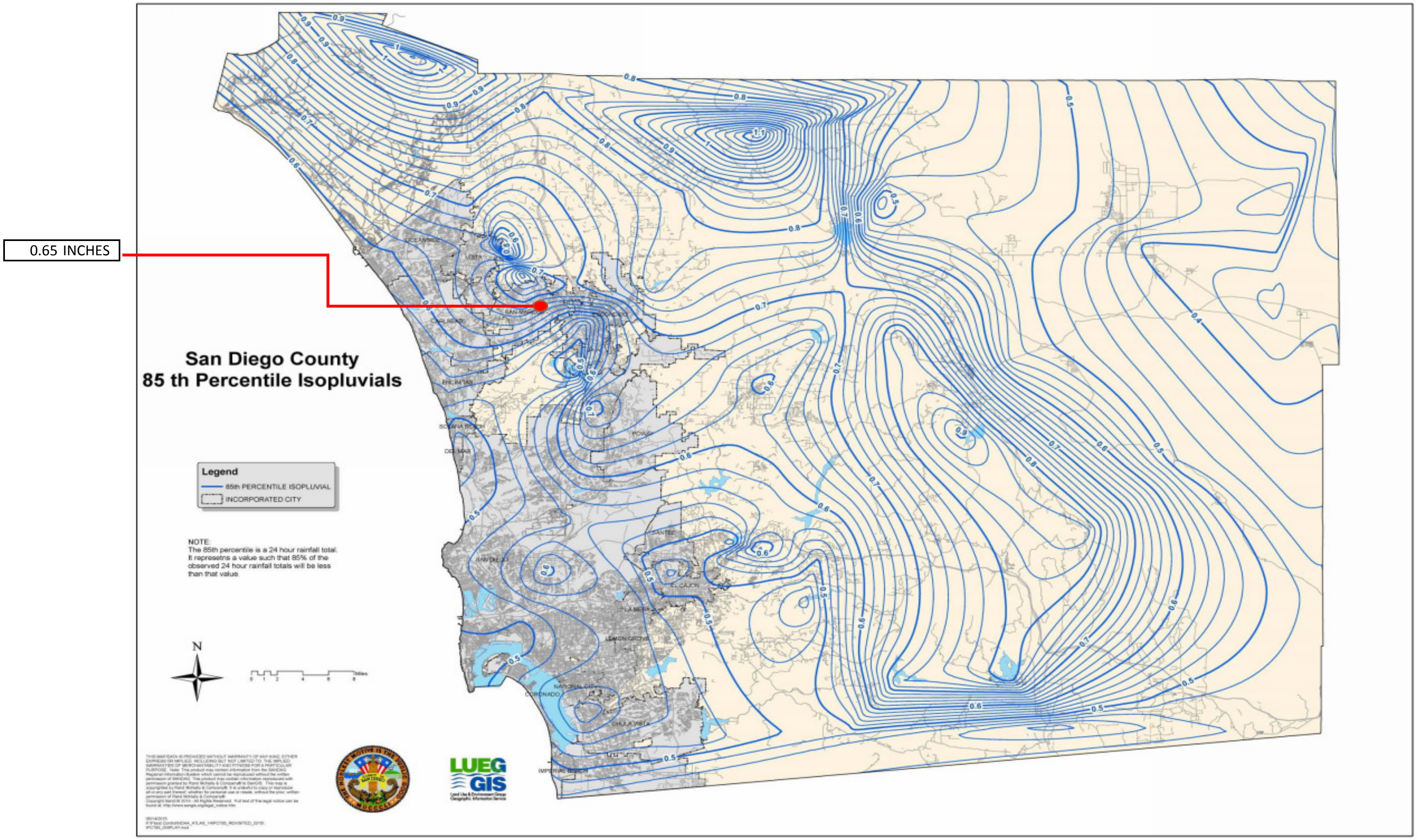


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

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

Indicate which Items are Included behind this cover sheet:

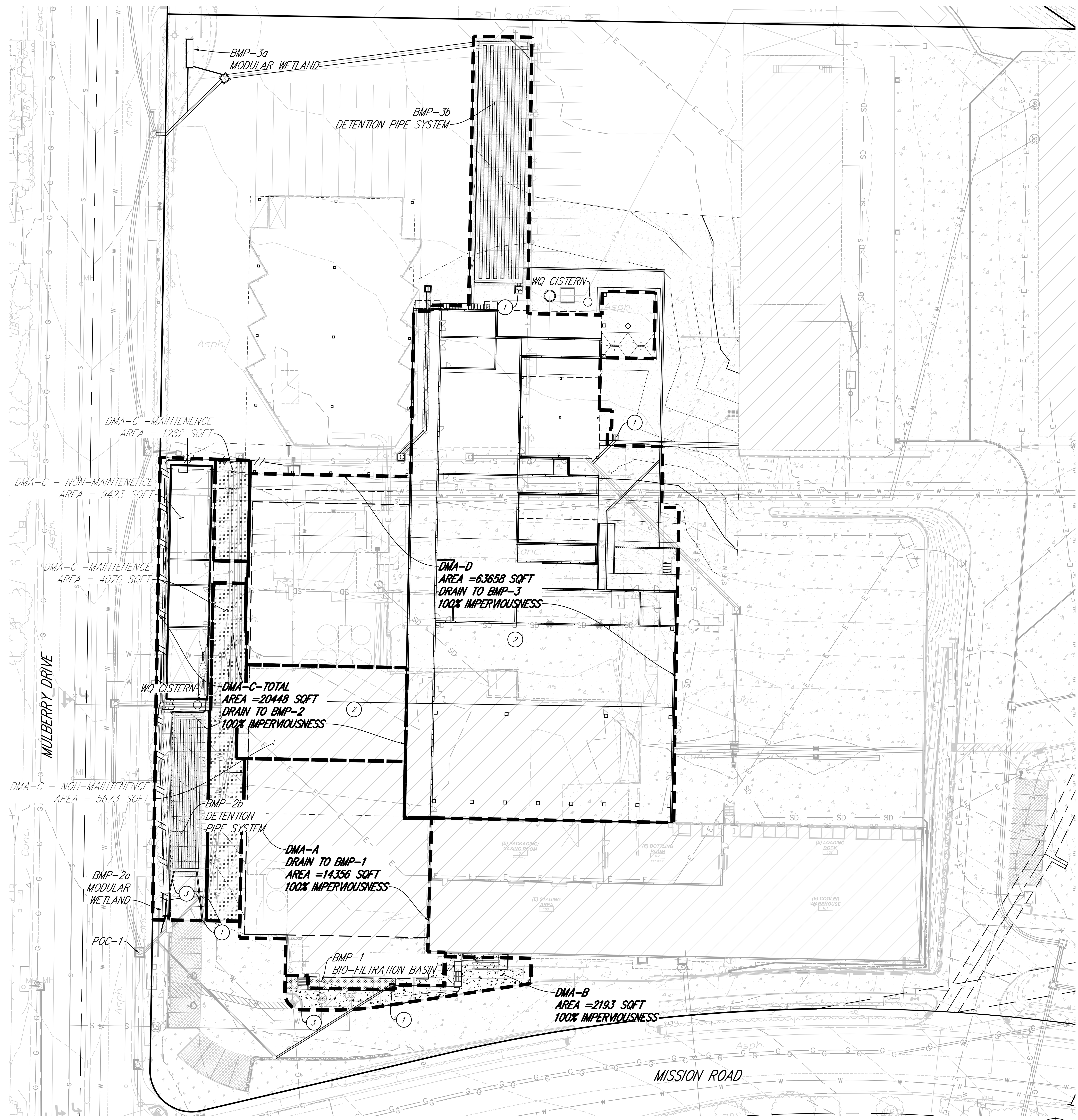
Attachment Sequence	**Contents**	**Checklist**
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on 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, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included ☐ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐ Included ☑ Not required because BMPs will drain in less than 96 hours

ATTACHMENT 2a

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

The Hydromodification Management Exhibit must identify:

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



LEGEND

NAME	SYMBOL
EXISTING MAJOR CONTOUR (SURVEYED)	
EXISTING MAJOR CONTOUR (SanGIS)	
PROPOSED MAJOR CONTOUR	
BASIN DELINEATION	
EXISTING DRIVEWAY TREATED IN LIEU OF PROPOSED SIDEWALK IN DMA-B	

NOTES:
1. ADDITIONAL AREA WITHIN DMA-C TO COMPENSATE FOR UNTREATABLE RUN OFF FROM DMA-B.
2. BMP 2b AND 3b ARE DETENTION PIPES THAT ACT AS FOREBAYS FOR HYDROMODIFICATION CONTROL.
3. UNDERLYING HYDROLOGIC SOIL GROUP FOR THIS SITE IS TYPE "D".
4. APPROXIMATE DEPTH TO GROUND WATER IS MORE THAN 20 FT.
5. THERE IS NO CRITICAL COARSE SEDIMENT YIELD AREA WITHIN THE PROJECT SITE.

HYDROMODIFICATION:
UNDERLYING SOIL GROUP: D
APPROXIMATE DEPTH TO GROUNDWATER: 4FT-8FT

SUMMARY OF DMAs

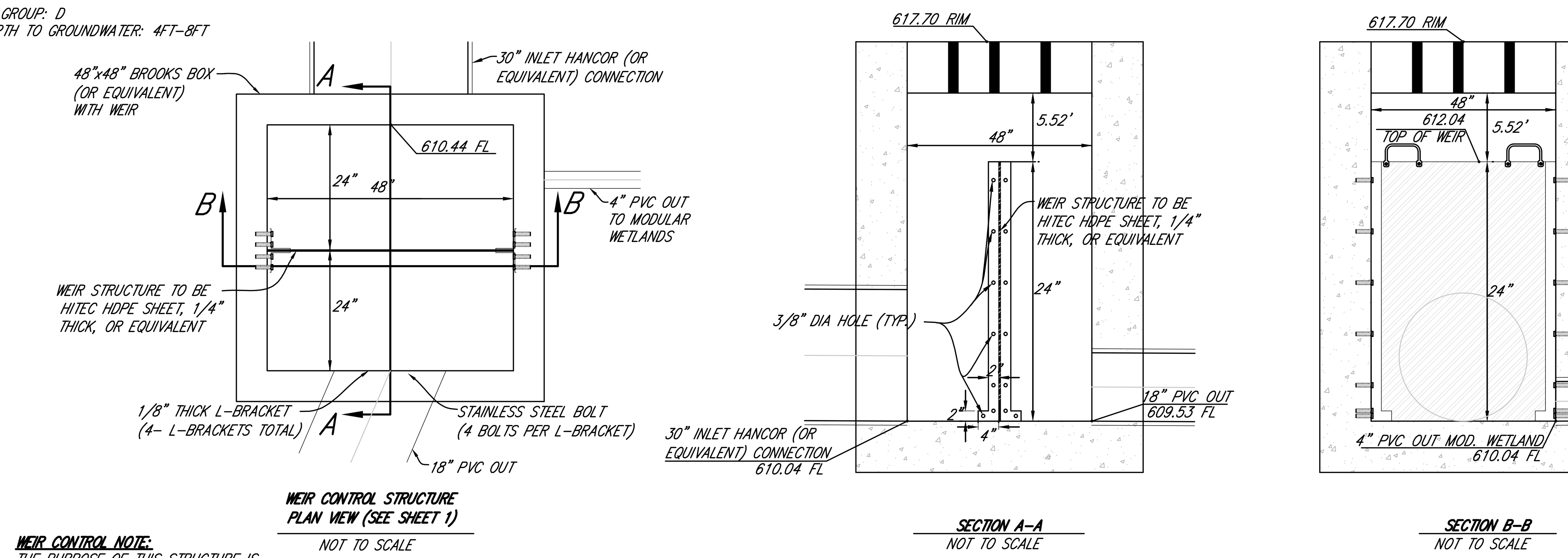
DMA ID NO.	AREA (SQFT)	DMA TYPE
DMA-A	14,356	DRAIN TO BMP
DMA-B	2,193	N/A*
DMA-C	20,448	DRAIN TO BMP
DMA-D	63,658	DRAIN TO BMP

*DMA-B TREATMENT AREA IS INCLUDED IN DMA-C. THUS, DMA-C TREATMENT AREA IS INCREASED BY AT LEAST THE AMOUNT REQUIRED TO BE TREATED IN DMA-B.

SCALE: 1"=30'
0 30 60 90 120

NO.	SOURCE CONTROL BMPs	IMPLEMENTATION
1	INLET STENCILING	MARK INLET WITH THE WORDS : "NO DUMPING! DRAINS TO WATERWAYS"
2	PREVENTION OF ILLICIT DISCHARGES	ALL INDUSTRIAL PROCESSES TO BE PERFORMED INDOORS. NO PROCESSES TO DRAIN TO EXTERIOR OR TO STORM DRAIN SYSTEM.
3	SIDE WALK/PARKING LOT MAINTENANCE	SWEEP REGULARLY TO PREVENT ACCUMULATION OF LITTER & DEBRIS

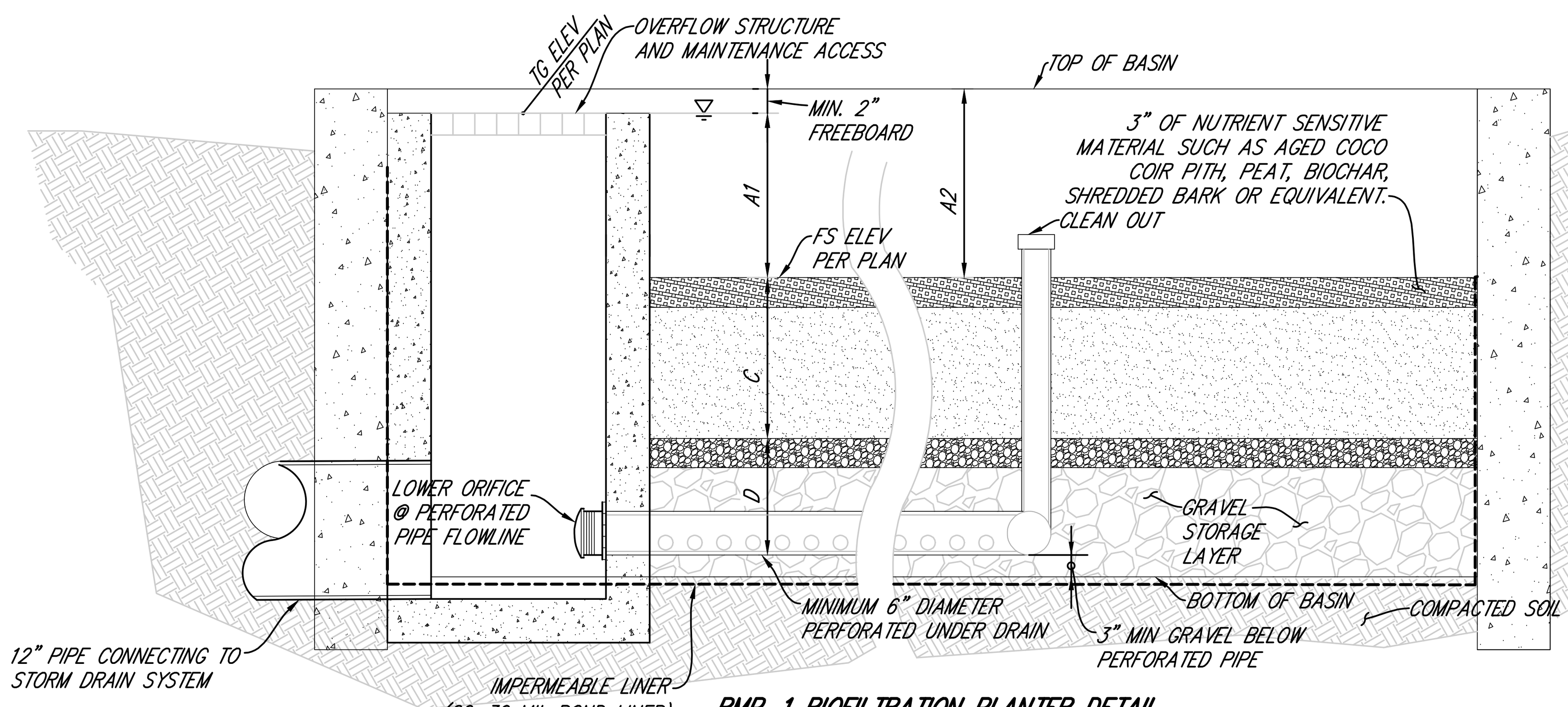
NOTE:
UNDERLYING SOIL GROUP: D
APPROXIMATE DEPTH TO GROUNDWATER: 4FT-8FT



WEIR CONTROL NOTE:
THE PURPOSE OF THIS STRUCTURE IS FOR DETENTION FOR WATER QUALITY AND HYDROMODIFICATION FLOW CONTROL SEPARATE FROM TYPICAL BIOFILTRATION FLOW MODELING.

WEIR CONTROL STRUCTURE DETAIL
NOT TO SCALE

HOLLANDIA DEVELOPMENT PHASE 3
HYDROMODIFICATION EXHIBIT
SHEET 1 OF 2

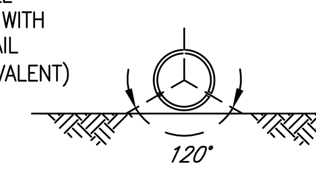


BMP-1 BIOFILTRATION PLANTER DETAIL
NOT TO SCALE

* NOTE: SOIL MEDIA AND PLANTING METHODS SHALL MEET THE BF-2 DESIGN CRITERIA

DETAIL "NO DUMPING" AT CATCH BASINS

NOTE: BIOFILTRATION PLANTER AND ALL GRATED INLETS SHALL BE STENCILED WITH CITY REQUIRED ITEM PER ABOVE DETAIL (DAS MANUFACTURING #SDO OR EQUIVALENT)



6" PVC PIPE PERFORATION LAYOUT DETAIL
NOT TO SCALE

PERMANENT WATER QUALITY TREATMENT FACILITY
KEEPING OUR WATER WAYS CLEAN
MAINTAIN WITH CARE – NO MODIFICATIONS WITHOUT AGENCY APPROVAL

DETAIL WATER QUALITY SIGN– PLACED AT EACH BIOFILTRATION BASIN

NOTE: ALL BIOFILTRATION AREAS WILL HAVE A SIGN POSTED TO BE VISIBLE AT ALL TIMES.

BIO–BASIN SUMMARY TABLE

BMP ID	SURFACE FOOTPRINT (SQFT)	A1 (INCH)	A2 (INCH)	C (INCH)	D (INCH)	RISER SIZE (INCH)	ORIFICES DIAMETER UPPER (INCH)	ORIFICES DIAMETER LOWER (INCH)	IMPERMEABLE LINER
BMP-1	392	7	9	21	9	24X24	N/A	0.5	YES

* FREEBOARD=A2-A1

SITE SPECIFIC DATA

PROJECT NUMBER		8380	
ORDER NUMBER		----	
PROJECT NAME		HOLLANDIA DAIRY REDEVELOPMENT	
PROJECT LOCATION		SAN MARCOS, CA	
STRUCTURE ID		BMP-2A	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
1495		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			N/A
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	606.71	PVC	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	606.20	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	609.52	609.52	609.52
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	36" X 36"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			1.82
ORIFICE SIZE (DIA. INCHES)			ø0.50"

NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO SET UPSTREAM BYPASS AT 6

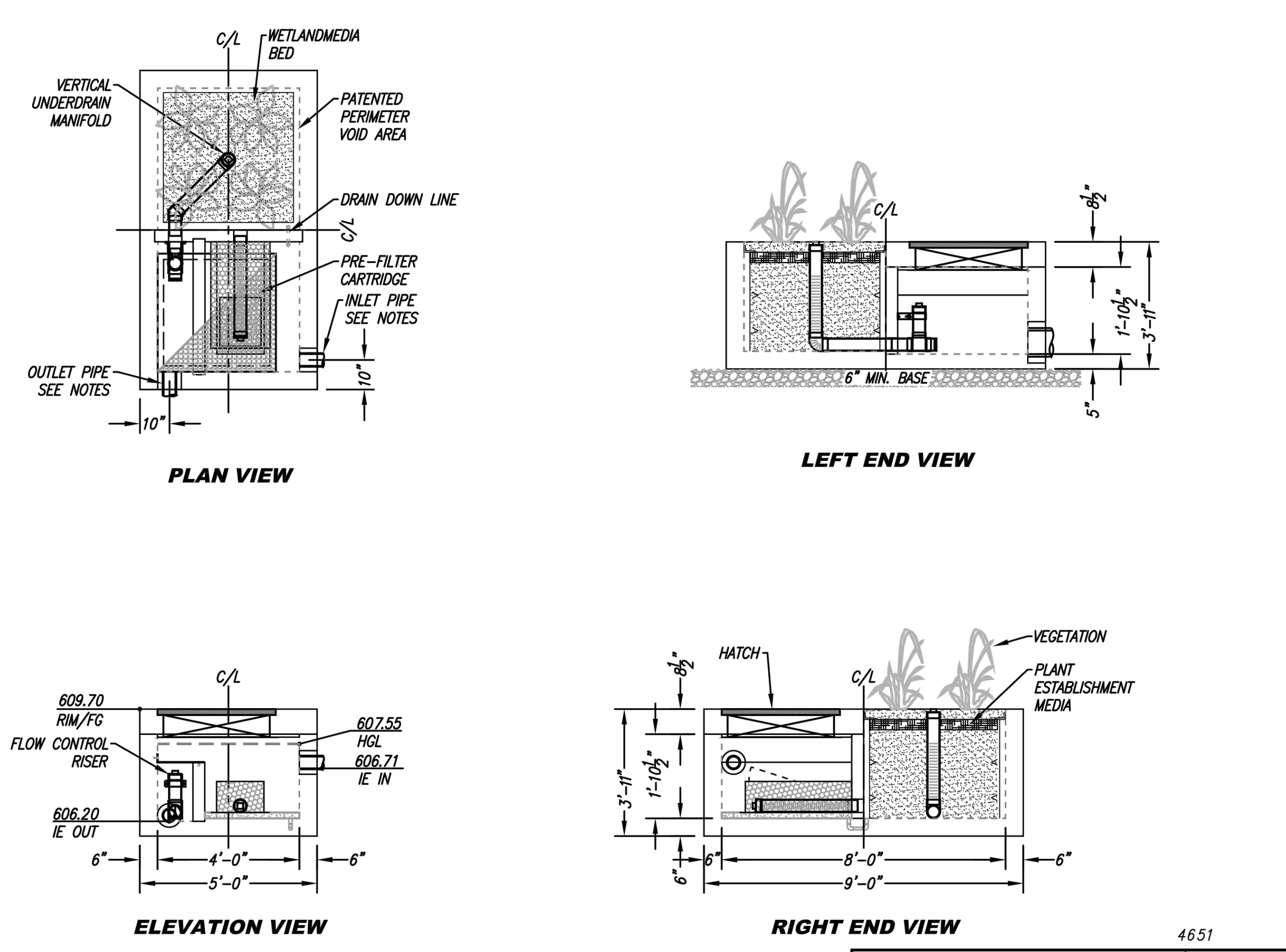
INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

4/22/19GSCHIPPER



4651

REQUIRED TREATMENT VOLUME (CF)	1495
DRAINDOWN DURATION (HOURS)	12
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	7.97
OPERATING HEAD (FT)	2.1
WETLANDMEDIA INFILTRATION RATE (IN/HR)	26
WETLANDMEDIA LOADING RATE (GPM/SF)	0.26

OR

MODULAR WETLANDS
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

PROPRIETARY AND CONFIDENTIAL:
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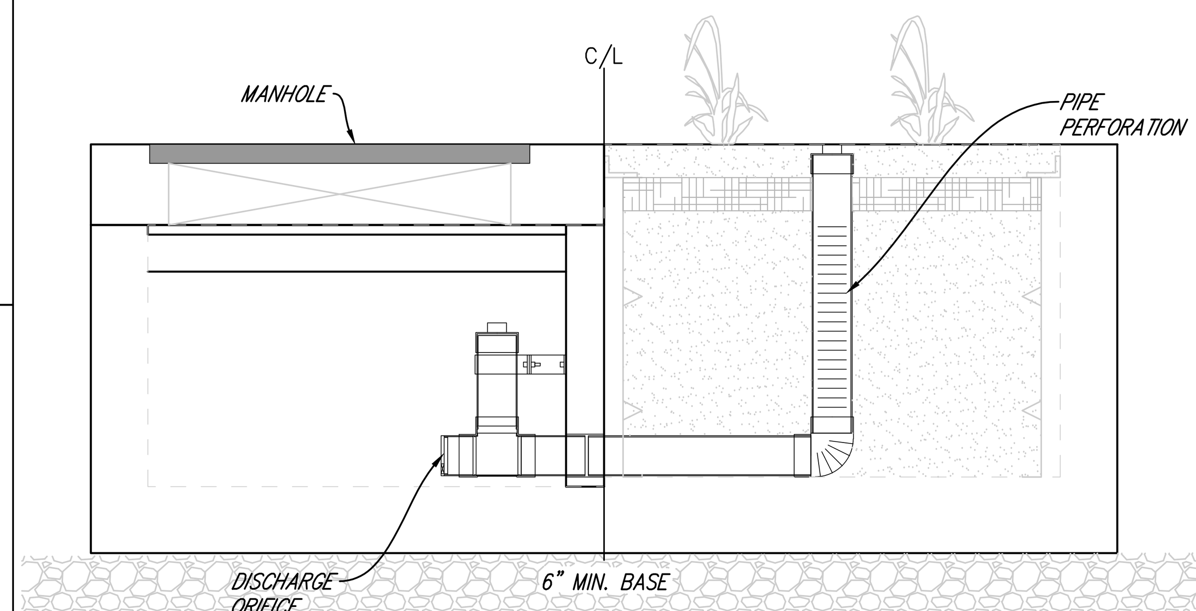
Bio Clean
A Forterra Company

MWS-L-4-8-3'-1"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL



BMP-2a AND BMP-3a MODULAR WETLAND DETAIL
NOT TO SCALE

MODULAR WETLAND SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT VALUE	REQUIRED TREATMENT UNITS	PROVIDED TREATMENT VALUE	PROVIDED TREATMENT UNITS	ORIFICE OUT (INCH)
BMP-2a	MWS-L-4-8	606.71	606.21	1495	CF	1692	CF	0.50
BMP-3a	MWS-L-4-6	610.04	609.54	4650	CF	9306	CF	0.69

SITE SPECIFIC DATA

PROJECT NUMBER		8380	
ORDER NUMBER		----	
PROJECT NAME		HOLLANDIA DAIRY REDEVELOPMENT	
PROJECT LOCATION		SAN MARCOS, CA	
STRUCTURE ID		BMP-3A	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
4651		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			N/A
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	610.04	PVC	4"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	609.54	PVC	4"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	609.52	609.52	609.52
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	36" X 36"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			1.82
ORIFICE SIZE (DIA. INCHES)			ø0.69"

NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO SET UPSTREAM BYPASS AT 610.04

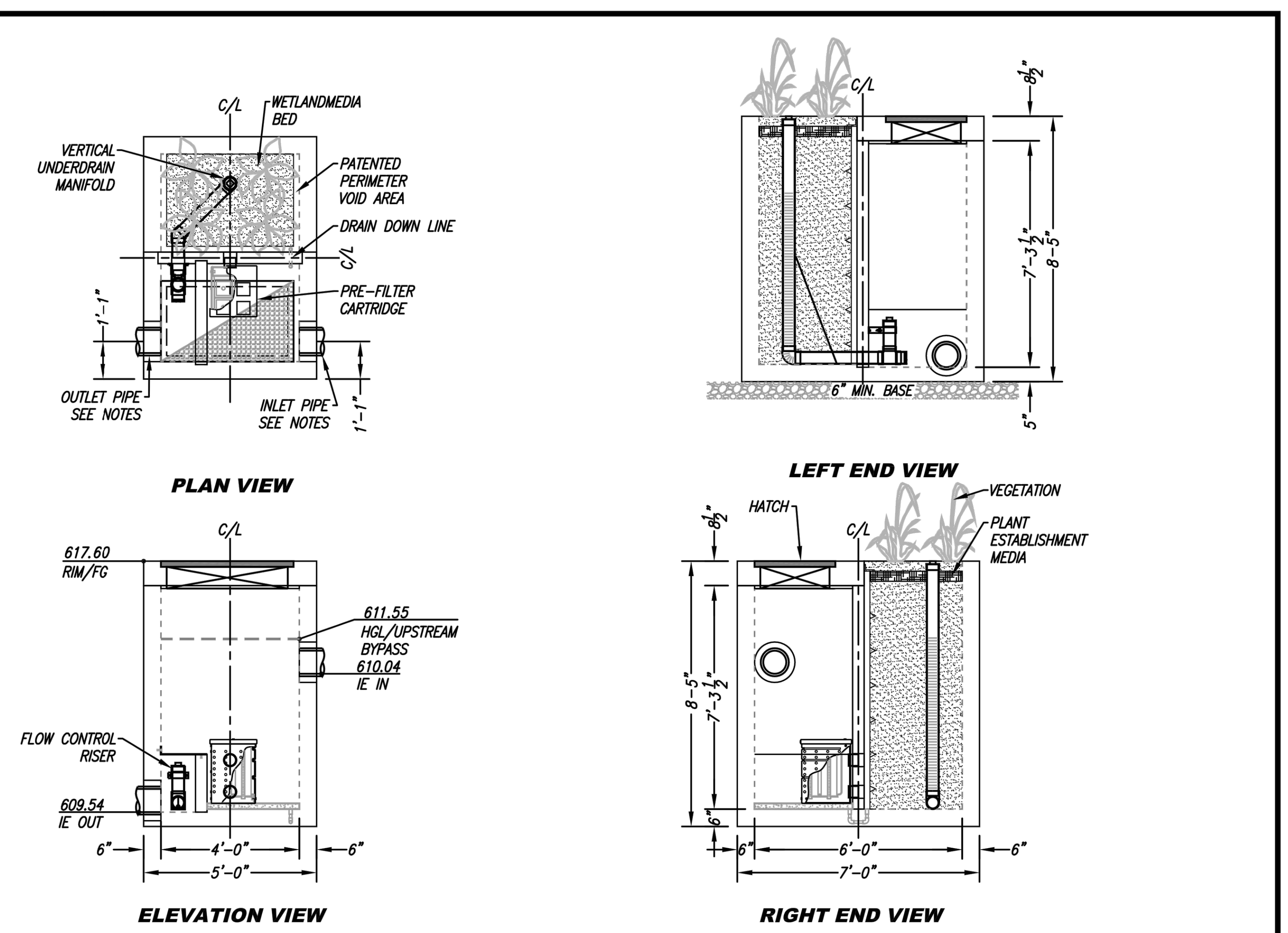
INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

4/22/19GSCHIPPER



REQUIRED TREATMENT VOLUME (CF)	4651
DRAINDOWN DURATION (HOURS)	10
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	12.02
OPERATING HEAD (FT)	4.9
WETLANDMEDIA INFILTRATION RATE (IN/HR)	26
WETLANDMEDIA LOADING RATE (GPM/SF)	0.26

MODULAR WETLANDS
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

PROPRIETARY AND CONFIDENTIAL:
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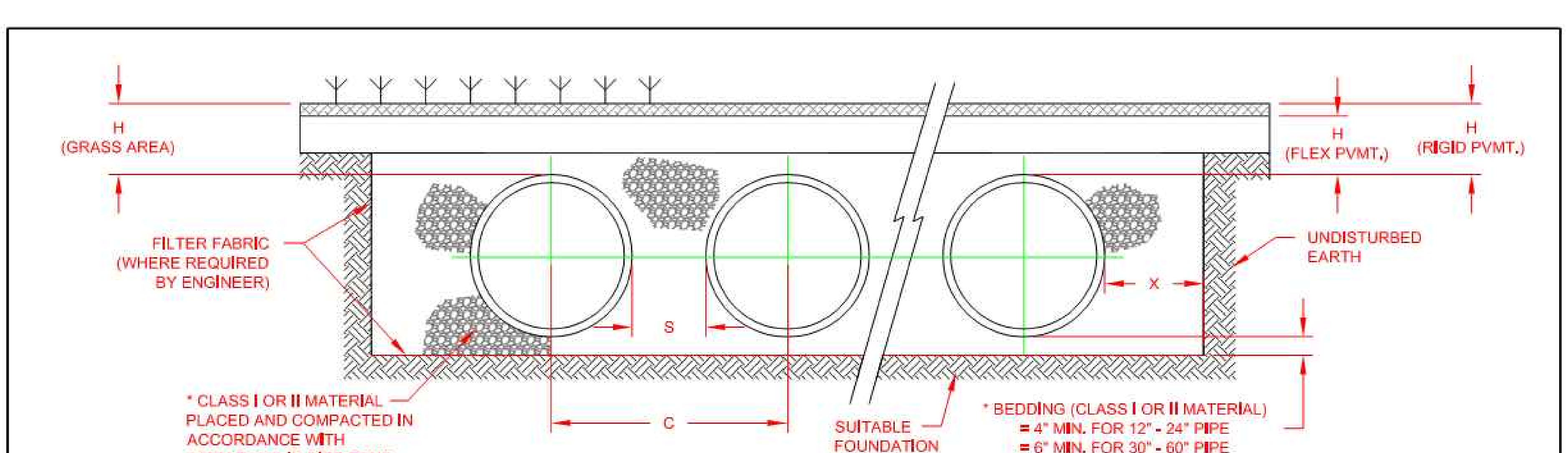
Bio Clean
A Forterra Company

MWS-L-4-6-7'-2"-V-HC
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

BMP-2b AND BMP-3b
DETENTION PIPE SYSTEM DETAIL



NOTES:

1. ALL REFERENCES TO CLASS I OR II MATERIAL ARE PER ASTM D2321 "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST EDITION.
2. ALL RETENTION AND DETENTION SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, LATEST EDITION AND THE MANUFACTURER'S PUBLISHED INSTALLATION GUIDELINES.
3. MEASURES SHOULD BE TAKEN TO PREVENT THE MIGRATION OF NATIVE FINES INTO THE BACKFILL MATERIAL, WHEN REQUIRED. SEE ASTM D2321.
4. FILTER FABRIC: A GEOTEXTILE FABRIC MAY BE USED AS SPECIFIED BY THE ENGINEER TO PREVENT THE MIGRATION OF FINES FROM THE NATIVE SOIL INTO THE SELECT BACKFILL MATERIAL.
5. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
6. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I OR II. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm).
7. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I OR II IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
8. MINIMUM COVER: MINIMUM COVER OVER ALL RETNETION/DETENTION SYSTEMS IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER IS 12" UP TO 36" DIAMETER PIPE AND 24" OF COVER FOR 42" - 60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

NOMINAL DIAMETER	NOMINAL O.D.	TYPICAL SPACING "S"	TYPICAL SPACING "C"	TYPICAL SIDE WALL "X"	H (NON-TRAFFIC)	H (TRAFFIC)
12" (300 MM)	14.5" (368 MM)	11" (279 MM)	25.4" (645 MM)	8" (203 MM)	12" (292 MM)	12" (292 MM)
15" (375 MM)	18" (457 MM)	12" (292 MM)	28.9" (734 MM)	8" (203 MM)	12" (292 MM)	12" (292 MM)
18" (450 MM)	21" (533 MM)	17" (434 MM)	33.9" (862 MM)	9" (229 MM)	12" (292 MM)	12" (292 MM)
24" (600 MM)	28" (711 MM)	13" (330 MM)	40.7" (1034 MM)	10" (254 MM)	12" (292 MM)	12" (292 MM)
30" (750 MM)	36" (914 MM)	18" (457 MM)	53.1" (1347 MM)	18" (457 MM)	12" (292 MM)	12" (292 MM)
36" (900 MM)	42" (1067 MM)	22" (559 MM)	63" (1600 MM)	18" (457 MM)	12" (292 MM)	12" (292 MM)
42" (1050 MM)	48" (1219 MM)	24" (610 MM)	71.9" (1826 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)
48" (1200 MM)	54" (1372 MM)	25" (635 MM)	78.5" (1994 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)
60" (1500 MM)	67" (1702 MM)	24" (610 MM)	90" (2286 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)

* CLASS I BACKFILL REQUIRED AROUND 60" DIAMETER FITTINGS.

REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D
3	REVISED 18" SPACING	TJR	01/05/09	CKS

HANCOR, INC. HAS PREPARED THIS DETAIL BASED ON INFORMATION PROVIDED TO HANCOR. THIS DRAWING IS INTENDED TO DEPICT THE COMPONENTS AS REQUESTED. HANCOR HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICES FOR THIS PROJECT, NOR HAS HANCOR INDEPENDENTLY VERIFIED THE INFORMATION SUPPLIED. THE INSTALLATION DETAILS PROVIDED HEREIN ARE GENERAL RECOMMENDATIONS AND ARE NOT SPECIFIC FOR THIS PROJECT. THE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION. IT IS THE DESIGN ENGINEERS RESPONSIBILITY TO ENSURE THE DETAILS PROVIDED HEREIN MEETS OR EXCEEDS THE APPLICABLE NATIONAL, STATE, OR LOCAL REQUIREMENTS AND TO ENSURE THAT THE DETAILS PROVIDED HEREIN ARE ACCEPTABLE FOR THIS PROJECT.

TYPICAL RET/DET CROSS SECTION DETAIL
DRAWING NUMBER: STD-702

Hancor
401 OLIVE ST.
FINDLAY, OHIO 45839

DRAWN BY: AWM
DATE: 07.25.06
SCALE: NTS

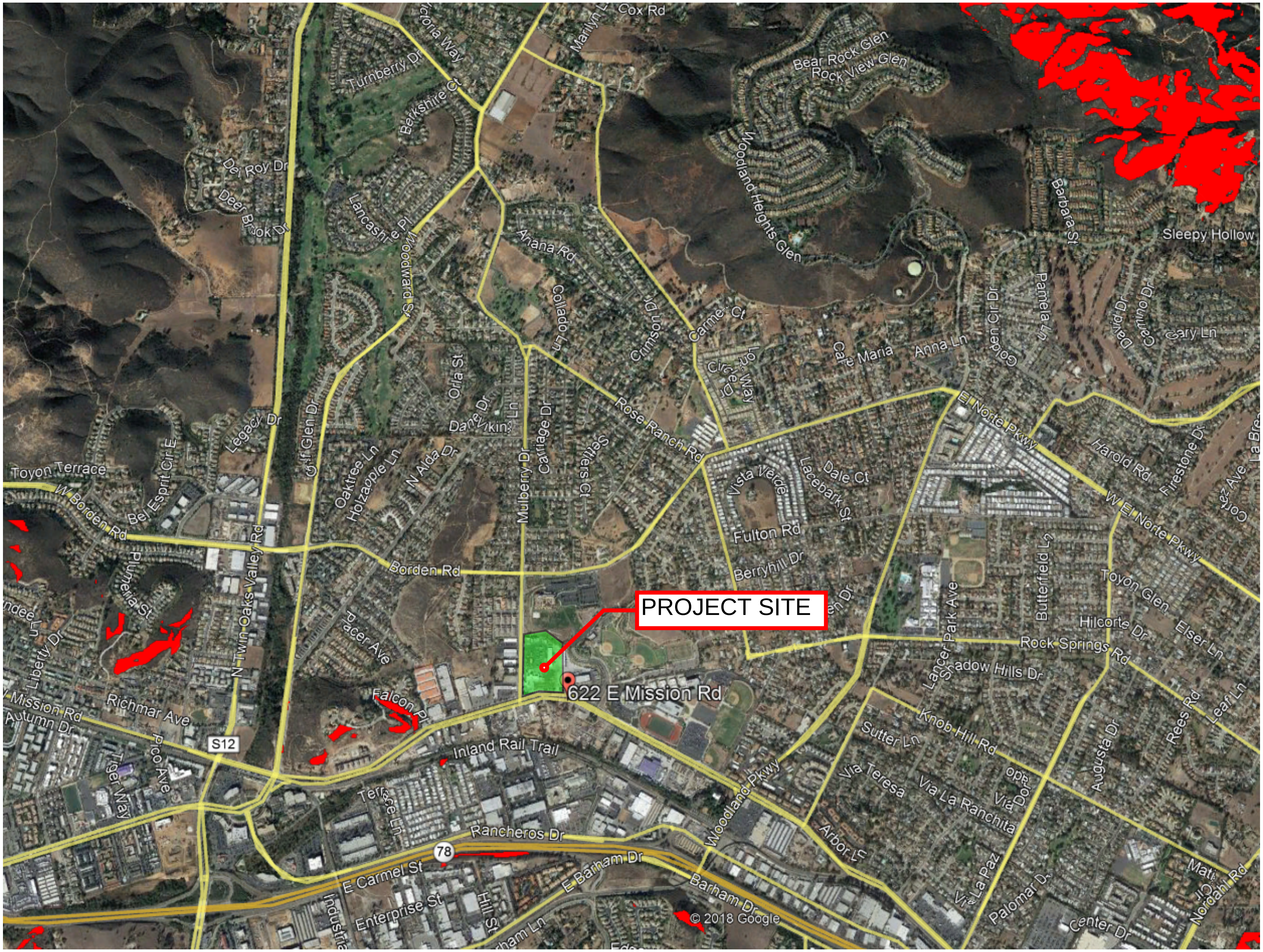
DETENTION PIPE SYSTEM SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT VALUE	REQUIRED TREATMENT UNITS	PROVIDED TREATMENT VALUE	PROVIDED TREATMENT UNITS	ORIFICE OUT (INCH)
BMP-2b	N/A	606.84	606.84	1495	CF	1692 CF	CF	N/A
BMP-3b	N/A	610.06	610.04	4650	CF	9306 CF	CF	N/A

HOLLANDIA DEVELOPMENT PHASE 3
HYDROMODIFICATION EXHIBIT
SHEET 2 OF 2

O: \08\08067\gp\gp10\Storm\tm\SWQMP\Attachment 2\Hydromod Exhibit-Post Development.dwg 2/11/2020 2:46 PM ORIGINAL PLOT SIZE: ----

ATTACHMENT 2b



Critical Course Sediment

ATTACHMENT 2c

*N/A DEFAULT LOW FLOW THRESHOLD OF 0.1Q2 USED.

ATTACHMENT 2d

Table of Contents

INTRODUCTION

This report provides Hydromodification and Water Quality design based on LID (Low Impact Development) principles for a proposed addition and renovation for the Hollandia Dairy in San Marcos, California.

The Hydromodification and Water Quality calculations were performed utilizing continuous simulation analysis to size the storm water treatment and control facilities. Storm Water Management Model (SWMM) version 5.1 distributed by USEPA is the basis of all calculations within this report. SWMM generates peak flow recurrence frequencies and flow duration series statistics based on an assigned rain gauge for pre-development, unmitigated post-development flows and post-development mitigated flows to determine compliance with the State Water Resources Control Board Order No.R9-2015-001 and Hydromodification Management Plan (HMP) requirements.

Total area is 14.54 acres, with the developed tributary area is approximately 2.28 acres. There is one point of compliance (POC) for the project in the analysis; POC receives flows from the basin, and the modular wetland and then drains into an existing public storm drain at Mulberry Drive, San Marcos, CA.

The Hydromodification and Water Quality system proposed for this project consists of a single biofiltration basin that will be a box planter and 2 modular wetland units that will catch the remaining of the new construction on site treat that water then discharge to Mulberry Drive where it will confluence at the corner of the project. This system detains storm water in the basin surface of the planter and, in the pre-storage prior to the modular wetland units. Bio-filtration filters storm water through plant roots and a biologically active soil mix, and then releases it into the existing storm drain system which currently collects the sites storm flows. The resulting mitigated outflows are shown to be equal to or less than all continuously simulated storms based on the historical data collected from the Escondido rain gage.

Low Flow Threshold

A downstream channel assessment has not been completed for this project and therefore the low flow threshold utilized for the system analysis is 10% of 2-year storm event (0.1Q2). This will be used as the low flow threshold to meet peak flow frequency and flow duration controls.

SECTION I. MODEL SETUP

Pre-development Model Setup

The SWMM model for this projects pre-development site is analyzed using historical rain gauge data. The Escondido gauge is utilized for this project. That data provides continuous precipitation input to a sub-catchment with its outfall based on the contributing basins imperviousness.

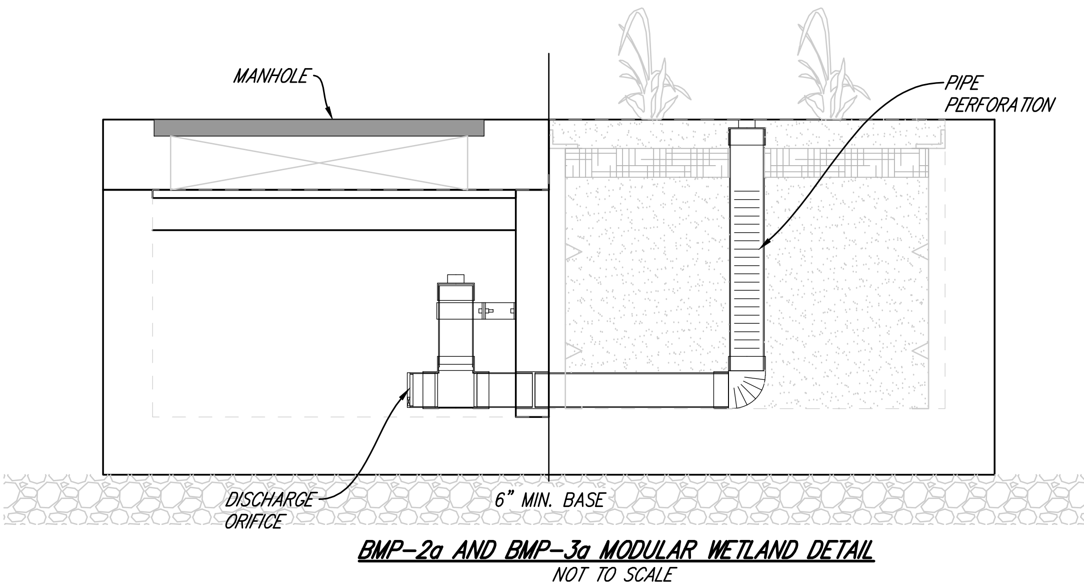
The imperviousness parameter in SWMM is the amount of effective or directly connected impervious area. The effective impervious area is the impervious area that drains directly to the Stormwater conveyance system. The pre-development condition is a vacant land with poor cover of grass and some shrubs with no trees. For the purpose of this study, the site that work is to be done is assumed to have 0% of impervious surface in the existing condition, even if the existing conditions have impervious.

The site is currently an existing and fully operating dairy that has a mass graded pad situated at the corner of Mulberry Drive and Mission Road, San Marcos, CA. The area being re-developed is currently a portion of the factory and sections of the existing truck dock. Utilities are supplied both on Mulberry and from Mission Ave.to the existing facilities. An existing industrial/commercial development exists to the west and south, and the property is bordered by Innovation Way to the east and Palomar Airport Road to the north. Drainage flows originate in several locations but take the general flow path from northeast to southwest as sheet flow and is collected in different areas that are currently not being treated and discharging to the existing storm drain system. Industrial waste has the potential to enter the existing storm drain system on the existing site and mix with stormwater runoff. For SWMM model illustration see figure 3, or Pre-development map in Attachment A of this SWMM report.

Post-Development Model Setup

Figure 3 illustrates each contributing basin discharging its overland flow directly into the biofiltration system (Planter, or Modular Wetland System). Each biofiltration layer section has a similar configuration as seen as in the detail drawing below. There is no actual elevation entered in the program. The bottom elevation of the biofiltration surface storage is assumed at 0 ft. Storm drain pipe is also utilized as a detention by having an orifice small flow restrictor at lower invert elevation of the downstream cleanout box and a bypass orifice/pipe to convey the bigger flow.

The Hollandia project layout proposes to replace an existing building and truck dock with a new building that will process dairy products. With the new building, stormwater runoff will be routed to either a biofiltration planter box or one of two modular wetlands units. The new building will be disconnected from the existing storm drain system and isolate only stormwater to the line. DMA-D will drain north to a detention system that will detain the stormwater runoff as well as the water on the surface of the detention tank system. This water will then be treated by BMP-3 which is a modular wetlands unit. Water will be separated by water quality flows and peak flows by a weir in a control structure prior to the Modular Wetlands unit. Once water is treated it will rejoin by passed water and continue down Mulberry Drive where it will confluence with the southern waters. The southern waters will come from two areas the first is DMA-C which just as DMA-D will travel to a detention system and be treated with a modular wetlands unit. This bmp will be sized according to flow rather than volume since there is both horizontal and vertical space constraints. This detention will also bypass peak flows with a catch basin that will act as a bubbler when the detention pipes are full; the water will then enter an existing vault that currently takes in the existing flows from the area. The final segment of this site redevelopment is the area DMA-A which will consist of roof flows that will enter a planter box that is being used as biofiltration. After treatment the water will exit out of the planter and confluence with an existing line that has been checked for adequate flow capacity. This water will then enter the existing vault mentioned earlier as it heads offsite to confluence with the remaining water from the north. The floor of the building and the roofs are being sloped to accommodate both water quality and the manufacturing process. See figure 1 (Note: for details regarding biofiltration section see Attachment 2A of this projects SWQMP).



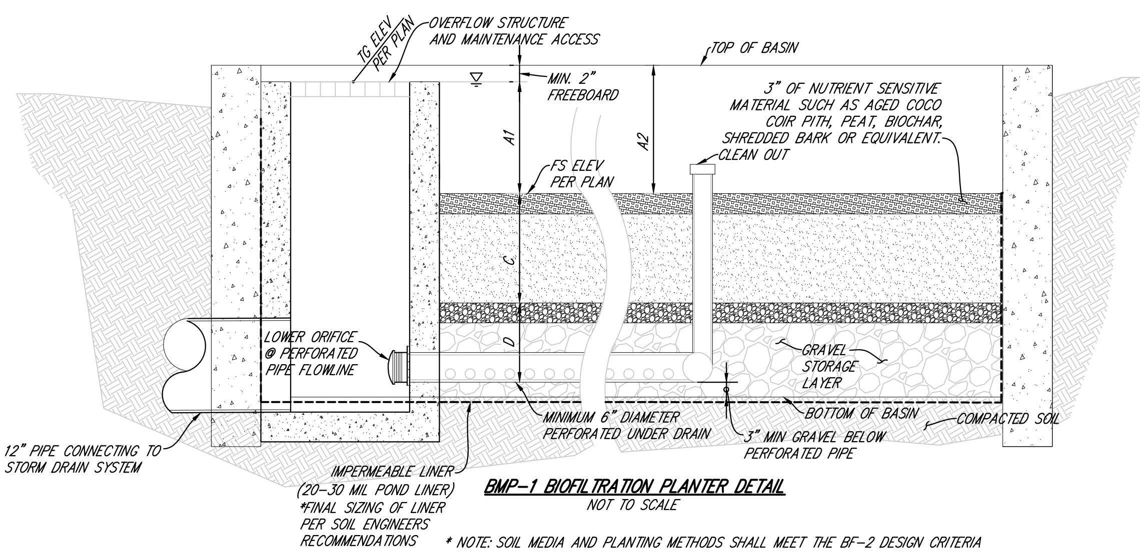


Figure-1. Typical
Bio-filtration Section

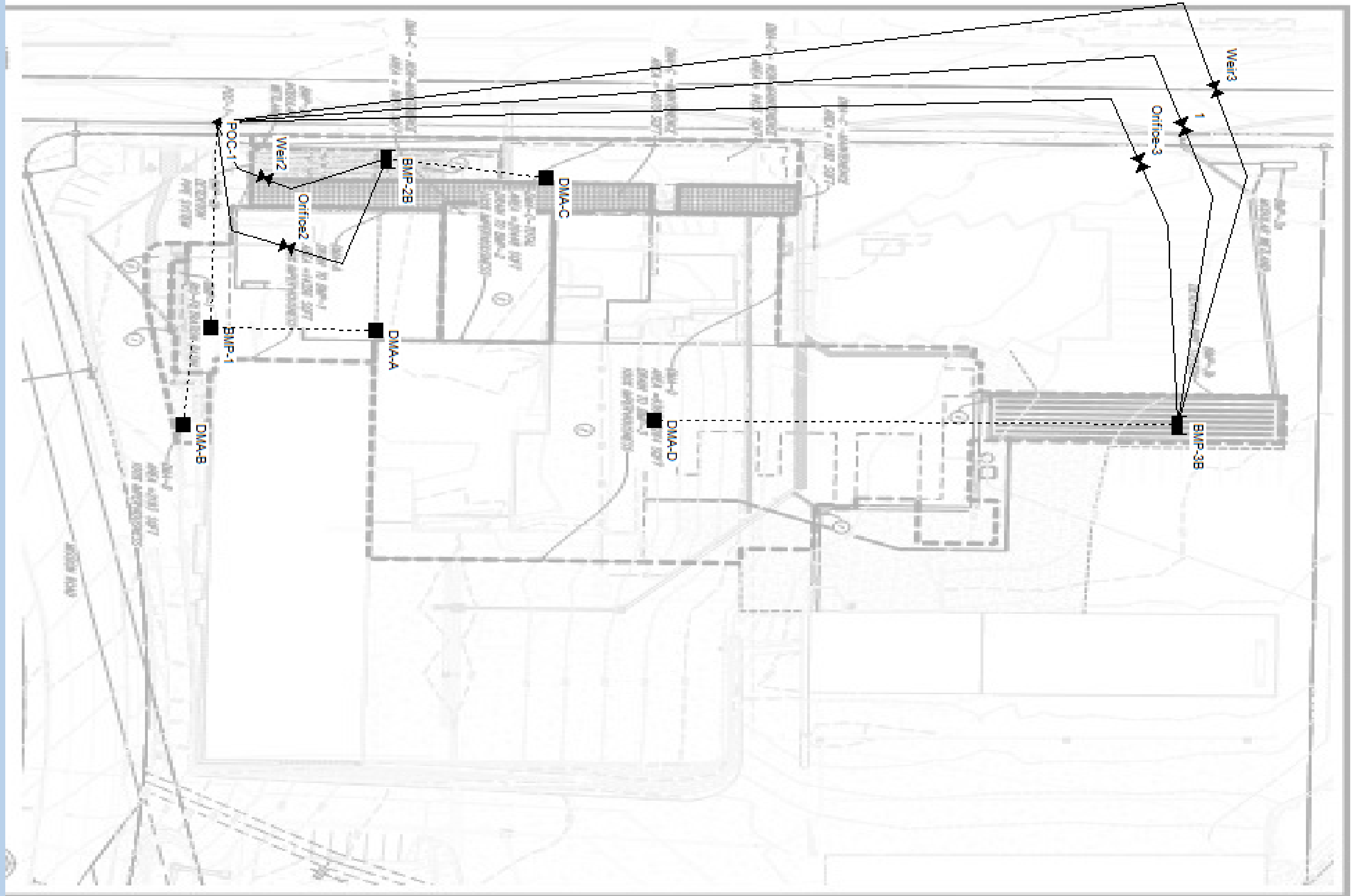


Fig.2 – SWMM Post-Development with Mitigation Hollandia Re-Development

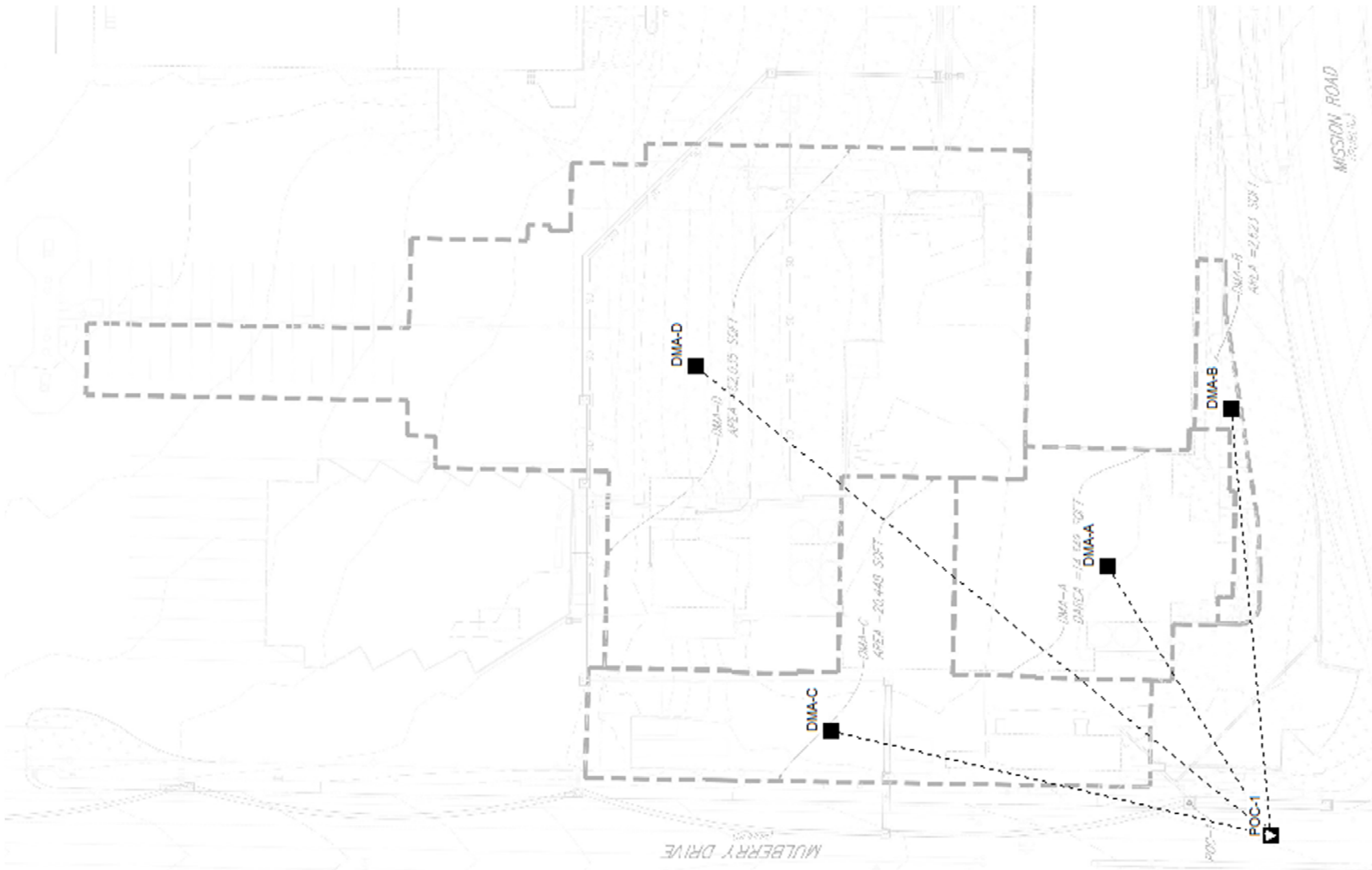


Fig.3 – SWMM Pre-Development Hollandia Re-development

Post-Development Drainage Management Areas (DMAs)

The DMAs provide an important framework for feasibility screening, BMP prioritization and storm water management system configuration. DMAs are defined based on drainage patterns of the site and the BMPs to which they drain.

In this project Hollandia DMAs drain to BMPs 1-3.

Table for Post-Development Hollandia Dairy Redevelopment

Post Development SUBCATCHMENTS]

;;Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope
BMP-1	Escondido	POC-1	0.009003	0	6	0.5
DMA-A	Escondido	BMP-1	0.320404	100	261.6	0.5
DMA-B	Escondido	POC-1	0.060216	100	15	0.9
DMA-C	Escondido	sto-bmp2-mws	0.469421	100	250	1.8
DMA-D	Escondido	Sto-BMP-3-MWS	1.424128	100	490	0.5
			2.283172			

***Note: DMA area includes area of DMA itself and downstream LID**

Table for Pre-Development Hollandia Dairy Redevelopment

[Pre Development SUBCATCHMENTS]

;;Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope
DMA-D	Escondido	POC-1	1.424128	0	490	0.5
DMA-B	Escondido	POC-1	0.060216	0	15	0.9
DMA-A	Escondido	POC-1	0.329408	0	53	1
DMA-C	Escondido	POC-1	0.469421	0	250	1.8

MODULAR WETLAND SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT		PROVIDED TREATMENT		ORIFICE OUT (INCH)
				VALUE	UNITS	VALUE	UNITS	
BMP-2a	MWS-L-4-8	606.71	606.21	1495	CF	1692	CF	0.50
BMP-3a	MWS-L-4-6	610.04	609.54	4650	CF	9306	CF	0.69

DETENTION PIPE SYSTEM SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT		PROVIDED TREATMENT		ORIFICE OUT (INCH)
				VALUE	UNITS	VALUE	UNITS	
BMP-2b	N/A	606.84	606.84	1495	CF	1692 CF	CF	N/A
BMP-3b	N/A	610.06	610.04	4650	CF	9306 CF	CF	N/A

BIO-BASIN SUMMARY TABLE (Also provided on Hydromodification exhibit)

SECTION II. SYSTEM REPRESENTATION

SWMM is a distributed model, which means that a study area can be subdivided into any number of irregular sub-catchments to best capture the effect that spatial variability in topography, drainage pathways, land cover, and soil characteristics have on runoff generation. For modeling of Hydromodification calculations, there are four main system representations: Rain gage, Sub-catchment (contributing basin or LID area), Nodes and Links.

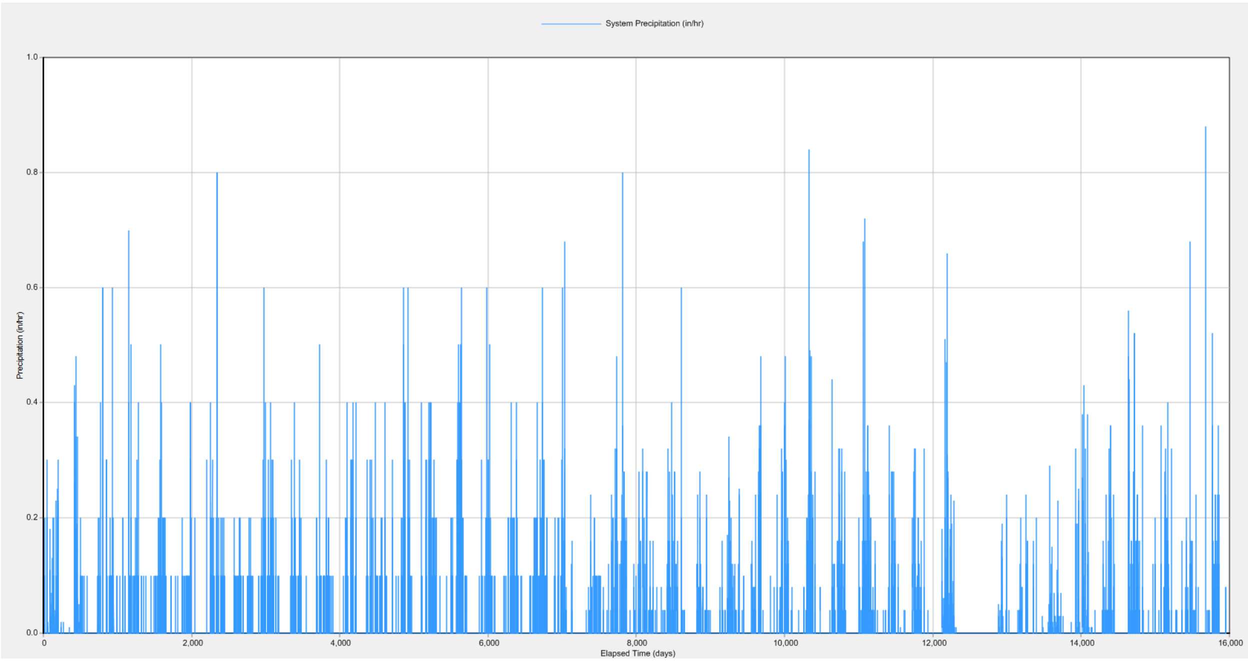


Fig. 2.1 – Time series rain data, which corresponds to runoff estimates for each of the 385,440 time steps (each date and hour) of the 58-year simulation period. (Inches/hour vs. elapsed time)

Rain Gauge

The properties of a rain gage describe the source and format of the precipitation data that are applied to the study area. In this project, the rainfall data consist of a long-term rainfall record stored in a user-defined Time Series labeled as "Escondido" rain gage station. The Escondido rain station was chosen due to its location to the project site.

The rain gage supplies precipitation data for one or more sub-catchment areas in a study region taken from the Project Clean Water website (www.projectcleanwater.org). This data file contains rainfall intensity, hourly-recorded time interval, and the dates of recorded precipitation each hour. The Escondido rain data has approximately 44 years of hourly precipitation data from 9/24/1964 to 5/23/2008 and generates 44 years of hourly runoff estimates, which corresponds to runoff estimates for each of the 385,440 time steps (each date and hour) of the 44 year simulation period.

Sub-catchment (contributing basin or LID area)
A basin is modeled using a sub-catchment object, which contains some of the following properties:

The rate of stormwater runoff and volume depends directly on the precipitation magnitude and its spatial and temporal distribution over the catchment. Each sub-catchment in SWMM is linked to a rain gauge object that describes the format and source of the rainfall input for the sub-catchment.

Area

This area is bounded by the sub-catchment boundary. Its value is determined directly from maps or field surveys of the site or by using SWMM's Auto-length tool when the sub-catchment is drawn to scale on SWMM's study area map. This Project is divided into several sub-catchments based on its outfall.

Width

Width can be defined as the sub-catchment's area divided by the length of the longest overland flow path that water can travel. When there are several such paths, one would use an average of their lengths to compute a width. If overland flow is visualized as running down –slope off an idealized, rectangular catchment, then the width of the sub-catchment is the physical width of overland flow.

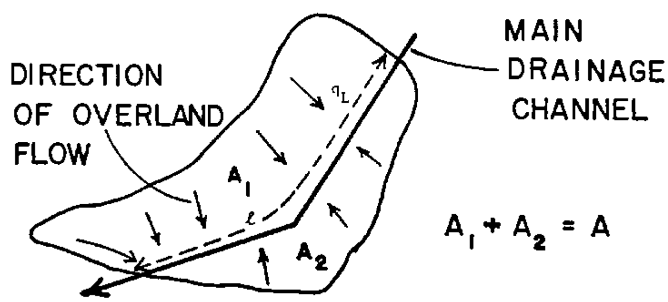


Figure-2-2 Irregular subcatchment shape for width calculations (DiGiano et al., 1977, p.165).

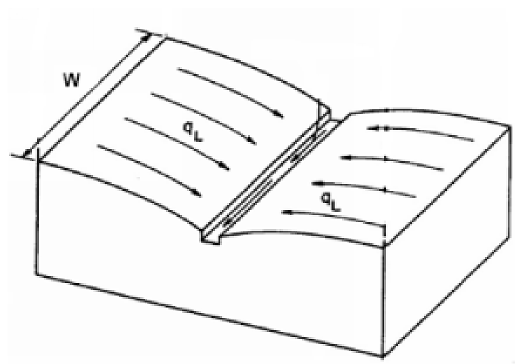


Figure-2-3 Idealized representation of a subcatchment.

Source: STORM WATER MANAGEMENT MODEL REFERENCE MANUAL VOLUME 1- JANUARY 2016

The method of calculations used following Figure 2-2 involves an estimitation by Guo and Urbonas (2007). As stated in the Storm Water Management Model Reference Manual Vol. 1

A more fundamental approach to estimating both subcatchment width and slope has recently been developed by Guo and Urbonas (2007). The idea is to use "shape factors" to convert a natural watershed as pictured in Figure 2-2 into the idealized overland flow plane of Figure 2-3. A shape factor is an index that reflects how overland flows are collected in a watershed. The shape factor X for the actual watershed is defined as A/L^2 where A is the watershed area and L is the length of the watershed's main drainage channel (not necessarily the length of overland flow). The shape factor Y for the idealized watershed is W/L. Requiring that the areas of the actual and idealized watersheds be the same and that the potential energy in terms of the vertical fall along the drainage channel be preserved, Guo and Urbonas (2007) derive the following expression for the shape factor Y of the idealized watershed:

$Y = 2X(1.5 - Z)(2K - X)/(2K - 1)$ (3-12) where K is an upper limit on the watershed shape factor. Guo and Urbonas (2007) recommend that K be between 4 and 6 and note that a value of 4 is used by Denver's Urban Drainage and Flood Control District.

Once Y is determined, the equivalent width W for the idealized watershed is computed as YL.

Applying this approach:

$X = (A \bullet 43{,}560\ ft^2/acre) / (L^2)$

$Z = A_m/A$

Z = skew factor, $0.5 \leq Z \leq 1$,
A_m = larger of the two areas on each side of the channel A = total area.

$W = L \bullet Y$

This width value is considerably lower than those derived from direct estimates of either the longest flow path length or the drainage channel length. As a result, it would most likely produce a longer time to peak for the runoff hydrograph.

Slope

This is the slope of the land surface over which runoff flows and is the same for both the pervious and impervious surfaces. It is the slope of what one considers being the overland flow path or its area-weighted average if there are several paths in the sub-catchment.

Imperviousness

This is the percentage of sub-catchment area covered by impervious surfaces such as sidewalks and roadways or whatever surfaces that rainfall cannot infiltrate.

Roughness Coefficient

The roughness coefficient reflects the amount of resistance that overland flow encounters as it runs off of the sub-catchment surface. The value used for this project's predevelopment is a default 0.1 as a short grass prairie. This was based on the figures in 2-4 and 2-4a and assuming to be the most conservative number since the site appears to be somewhat maintained.

Table 3-5 Estimates of Manning's roughness coefficient for overland flow

Source	Ground Cover	n	Range
Crawford and Linsley (1966)[a]	Smooth asphalt	0.01	
	Asphalt of concrete paving	0.014	
	Packed clay	0.03	
	Light turf	0.20	
	Dense turf	0.35	
	Dense shrubbery and forest litter	0.4	
Engman (1986)[b]	Concrete or asphalt	0.011	0.010-0.013
	Bare sand	0.010	0.01-0.016
	Graveled surface	0.02	0.012-0.03
	Bare clay-loam (eroded)	0.02	0.012-0.033
	Range (natural)	0.13	0.01-0.32
	Bluegrass sod	0.45	0.39-0.63
	Short grass prairie	0.15	0.10-0.20
	Bermuda grass	0.41	0.30-0.48
Yen (2001)[c]	Smooth asphalt pavement	0.012	0.010-0.015
	Smooth impervious surface	0.013	0.011-0.015
	Tar and sand pavement	0.014	0.012-0.016
	Concrete pavement	0.017	0.014-0.020
	Rough impervious surface	0.019	0.015-0.023
	Smooth bare packed soil	0.021	0.017-0.025
	Moderate bare packed soil	0.030	0.025-0.035
	Rough bare packed soil	0.038	0.032-0.045
	Gravel soil	0.032	0.025-0.045
	Mowed poor grass	0.038	0.030-0.045
	Average grass, closely clipped sod	0.050	0.040-0.060
	Pasture	0.055	0.040-0.070
	Timberland	0.090	0.060-0.120
	Dense grass	0.090	0.060-0.120
	Shrubs and bushes	0.120	0.080-0.180
	Business land use	0.022	0.014-0.035
	Semi-business land use	0.035	0.022-0.050
	Industrial land use	0.035	0.020-0.050
	Dense residential land use	0.040	0.025-0.060
	Suburban residential land use	0.055	0.030-0.080
	Parks and lawns	0.075	0.040-0.120

[a]Obtained by calibration of Stanford Watershed Model.
[b]Computed by Engman (1986) by kinematic wave and storage analysis of measured rainfall-runoff data.
[c]Computed on basis of kinematic wave analysis.

Figure 2 -4

Source: *Storm Water Management Model Reference Manual Volume I – Hydrology (Revised) ~ January 2016*

The pre-development condition is an existing and functional dairy operations facility . In the model, clay soil was used for the post-development condition and the pre-development condition for a conservative approach (yield to a higher runoff). Infiltration of rainfall from the pervious area of a sub-catchment into the unsaturated upper soil zone can be described using three different infiltration models: Horton, Green-Ampt, and Curve Number. There is no general agreement on which method of these three is the best.

The Green-Ampt method was chosen to calculate the infiltration of the pervious areas based on the availability of data for this project. It is invoked when editing the infiltration property of a sub-catchment.

The Hydrologic Soil Class identified for this project is a rating of D. This determination was from Web Soil Survey and is provided as Attachment E of this projects SWMM report.

Table 1 – Soil Infiltration Parameter

SWMM Parameter Name	Unit	Range	Use in San Diego
Infiltration	Method	HORTON GREEN_AMPT CURVE_NUMBER	GREEN_AMPT
Suction Head (Green-Ampt)	Inches	1.93 – 12.60 presented in Table A.2 of SWMM Manual	Hydrologic Soil Group A: 1.5 Hydrologic Soil Group B: 3.0 Hydrologic Soil Group C: 6.0 Hydrologic Soil Group D: 9.0
Conductivity (Green-Ampt)	Inches per hour	0.01 – 4.74 presented in Table A.2 of SWMM Manual by soil texture class 0.00 – Ç0.45 presented in Table A.3 of SWMM Manual by hydrologic soil group	Hydrologic Soil Group A: 0.3 Hydrologic Soil Group B: 0.2 Hydrologic Soil Group C: 0.1 Hydrologic Soil Group D: 0.025 Note: reduce conductivity by 25% in the post-project condition when native soils will be compacted. For fill soils in post-project condition, see Section G.1.4.3.
Initial Deficit (Green-Ampt)		The difference between soil porosity and initial moisture content. Based on the values provided in Table A.2 of SWMM Manual, the range for completely dry soil would be 0.097 to 0.375	Hydrologic Soil Group A: 0.30 Hydrologic Soil Group B: 0.31 Hydrologic Soil Group C: 0.32 Hydrologic Soil Group D: 0.33 Note: in long-term continuous simulation, this value is not important as the soil will reach equilibrium after a few storm events regardless of the initial moisture content specified.
Groundwater	yes/no	yes/no	NO
LID Controls			Project Specific
Snow Pack Land Uses Initial Buildup Curb Length			Not applicable to hydromodification management studies

Source: Model BMP Design Manual San Diego Region Appendices, February 26, 2016

LID controls

Utilizing LID controls within a SWMM project is a two-step process that:

- Creates a set of scale-independent LID controls that can be deployed throughout the study area,
- Assign any desired mix and sizing of these controls to designated sub-catchments.

The LID control type that was selected was a biofiltration cell that contains vegetation grown in an engineered soil mixture placed above a gravel drainage bed. Biofiltration provides storage, infiltration (depending on the soil type) and evaporation of both direct rainfall and runoff captured from surrounding areas. For this project, we do not allow infiltration to the existing/filled soil.

SECTION III. CONTINUES SIMULATION OPTIONS

Simulation Dates

These dates determine the starting and ending dates/times of a simulation and are chosen based on the rain data availability.

Start analysis on 09/24/1964
Start Reporting on 09/24/1964
End Analysis on 05/23/2008

Time Steps

The Time Steps establish the length of the time steps used for runoff computation, routing computation and results reporting. Time steps are specified in days and hours: minutes: seconds except for flow routing which is entered as decimal seconds.

Climatology

-Evaporation Data

The available evaporation data for San Diego County that is similar to the Hollandia Dairy project conditions is taken Table G.1-1: Monthly Average Reference Evapotranspiration by ETo Zone for use in SWMM Models for Hydromodification Management Studies in San Diego County CIMIS Zone 6 (in/day).

January	February	March	April	May	June
0.06	0.08	0.11	0.15	0.17	0.19
July	August	September	October	November	December
0.19	0.18	0.15	0.11	0.08	0.06

SECTION IV. BIOFILTRATION AS LID CONTROL

LID controls are represented by a combination of vertical layers whose properties are defined on a per-unit-area basis. This allows an LID of the same design but differing coverage area to easily be placed within different sub-catchments of a study area. During a simulation, SWMM performs a moisture balance that keeps track of how much water moves between and is stored within each LID layer. If the biofiltration basin is full and water is leaving the upper weir, the flow is divided in two flows: the lower flow discharging from the bottom orifice directly draining to the point of compliance and the upper flow is routed at the top of the biofiltration basin and after routing, discharged to the point of compliance. In this project, we used 100% of the area of this specific sub-catchment for biofiltration.

1. Surface

<u>Storage Depth</u>
When confining walls or berms are present, this is the maximum depth to which water can pond above the surface of the unit before overflow occurs (in inches). In this project, storage depths vary. Table 3 shows depths of surface ponding.

<u>Vegetation Volume Fraction</u>
It is the fraction of the volume within the storage depth that is filled with vegetation. This is the volume occupied by stems and leaves, not their surface area coverage. Normally this volume can be ignored, but may be as high as 0.1 to 0.2 for very dense vegetative growth. Based on our visual observation in the field, the average type of vegetation for this site is a low-density vegetation type. Therefore, we used 0.1 for the vegetation volume fraction assuming type of vegetation used is a low-density type.

<u>Surface Roughness</u>
Manning's n value for overland flow over a vegetative surface.

<u>Surface Slope</u>
Slope of porous pavement surface or vegetative swale (percent).

2. Soil

<u>Thickness</u>
The thickness of the soil layer in inches. We used a typical value of 18 inches soil thickness for a biofiltration.

The volume of pore space relative to total volume of soil (as a fraction). We designed it with a soil mix porosity of 0.40 maximum for a good percolation rate (Countywide Model SUSMP Table B1 – Soil Porosity Appendix A: Assumed Water Movement Hydraulics for Modeling BMPs).

<u>Field Capacity</u>
Volume of pore water relative to total volume after the soil has been allowed to drain fully (as a fraction). We used 0.2 for this soil. Below this level, vertical drainage of water through the soil layer does not occur. (See Table 1 – Soil Infiltration Parameter).

Wilting Point
Volume of pore water relative to total volume for a well-dried soil where only bound water remains (as a fraction). The moisture content of the soil cannot fall below this limit.
We assumed the minimum moisture content within this biofiltration soil is 0.1.

Conductivity
Hydraulic conductivity for the fully saturated soil is 5 inches/hour. This is a design minimum value for percolation rate.

Conductivity Slope
Slope of the curve of log (conductivity) versus soil moisture content (dimensionless). Typical values range from 5 for sands to 15 for silty clay. We designed this soil to have a very good percolation rate therefore the conductivity slope is 5.

Suction Head
The average value of soil capillary suction along the wetting front (inches). This is the same parameter as used in the Green-Ampt infiltration model. Table 1 was utilized to determine the capillary of the soil mix top layer of a biofiltration system. The suction head will be 1.5 inches.

3. Storage Layer

The Storage Layer page of the LID Control Editor describes the properties of the crushed stone or gravel layer used in biofiltration cells as a bottom storage/drainage layer. The following data fields are displayed:

Height
this is the thickness of a gravel layer (inches). Crushed stone and gravel layers are vary ranging from 12 to 36 inches thick. A table is provided to summarized the BMP configurations.

Void Ratio
The volume of void space relative to the volume of solids in the layer. Typical values range from 0.5 to 0.75 for gravel beds. Note that porosity = void ratio / (1 + void ratio). We designed this void ratio to have a value of 0.67.

Seepage Rate
The rate at which water infiltrates into the native soil below the layer (in inches/hour). This would typically be the Saturated Hydraulic Conductivity of the surrounding sub-catchment if Green-Ampt infiltration is used. Since the liner beneath the gravel layer is proposed, the seepage rate is assumed to be 0 in/hr.

Clogging Factor
Total volume of treated runoff it takes to completely clog the bottom of the layer divided by the void volume of the layer. For south east biofiltration, a value of 0 was used to ignore clogging since the system does NOT consider infiltration to the native soils. Clogging progressively reduces the Infiltration

Rate in direct proportion to the cumulative volume of runoff treated and may only be of concern for infiltration trenches with permeable bottoms and no under drains. We assumed zero for the clogging factor since the infiltration rate is not considered.

4. Underdrain Layer

LID storage layers can contain an optional underdrain system that collects stored water from the bottom of the layer and conveys it to a conventional storm drain. The Underdrain page of the LID Control Editor describes the properties of this system. It contains the following data entry fields:

Drain Coefficient and Drain Exponent
Coefficient *C* and exponent *n* that determines the rate of flow through the underdrain as a function of height of stored water above the drain height. The following equation is used to compute this flow rate (per unit area of the LID unit):

$q = C(h-Hd)^n$

where *q* is the outflow (in/hr), *h* is the height of stored water (inches), and *Hd* is the drain height. A typical value for *n* would be 0.5 (making the drain act like an orifice.

Drain Offset Height
Height of any underdrain piping above the bottom of a storage layer (inches). In this project, this value was set to 0 as the underdrain piping is at the bottom of the storage layer.

Table 3 – Summary of LID Drain/flow coefficient

Sub Cat Name*	LID Process*	LID Area (sf)*	Orifice D (1/16in)	Orifice D (in)	UD C factor*	T surf (in)*	T soil (in)*	T store (in)*	n (soil)*	e (store)*	Drawdown surface (hr)	Drawdown Soil (hr)	Drawdown Storage (hr)	Drawdown total (hr)
BMP-1	BMP-1	392.19	8	0.5	0.212244661	8	18	12	0.4	0.67	6.5	7.6	13.1	27.2

Note:
$q = C(h-Hd)^n$
C= $C_o A_o \frac{\sqrt{2g}}{A} \times 12^{0.5} \times 3600$

SECTION V. RUNNING THE SIMULATION

In general, the Run time will depend on the complexity of the watershed being modeled, the routing method used, and the size of the routing time step used. The larger the time steps, the faster the simulation, but the less detailed the results.

Model Results

SWMM's Status Report summarizes overall results for the 58-yr simulation. The runoff continuity error is -7.21 % and the flow routing continuity error is 0.02%. When a run completes successfully, the mass continuity errors for runoff, flow routing, and pollutant routing will be displayed in the Run Status window. These errors represent the percent difference between initial storage + total inflow and final storage + total outflow for the entire drainage system. If they exceed some reasonable level, such as 10 percent, then the validity of the analysis results must be questioned. The most common reasons for an excessive continuity error are computational time steps that are too long or conduits that are too short.

In addition to the system continuity error, the Status Report produced by a run will list those nodes of the drainage network that have the largest flow continuity errors. If the error for a node is excessive, then one should first consider if the node in question is of importance to the purpose of the simulation. If it is, then further study is warranted to determine how the error might be reduced.

The SWMM program ranks the partial duration series, the exceedance frequency and the return period. They are computed using the Weibull formula for plotting position. See the flow duration curve and peak flow frequency on the following pages.

SECTION VI. RESULT ANALYSIS

Development of the Flow Duration Statistics

The flow duration statistics are also developed directly from the SWMM binary output file. It should be noted right from the start that the "durations" that we are talking about in this section have nothing to do with the "storm durations" presented in the peak flow statistics section. Other than using the same sequence of letters for the word, the two concepts have nothing to do with each other and the reader is cautioned not to confuse the two. The goal of the flow duration statistics is to determine, for the flow rates that fall within the hydromorphologicaly significant range, the length of time that each of those flow rates occur. Since the amount of sediment transported by a river or stream is proportional to the velocity of the water flowing and the length of time that velocity of flow acts on the sediment, knowing the velocity and length of time for each flow rate is very useful.

Methodology

The methodology for determining the flow duration curves comes from a document developed by the U.S. Geological Survey (USGS). The first stop on the journey to find this document was a link to the USGS water site (http://www.usgs.gov/water/). This link is found in Appendix E (SDHMP Continuous

SECTION V. RUNNING THE SIMULATION

In general, the Run time will depend on the complexity of the watershed being modeled, the routing method used, and the size of the routing time step used. The larger the time steps, the faster the simulation, but the less detailed the results.

Model Results

SWMM's Status Report summarizes overall results for the 58-yr simulation. The runoff continuity error is -7.21 % and the flow routing continuity error is 0.03%. When a run completes successfully, the mass continuity errors for runoff, flow routing, and pollutant routing will be displayed in the Run Status window. These errors represent the percent difference between initial storage + total inflow and final storage + total outflow for the entire drainage system. If they exceed some reasonable level, such as 10 percent, then the validity of the analysis results must be questioned. The most common reasons for an excessive continuity error are computational time steps that are too long or conduits that are too short.

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Simulation Modeling Primer), found in the County Hydromodification Management Plan[1]. On this web site a search for "Flow Duration Curves" leads to USGS Publication 1542-A, Flow-duration curves, by James K. Searcy 1959 (http://pubs.er.usgs.gov/publication/wsp1542A). In this publication the development of the flow duration curves is discussed in detail.

In Pub 1542-A, beginning on page 7 an example problem is used to illustrate the compilation of data used to create the flow duration plots. A completed form 9-217-c form shows the monthly tabulation of flow rates for Bowie Creek near Hattiesburg, Miss. For each flow range the number of readings is tabulated and then the total number of each flow rate is totaled for the year. It should be noted that while this example is for a stream with a minimum flow rate of 100cfs, for the purposes of run-off studies in Southern California the minimum flow rate of zero (0) cfs is the common low flow value. Once each of the year's data has been compiled the summary numbers from each year are transferred to form 9-217-d. On this form the total number of each flow rate is again totaled and the percentage of time exceeded calculated (as will be explained later under the discussion of our calculations). Once the data has been compiled a graph of Discharge Rate vs. Percent Time Exceeded is developed. As will be explained in the next section, the use of these curves leads to the amount of time each particular flow can be expected to occur (based on historical data).

How to Read the Graphs[2]

Figure 6-1 shows a flow duration curve for a hypothetical development. The three curves show what percentage of the time a range of flow rates are exceeded for three different conditions: pre-project, post-project and post-project with storm water mitigation. Under pre-project conditions the minimum geomorphically significant flow rate is 0.10cfs (assumed) and as read from the graph, flows would equal or exceed this value about 0.14% of the time (or about 12 hours per year) (0.0014 x 365days x 24 hour/day). For post-project conditions, this flow rate would occur more often – about 0.38% of the time (or about 33 hours per year) (0.0038 x 365days x 24 hour/day). This increase in the duration of the geomorphically significant flow after development illustrates why duration control is closely linked to

[1] FINAL HYDROMODIFICATION MANAGEMENT PLAN, Prepared for County of San Diego, California, March 2011, by Brown and Caldwell Engineering of San Diego. (http://www.projectcleanwater.org/images/stories/Docs/LDS/HMP/0311_SD_HMP_wAppendices.pdf)

[2] The graph and the explanation were taken directly from Appendix E of the Hydromodification Plan

protecting creeks from accelerated erosion.

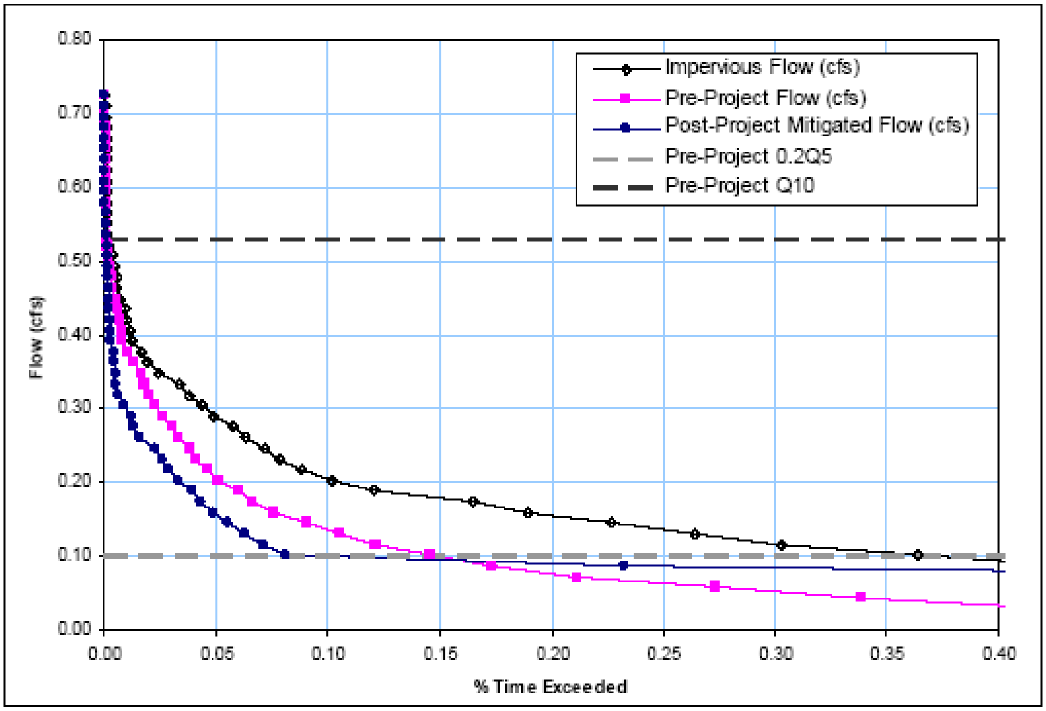


Figure 6-1. Flow Duration Series Statistics for a Hypothetical Development Scenario

Development of Flow Duration Curves

The first step in developing the flow duration curves is to count the number of occurrences of each flow rate. This is done by first rounding every non-zero flow value to an appropriate number of decimal places (say two places). This in effect groups each flow into closely related values or "bins" as they are referred to in publication 9-217d. Then the entire runoff record is queried for each value and the number of each value counted. The next step is to enter the results of the query into a grid patterned after form 9-217d. The data is entered in ascending order starting with the lowest flow first. The grid is composed of four columns. They are (from left to right) Discharge Rate, Number of **Periods (count),** Total Periods Exceeding (the total number of periods equal to or exceeding this value), and Percent Time Exceeded. Starting at the top row (row 1), the flow rate (which is often times zero) is entered with the corresponding number of times that value was found. The next column is the total number of values greater than or equal to that flow rate. For the first flow rate point, by definition all flow rate values are greater than or equal to this value, therefore the total number of runoff records of the rainfall record is entered here. The final column which is the percent of time exceeded is calculated by dividing the total periods exceeded by the total number of periods in the study. For the first row this number should be 100%

For the next row (row 2), the flow rate, and the flow rate count are entered. The total number of periods exceeding for row 2 is calculated by subtracting Number of Periods of row 1 from the Total Periods Exceeding of line 1. This result is entered in the Total Periods Exceeding on row 2. As was the case for line 1, the final column is calculated by dividing the total periods exceeded by the total number of periods in the study. For the second row this number should be something less than 100% and continually decrease as we move down the chart. If all the calculations are correct, then everything should zero out on the last line of the calculations.

The final step in developing the flow duration curves is to make a plot of the Discharge Rate vs. the Percent Time Exceeded. For the purposes of this report, the first value corresponding to the zero flow rate is not plotted allowing the graph to be focused on the actual flow rate values.

The Flow Duration Analysis

The Peak Flow Statistics analysis is composed of the following series of files:

1. The Flow Duration Plot
2. Comparison of the Un-Mitigated Flow Duration Curve to the Pre-Development Curve (Pass/Fail)
3. Comparison of the Mitigated Flow Duration Curve to the Pre-Development Curve (Pass/Fail)
4. The calculations for the Pre-Development flow duration curve development (USGS9217d)
5. The calculations for the Post-Development flow duration curve development (USGS9217d)
6. The calculations for the Mitigated flow duration curve development (USGS9217d)

The Flow Duration Plot

The Flow Duration Curves Plot is the plotting of all three (pre, un-mitigated and mitigated) sets of Discharge Rate vs. the Percent Time Exceeded data point pair lists. In addition to these curves horizontal lines are plotted corresponding to the Q_{10} and Q_{lf} (low flow threshold) values. Within the geomorphically significant range (Q_{10} – Q_{lf}) one can see a visual representation of the relative positions of the flow duration curves. The flow duration curves are compared in an East/West (horizontal) direction to compare post development Discharge Rates to pre-development Discharge Rates. The pre-development curve is plotted in blue, the unmitigated curve is plotted in red, and the mitigated curve is plotted in green. As long as the post development curve lies to the left of the pre-development curve (mostly[3]), the project meets the peak flow hydromodification requirements.

Pass/Fail comparison of the curves

The next two sets of data are the point by point comparison of the post-development curve(s) and the pre-development curve. The Pass/Fail table is helpful in determining compliance since the plotted lines can be difficult to see at the scales suitable for use in a report. Each point on the post- development curve has a corresponding "Y" value (Flow Rate), and "X" value (% Time Exceeded). For each point on the post development curve, the "Y" value is used to interpolate the corresponding Percent Time Exceeded (X) value from the pre-development curve. Then the Post-development Percent Time Exceeded value is compared to the pre-development Percent Time Exceeded value. Based on the relative values of each point, pass/fail criteria are determined point by point.

For each set of data, the upper right hand header value shows the name of the file being displayed (ex. flowDurationPassFailMitigated.TXT). The first line of the file shows the name of the SWMM output file (*.out). The next line shows the time stamp of the SWMM file that is being analyzed. The time stamps of all of the report files should be within a minute or two of each other, otherwise there may have been

[3] See hydromodification limits for exceedance of pre-development values

tampering with the files. Each report run creates and prints all of the files and reports at one time so all the time stamps should be very close.

The first column is the zero based number of the point. The next two columns show the post development "X" and "Y" values. The next column shows the value interpolated between the two bounding points on the pre-development curve. The next three columns show the true or false values of the comparison of the two "X" values. The last column shows the resultant pass or fail status of the point. There are three ways a point can pass. They are:

1. Q_{post} being outside of the geomorphically significant range Q_{lf} to Q_{10}
2. Q_{post} being less than Q_{pre}
3. Q_{post} being less than 110% of the value of Q_{pre} if the point is between Q_{lf} and Q_{10}

There are two ways that a point can fail. They are:

1. Q_{post} being greater than 110% of Q_{pre} if the point is between Q_{lf} and Q_{10}
2. If more than 10% of the points are between 100% and 110% of Q_{pre} for the points between Q_{lf} and Q_{10}

A quick scan down the last column will quickly tell if there are any points that fail.

At the bottom of each set of data are the date stamp of the report to the left, and to the right is the page number/number of pages for the specific set of data (not the pages of the report!). Each new set of data has its own page numbering. Between the file name in the header row and the page numbering in the footer row, the engineer can readily scan the document for the data of interest.

Plan Check Suggestions

As was described under the peak flow section, is the responsibility of the reviewing agency to confirm that the data sets presented are valid results from consistent calculations, and that any and all results can be duplicated by manual methods and achieve the same results. In light of these goals, the plan checker is invited to consider the following tasks as part of the plan check process.

Compare the Data Stamps for Each of the Statistics Files Used In This Analysis.

As was described in the Peak Flows section, all report files should have time stamps that are nearly identical. If the time values are more than a few minutes apart then the potential for inconsistent results files should be investigated.

Verify the Flow Rate Counts

For each of the pre, and mitigated flow duration tables, a few randomly selected flow value counts should be checked against the values taken directly from the SWMM file. This can be done by opening the corresponding SWMM file, selecting the outfall node, selecting Report>Table>By Object, Setting the time format to Date/Time, selecting the appropriate node value, and clicking the OK button to generate a table of the date/time/Total Inflow values. Next step is to click in the left most header row of the SWMM table which will select the entire table. Now from the main menu select Edit>Copy To>Clipboard. Now open a new blank sheet in MS Excel (or suitable spread sheet program) select cell

A1 and paste the results from the clipboard into the spread sheet. Now sort the values based on the Total Inflow column. This will group all the flow values together enabling the number of occurrences of each value to be counted. At this point the a few (or all) of the counts on the various USGS9217d.txt files can be verified.

Manually Verify That the Percent Exceeded Values (form USGS9217d) are Correctly Calculated

The discharge rates and counts are confirmed as was described above. The top row should be the smallest runoff value (0.00cfs usually). Total Periods Exceeding of the first line should be the total number of rainfall records in the study. The percentage of Time Exceeding should be the total periods Exceeding divided by the total number of rainfall records in the study (100% for the first line). For each successive discharge rate, the total periods exceeding for the current line should be the total periods exceeding from the line above minus the number of periods from the line above. The number of periods and the number of periods exceeding should zero out at the last line.

Compare Plotted Curves to Table Data
Randomly check a few of the plotted points against the values verified above.
Verify by Observation that the plotted values of Q_{10} and Q_{lf} are reasonable.
Verify that the correct values for each of these return periods are plotted correctly on the graph.

Development of the Peak Flow Statistics

The peak flow statistics are developed directly from the binary output file produced by the SWMM program. The site is modeled three ways, Pre-Development, Post-Development-Unmitigated, and Post-Development-Mitigated. For each of these files a specific time period differentiating distinct storms is chosen. The SWMM results are extracted and each flow value is queried. The majority of the values for Southern California sites are zero flow. As each successive record is read, as soon as a non-zero value is read the time and flow value of that record are recorded as the beginning of an event. The first record is automatically recorded as the “tentative” peak value. As each successive non-zero value is read and the successive flow value is compared to the peak value and the greater value is retained as the peak value of the storm. As soon as a successive number of zero values equal to the predetermined storm separation value, then the time value of the last non-zero value is recorded as the end of the storm, the duration of the storm is the difference between the end time and the start time, and the peak value is recorded as the highest flow value between the start and end times.

Once the entire SWMM output file is read all of the distinct storm events will have been recorded in a special list. The storms will be in the order of their occurrence. To develop the peak flow statistics table the first step is to sort the storms in descending order of the peak flow value. Once the list is sorted then the relative rank of each storm is assigned with the highest ranking storm being the storm with the highest peak flow. There are several methods that can be used to determine which storm should be ranked above another equally valued storm. For the purposes of these studies an Ordinal ranking is used so that each storm has a unique rank number. Where two or more storms have equal flow values, the earlier storm is assigned the higher rank. This is done consistently throughout the storm record. Since we are only looking at peak flow statistics, it is assumed that the relative ranking of individual (but equal) storms is irrelevant to the calculations.

The exceedance frequency and return period are both computed using the Weibull formula for plotting position. Therefore, for a specific event the exceedance frequency F and the return period in years T are calculated using the following equations[4]:

$F=m/(n_R+1)$ and $T=n+1/m$

where m is the event's rank, n_R is the total number of events and n is the number of years under analysis.

Once the Peak flow statistics table is complete, a plot of Return Frequency vs. peak flow is created. All three conditions (pre, post and mitigated) are plotted on the same plot.

The Peak Flow Statistics Analysis

The Peak Flow Statistics analysis is composed of the following series of files:

1. The Peak Flow Frequency Plot
2. The Comparison of the Un-Mitigated Peak Flow Curve to the Pre-Development Curve (Pass/Fail)
3. The Comparison of the Mitigated Conditions Curve to the Pre-Development Curve (Pass/Fail)
4. The Peak Flow Statistics Calculation for the Pre-Development Curve.
5. The Peak Flow Statistics Calculation for the Un-Mitigated Curve.
6. The Peak Flow Statistics Calculation for the Mitigated Curve.

The Peak Flow Frequency Plot

The Peak Flow Frequency Curves are the plotting of all three (Pre, Un-Mitigated and Mitigated) sets of return Period vs peak flow data point pair lists. In addition to these curves horizontal lines are plotted corresponding to the Q_{10}, Q_5, Q_2 and Q_{lf} (low flow threshold) values. Within the geomorphically significant range ($Q_{10} – Q_{lf}$) one can see a visual representation of the relative positions of the peak flow curves. The peak flow curves are compared in a North/South (vertical) direction to compare post development peak flows to pre-development flows. The Pre-Development curve is plotted in blue, the unmitigated curve is plotted in red, and the mitigated curve is plotted in green. As long as the post development curve lies below the pre-development curve (mostly[5]), the project meets the peak flow hydromodification requirements.

Pass/Fail comparison of the curves

The next two sets of data are the point by point comparison of the post-development curve(s) and the pre-development curve. The Pass/Fail table is helpful in determining compliance since the plotted lines can be difficult to see at the scales suitable for use in a report. Each point on the post- development curve has a corresponding "X" value (Recurrence Interval), and "Y" value (Peak Flow). For each point on the post development curve, the "X" value is used to interpolate the corresponding peak flow value from the pre-development curve. Then the Post-development peak flow value is compared to the pre-development peak flow value. Based on the relative values of each point, pass/fail criteria are determined point by point.

[4] Pg 169-170 STORM WATER MANAGEMENT MODEL APPLICATIONS MANUAL, EPA/600/R-09/000 July 2009
[5] See hydromodification limits for exceedance of pre-development values

For each set of data, the upper right hand header value shows the name of the file being displayed (ex. peakFlowPassFailMitigated.TXT). The first line of the file also shows this value. The next line shows the time stamp of the file that is being analyzed. The time stamps of all of the report files should be within a minute or two of each other, otherwise there may have been tampering with the files. Each report run creates and prints all of the files and reports at one time so all the time stamps should be very close. It should be noted that the SWMM.out files will not have related time stamps since each file is developed independently.

The first column is the zero based number of the point. The next two columns show the post development "X" and "Y" values. The next column shows the value interpolated between the two bounding points on the pre-development curve. The next three columns show the true or false values of the comparison of the two "Y" values. The last column shows the resultant pass or fail status of the point. There are three ways a point can pass. They are:

1. Point is outside of the geomorphically significant range $Q_{10} – Q_{lf}$
2. Q_{post} being less than Q_{pre}
3. Q_{post} being less than 110% of the value of Q_{pre} if the point is between Q_5 and Q_{10}[6]

There are four ways that a point can fail. They are:

1. Q_{post} being greater than Q_{pre} if the point is between Q_{lf} and Q_5
2. Q_{post} being greater than 110% of Q_{pre} if the point is between Q_{lf} and Q_{10}
3. If more than 10% of the points are between 100% and 110% of Q_{pre} for the points between Q_5 and Q_{10}
4. If the frequency interval for points > 100% of Q_{pre} is greater than 1 year for the points between Q_5 and Q_{10}

A quick scan down the last column will quickly tell if there are any points that fail.

At the bottom of each set of data are the date stamp of the report to the left, and to the right is the page number/number of pages for the specific set of data (not the pages of the report!). Each new set of data has its own page numbering. Between the file name in the header row and the page numbering in the footer row, the engineer can readily scan the document for the data of interest.

The Peak Flow Statistics Calculations

There are three sets of data for the Peak Flow Statistics calculations (Pre-Development, Un-Mitigated, and Mitigated). As was the case for the pass/fail data, the upper right hand corner of each sheet has the file name. The first row of the data is the SWMM file name. The second row is the SWMM file time stamp of the file being analyzed. The 4th, 5th, and 6th rows are the calculated values for Q_{10}, Q_5, and Q_2. These values are derived by linear interpolation between the nearest bounding points in the listing. While the relationship between the points in the peak flow analysis is not technically a linear relationship, the error introduced in using linear interpolation between such relatively close data points is assumed to be irrelevant. Finally, the footer row shows the report time and the page/number of pages of the data set.

[6] See section on how a point can fail point number 3 hereon

As was previously discussed, each storm listed was determined by reading the flow values directly from the binary output file from the SWMM program. The storms were then sorted in descending order of peak flow values. Then each storm was assigned a unique rank, then the Frequency and Return Period were calculated using Weibull formulas. Every discharge value for the entire rainfall record is listed in each of these lists. It should be noted that the derivation of these peak flow statistics values use full precision (i.e. no rounding off) of the SWMM output values. Since the precision of the calculations may not be the same as the SWMM program uses, and also the assignment of rank to values of equal peak flow value may differ slightly from the way SWMM calculates the tables, minor variances in the data values and/or the order of storms can be expected.

Finally, as was previously stated, the values of the Return Period were plotted vs. the peak flow values to develop the peak flow frequency curves.

Plan Check Suggestions

As is the responsibility of the reviewing agency, any and all methods should be considered to verify that the SWMM analysis adequately models the site as far as hydrologic discharge is concerned, and that the data sets presented are valid results from consistent calculations, and that any and all results can be duplicated by manual methods and achieve the same results. In light of these goals, the plan checker is invited to consider the following tasks as part of the plan check process.

Compare the Data Stamps for Each of the Statistics Files Used In This Analysis.

For each set of calculations and report files, the first step of the process is to list out all the files in the report folder and delete those files. The very first step leaves the reports folder completely empty. Then as each successive step is performed, the results file is placed in the reports folder. Once all of the results files are complete, then the report file is compiled using the data directly from the files placed in the results folder. This means that the time stamps on each of the report files in the report should be within a minute or two depending on the speed of the computer. If the time values are more than a few minutes apart then the potential for inconsistent results files should be investigated.

Verify A Few Random Storm Statistics

For each of the Pre, Un-mitigate and Mitigated peak flow statics tables, a few randomly selected storms should be checked against the values taken directly from the SWMM file. This can be done by opening the corresponding SWMM file, selecting the outfall node, selecting Report>Table>By Object, Setting the time format to Date/Time, selecting the appropriate node value, and clicking the OK button to generate a table of the date/time/Total Inflow values. Now scroll down the list to the start date and time of the randomly selected storm. Verify that the start date, end date, and the highest flow value between the start and end date correspond to the values shown in the statistics table. Do this for a few storm to verify that the data corresponds to the SWMM output file. Verify by hand a few of the frequency and return period values.

Compare Plotted Curves to Table Data

Randomly check a few of the plotted points against the values found in the Peak Flow Frequency Tables.

Verify by Observation that the values of Q_{10}, Q_5, Q_2 and Q_{lf} are reasonable.

For each value shown on the reports, verify that the value shown for say Q10 is in between the next higher return period and the next lower period. Also verify that the correct values for each of these return periods are plotted correctly on the peak flow frequency graph.

Manually Verify That the Pass Fail Table Is Correctly Calculated

Select at random several points on each of the pass/fail tables to verify that the values for post X/Y and interpolated Y look reasonable. Also check that the various test results are shown accurately in the chart and also the final pass/fail result looks accurate.

Drawdown Time of Bio-filtration Surface Ponding

The drawdown time for hydromodification flow control facilities was calculated by assuming a starting water surface elevation coincident with the peak operating level in the bio-filtration facility such as the elevation at the weir or the emergency spillway overflow.

The instruction from the county of San Diego Department of Environmental Health (DEH) limits the drawdown time hydromodification flow control facilities to 96 hours. This restriction was implemented as mitigation to potential vector breeding issues and the subsequent risk to human health. See Attachment C for Drawdown time of each pond and derivations of drawdown times for BMPs.

Drawdown time and Calculations are included as Attachment D of this SWMM report.

VII. SUMMARY AND CONCLUSION

Hydromodification calculations were performed utilizing continuous simulation to size storm water control facilities. SWMM (Storm Water Management Model) version 5.0 distributed by USEPA was used to generate computed peak flow recurrence and flow duration series statistics.

There are several tributary areas planned as industrial use treated by 5 biofiltration basins (labeled as BMP-# (Best Management Practices) with a total tributary area of approximately 4.43 acres. The areas were grouped based on its outfall and were analyzed for pre-development and mitigated post-development conditions; Whole Basin A drains to one point of compliance (POC).

The analyzed SWMM runs attached show that the proposed biofiltration facilities provided with variety of orifice flow control at the base of the gravel storage configured as shown in Figure 6-1 is in compliance with the HMP and BMP Manual.

Hollandia Dairy Re-Development

On POC, The flow duration curve on the following page shows the existing condition 27.1 hours (0.309%×365days×24 hour/day = 27.1 hours).

With the proposed square footage of LID areas and orifices acting as the low flow restrictor configured as shown in Figure 1 the duration of the flow is 27.2 hours (0.310×365days×24 hour/day =27.2 hours). This flow duration is higher than the existing conditions but within the allowable 10%.Therefore, this study has demonstrated that the proposed optimized biofiltration basin is sufficient to meet the current HMP and BMP criteria (See Table 7-1).

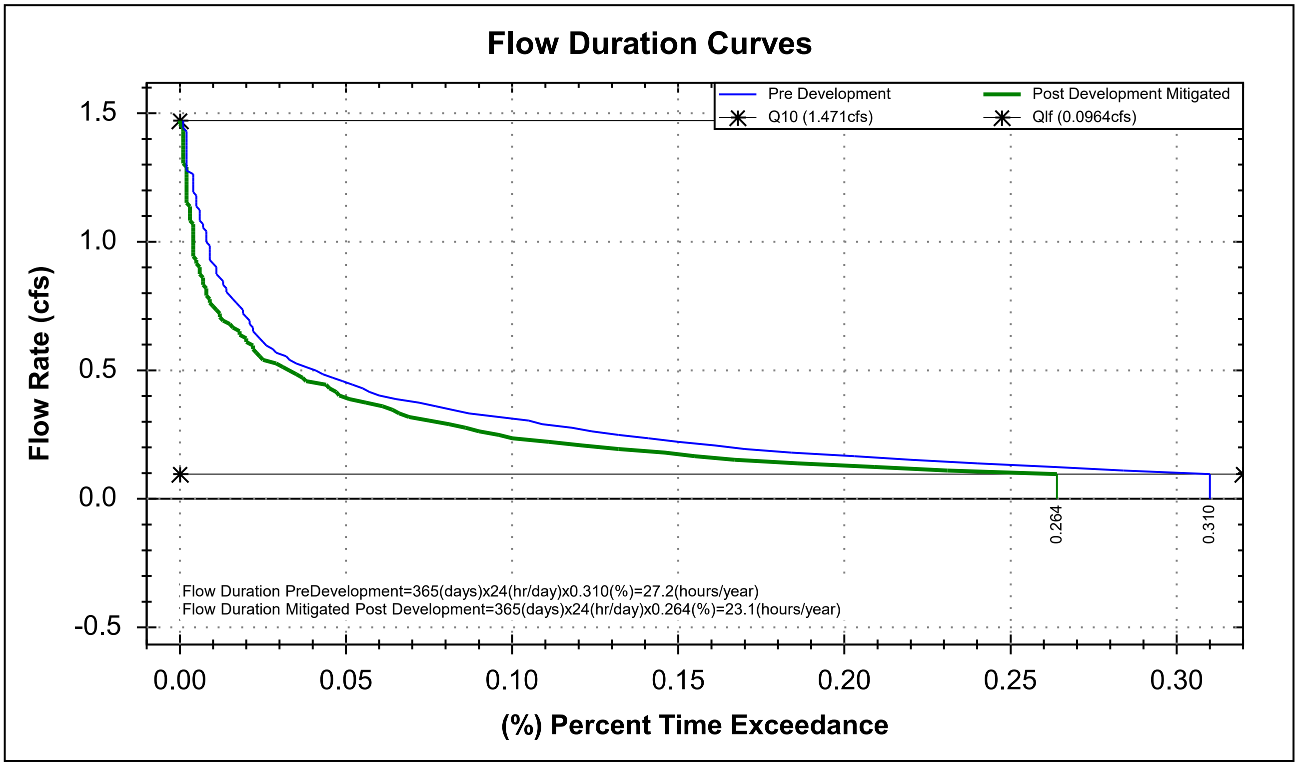
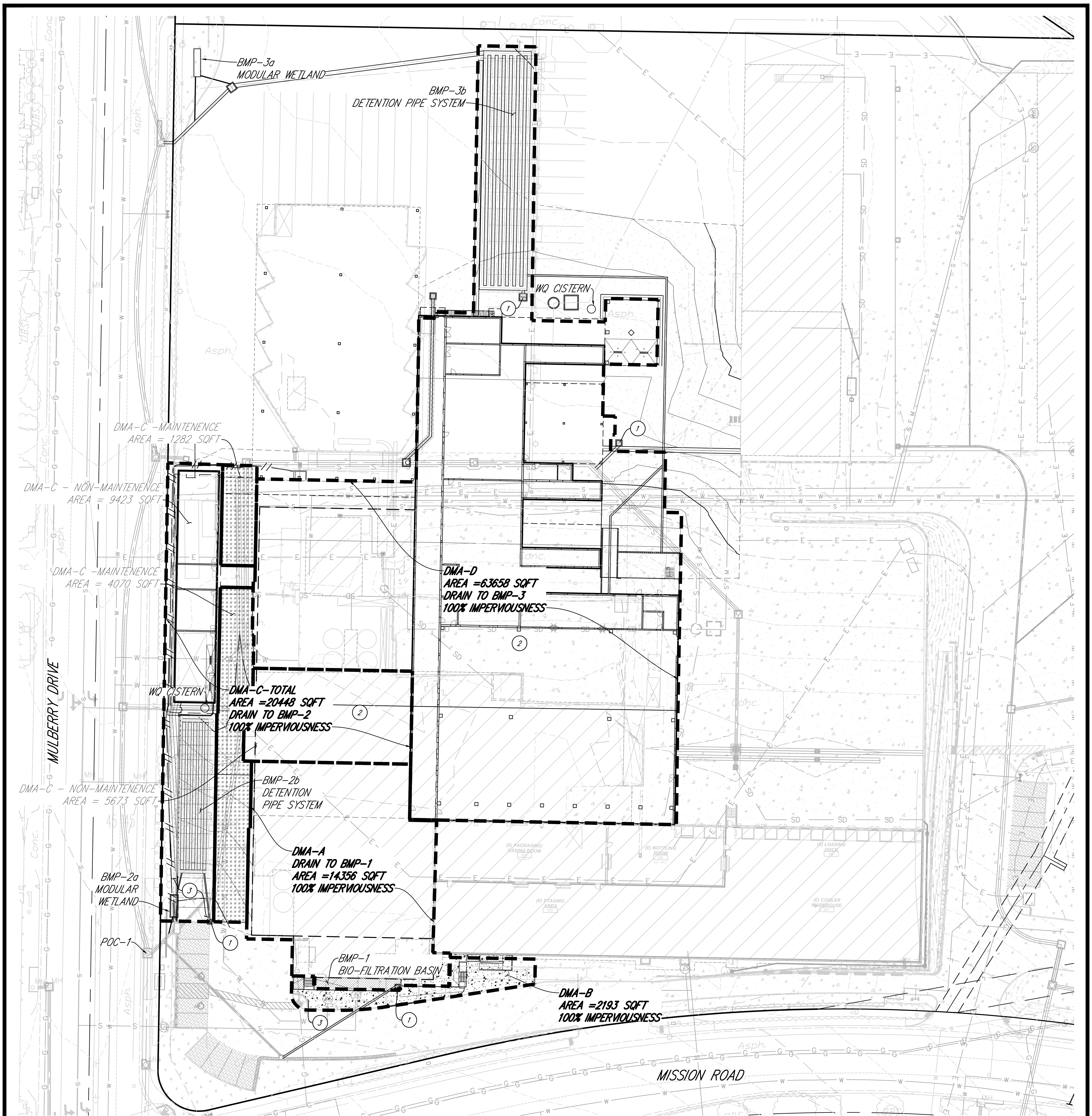


Table 7-1

Attachment A SWMM Drainage Management Area Map



LEGEND

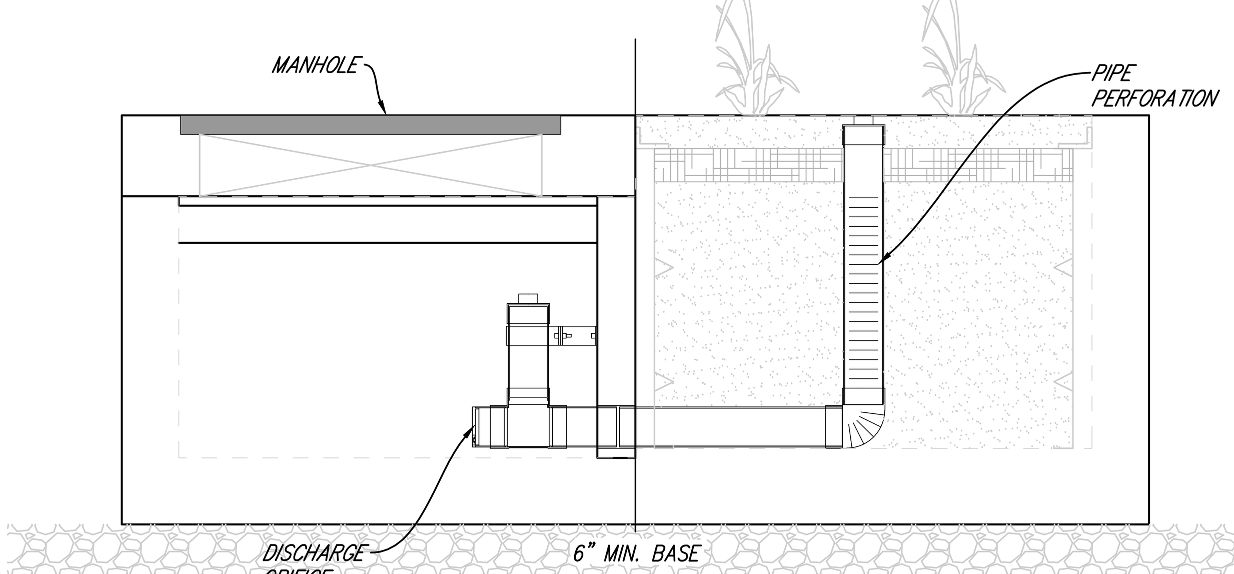
NAME	SYMBOL
EXISTING MAJOR CONTOUR (SURVEYED)	
EXISTING MAJOR CONTOUR (SanGIS)	
PROPOSED MAJOR CONTOUR	
BASIN DELINEATION	
EXISTING DRIVEWAY TREATED IN LIEU OF PROPOSED SIDEWALK IN DMA-B	

NOTES:
1. ADDITIONAL AREA WITHIN DMA-C TO COMPENSATE FOR UNTREATABLE RUN OFF FROM DMA-B.
2. BMP 2b AND 3b ARE DETENTION PIPES THAT ACT AS FOREBAYS FOR HYDROMODIFICATION CONTROL.
3. UNDERLYING HYDROLOGIC SOIL GROUP FOR THIS SITE IS TYPE "D".
4. APPROXIMATE DEPTH TO GROUND WATER IS MORE THAN 20 FT.
5. THERE IS NO CRITICAL COARSE SEDIMENT YIELD AREA WITHIN THE PROJECT SITE.

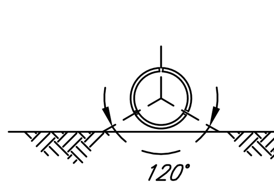
DMA:
UNDERLYING SOIL GROUP: D
APPROXIMATE DEPTH TO GROUNDWATER: 4FT-8FT

SCALE: 1"=30'
0 30 60 90 120

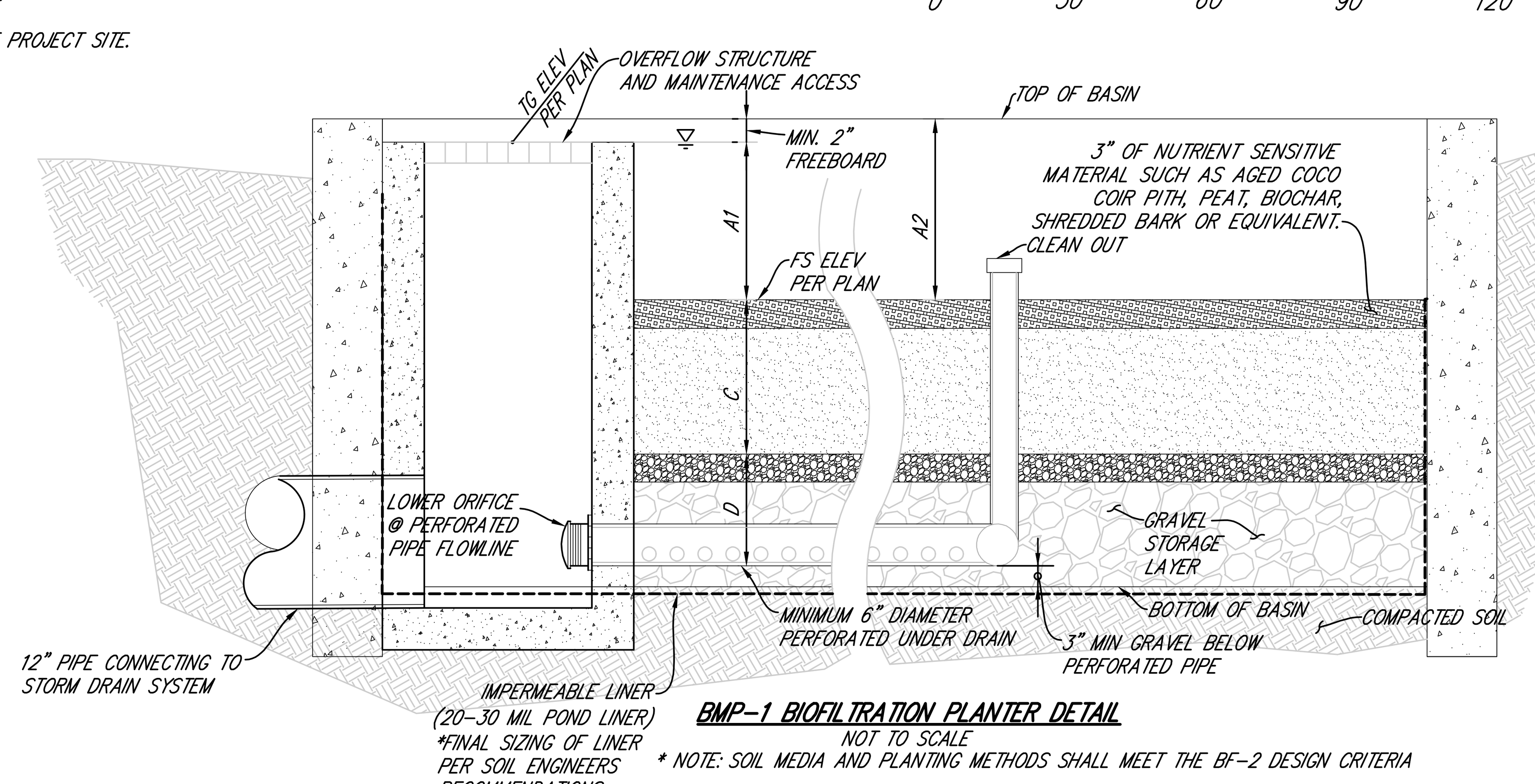
NO.	SOURCE CONTROL BMPs	IMPLEMENTATION
1	INLET STENCILING	MARK INLET WITH THE WORDS : "NO DUMPING! DRAINS TO WATERWAYS"
2	PREVENTION OF ILLICIT DISCHARGES	ALL INDUSTRIAL PROCESSES TO BE PERFORMED INDOORS. NO PROCESSES TO DRAIN TO EXTERIOR OR TO STORM DRAIN SYSTEM.
3	SIDE WALK/PARKING LOT MAINTENANCE	SWEEP REGULARLY TO PREVENT ACCUMULATION OF LITTER & DEBRIS



BMP-2a AND BMP-3a MODULAR WETLAND DETAIL
NOT TO SCALE



6" PVC PIPE PERFORATION LAYOUT DETAIL
NOT TO SCALE



BMP-1 BIOFILTRATION PLANTER DETAIL
NOT TO SCALE
* NOTE: SOIL MEDIA AND PLANTING METHODS SHALL MEET THE BF-2 DESIGN CRITERIA

BIO-BASIN SUMMARY TABLE

BMP ID	SURFACE FOOTPRINT (SQFT)	A1 (INCH)	A2 (INCH)	C (INCH)	D (INCH)	RISER SIZE (INCH)	ORIFICES DIAMETER		IMPERMEABLE LINER
							UPPER (INCH)	LOWER (INCH)	
BMP-1	392	7	9	21	9	24X24	N/A	0.5	YES

* FREEBOARD=A2-A1

MODULAR WETLAND SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT		PROVIDED TREATMENT		ORIFICE OUT (INCH)
				VALUE	UNITS	VALUE	UNITS	
BMP-2a	MWS-L-4-8	606.71	606.21	1495	CF	1692	CF	0.50
BMP-3a	MWS-L-4-6	610.04	609.54	4650	CF	9306	CF	0.69

DETENTION PIPE SYSTEM SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT		PROVIDED TREATMENT		ORIFICE OUT (INCH)
				VALUE	UNITS	VALUE	UNITS	
BMP-2b	N/A	606.84	606.84	1495	CF	1692 CF	CF	N/A
BMP-3b	N/A	610.06	610.04	4650	CF	9306 CF	CF	N/A

SUMMARY OF DMAs

DMA ID NO.	AREA (SQFT)	DMA TYPE
DMA-A	14,356	DRAIN TO BMP
DMA-B	2,193	N/A*
DMA-C	20,448	DRAIN TO BMP
DMA-D	63,658	DRAIN TO BMP

*DMA-B TREATMENT AREA IS INCLUDED IN DMA-C. THUS, DMA-C TREATMENT AREA IS INCREASED BY AT LEAST THE AMOUNT REQUIRED TO BE TREATED IN DMA-B.

HOLLANDIA RE-DEVELOPMENT
DMA EXHIBIT

G:\08\08067\gp\gp10\Storm\m\SWQMP\Attachment 1\DMA Exhibit.dwg 2/19/2020 10:11 AM ORIGINAL PLOT SIZE: ----

Attachment B SWMM Statistics Analysis, Flow Duration Curve and Pass/Fail Table

STATISTICS ANALYSIS OF THE SWMM FILES FOR:

DISCHARGE NODE: POC-1

ANALYSIS DETAILS

Statistics Selection: Nodes/Total Inflow
Stream Susceptibility to Channel Erosion: High (Qlf = (0.1)Q2)
Assumed time between storms (hours): 24

PRE-DEVELOPMENT SWMM FILE

SWMM file name: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-pre.out
SWMM file time stamp: 2/3/2020 10:12:51 AM
Selected Node to Analyze: POC-1

POST-DEVELOPMENT MITIGATED SWMM FILE

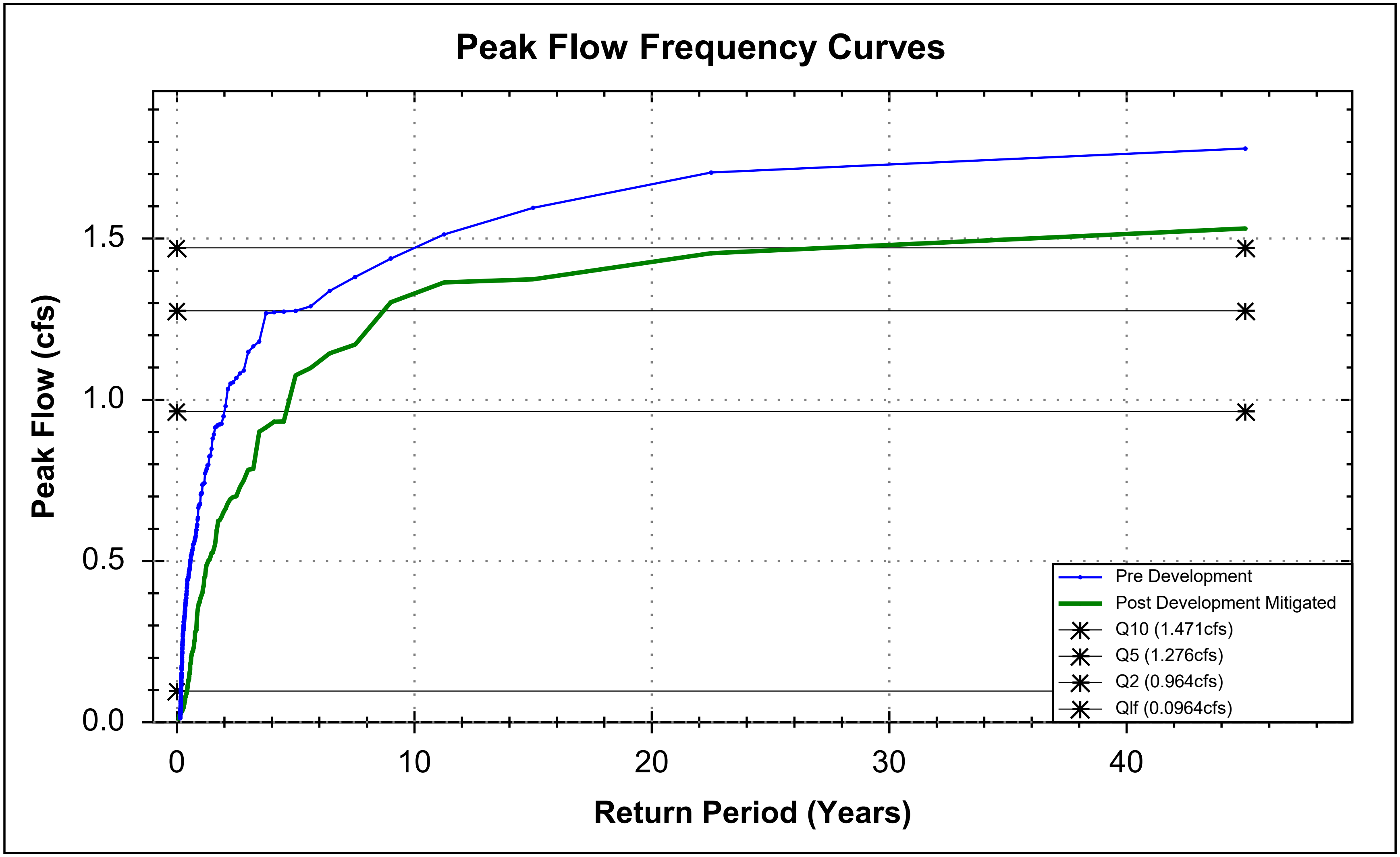
SWMM file name: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-post.out
SWMM file time stamp: 2/11/2020 11:31:23 AM
Selected Node to Analyze: POC-1

MITIGATED CONDITIONS RESULTS

For the Mitigated Conditions:
    Peak Flow Conditions PASS
    Flow Duration Conditions PASS

The Mitigated Conditions peak flow frequency curve is composed of 581 points. Of the points, 1 point(s) are above the flow control upper limit (Q10), 473 point(s) are below the low flow threshold value (Qlf). Of the points within the flow control range (Qlf to Q10), 107 point(s) have a lower peak flow rate than pre-development conditions. These points all pass. There are no points that failed, therefore the unmitigated conditions peak flow requirements have been met.

The Mitigated Conditions flow duration curve is composed of 100 flow bins (points) between the upper flow threshold (cfs) and lower flow threshold (cfs). Each point represents the number of hours where the discharge was equal to or greater than the discharge value, but less than the next greater flow value. Comparing the post-development flow duration curve to the pre-development curve, 99 point(s) have a lower duration than pre-development conditions. These points all pass. There are no points that failed, therefore the unmitigated conditions flow duration requirements have been met.


Peak Flow Frequency Curves
Peak Flow (cfs)
Return Period (Years)
0.0
0.5
1.0
1.5
0
10
20
30
40
Pre Development
Post Development Mitigated
Q10 (1.471cfs)
Q5 (1.276cfs)
Q2 (0.964cfs)
Qlf (0.0964cfs)

Compare Post-Development Curve to Pre-Development Curve

post-development SWMM file: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-post.out
post-development time stamp: 2/11/2020 11:31:23 AM
Compared to:
pre-development SWMM file: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-pre.out
pre-development time stamp: 2/3/2020 10:12:51 AM

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
0	45.00	1.53	1.78	FALSE	FALSE	FALSE	Pass- Qpost Above Flow Control Upper Limit
1	22.50	1.45	1.70	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
2	15.00	1.37	1.60	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
3	11.25	1.36	1.51	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
4	9.00	1.30	1.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
5	7.50	1.17	1.38	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
6	6.43	1.14	1.34	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
7	5.63	1.10	1.29	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
8	5.00	1.08	1.28	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
9	4.50	0.93	1.27	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
10	4.09	0.93	1.27	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
11	3.75	0.91	1.27	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
12	3.46	0.90	1.18	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
13	3.21	0.79	1.17	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
14	3.00	0.78	1.15	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
15	2.81	0.75	1.09	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
16	2.65	0.73	1.08	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
17	2.50	0.70	1.07	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
18	2.37	0.70	1.05	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
19	2.25	0.69	1.05	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
20	2.14	0.68	1.03	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
21	2.05	0.66	0.98	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
22	1.96	0.65	0.95	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
23	1.88	0.64	0.93	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
24	1.80	0.63	0.92	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
25	1.73	0.62	0.92	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
26	1.67	0.59	0.92	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
27	1.61	0.55	0.91	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
28	1.55	0.54	0.89	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
29	1.50	0.53	0.88	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
30	1.45	0.52	0.85	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
31	1.41	0.51	0.83	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
32	1.36	0.50	0.82	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
33	1.32	0.50	0.80	TRUE	FALSE	FALSE	Pass- Qpost < Qpre

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
34	1.29	0.49	0.80	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
35	1.25	0.49	0.79	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
36	1.22	0.47	0.78	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
37	1.18	0.45	0.77	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
38	1.15	0.45	0.74	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
39	1.13	0.42	0.74	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
40	1.10	0.42	0.74	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
41	1.07	0.40	0.74	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
42	1.05	0.40	0.71	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
43	1.02	0.39	0.71	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
44	1.00	0.39	0.71	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
45	0.98	0.38	0.68	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
46	0.96	0.37	0.68	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
47	0.94	0.37	0.67	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
48	0.92	0.37	0.67	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
49	0.90	0.36	0.66	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
50	0.88	0.35	0.63	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
51	0.87	0.35	0.63	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
52	0.85	0.33	0.61	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
53	0.83	0.32	0.61	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
54	0.82	0.29	0.60	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
55	0.80	0.29	0.59	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
56	0.79	0.28	0.58	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
57	0.78	0.28	0.57	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
58	0.76	0.28	0.57	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
59	0.75	0.25	0.57	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
60	0.74	0.25	0.56	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
61	0.73	0.25	0.56	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
62	0.71	0.24	0.55	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
63	0.70	0.23	0.55	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
64	0.69	0.23	0.55	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
65	0.68	0.23	0.55	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
66	0.67	0.22	0.55	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
67	0.66	0.22	0.54	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
68	0.65	0.22	0.53	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
69	0.64	0.22	0.53	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
70	0.63	0.22	0.53	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
71	0.63	0.21	0.53	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
72	0.62	0.21	0.52	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
73	0.61	0.21	0.52	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
74	0.60	0.20	0.52	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
75	0.59	0.20	0.52	TRUE	FALSE	FALSE	Pass- Qpost < Qpre

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
76	0.58	0.19	0.51	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
77	0.58	0.18	0.50	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
78	0.57	0.18	0.50	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
79	0.56	0.18	0.50	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
80	0.56	0.18	0.49	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
81	0.55	0.16	0.49	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
82	0.54	0.16	0.49	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
83	0.54	0.15	0.48	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
84	0.53	0.15	0.48	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
85	0.52	0.15	0.47	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
86	0.52	0.15	0.47	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
87	0.51	0.14	0.47	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
88	0.51	0.13	0.47	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
89	0.50	0.13	0.46	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
90	0.50	0.13	0.46	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
91	0.49	0.13	0.45	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
92	0.48	0.13	0.45	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
93	0.48	0.13	0.45	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
94	0.47	0.13	0.45	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
95	0.47	0.13	0.45	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
96	0.46	0.12	0.45	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
97	0.46	0.12	0.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
98	0.46	0.11	0.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
99	0.45	0.11	0.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
100	0.45	0.11	0.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
101	0.44	0.11	0.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
102	0.44	0.11	0.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
103	0.43	0.10	0.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
104	0.43	0.10	0.43	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
105	0.43	0.10	0.43	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
106	0.42	0.10	0.42	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
107	0.42	0.10	0.42	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
108	0.41	0.09	0.42	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
109	0.41	0.09	0.41	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
110	0.41	0.09	0.41	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
111	0.40	0.09	0.40	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
112	0.40	0.09	0.40	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
113	0.40	0.09	0.40	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
114	0.39	0.09	0.39	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
115	0.39	0.09	0.39	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
116	0.39	0.09	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
117	0.38	0.09	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
118	0.38	0.08	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
119	0.38	0.08	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
120	0.37	0.08	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
121	0.37	0.08	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
122	0.37	0.08	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
123	0.36	0.08	0.37	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
124	0.36	0.08	0.37	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
125	0.36	0.08	0.37	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
126	0.35	0.08	0.37	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
127	0.35	0.08	0.36	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
128	0.35	0.08	0.36	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
129	0.35	0.08	0.36	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
130	0.34	0.07	0.36	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
131	0.34	0.07	0.35	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
132	0.34	0.07	0.35	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
133	0.34	0.07	0.35	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
134	0.33	0.07	0.34	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
135	0.33	0.07	0.34	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
136	0.33	0.07	0.34	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
137	0.33	0.07	0.34	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
138	0.32	0.06	0.34	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
139	0.32	0.06	0.33	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
140	0.32	0.06	0.33	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
141	0.32	0.06	0.33	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
142	0.32	0.06	0.33	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
143	0.31	0.06	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
144	0.31	0.06	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
145	0.31	0.06	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
146	0.31	0.06	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
147	0.30	0.06	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
148	0.30	0.06	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
149	0.30	0.06	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
150	0.30	0.06	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
151	0.30	0.06	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
152	0.29	0.05	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
153	0.29	0.05	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
154	0.29	0.05	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
155	0.29	0.05	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
156	0.29	0.05	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
157	0.29	0.05	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
158	0.28	0.05	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
159	0.28	0.05	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
160	0.28	0.05	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
161	0.28	0.05	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
162	0.28	0.05	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
163	0.27	0.05	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
164	0.27	0.05	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
165	0.27	0.05	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
166	0.27	0.05	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
167	0.27	0.04	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
168	0.27	0.04	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
169	0.27	0.04	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
170	0.26	0.04	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
171	0.26	0.04	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
172	0.26	0.04	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
173	0.26	0.04	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
174	0.26	0.04	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
175	0.26	0.04	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
176	0.25	0.04	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
177	0.25	0.04	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
178	0.25	0.04	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
179	0.25	0.04	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
180	0.25	0.04	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
181	0.25	0.04	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
182	0.25	0.04	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
183	0.25	0.04	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
184	0.24	0.04	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
185	0.24	0.04	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
186	0.24	0.04	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
187	0.24	0.04	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
188	0.24	0.04	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
189	0.24	0.04	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
190	0.24	0.04	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
191	0.23	0.04	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
192	0.23	0.04	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
193	0.23	0.04	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
194	0.23	0.04	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
195	0.23	0.04	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
196	0.23	0.04	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
197	0.23	0.04	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
198	0.23	0.04	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
199	0.23	0.04	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
200	0.22	0.04	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
201	0.22	0.04	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
202	0.22	0.04	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
203	0.22	0.04	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
204	0.22	0.04	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
205	0.22	0.04	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
206	0.22	0.04	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
207	0.22	0.04	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
208	0.22	0.04	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
209	0.21	0.04	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
210	0.21	0.04	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
211	0.21	0.03	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
212	0.21	0.03	0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
213	0.21	0.03	0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
214	0.21	0.03	0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
215	0.21	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
216	0.21	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
217	0.21	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
218	0.21	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
219	0.21	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
220	0.20	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
221	0.20	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
222	0.20	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
223	0.20	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
224	0.20	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
225	0.20	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
226	0.20	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
227	0.20	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
228	0.20	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
229	0.20	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
230	0.20	0.03	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
231	0.19	0.03	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
232	0.19	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
233	0.19	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
234	0.19	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
235	0.19	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
236	0.19	0.03	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
237	0.19	0.03	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
238	0.19	0.03	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
239	0.19	0.03	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
240	0.19	0.03	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
241	0.19	0.03	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
242	0.19	0.03	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
243	0.18	0.03	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
244	0.18	0.03	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
245	0.18	0.03	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
246	0.18	0.03	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
247	0.18	0.03	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
248	0.18	0.03	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
249	0.18	0.03	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
250	0.18	0.03	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
251	0.18	0.03	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
252	0.18	0.03	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
253	0.18	0.03	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
254	0.18	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
255	0.18	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
256	0.18	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
257	0.17	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
258	0.17	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
259	0.17	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
260	0.17	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
261	0.17	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
262	0.17	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
263	0.17	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
264	0.17	0.03	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
265	0.17	0.03	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
266	0.17	0.03	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
267	0.17	0.03	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
268	0.17	0.03	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
269	0.17	0.03	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
270	0.17	0.03	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
271	0.17	0.03	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
272	0.17	0.03	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
273	0.16	0.03	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
274	0.16	0.03	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
275	0.16	0.03	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
276	0.16	0.03	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
277	0.16	0.03	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
278	0.16	0.03	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
279	0.16	0.03	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
280	0.16	0.03	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
281	0.16	0.03	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
282	0.16	0.03	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
283	0.16	0.03	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
284	0.16	0.03	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
285	0.16	0.03	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
286	0.16	0.03	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
287	0.16	0.03	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
288	0.16	0.03	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
289	0.16	0.03	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
290	0.16	0.03	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
291	0.15	0.03	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
292	0.15	0.03	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
293	0.15	0.03	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
294	0.15	0.03	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
295	0.15	0.03	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
296	0.15	0.03	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
297	0.15	0.03	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
298	0.15	0.03	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
299	0.15	0.03	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
300	0.15	0.03	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
301	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
302	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
303	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
304	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
305	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
306	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
307	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
308	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
309	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
310	0.15	0.03	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
311	0.14	0.03	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
312	0.14	0.03	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
313	0.14	0.03	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
314	0.14	0.03	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
315	0.14	0.03	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
316	0.14	0.03	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
317	0.14	0.03	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
318	0.14	0.03	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
319	0.14	0.03	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
320	0.14	0.03	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
321	0.14	0.03	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
322	0.14	0.03	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
323	0.14	0.03	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
324	0.14	0.03	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
325	0.14	0.03	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
326	0.14	0.03	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
327	0.14	0.03	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
328	0.14	0.02	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
329	0.14	0.02	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
330	0.14	0.02	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
331	0.14	0.02	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
332	0.14	0.02	0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
333	0.14	0.02	0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
334	0.13	0.02	0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
335	0.13	0.02	0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
336	0.13	0.02	0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
337	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
338	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
339	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
340	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
341	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
342	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
343	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
344	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
345	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
346	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
347	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
348	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
349	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
350	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
351	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
352	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
353	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
354	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
355	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
356	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
357	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
358	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
359	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
360	0.13	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
361	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
362	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
363	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
364	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
365	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
366	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
367	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
368	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
369	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
370	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
371	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
372	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
373	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
374	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
375	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
376	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
377	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
378	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
379	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
380	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
381	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
382	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
383	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
384	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
385	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
386	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
387	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
388	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
389	0.12	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
390	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
391	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
392	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
393	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
394	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
395	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
396	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
397	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
398	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
399	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
400	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
401	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
402	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
403	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
404	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
405	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
406	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
407	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
408	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
409	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
410	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
411	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
412	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
413	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
414	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
415	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
416	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
417	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
418	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
419	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
420	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
421	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
422	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
423	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
424	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
425	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
426	0.11	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
427	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
428	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
429	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
430	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
431	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
432	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
433	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
434	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
435	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
436	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
437	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
438	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
439	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
440	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
441	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
442	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
443	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
444	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
445	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
446	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
447	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
448	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
449	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
450	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
451	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
452	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
453	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
454	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
455	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
456	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
457	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
458	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
459	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
460	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
461	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
462	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
463	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
464	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
465	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
466	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
467	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
468	0.10	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
469	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
470	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
471	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
472	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
473	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
474	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
475	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
476	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
477	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
478	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
479	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
480	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
481	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
482	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
483	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
484	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
485	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
486	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
487	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
488	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
489	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
490	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
491	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
492	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
493	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
494	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
495	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
496	0.09	0.02	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
497	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
498	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
499	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
500	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
501	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
502	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
503	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
504	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
505	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
506	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
507	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
508	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
509	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
510	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
511	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
512	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
513	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
514	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
515	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
516	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
517	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
518	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
519	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
520	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
521	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
522	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
523	0.09	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
524	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
525	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
526	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
527	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
528	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
529	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
530	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
531	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
532	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
533	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
534	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
535	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
536	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
537	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
538	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
539	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
540	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
541	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
542	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
543	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
544	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
545	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
546	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
547	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
548	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
549	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
550	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
551	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
552	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
553	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
554	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
555	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
556	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
557	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
558	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
559	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
560	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
561	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
562	0.08	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
563	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
564	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
565	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
566	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
567	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
568	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
569	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
570	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
571	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
572	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
573	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
574	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
575	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
576	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
577	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
578	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
579	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
580	0.07	0.01	âˆž	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

SWMM.out file name: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-pre.out
SWMM.out time stamp: 2/3/2020 10:12:51 AM

Q10: 1.471
Q5: 1.276
Q2: 0.964

Peak Flow Statistics Table Values

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
1	1993/01/06 16:00:00	1993/01/10 18:00:00	99	1.779	0.30%	45
2	2007/08/26 07:00:00	2007/08/26 10:00:00	4	1.705	0.59%	22.5
3	1986/02/15 01:00:00	1986/02/15 11:00:00	11	1.595	0.89%	15
4	1971/02/23 05:00:00	1971/02/23 13:00:00	9	1.513	1.19%	11.25
5	1995/01/04 15:00:00	1995/01/05 02:00:00	12	1.438	1.48%	9
6	1995/01/25 08:00:00	1995/01/25 23:00:00	16	1.381	1.78%	7.5
7	1998/02/14 13:00:00	1998/02/15 01:00:00	13	1.337	2.08%	6.43
8	1978/03/16 22:00:00	1978/03/18 14:00:00	41	1.29	2.37%	5.63
9	1983/03/01 14:00:00	1983/03/03 09:00:00	44	1.276	2.67%	5
10	1966/12/05 01:00:00	1966/12/07 00:00:00	48	1.273	2.97%	4.5
11	1983/12/25 06:00:00	1983/12/25 20:00:00	15	1.271	3.26%	4.09
12	1978/01/16 06:00:00	1978/01/16 14:00:00	9	1.268	3.56%	3.75
13	1967/11/19 06:00:00	1967/11/20 03:00:00	22	1.18	3.86%	3.46
14	1981/02/08 23:00:00	1981/02/09 08:00:00	10	1.166	4.15%	3.21
15	1988/04/20 07:00:00	1988/04/21 23:00:00	41	1.148	4.45%	3
16	1972/11/14 13:00:00	1972/11/14 16:00:00	4	1.091	4.75%	2.81
17	1983/11/25 00:00:00	1983/11/25 03:00:00	4	1.081	5.04%	2.65
18	1969/01/24 07:00:00	1969/01/25 18:00:00	36	1.068	5.34%	2.5
19	1980/01/28 08:00:00	1980/01/30 20:00:00	61	1.054	5.64%	2.37
20	1967/04/11 09:00:00	1967/04/12 05:00:00	21	1.05	5.93%	2.25
21	2007/01/31 00:00:00	2007/01/31 01:00:00	2	1.033	6.23%	2.14
22	1998/01/09 15:00:00	1998/01/10 19:00:00	29	0.98	6.53%	2.05
23	2005/01/09 04:00:00	2005/01/11 10:00:00	55	0.948	6.82%	1.96
24	1993/02/08 01:00:00	1993/02/08 11:00:00	11	0.926	7.12%	1.88
25	1967/12/18 15:00:00	1967/12/19 15:00:00	25	0.923	7.42%	1.8
26	1965/11/22 04:00:00	1965/11/23 07:00:00	28	0.922	7.72%	1.73
27	2004/10/18 09:00:00	2004/10/18 11:00:00	3	0.917	8.01%	1.67
28	1993/01/12 22:00:00	1993/01/14 07:00:00	34	0.914	8.31%	1.61
29	1980/02/16 18:00:00	1980/02/21 04:00:00	107	0.892	8.61%	1.55
30	1998/02/03 16:00:00	1998/02/03 22:00:00	7	0.88	8.90%	1.5
31	1991/03/20 07:00:00	1991/03/21 07:00:00	25	0.848	9.20%	1.45
32	1992/02/15 14:00:00	1992/02/15 18:00:00	5	0.827	9.50%	1.41
33	1985/11/25 00:00:00	1985/11/25 08:00:00	9	0.824	9.79%	1.36
34	2004/10/27 04:00:00	2004/10/27 10:00:00	7	0.799	10.09%	1.32
35	1979/01/05 07:00:00	1979/01/06 07:00:00	25	0.796	10.39%	1.29
36	2007/11/30 10:00:00	2007/12/01 01:00:00	16	0.786	10.68%	1.25
37	1970/03/04 21:00:00	1970/03/05 02:00:00	6	0.779	10.98%	1.22
38	1969/02/06 08:00:00	1969/02/06 19:00:00	12	0.771	11.28%	1.18
39	2004/10/19 16:00:00	2004/10/20 17:00:00	26	0.741	11.57%	1.15

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
40	1974/12/04 09:00:00	1974/12/04 10:00:00	2	0.74	11.87%	1.13
41	1980/03/02 21:00:00	1980/03/03 04:00:00	8	0.738	12.17%	1.1
42	1982/03/18 02:00:00	1982/03/19 17:00:00	40	0.736	12.46%	1.07
43	1980/01/10 23:00:00	1980/01/12 08:00:00	34	0.711	12.76%	1.05
44	1981/03/19 21:00:00	1981/03/19 22:00:00	2	0.71	13.06%	1.02
45	2004/02/26 06:00:00	2004/02/26 10:00:00	5	0.706	13.35%	1
46	1982/01/01 09:00:00	1982/01/01 12:00:00	4	0.677	13.65%	0.98
47	2003/02/25 17:00:00	2003/02/25 20:00:00	4	0.675	13.95%	0.96
48	1978/02/05 20:00:00	1978/02/06 22:00:00	27	0.674	14.24%	0.94
49	1978/12/16 23:00:00	1978/12/18 16:00:00	42	0.671	14.54%	0.92
50	1995/03/05 08:00:00	1995/03/06 03:00:00	20	0.664	14.84%	0.9
51	2006/04/04 23:00:00	2006/04/05 09:00:00	11	0.634	15.13%	0.88
52	1977/05/08 18:00:00	1977/05/08 23:00:00	6	0.628	15.43%	0.87
53	1978/01/14 16:00:00	1978/01/15 06:00:00	15	0.612	15.73%	0.85
54	1983/02/27 17:00:00	1983/02/27 21:00:00	5	0.607	16.02%	0.83
55	1991/02/27 15:00:00	1991/03/01 13:00:00	47	0.596	16.32%	0.82
56	1985/11/29 08:00:00	1985/11/29 18:00:00	11	0.589	16.62%	0.8
57	1982/12/22 23:00:00	1982/12/23 01:00:00	3	0.579	16.91%	0.79
58	1979/01/17 12:00:00	1979/01/18 16:00:00	29	0.574	17.21%	0.78
59	1991/03/19 01:00:00	1991/03/19 05:00:00	5	0.571	17.51%	0.76
60	1993/11/14 17:00:00	1993/11/14 18:00:00	2	0.567	17.80%	0.75
61	1983/03/23 18:00:00	1983/03/23 23:00:00	6	0.562	18.10%	0.74
62	1965/04/08 14:00:00	1965/04/10 01:00:00	36	0.558	18.40%	0.73
63	2003/02/12 17:00:00	2003/02/13 18:00:00	26	0.554	18.69%	0.71
64	1976/04/14 11:00:00	1976/04/14 12:00:00	2	0.554	18.99%	0.7
65	1970/11/29 14:00:00	1970/11/30 03:00:00	14	0.552	19.29%	0.69
66	1970/12/21 03:00:00	1970/12/21 11:00:00	9	0.551	19.58%	0.68
67	1998/02/08 16:00:00	1998/02/08 22:00:00	7	0.55	19.88%	0.67
68	1974/03/07 18:00:00	1974/03/08 15:00:00	22	0.54	20.18%	0.66
69	1991/03/25 07:00:00	1991/03/27 18:00:00	60	0.534	20.47%	0.65
70	1970/02/28 16:00:00	1970/03/02 08:00:00	41	0.533	20.77%	0.64
71	1973/02/11 05:00:00	1973/02/13 02:00:00	46	0.532	21.07%	0.63
72	1994/02/17 12:00:00	1994/02/17 14:00:00	3	0.526	21.36%	0.63
73	1967/11/21 13:00:00	1967/11/21 15:00:00	3	0.521	21.66%	0.62
74	1981/03/01 05:00:00	1981/03/01 17:00:00	13	0.519	21.96%	0.61
75	1966/12/03 13:00:00	1966/12/03 20:00:00	8	0.518	22.26%	0.6
76	1992/02/06 17:00:00	1992/02/07 00:00:00	8	0.516	22.55%	0.59
77	1976/02/08 15:00:00	1976/02/09 03:00:00	13	0.514	22.85%	0.58
78	1998/02/22 17:00:00	1998/02/24 20:00:00	52	0.503	23.15%	0.58
79	1967/01/24 18:00:00	1967/01/25 01:00:00	8	0.503	23.44%	0.57
80	1996/11/21 20:00:00	1996/11/22 04:00:00	9	0.499	23.74%	0.56
81	1973/01/16 20:00:00	1973/01/16 23:00:00	4	0.494	24.04%	0.56
82	1976/03/03 00:00:00	1976/03/03 04:00:00	5	0.49	24.33%	0.55
83	2005/01/03 08:00:00	2005/01/04 12:00:00	29	0.486	24.63%	0.54
84	1967/01/22 19:00:00	1967/01/23 02:00:00	8	0.478	24.93%	0.54
85	1974/01/04 19:00:00	1974/01/05 03:00:00	9	0.476	25.22%	0.53
86	1996/01/31 18:00:00	1996/02/01 08:00:00	15	0.473	25.52%	0.52

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
87	1991/12/29 16:00:00	1991/12/29 18:00:00	3	0.471	25.82%	0.52
88	1992/01/05 15:00:00	1992/01/06 05:00:00	15	0.47	26.11%	0.51
89	1995/03/11 03:00:00	1995/03/12 01:00:00	23	0.467	26.41%	0.51
90	1994/03/25 00:00:00	1994/03/25 16:00:00	17	0.463	26.71%	0.5
91	1998/02/17 16:00:00	1998/02/17 22:00:00	7	0.458	27.00%	0.5
92	1983/01/27 08:00:00	1983/01/27 14:00:00	7	0.454	27.30%	0.49
93	1992/02/12 18:00:00	1992/02/13 07:00:00	14	0.45	27.60%	0.48
94	1980/03/06 01:00:00	1980/03/06 14:00:00	14	0.449	27.89%	0.48
95	1988/12/24 23:00:00	1988/12/25 02:00:00	4	0.448	28.19%	0.47
96	1965/12/09 06:00:00	1965/12/10 11:00:00	30	0.447	28.49%	0.47
97	1979/03/01 13:00:00	1979/03/01 21:00:00	9	0.445	28.78%	0.46
98	1969/01/14 07:00:00	1969/01/14 13:00:00	7	0.444	29.08%	0.46
99	1980/02/14 01:00:00	1980/02/15 11:00:00	35	0.444	29.38%	0.46
100	1986/11/17 22:00:00	1986/11/18 03:00:00	6	0.443	29.67%	0.45
101	2005/02/21 03:00:00	2005/02/21 17:00:00	15	0.443	29.97%	0.45
102	1994/02/07 15:00:00	1994/02/08 07:00:00	17	0.441	30.27%	0.44
103	1987/01/07 00:00:00	1987/01/07 09:00:00	10	0.441	30.56%	0.44
104	2004/02/22 14:00:00	2004/02/23 08:00:00	19	0.436	30.86%	0.43
105	1982/03/15 13:00:00	1982/03/16 00:00:00	12	0.428	31.16%	0.43
106	1965/12/13 01:00:00	1965/12/13 03:00:00	3	0.427	31.45%	0.43
107	1965/11/16 17:00:00	1965/11/17 00:00:00	8	0.422	31.75%	0.42
108	1976/12/31 09:00:00	1976/12/31 12:00:00	4	0.417	32.05%	0.42
109	1975/03/08 09:00:00	1975/03/08 14:00:00	6	0.416	32.34%	0.41
110	1976/02/05 06:00:00	1976/02/06 07:00:00	26	0.406	32.64%	0.41
111	1965/12/29 20:00:00	1965/12/29 22:00:00	3	0.405	32.94%	0.41
112	1993/01/15 13:00:00	1993/01/18 18:00:00	78	0.398	33.23%	0.4
113	2003/04/14 17:00:00	2003/04/14 18:00:00	2	0.397	33.53%	0.4
114	1969/02/23 23:00:00	1969/02/26 00:00:00	50	0.395	33.83%	0.4
115	1988/01/17 11:00:00	1988/01/17 21:00:00	11	0.395	34.12%	0.39
116	2005/02/22 18:00:00	2005/02/23 13:00:00	20	0.387	34.42%	0.39
117	1966/11/07 16:00:00	1966/11/07 18:00:00	3	0.384	34.72%	0.39
118	2006/01/02 14:00:00	2006/01/02 17:00:00	4	0.384	35.01%	0.38
119	1972/12/04 15:00:00	1972/12/04 19:00:00	5	0.381	35.31%	0.38
120	1986/02/08 05:00:00	1986/02/08 18:00:00	14	0.38	35.61%	0.38
121	2001/01/11 04:00:00	2001/01/12 14:00:00	35	0.379	35.91%	0.37
122	1970/03/08 12:00:00	1970/03/08 20:00:00	9	0.378	36.20%	0.37
123	1978/11/13 23:00:00	1978/11/14 00:00:00	2	0.378	36.50%	0.37
124	1973/03/08 13:00:00	1973/03/08 20:00:00	8	0.371	36.80%	0.36
125	1971/12/24 22:00:00	1971/12/26 00:00:00	27	0.369	37.09%	0.36
126	1969/01/20 09:00:00	1969/01/21 17:00:00	33	0.368	37.39%	0.36
127	1967/03/13 15:00:00	1967/03/13 23:00:00	9	0.366	37.69%	0.35
128	1970/12/19 02:00:00	1970/12/19 06:00:00	5	0.362	37.98%	0.35
129	1968/03/08 07:00:00	1968/03/08 14:00:00	8	0.361	38.28%	0.35
130	1987/12/16 17:00:00	1987/12/16 23:00:00	7	0.359	38.58%	0.35
131	1974/01/06 13:00:00	1974/01/08 05:00:00	41	0.357	38.87%	0.34
132	1995/02/14 09:00:00	1995/02/14 11:00:00	3	0.35	39.17%	0.34
133	1971/12/27 14:00:00	1971/12/28 16:00:00	27	0.346	39.47%	0.34

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
134	1983/11/20 12:00:00	1983/11/21 10:00:00	23	0.346	39.76%	0.34
135	1980/03/10 15:00:00	1980/03/10 21:00:00	7	0.343	40.06%	0.33
136	1992/12/07 10:00:00	1992/12/07 17:00:00	8	0.342	40.36%	0.33
137	1982/02/10 10:00:00	1982/02/10 21:00:00	12	0.339	40.65%	0.33
138	1976/11/12 01:00:00	1976/11/12 09:00:00	9	0.336	40.95%	0.33
139	1972/11/16 13:00:00	1972/11/17 11:00:00	23	0.336	41.25%	0.32
140	1987/01/04 17:00:00	1987/01/05 01:00:00	9	0.329	41.54%	0.32
141	1975/03/10 11:00:00	1975/03/11 15:00:00	29	0.329	41.84%	0.32
142	1978/03/11 22:00:00	1978/03/15 08:00:00	83	0.327	42.14%	0.32
143	1965/12/14 15:00:00	1965/12/14 17:00:00	3	0.326	42.43%	0.32
144	1971/05/07 20:00:00	1971/05/07 22:00:00	3	0.325	42.73%	0.31
145	1979/03/17 05:00:00	1979/03/17 09:00:00	5	0.324	43.03%	0.31
146	1983/02/08 04:00:00	1983/02/08 07:00:00	4	0.323	43.32%	0.31
147	1976/09/10 00:00:00	1976/09/10 21:00:00	22	0.323	43.62%	0.31
148	1969/02/22 03:00:00	1969/02/22 08:00:00	6	0.321	43.92%	0.3
149	1998/03/28 17:00:00	1998/03/29 17:00:00	25	0.319	44.21%	0.3
150	2003/03/15 17:00:00	2003/03/16 18:00:00	26	0.319	44.51%	0.3
151	1975/04/08 03:00:00	1975/04/09 02:00:00	24	0.317	44.81%	0.3
152	1994/02/20 16:00:00	1994/02/20 17:00:00	2	0.314	45.10%	0.3
153	1997/01/12 16:00:00	1997/01/13 12:00:00	21	0.313	45.40%	0.29
154	1973/11/22 23:00:00	1973/11/23 02:00:00	4	0.312	45.70%	0.29
155	1964/11/17 18:00:00	1964/11/18 00:00:00	7	0.312	45.99%	0.29
156	2008/02/03 11:00:00	2008/02/03 16:00:00	6	0.312	46.29%	0.29
157	2004/02/03 00:00:00	2004/02/03 01:00:00	2	0.312	46.59%	0.29
158	1998/02/06 17:00:00	1998/02/06 20:00:00	4	0.311	46.88%	0.29
159	1986/09/25 03:00:00	1986/09/25 07:00:00	5	0.309	47.18%	0.28
160	1990/01/17 03:00:00	1990/01/17 04:00:00	2	0.302	47.48%	0.28
161	1979/03/27 10:00:00	1979/03/28 04:00:00	19	0.3	47.77%	0.28
162	1994/04/28 00:00:00	1994/04/28 02:00:00	3	0.3	48.07%	0.28
163	1983/10/01 04:00:00	1983/10/01 18:00:00	15	0.298	48.37%	0.28
164	1982/11/30 12:00:00	1982/11/30 20:00:00	9	0.295	48.66%	0.27
165	1990/01/14 04:00:00	1990/01/14 06:00:00	3	0.291	48.96%	0.27
166	1976/03/01 17:00:00	1976/03/01 19:00:00	3	0.288	49.26%	0.27
167	2006/03/10 17:00:00	2006/03/11 08:00:00	16	0.288	49.55%	0.27
168	1986/03/10 16:00:00	1986/03/10 21:00:00	6	0.285	49.85%	0.27
169	1988/11/25 10:00:00	1988/11/25 14:00:00	5	0.285	50.15%	0.27
170	2002/12/20 17:00:00	2002/12/20 20:00:00	4	0.284	50.45%	0.27
171	1986/03/15 22:00:00	1986/03/16 20:00:00	23	0.284	50.74%	0.26
172	1988/12/21 06:00:00	1988/12/21 08:00:00	3	0.284	51.04%	0.26
173	1995/03/23 12:00:00	1995/03/23 14:00:00	3	0.279	51.34%	0.26
174	2004/03/02 03:00:00	2004/03/02 05:00:00	3	0.278	51.63%	0.26
175	1973/01/18 21:00:00	1973/01/19 02:00:00	6	0.278	51.93%	0.26
176	1977/08/17 01:00:00	1977/08/17 10:00:00	10	0.276	52.23%	0.26
177	1983/03/18 04:00:00	1983/03/18 23:00:00	20	0.275	52.52%	0.25
178	2004/12/29 02:00:00	2004/12/29 07:00:00	6	0.274	52.82%	0.25
179	1983/04/30 04:00:00	1983/04/30 06:00:00	3	0.274	53.12%	0.25
180	2008/02/22 04:00:00	2008/02/22 13:00:00	10	0.273	53.41%	0.25

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
181	1976/04/12 22:00:00	1976/04/13 04:00:00	7	0.272	53.71%	0.25
182	1980/01/09 05:00:00	1980/01/09 19:00:00	15	0.271	54.01%	0.25
183	1982/11/10 04:00:00	1982/11/11 02:00:00	23	0.269	54.30%	0.25
184	1995/01/12 09:00:00	1995/01/12 15:00:00	7	0.266	54.60%	0.25
185	1996/12/09 18:00:00	1996/12/09 20:00:00	3	0.256	54.90%	0.24
186	1973/03/11 13:00:00	1973/03/11 17:00:00	5	0.255	55.19%	0.24
187	2008/01/05 04:00:00	2008/01/07 05:00:00	50	0.255	55.49%	0.24
188	1980/03/26 00:00:00	1980/03/26 02:00:00	3	0.253	55.79%	0.24
189	1993/02/19 18:00:00	1993/02/20 00:00:00	7	0.25	56.08%	0.24
190	1965/12/16 06:00:00	1965/12/16 09:00:00	4	0.249	56.38%	0.24
191	1969/03/21 19:00:00	1969/03/21 21:00:00	3	0.248	56.68%	0.24
192	2000/10/29 23:00:00	2000/10/30 01:00:00	3	0.248	56.97%	0.23
193	1992/01/07 20:00:00	1992/01/07 23:00:00	4	0.243	57.27%	0.23
194	1995/04/18 10:00:00	1995/04/18 13:00:00	4	0.24	57.57%	0.23
195	1986/03/12 14:00:00	1986/03/12 15:00:00	2	0.239	57.86%	0.23
196	1995/01/07 19:00:00	1995/01/08 04:00:00	10	0.239	58.16%	0.23
197	1993/01/31 01:00:00	1993/01/31 02:00:00	2	0.238	58.46%	0.23
198	1992/12/29 14:00:00	1992/12/29 20:00:00	7	0.237	58.75%	0.23
199	2005/01/07 15:00:00	2005/01/07 17:00:00	3	0.232	59.05%	0.23
200	1979/02/21 05:00:00	1979/02/21 22:00:00	18	0.229	59.35%	0.23
201	1983/01/29 02:00:00	1983/01/29 05:00:00	4	0.228	59.64%	0.22
202	2006/02/28 00:00:00	2006/02/28 10:00:00	11	0.226	59.94%	0.22
203	1985/11/11 10:00:00	1985/11/11 17:00:00	8	0.218	60.24%	0.22
204	2003/12/25 18:00:00	2003/12/25 20:00:00	3	0.215	60.53%	0.22
205	1980/01/18 18:00:00	1980/01/19 01:00:00	8	0.215	60.83%	0.22
206	1979/01/31 07:00:00	1979/02/01 11:00:00	29	0.214	61.13%	0.22
207	1972/11/11 08:00:00	1972/11/11 09:00:00	2	0.212	61.42%	0.22
208	1978/04/07 01:00:00	1978/04/07 02:00:00	2	0.21	61.72%	0.22
209	1965/03/31 18:00:00	1965/04/02 02:00:00	33	0.207	62.02%	0.22
210	2000/02/21 17:00:00	2000/02/21 20:00:00	4	0.202	62.31%	0.21
211	1987/11/04 17:00:00	1987/11/05 00:00:00	8	0.201	62.61%	0.21
212	2006/03/28 22:00:00	2006/03/29 01:00:00	4	0.196	62.91%	0.21
213	1997/01/25 23:00:00	1997/01/26 09:00:00	11	0.193	63.20%	0.21
214	2002/11/08 17:00:00	2002/11/08 17:00:00	1	0.188	63.50%	0.21
215	1998/04/11 17:00:00	1998/04/11 20:00:00	4	0.187	63.80%	0.21
216	1978/03/31 03:00:00	1978/03/31 05:00:00	3	0.185	64.09%	0.21
217	1968/04/01 20:00:00	1968/04/01 20:00:00	1	0.184	64.39%	0.21
218	1996/12/11 10:00:00	1996/12/11 20:00:00	11	0.181	64.69%	0.21
219	1969/02/18 15:00:00	1969/02/18 20:00:00	6	0.179	64.99%	0.21
220	1989/03/25 15:00:00	1989/03/25 17:00:00	3	0.178	65.28%	0.21
221	1992/03/02 11:00:00	1992/03/02 11:00:00	1	0.178	65.58%	0.2
222	2005/03/22 22:00:00	2005/03/23 00:00:00	3	0.176	65.88%	0.2
223	1973/03/22 00:00:00	1973/03/22 02:00:00	3	0.175	66.17%	0.2
224	1979/10/20 14:00:00	1979/10/20 15:00:00	2	0.172	66.47%	0.2
225	1983/03/20 20:00:00	1983/03/21 03:00:00	8	0.17	66.77%	0.2
226	2008/02/14 12:00:00	2008/02/14 14:00:00	3	0.17	67.06%	0.2
227	2005/02/11 12:00:00	2005/02/12 15:00:00	28	0.169	67.36%	0.2

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
228	1985/12/02 23:00:00	1985/12/03 03:00:00	5	0.168	67.66%	0.2
229	2001/11/24 17:00:00	2001/11/24 18:00:00	2	0.166	67.95%	0.2
230	1973/03/20 08:00:00	1973/03/20 11:00:00	4	0.165	68.25%	0.2
231	1996/02/25 10:00:00	1996/02/26 01:00:00	16	0.163	68.55%	0.2
232	1969/03/13 14:00:00	1969/03/13 19:00:00	6	0.163	68.84%	0.19
233	1981/02/25 21:00:00	1981/02/25 22:00:00	2	0.153	69.14%	0.19
234	1996/01/21 19:00:00	1996/01/21 20:00:00	2	0.152	69.44%	0.19
235	1993/03/28 03:00:00	1993/03/28 03:00:00	1	0.151	69.73%	0.19
236	1979/03/19 01:00:00	1979/03/20 03:00:00	27	0.146	70.03%	0.19
237	1978/01/30 12:00:00	1978/01/30 13:00:00	2	0.144	70.33%	0.19
238	1977/12/26 04:00:00	1977/12/26 18:00:00	15	0.143	70.62%	0.19
239	1993/02/23 20:00:00	1993/02/24 07:00:00	12	0.141	70.92%	0.19
240	1996/02/27 21:00:00	1996/02/27 23:00:00	3	0.141	71.22%	0.19
241	1973/03/06 23:00:00	1973/03/07 02:00:00	4	0.138	71.51%	0.19
242	1982/01/20 23:00:00	1982/01/21 14:00:00	16	0.138	71.81%	0.19
243	1992/03/23 04:00:00	1992/03/23 04:00:00	1	0.136	72.11%	0.19
244	1969/01/26 19:00:00	1969/01/26 21:00:00	3	0.132	72.40%	0.18
245	1972/12/08 13:00:00	1972/12/08 15:00:00	3	0.129	72.70%	0.18
246	1982/04/02 12:00:00	1982/04/02 16:00:00	5	0.128	73.00%	0.18
247	1998/05/12 17:00:00	1998/05/12 18:00:00	2	0.128	73.29%	0.18
248	1990/06/10 04:00:00	1990/06/10 05:00:00	2	0.126	73.59%	0.18
249	1986/12/06 17:00:00	1986/12/06 18:00:00	2	0.125	73.89%	0.18
250	1995/12/20 17:00:00	1995/12/20 18:00:00	2	0.123	74.18%	0.18
251	1981/11/28 09:00:00	1981/11/29 01:00:00	17	0.122	74.48%	0.18
252	2005/02/18 05:00:00	2005/02/19 01:00:00	21	0.118	74.78%	0.18
253	1994/04/25 18:00:00	1994/04/26 21:00:00	28	0.117	75.07%	0.18
254	1978/11/21 19:00:00	1978/11/21 20:00:00	2	0.115	75.37%	0.18
255	2008/01/23 21:00:00	2008/01/23 22:00:00	2	0.115	75.67%	0.18
256	1976/02/07 07:00:00	1976/02/07 09:00:00	3	0.113	75.96%	0.18
257	1965/04/03 07:00:00	1965/04/03 20:00:00	14	0.112	76.26%	0.18
258	1983/05/01 07:00:00	1983/05/01 08:00:00	2	0.11	76.56%	0.17
259	1983/12/03 17:00:00	1983/12/03 17:00:00	1	0.109	76.85%	0.17
260	1981/03/05 08:00:00	1981/03/05 15:00:00	8	0.109	77.15%	0.17
261	2002/03/17 23:00:00	2002/03/17 23:00:00	1	0.108	77.45%	0.17
262	1977/01/03 23:00:00	1977/01/04 00:00:00	2	0.106	77.74%	0.17
263	1975/04/06 12:00:00	1975/04/06 16:00:00	5	0.106	78.04%	0.17
264	1994/03/06 23:00:00	1994/03/07 06:00:00	8	0.106	78.34%	0.17
265	1983/02/25 00:00:00	1983/02/25 00:00:00	1	0.105	78.64%	0.17
266	1995/01/10 19:00:00	1995/01/10 23:00:00	5	0.105	78.93%	0.17
267	1970/03/11 12:00:00	1970/03/11 16:00:00	5	0.105	79.23%	0.17
268	1994/03/19 03:00:00	1994/03/19 10:00:00	8	0.102	79.53%	0.17
269	1973/02/28 05:00:00	1973/02/28 06:00:00	2	0.1	79.82%	0.17
270	1975/02/10 02:00:00	1975/02/10 03:00:00	2	0.1	80.12%	0.17
271	1967/04/22 03:00:00	1967/04/22 05:00:00	3	0.099	80.42%	0.17
272	1982/03/28 18:00:00	1982/03/28 18:00:00	1	0.096	80.71%	0.17
273	2000/02/13 17:00:00	2000/02/13 19:00:00	3	0.096	81.01%	0.17
274	1969/01/28 20:00:00	1969/01/28 21:00:00	2	0.094	81.31%	0.16

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
275	1976/04/15 16:00:00	1976/04/15 17:00:00	2	0.091	81.60%	0.16
276	1974/04/02 05:00:00	1974/04/02 07:00:00	3	0.089	81.90%	0.16
277	1965/11/25 11:00:00	1965/11/25 13:00:00	3	0.088	82.20%	0.16
278	2001/12/21 17:00:00	2001/12/21 19:00:00	3	0.079	82.49%	0.16
279	1983/03/22 13:00:00	1983/03/22 15:00:00	3	0.079	82.79%	0.16
280	2005/04/28 09:00:00	2005/04/28 09:00:00	1	0.078	83.09%	0.16
281	1970/03/06 23:00:00	1970/03/07 01:00:00	3	0.077	83.38%	0.16
282	1986/03/13 17:00:00	1986/03/13 21:00:00	5	0.072	83.68%	0.16
283	2006/03/21 02:00:00	2006/03/21 03:00:00	2	0.071	83.98%	0.16
284	1965/02/06 18:00:00	1965/02/06 18:00:00	1	0.068	84.27%	0.16
285	1975/12/11 23:00:00	1975/12/12 07:00:00	9	0.067	84.57%	0.16
286	2004/12/31 16:00:00	2004/12/31 17:00:00	2	0.064	84.87%	0.16
287	1974/10/29 05:00:00	1974/10/29 08:00:00	4	0.064	85.16%	0.16
288	2007/12/08 07:00:00	2007/12/08 08:00:00	2	0.063	85.46%	0.16
289	1983/04/21 01:00:00	1983/04/21 03:00:00	3	0.063	85.76%	0.16
290	1979/02/02 16:00:00	1979/02/02 16:00:00	1	0.061	86.05%	0.16
291	1964/12/27 15:00:00	1964/12/27 16:00:00	2	0.059	86.35%	0.16
292	1992/03/26 19:00:00	1992/03/26 19:00:00	1	0.057	86.65%	0.15
293	2003/02/11 17:00:00	2003/02/11 17:00:00	1	0.056	86.94%	0.15
294	1968/02/13 22:00:00	1968/02/13 23:00:00	2	0.051	87.24%	0.15
295	1986/03/08 19:00:00	1986/03/08 19:00:00	1	0.051	87.54%	0.15
296	1978/09/05 18:00:00	1978/09/05 18:00:00	1	0.05	87.83%	0.15
297	1987/12/04 21:00:00	1987/12/04 22:00:00	2	0.049	88.13%	0.15
298	1977/03/25 02:00:00	1977/03/25 03:00:00	2	0.049	88.43%	0.15
299	1979/02/14 03:00:00	1979/02/14 05:00:00	3	0.046	88.72%	0.15
300	1978/11/23 13:00:00	1978/11/23 13:00:00	1	0.046	89.02%	0.15
301	1975/02/03 14:00:00	1975/02/03 14:00:00	1	0.045	89.32%	0.15
302	1982/03/27 01:00:00	1982/03/27 06:00:00	6	0.044	89.61%	0.15
303	1983/10/07 09:00:00	1983/10/07 10:00:00	2	0.044	89.91%	0.15
304	1998/01/29 17:00:00	1998/01/29 18:00:00	2	0.044	90.21%	0.15
305	1978/03/22 05:00:00	1978/03/22 05:00:00	1	0.043	90.50%	0.15
306	1973/03/04 00:00:00	1973/03/04 00:00:00	1	0.041	90.80%	0.15
307	2000/02/17 17:00:00	2000/02/17 18:00:00	2	0.041	91.10%	0.15
308	1971/05/28 13:00:00	1971/05/28 14:00:00	2	0.039	91.39%	0.15
309	1998/03/25 17:00:00	1998/03/25 17:00:00	1	0.039	91.69%	0.15
310	1997/01/23 07:00:00	1997/01/23 08:00:00	2	0.038	91.99%	0.15
311	1987/11/02 03:00:00	1987/11/02 04:00:00	2	0.037	92.28%	0.15
312	1996/03/13 07:00:00	1996/03/13 09:00:00	3	0.034	92.58%	0.14
313	1991/01/09 14:00:00	1991/01/09 15:00:00	2	0.033	92.88%	0.14
314	1975/11/28 16:00:00	1975/11/28 17:00:00	2	0.033	93.18%	0.14
315	2002/11/09 17:00:00	2002/11/09 17:00:00	1	0.033	93.47%	0.14
316	2002/12/16 17:00:00	2002/12/16 17:00:00	1	0.033	93.77%	0.14
317	1998/03/26 17:00:00	1998/03/26 17:00:00	1	0.029	94.07%	0.14
318	1982/12/09 19:00:00	1982/12/09 19:00:00	1	0.028	94.36%	0.14
319	1979/11/07 20:00:00	1979/11/07 22:00:00	3	0.027	94.66%	0.14
320	1987/02/25 02:00:00	1987/02/25 02:00:00	1	0.024	94.96%	0.14
321	1995/01/03 14:00:00	1995/01/03 14:00:00	1	0.024	95.25%	0.14

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
322	1971/02/16 22:00:00	1971/02/16 22:00:00	1	0.024	95.55%	0.14
323	2007/02/19 11:00:00	2007/02/19 16:00:00	6	0.023	95.85%	0.14
324	1983/02/26 14:00:00	1983/02/26 14:00:00	1	0.022	96.14%	0.14
325	1994/12/25 03:00:00	1994/12/25 03:00:00	1	0.022	96.44%	0.14
326	1978/11/11 16:00:00	1978/11/11 16:00:00	1	0.02	96.74%	0.14
327	1976/10/22 20:00:00	1976/10/22 20:00:00	1	0.02	97.03%	0.14
328	1995/12/23 10:00:00	1995/12/23 10:00:00	1	0.019	97.33%	0.14
329	1982/09/26 06:00:00	1982/09/26 09:00:00	4	0.018	97.63%	0.14
330	1995/03/21 11:00:00	1995/03/21 11:00:00	1	0.017	97.92%	0.14
331	1990/02/17 19:00:00	1990/02/17 20:00:00	2	0.017	98.22%	0.14
332	1995/01/16 11:00:00	1995/01/16 11:00:00	1	0.015	98.52%	0.14
333	1995/04/16 09:00:00	1995/04/16 09:00:00	1	0.015	98.81%	0.14
334	1966/10/04 14:00:00	1966/10/04 14:00:00	1	0.014	99.11%	0.14
335	1968/12/25 20:00:00	1968/12/25 20:00:00	1	0.014	99.41%	0.13
336	1983/04/18 05:00:00	1983/04/18 05:00:00	1	0.012	99.70%	0.13
--End of Data-----------------						

SWMM.out file name: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-post.out
SWMM.out time stamp: 2/11/2020 11:31:23 AM

Q10: 0.000
Q5: 0.000
Q2: 0.000

Peak Flow Statistics Table Values

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
1	1993/01/06 06:00:00	1993/01/23 04:00:00	407	1.531	0.16%	45
2	1995/01/03 07:00:00	1995/01/20 00:00:00	402	1.454	0.32%	22.5
3	1966/12/03 05:00:00	1966/12/11 07:00:00	195	1.374	0.48%	15
4	1978/03/11 17:00:00	1978/03/25 18:00:00	338	1.364	0.64%	11.25
5	1983/02/24 09:00:00	1983/03/09 18:00:00	322	1.302	0.80%	9
6	1978/01/14 14:00:00	1978/01/20 21:00:00	152	1.171	0.96%	7.5
7	1980/01/27 20:00:00	1980/02/04 03:00:00	176	1.144	1.12%	6.43
8	1967/11/19 03:00:00	1967/11/27 01:00:00	191	1.098	1.28%	5.63
9	1969/01/13 17:00:00	1969/02/01 11:00:00	451	1.076	1.44%	5
10	1965/11/14 10:00:00	1965/11/29 01:00:00	352	0.932	1.59%	4.5
11	1988/04/19 23:00:00	1988/04/26 07:00:00	153	0.932	1.75%	4.09
12	1979/01/05 07:00:00	1979/01/11 20:00:00	158	0.914	1.91%	3.75
13	2004/12/28 08:00:00	2005/01/16 05:00:00	454	0.901	2.07%	3.46
14	2007/11/30 07:00:00	2007/12/05 08:00:00	122	0.785	2.23%	3.21
15	1986/02/14 23:00:00	1986/02/20 09:00:00	131	0.783	2.39%	3
16	1980/02/13 12:00:00	1980/02/25 17:00:00	294	0.75	2.55%	2.81
17	2004/10/17 08:00:00	2004/10/25 03:00:00	188	0.728	2.71%	2.65
18	1991/03/19 00:00:00	1991/04/01 01:00:00	314	0.701	2.87%	2.5
19	1995/03/03 09:00:00	1995/03/16 09:00:00	313	0.698	3.03%	2.37
20	1980/01/07 14:00:00	1980/01/21 11:00:00	334	0.692	3.19%	2.25
21	1970/02/28 13:00:00	1970/03/16 00:00:00	372	0.679	3.35%	2.14
22	1985/11/24 15:00:00	1985/12/07 03:00:00	301	0.661	3.51%	2.05
23	1982/03/15 12:00:00	1982/03/24 12:00:00	217	0.651	3.67%	1.96
24	1991/02/27 13:00:00	1991/03/05 20:00:00	152	0.636	3.83%	1.88
25	1978/12/16 22:00:00	1978/12/23 19:00:00	166	0.627	3.99%	1.8
26	1998/02/03 05:00:00	1998/03/01 06:00:00	626	0.624	4.15%	1.73
27	1996/11/21 16:00:00	1996/11/27 00:00:00	129	0.594	4.31%	1.67
28	2004/10/27 03:00:00	2004/11/01 13:00:00	131	0.552	4.47%	1.61
29	1967/01/22 16:00:00	1967/01/29 08:00:00	161	0.538	4.63%	1.55
30	1976/02/03 17:00:00	1976/02/14 19:00:00	267	0.525	4.78%	1.5
31	1965/03/31 15:00:00	1965/04/14 15:00:00	337	0.525	4.94%	1.45
32	1971/02/23 04:00:00	1971/02/28 00:00:00	117	0.513	5.10%	1.41
33	1981/02/25 05:00:00	1981/03/09 09:00:00	293	0.503	5.26%	1.36
34	2004/02/22 02:00:00	2004/03/05 02:00:00	289	0.502	5.42%	1.32
35	1974/03/06 19:00:00	1974/03/12 22:00:00	148	0.494	5.58%	1.29
36	2007/08/26 07:00:00	2007/08/30 16:00:00	106	0.488	5.74%	1.25
37	1987/01/04 13:00:00	1987/01/11 16:00:00	172	0.475	5.90%	1.22
38	2005/02/18 04:00:00	2005/02/27 20:00:00	233	0.451	6.06%	1.18
39	1969/02/18 09:00:00	1969/03/03 08:00:00	312	0.449	6.22%	1.15

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
40	1980/03/02 20:00:00	1980/03/14 12:00:00	281	0.423	6.38%	1.13
41	1996/01/31 04:00:00	1996/02/05 18:00:00	135	0.417	6.54%	1.1
42	1981/02/08 17:00:00	1981/02/14 08:00:00	136	0.401	6.70%	1.07
43	1971/12/22 05:00:00	1972/01/02 18:00:00	278	0.397	6.86%	1.05
44	1983/12/24 19:00:00	1983/12/31 03:00:00	153	0.392	7.02%	1.02
45	1976/03/01 08:00:00	1976/03/07 16:00:00	153	0.385	7.18%	1
46	1976/09/09 19:00:00	1976/09/15 15:00:00	141	0.385	7.34%	0.98
47	1974/01/04 17:00:00	1974/01/13 03:00:00	203	0.372	7.50%	0.96
48	1993/02/07 19:00:00	1993/02/14 00:00:00	150	0.372	7.66%	0.94
49	1970/12/16 22:00:00	1970/12/26 15:00:00	234	0.368	7.81%	0.92
50	2003/02/11 09:00:00	2003/02/19 04:00:00	188	0.362	7.97%	0.9
51	1977/05/08 10:00:00	1977/05/14 22:00:00	157	0.351	8.13%	0.88
52	1970/11/25 23:00:00	1970/12/04 20:00:00	214	0.346	8.29%	0.87
53	2008/01/05 01:00:00	2008/01/11 14:00:00	158	0.333	8.45%	0.85
54	1998/01/09 05:00:00	1998/01/15 22:00:00	162	0.317	8.61%	0.83
55	1992/01/02 23:00:00	1992/01/12 05:00:00	223	0.286	8.77%	0.82
56	1974/12/04 03:00:00	1974/12/08 20:00:00	114	0.286	8.93%	0.8
57	1992/02/06 11:00:00	1992/02/20 05:00:00	331	0.282	9.09%	0.79
58	1967/12/16 13:00:00	1967/12/24 07:00:00	187	0.28	9.25%	0.78
59	1965/12/09 05:00:00	1965/12/20 17:00:00	277	0.279	9.41%	0.76
60	1967/04/11 08:00:00	1967/04/16 12:00:00	125	0.254	9.57%	0.75
61	1986/03/08 15:00:00	1986/03/21 06:00:00	304	0.254	9.73%	0.74
62	1982/12/22 18:00:00	1982/12/26 09:00:00	88	0.252	9.89%	0.73
63	1997/01/12 13:00:00	1997/01/19 05:00:00	161	0.235	10.05%	0.71
64	1972/11/11 01:00:00	1972/11/21 19:00:00	259	0.233	10.21%	0.7
65	1978/02/05 00:00:00	1978/02/11 06:00:00	151	0.229	10.37%	0.69
66	1986/11/17 18:00:00	1986/11/22 10:00:00	113	0.225	10.53%	0.68
67	1995/01/24 00:00:00	1995/01/30 15:00:00	160	0.221	10.69%	0.67
68	1966/11/07 14:00:00	1966/11/11 13:00:00	96	0.219	10.85%	0.66
69	1983/03/17 04:00:00	1983/03/28 14:00:00	275	0.219	11.00%	0.65
70	1968/03/07 21:00:00	1968/03/12 15:00:00	115	0.218	11.16%	0.64
71	1973/01/16 15:00:00	1973/01/23 00:00:00	154	0.217	11.32%	0.63
72	1995/02/13 15:00:00	1995/02/18 20:00:00	126	0.213	11.48%	0.63
73	1988/01/17 05:00:00	1988/01/21 23:00:00	115	0.209	11.64%	0.62
74	1975/03/05 14:00:00	1975/03/17 02:00:00	277	0.205	11.80%	0.61
75	1977/08/16 14:00:00	1977/08/22 04:00:00	135	0.204	11.96%	0.6
76	1975/04/05 21:00:00	1975/04/13 22:00:00	194	0.2	12.12%	0.59
77	2003/02/25 06:00:00	2003/03/03 06:00:00	145	0.186	12.28%	0.58
78	1986/09/24 00:00:00	1986/09/28 16:00:00	113	0.184	12.44%	0.58
79	1983/11/24 23:00:00	1983/11/28 08:00:00	82	0.183	12.60%	0.57
80	2007/01/30 11:00:00	2007/02/03 17:00:00	103	0.181	12.76%	0.56
81	1987/12/16 12:00:00	1987/12/22 09:00:00	142	0.18	12.92%	0.56
82	1992/12/07 08:00:00	1992/12/12 13:00:00	126	0.161	13.08%	0.55
83	1969/02/05 03:00:00	1969/02/10 10:00:00	128	0.157	13.24%	0.54
84	1981/12/30 07:00:00	1982/01/07 10:00:00	196	0.155	13.40%	0.54
85	1982/11/29 15:00:00	1982/12/05 03:00:00	133	0.154	13.56%	0.53
86	1972/12/04 12:00:00	1972/12/12 09:00:00	190	0.149	13.72%	0.52

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
87	2006/04/04 18:00:00	2006/04/09 08:00:00	111	0.149	13.88%	0.52
88	1979/03/27 03:00:00	1979/04/01 22:00:00	140	0.142	14.04%	0.51
89	1976/12/30 13:00:00	1977/01/08 20:00:00	224	0.133	14.19%	0.51
90	1979/03/01 07:00:00	1979/03/05 08:00:00	98	0.133	14.35%	0.5
91	1967/03/13 11:00:00	1967/03/17 04:00:00	90	0.132	14.51%	0.5
92	1979/10/19 22:00:00	1979/10/24 08:00:00	107	0.132	14.67%	0.49
93	1976/11/11 22:00:00	1976/11/16 14:00:00	113	0.132	14.83%	0.48
94	1982/11/09 13:00:00	1982/11/15 02:00:00	134	0.129	14.99%	0.48
95	1994/02/17 11:00:00	1994/02/23 04:00:00	138	0.128	15.15%	0.47
96	1985/11/11 05:00:00	1985/11/16 16:00:00	132	0.126	15.31%	0.47
97	1981/03/19 20:00:00	1981/03/23 05:00:00	82	0.119	15.47%	0.46
98	2003/04/14 07:00:00	2003/04/19 07:00:00	121	0.117	15.63%	0.46
99	2005/02/11 01:00:00	2005/02/17 02:00:00	146	0.114	15.79%	0.46
100	1993/02/18 15:00:00	1993/02/28 01:00:00	227	0.113	15.95%	0.45
101	1986/02/07 20:00:00	1986/02/12 08:00:00	109	0.109	16.11%	0.45
102	1988/12/21 03:00:00	1988/12/28 18:00:00	184	0.108	16.27%	0.44
103	2006/02/27 20:00:00	2006/03/04 02:00:00	103	0.106	16.43%	0.44
104	1982/02/09 16:00:00	1982/02/14 16:00:00	121	0.1	16.59%	0.43
105	1974/10/28 05:00:00	1974/11/04 08:00:00	172	0.099	16.75%	0.43
106	1988/11/25 07:00:00	1988/11/28 15:00:00	81	0.099	16.91%	0.43
107	1983/01/27 07:00:00	1983/02/01 12:00:00	126	0.097	17.07%	0.42
108	2001/01/10 23:00:00	2001/01/16 12:00:00	134	0.096	17.22%	0.42
109	1973/11/22 19:00:00	1973/11/26 10:00:00	88	0.093	17.38%	0.41
110	2008/02/03 08:00:00	2008/02/07 07:00:00	96	0.092	17.54%	0.41
111	1976/04/11 19:00:00	1976/04/19 04:00:00	178	0.092	17.70%	0.41
112	1990/01/13 09:00:00	1990/01/19 13:00:00	149	0.089	17.86%	0.4
113	1979/03/15 22:00:00	1979/03/23 02:00:00	173	0.087	18.02%	0.4
114	1989/03/25 11:00:00	1989/03/29 07:00:00	93	0.087	18.18%	0.4
115	1994/02/03 20:00:00	1994/02/12 07:00:00	204	0.087	18.34%	0.39
116	1973/03/04 00:00:00	1973/03/17 00:00:00	313	0.086	18.50%	0.39
117	1964/12/27 09:00:00	1964/12/31 10:00:00	98	0.086	18.66%	0.39
118	1964/11/17 13:00:00	1964/11/21 04:00:00	88	0.086	18.82%	0.38
119	1979/02/21 01:00:00	1979/02/25 16:00:00	112	0.083	18.98%	0.38
120	2005/12/31 16:00:00	2006/01/05 21:00:00	126	0.083	19.14%	0.38
121	1992/03/02 08:00:00	1992/03/06 04:00:00	93	0.081	19.30%	0.37
122	1982/01/20 03:00:00	1982/01/25 10:00:00	128	0.08	19.46%	0.37
123	1986/12/06 03:00:00	1986/12/10 16:00:00	110	0.08	19.62%	0.37
124	1965/02/06 00:00:00	1965/02/10 05:00:00	102	0.079	19.78%	0.36
125	1965/12/29 17:00:00	1966/01/02 01:00:00	81	0.079	19.94%	0.36
126	1978/11/10 18:00:00	1978/11/17 22:00:00	173	0.079	20.10%	0.36
127	2008/02/22 03:00:00	2008/02/26 09:00:00	103	0.078	20.26%	0.35
128	2003/03/15 08:00:00	2003/03/20 07:00:00	120	0.077	20.41%	0.35
129	1973/02/10 22:00:00	1973/02/16 21:00:00	144	0.077	20.57%	0.35
130	2002/11/08 08:00:00	2002/11/13 12:00:00	125	0.076	20.73%	0.35
131	2006/03/10 17:00:00	2006/03/14 23:00:00	103	0.074	20.89%	0.34
132	1994/03/19 02:00:00	1994/03/23 16:00:00	111	0.073	21.05%	0.34
133	1981/11/26 18:00:00	1981/12/02 18:00:00	145	0.071	21.21%	0.34

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
134	1971/05/06 06:00:00	1971/05/10 08:00:00	99	0.071	21.37%	0.34
135	1988/04/14 18:00:00	1988/04/17 12:00:00	67	0.07	21.53%	0.33
136	1997/01/25 20:00:00	1997/01/29 21:00:00	98	0.067	21.69%	0.33
137	1991/12/28 01:00:00	1992/01/01 14:00:00	110	0.066	21.85%	0.33
138	1979/01/15 14:00:00	1979/01/22 00:00:00	155	0.066	22.01%	0.33
139	1993/01/31 01:00:00	1993/02/02 03:00:00	51	0.065	22.17%	0.32
140	1988/02/02 03:00:00	1988/02/05 20:00:00	90	0.064	22.33%	0.32
141	1987/11/04 17:00:00	1987/11/08 08:00:00	88	0.063	22.49%	0.32
142	2000/04/17 18:00:00	2000/04/20 14:00:00	69	0.062	22.65%	0.32
143	1992/12/27 20:00:00	1993/01/03 19:00:00	168	0.061	22.81%	0.32
144	2003/12/25 01:00:00	2003/12/28 09:00:00	81	0.061	22.97%	0.31
145	2001/11/24 09:00:00	2001/11/27 14:00:00	78	0.061	23.13%	0.31
146	1980/12/04 13:00:00	1980/12/08 17:00:00	101	0.06	23.29%	0.31
147	1993/11/14 17:00:00	1993/11/16 08:00:00	40	0.059	23.44%	0.31
148	1966/02/06 10:00:00	1966/02/11 09:00:00	120	0.058	23.60%	0.3
149	1973/03/20 08:00:00	1973/03/24 19:00:00	108	0.058	23.76%	0.3
150	1996/12/09 18:00:00	1996/12/15 03:00:00	130	0.058	23.92%	0.3
151	2005/04/28 08:00:00	2005/05/01 05:00:00	70	0.057	24.08%	0.3
152	1983/02/05 17:00:00	1983/02/11 10:00:00	138	0.055	24.24%	0.3
153	1977/12/25 11:00:00	1977/12/31 13:00:00	147	0.055	24.40%	0.29
154	1974/04/02 01:00:00	1974/04/04 21:00:00	69	0.054	24.56%	0.29
155	1983/12/03 15:00:00	1983/12/05 21:00:00	55	0.054	24.72%	0.29
156	2008/02/14 12:00:00	2008/02/17 03:00:00	64	0.054	24.88%	0.29
157	1978/09/05 17:00:00	1978/09/08 17:00:00	73	0.052	25.04%	0.29
158	1973/02/27 23:00:00	1973/03/02 13:00:00	63	0.052	25.20%	0.29
159	2006/05/22 04:00:00	2006/05/24 13:00:00	58	0.051	25.36%	0.28
160	1978/01/30 07:00:00	1978/02/01 23:00:00	65	0.051	25.52%	0.28
161	1994/03/24 22:00:00	1994/03/28 10:00:00	85	0.051	25.68%	0.28
162	1987/12/04 21:00:00	1987/12/06 23:00:00	51	0.049	25.84%	0.28
163	1990/02/17 11:00:00	1990/02/21 12:00:00	98	0.049	26.00%	0.28
164	1977/12/18 01:00:00	1977/12/20 08:00:00	56	0.049	26.16%	0.27
165	1994/03/06 05:00:00	1994/03/09 18:00:00	86	0.046	26.32%	0.27
166	1996/03/12 17:00:00	1996/03/16 01:00:00	81	0.046	26.48%	0.27
167	1968/04/01 19:00:00	1968/04/04 17:00:00	71	0.045	26.63%	0.27
168	1995/04/16 07:00:00	1995/04/21 08:00:00	122	0.044	26.79%	0.27
169	1998/03/25 12:00:00	1998/04/04 07:00:00	236	0.044	26.95%	0.27
170	1983/04/29 02:00:00	1983/05/03 21:00:00	116	0.044	27.11%	0.27
171	1975/11/27 17:00:00	1975/12/02 00:00:00	104	0.044	27.27%	0.26
172	2004/02/02 23:00:00	2004/02/05 06:00:00	56	0.044	27.43%	0.26
173	2006/03/28 22:00:00	2006/03/31 02:00:00	53	0.044	27.59%	0.26
174	1995/03/21 11:00:00	1995/03/25 17:00:00	103	0.044	27.75%	0.26
175	1978/11/21 18:00:00	1978/11/25 16:00:00	95	0.043	27.91%	0.26
176	1986/01/30 04:00:00	1986/02/02 23:00:00	92	0.043	28.07%	0.26
177	1978/04/07 01:00:00	1978/04/09 18:00:00	66	0.043	28.23%	0.25
178	1973/11/17 06:00:00	1973/11/21 03:00:00	94	0.043	28.39%	0.25
179	1996/01/21 18:00:00	1996/01/26 01:00:00	104	0.043	28.55%	0.25
180	1975/12/11 23:00:00	1975/12/14 22:00:00	72	0.043	28.71%	0.25

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
181	1983/11/20 09:00:00	1983/11/23 16:00:00	80	0.042	28.87%	0.25
182	2002/12/20 06:00:00	2002/12/23 20:00:00	87	0.042	29.03%	0.25
183	1971/05/28 01:00:00	1971/05/31 09:00:00	81	0.041	29.19%	0.25
184	1982/03/26 21:00:00	1982/04/06 02:00:00	246	0.041	29.35%	0.25
185	1967/04/18 19:00:00	1967/04/25 06:00:00	156	0.041	29.51%	0.24
186	1978/03/30 14:00:00	1978/04/03 09:00:00	92	0.041	29.67%	0.24
187	1979/01/31 00:00:00	1979/02/05 19:00:00	140	0.041	29.82%	0.24
188	1977/03/16 12:00:00	1977/03/19 10:00:00	71	0.041	29.98%	0.24
189	1986/04/06 05:00:00	1986/04/09 00:00:00	68	0.04	30.14%	0.24
190	1985/02/01 15:00:00	1985/02/05 06:00:00	88	0.04	30.30%	0.24
191	2000/10/29 22:00:00	2000/10/31 17:00:00	44	0.039	30.46%	0.24
192	1986/10/09 18:00:00	1986/10/12 13:00:00	68	0.039	30.62%	0.23
193	1981/01/28 06:00:00	1981/02/01 19:00:00	110	0.039	30.78%	0.23
194	1985/09/18 08:00:00	1985/09/20 05:00:00	46	0.039	30.94%	0.23
195	2002/12/16 09:00:00	2002/12/19 02:00:00	66	0.039	31.10%	0.23
196	1969/03/10 02:00:00	1969/03/15 14:00:00	133	0.038	31.26%	0.23
197	1977/03/24 11:00:00	1977/03/27 23:00:00	85	0.038	31.42%	0.23
198	2001/01/26 11:00:00	2001/01/29 15:00:00	77	0.038	31.58%	0.23
199	1995/12/20 17:00:00	1995/12/22 08:00:00	40	0.038	31.74%	0.23
200	1969/11/06 18:00:00	1969/11/11 04:00:00	107	0.037	31.90%	0.23
201	1996/10/30 13:00:00	1996/11/01 17:00:00	53	0.037	32.06%	0.22
202	1975/02/09 06:00:00	1975/02/12 10:00:00	77	0.037	32.22%	0.22
203	1987/10/22 16:00:00	1987/10/25 00:00:00	57	0.037	32.38%	0.22
204	1980/03/25 22:00:00	1980/03/27 18:00:00	45	0.037	32.54%	0.22
205	1971/10/16 04:00:00	1971/10/19 12:00:00	81	0.037	32.70%	0.22
206	2007/02/19 04:00:00	2007/02/24 05:00:00	122	0.036	32.85%	0.22
207	1975/02/03 09:00:00	1975/02/06 20:00:00	84	0.036	33.01%	0.22
208	1983/11/11 22:00:00	1983/11/15 13:00:00	88	0.036	33.17%	0.22
209	2005/03/22 20:00:00	2005/03/24 20:00:00	49	0.035	33.33%	0.22
210	1983/10/07 07:00:00	1983/10/09 03:00:00	45	0.035	33.49%	0.21
211	1982/11/19 02:00:00	1982/11/21 09:00:00	56	0.035	33.65%	0.21
212	1971/01/02 04:00:00	1971/01/04 11:00:00	56	0.035	33.81%	0.21
213	1982/01/28 17:00:00	1982/01/30 06:00:00	38	0.035	33.97%	0.21
214	1998/05/12 09:00:00	1998/05/14 21:00:00	61	0.035	34.13%	0.21
215	1970/10/03 14:00:00	1970/10/05 11:00:00	46	0.035	34.29%	0.21
216	1964/10/15 09:00:00	1964/10/17 05:00:00	45	0.034	34.45%	0.21
217	1964/11/09 12:00:00	1964/11/13 18:00:00	103	0.034	34.61%	0.21
218	1994/04/25 17:00:00	1994/04/30 01:00:00	105	0.034	34.77%	0.21
219	2005/10/16 17:00:00	2005/10/20 11:00:00	91	0.034	34.93%	0.21
220	2007/12/07 04:00:00	2007/12/10 19:00:00	88	0.034	35.09%	0.21
221	1996/02/25 09:00:00	1996/02/29 17:00:00	105	0.034	35.25%	0.2
222	1972/05/19 04:00:00	1972/05/22 11:00:00	80	0.034	35.41%	0.2
223	2004/12/05 11:00:00	2004/12/07 08:00:00	46	0.034	35.57%	0.2
224	2006/12/10 00:00:00	2006/12/12 00:00:00	49	0.034	35.73%	0.2
225	1985/02/09 05:00:00	1985/02/11 04:00:00	48	0.034	35.89%	0.2
226	1979/11/07 19:00:00	1979/11/10 13:00:00	67	0.034	36.04%	0.2
227	1993/03/26 02:00:00	1993/03/30 00:00:00	95	0.034	36.20%	0.2

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
228	1983/04/20 01:00:00	1983/04/23 02:00:00	74	0.034	36.36%	0.2
229	1968/12/25 18:00:00	1968/12/28 01:00:00	56	0.033	36.52%	0.2
230	1970/02/10 01:00:00	1970/02/13 10:00:00	82	0.033	36.68%	0.2
231	2001/04/21 01:00:00	2001/04/23 03:00:00	51	0.033	36.84%	0.2
232	1985/12/11 02:00:00	1985/12/12 14:00:00	37	0.033	37.00%	0.19
233	1994/12/24 08:00:00	1994/12/27 05:00:00	70	0.033	37.16%	0.19
234	1990/06/09 10:00:00	1990/06/12 11:00:00	74	0.033	37.32%	0.19
235	1985/03/27 08:00:00	1985/03/30 08:00:00	73	0.033	37.48%	0.19
236	1992/03/20 16:00:00	1992/03/24 23:00:00	104	0.032	37.64%	0.19
237	2005/03/04 15:00:00	2005/03/06 13:00:00	47	0.032	37.80%	0.19
238	1996/04/18 01:00:00	1996/04/19 19:00:00	43	0.032	37.96%	0.19
239	1983/02/02 12:00:00	1983/02/04 09:00:00	46	0.032	38.12%	0.19
240	1967/08/31 02:00:00	1967/09/01 14:00:00	37	0.032	38.28%	0.19
241	1997/04/03 17:00:00	1997/04/05 13:00:00	45	0.032	38.44%	0.19
242	1971/04/14 11:00:00	1971/04/17 10:00:00	72	0.032	38.60%	0.19
243	1969/03/21 13:00:00	1969/03/23 12:00:00	48	0.032	38.76%	0.19
244	2000/02/21 10:00:00	2000/02/24 14:00:00	77	0.032	38.92%	0.18
245	2002/11/29 11:00:00	2002/12/01 13:00:00	51	0.031	39.07%	0.18
246	1968/11/15 06:00:00	1968/11/17 05:00:00	48	0.031	39.23%	0.18
247	1988/01/05 14:00:00	1988/01/07 06:00:00	41	0.031	39.39%	0.18
248	1994/01/25 01:00:00	1994/01/28 14:00:00	86	0.031	39.55%	0.18
249	1990/01/02 03:00:00	1990/01/03 15:00:00	37	0.031	39.71%	0.18
250	1974/12/28 06:00:00	1974/12/31 02:00:00	69	0.031	39.87%	0.18
251	2003/11/12 05:00:00	2003/11/14 00:00:00	44	0.031	40.03%	0.18
252	2007/04/20 14:00:00	2007/04/23 14:00:00	73	0.031	40.19%	0.18
253	1982/09/26 01:00:00	1982/09/27 23:00:00	47	0.031	40.35%	0.18
254	1974/01/01 04:00:00	1974/01/03 12:00:00	57	0.03	40.51%	0.18
255	1976/10/22 20:00:00	1976/10/24 09:00:00	38	0.03	40.67%	0.18
256	1998/04/11 11:00:00	1998/04/13 15:00:00	53	0.03	40.83%	0.18
257	1987/02/23 13:00:00	1987/02/27 20:00:00	104	0.03	40.99%	0.18
258	1991/10/26 22:00:00	1991/10/28 16:00:00	43	0.03	41.15%	0.17
259	1997/12/06 13:00:00	1997/12/09 16:00:00	76	0.03	41.31%	0.17
260	2002/03/17 23:00:00	2002/03/19 03:00:00	29	0.029	41.47%	0.17
261	1971/01/12 19:00:00	1971/01/13 20:00:00	26	0.029	41.63%	0.17
262	2004/11/21 05:00:00	2004/11/22 19:00:00	39	0.029	41.79%	0.17
263	1983/10/01 04:00:00	1983/10/03 11:00:00	56	0.029	41.95%	0.17
264	2008/01/23 20:00:00	2008/01/25 12:00:00	41	0.029	42.11%	0.17
265	1992/12/17 23:00:00	1992/12/19 07:00:00	33	0.029	42.26%	0.17
266	1979/02/14 03:00:00	1979/02/15 14:00:00	36	0.029	42.42%	0.17
267	1976/11/27 04:00:00	1976/11/28 15:00:00	36	0.029	42.58%	0.17
268	2007/02/12 22:00:00	2007/02/14 17:00:00	44	0.028	42.74%	0.17
269	1978/01/10 17:00:00	1978/01/13 03:00:00	59	0.028	42.90%	0.17
270	1991/03/13 18:00:00	1991/03/16 18:00:00	73	0.028	43.06%	0.17
271	1980/03/21 19:00:00	1980/03/22 20:00:00	26	0.028	43.22%	0.17
272	1987/10/31 03:00:00	1987/11/03 12:00:00	82	0.028	43.38%	0.17
273	1967/11/30 16:00:00	1967/12/01 16:00:00	25	0.028	43.54%	0.17
274	1992/03/26 17:00:00	1992/03/28 01:00:00	33	0.028	43.70%	0.16

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
275	1971/02/16 16:00:00	1971/02/18 17:00:00	50	0.028	43.86%	0.16
276	1965/03/11 14:00:00	1965/03/13 13:00:00	48	0.028	44.02%	0.16
277	2000/02/13 12:00:00	2000/02/15 03:00:00	40	0.028	44.18%	0.16
278	1991/01/09 14:00:00	1991/01/10 20:00:00	31	0.028	44.34%	0.16
279	2004/02/18 16:00:00	2004/02/19 22:00:00	31	0.028	44.50%	0.16
280	1973/01/04 01:00:00	1973/01/06 02:00:00	50	0.028	44.66%	0.16
281	1997/01/05 09:00:00	1997/01/06 10:00:00	26	0.028	44.82%	0.16
282	1984/12/07 23:00:00	1984/12/09 02:00:00	28	0.028	44.98%	0.16
283	2001/12/21 13:00:00	2001/12/23 00:00:00	36	0.028	45.14%	0.16
284	1997/01/23 06:00:00	1997/01/24 11:00:00	30	0.027	45.30%	0.16
285	2008/01/26 22:00:00	2008/01/29 19:00:00	70	0.027	45.45%	0.16
286	1987/04/03 21:00:00	1987/04/05 03:00:00	31	0.027	45.61%	0.16
287	1973/01/09 10:00:00	1973/01/11 01:00:00	40	0.027	45.77%	0.16
288	1997/02/27 12:00:00	1997/03/01 02:00:00	39	0.027	45.93%	0.16
289	1988/11/14 07:00:00	1988/11/15 14:00:00	32	0.027	46.09%	0.16
290	1982/12/07 23:00:00	1982/12/11 00:00:00	74	0.027	46.25%	0.16
291	1965/12/22 00:00:00	1965/12/24 02:00:00	51	0.027	46.41%	0.16
292	1990/11/19 22:00:00	1990/11/21 10:00:00	37	0.027	46.57%	0.15
293	1990/01/31 01:00:00	1990/02/01 04:00:00	28	0.027	46.73%	0.15
294	1968/02/13 09:00:00	1968/02/15 02:00:00	42	0.027	46.89%	0.15
295	2004/04/01 22:00:00	2004/04/03 16:00:00	43	0.027	47.05%	0.15
296	2006/03/21 02:00:00	2006/03/21 23:00:00	22	0.027	47.21%	0.15
297	1968/12/19 14:00:00	1968/12/21 11:00:00	46	0.027	47.37%	0.15
298	1983/12/09 18:00:00	1983/12/10 21:00:00	28	0.027	47.53%	0.15
299	1972/01/09 09:00:00	1972/01/11 00:00:00	40	0.027	47.69%	0.15
300	2007/12/19 01:00:00	2007/12/22 00:00:00	72	0.027	47.85%	0.15
301	1995/12/23 10:00:00	1995/12/24 11:00:00	26	0.026	48.01%	0.15
302	1998/01/29 13:00:00	1998/01/30 21:00:00	33	0.026	48.17%	0.15
303	1990/04/04 09:00:00	1990/04/05 20:00:00	36	0.026	48.33%	0.15
304	1965/01/24 07:00:00	1965/01/25 08:00:00	26	0.026	48.48%	0.15
305	1966/10/10 12:00:00	1966/10/11 12:00:00	25	0.026	48.64%	0.15
306	1967/04/04 16:00:00	1967/04/05 18:00:00	27	0.026	48.80%	0.15
307	1981/03/26 22:00:00	1981/03/27 22:00:00	25	0.026	48.96%	0.15
308	1970/01/16 16:00:00	1970/01/19 00:00:00	57	0.026	49.12%	0.15
309	1967/03/31 10:00:00	1967/04/03 10:00:00	73	0.026	49.28%	0.15
310	1994/04/09 09:00:00	1994/04/10 13:00:00	29	0.026	49.44%	0.15
311	1975/03/22 08:00:00	1975/03/24 01:00:00	42	0.026	49.60%	0.15
312	1974/03/02 10:00:00	1974/03/04 12:00:00	51	0.026	49.76%	0.14
313	1982/01/10 18:00:00	1982/01/11 18:00:00	25	0.026	49.92%	0.14
314	1983/08/16 15:00:00	1983/08/19 04:00:00	62	0.026	50.08%	0.14
315	1971/03/13 06:00:00	1971/03/14 17:00:00	36	0.026	50.24%	0.14
316	1975/03/31 21:00:00	1975/04/01 22:00:00	26	0.026	50.40%	0.14
317	1983/01/19 04:00:00	1983/01/20 05:00:00	26	0.026	50.56%	0.14
318	1988/02/29 22:00:00	1988/03/03 10:00:00	61	0.026	50.72%	0.14
319	1978/04/15 20:00:00	1978/04/16 20:00:00	25	0.026	50.88%	0.14
320	2000/02/17 14:00:00	2000/02/18 18:00:00	29	0.026	51.04%	0.14
321	1993/06/05 13:00:00	1993/06/06 16:00:00	28	0.026	51.20%	0.14

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
322	1972/04/30 04:00:00	1972/05/01 05:00:00	26	0.026	51.36%	0.14
323	1973/04/30 05:00:00	1973/05/01 06:00:00	26	0.026	51.52%	0.14
324	1975/01/30 18:00:00	1975/01/31 18:00:00	25	0.026	51.67%	0.14
325	1993/11/23 02:00:00	1993/11/23 23:00:00	22	0.025	51.83%	0.14
326	1989/02/04 04:00:00	1989/02/05 11:00:00	32	0.025	51.99%	0.14
327	1993/12/11 17:00:00	1993/12/13 01:00:00	33	0.025	52.15%	0.14
328	1991/01/03 16:00:00	1991/01/05 17:00:00	50	0.025	52.31%	0.14
329	1973/02/03 13:00:00	1973/02/04 15:00:00	27	0.025	52.47%	0.14
330	1995/01/21 03:00:00	1995/01/22 03:00:00	25	0.025	52.63%	0.14
331	1972/10/19 03:00:00	1972/10/21 19:00:00	65	0.025	52.79%	0.14
332	2006/04/14 13:00:00	2006/04/16 07:00:00	43	0.025	52.95%	0.14
333	1986/07/19 12:00:00	1986/07/20 12:00:00	25	0.025	53.11%	0.14
334	1985/10/09 12:00:00	1985/10/10 09:00:00	22	0.024	53.27%	0.14
335	1968/01/27 07:00:00	1968/01/29 02:00:00	44	0.024	53.43%	0.13
336	2001/12/09 14:00:00	2001/12/10 16:00:00	27	0.024	53.59%	0.13
337	2003/05/03 16:00:00	2003/05/04 13:00:00	22	0.024	53.75%	0.13
338	1966/10/04 00:00:00	1966/10/06 01:00:00	50	0.024	53.91%	0.13
339	1980/04/22 15:00:00	1980/04/24 22:00:00	56	0.024	54.07%	0.13
340	1981/04/18 13:00:00	1981/04/20 04:00:00	40	0.024	54.23%	0.13
341	1989/10/22 00:00:00	1989/10/23 03:00:00	28	0.024	54.39%	0.13
342	1987/10/28 20:00:00	1987/10/29 13:00:00	18	0.024	54.55%	0.13
343	1983/04/17 22:00:00	1983/04/18 23:00:00	26	0.024	54.70%	0.13
344	2006/03/17 20:00:00	2006/03/19 05:00:00	34	0.024	54.86%	0.13
345	1973/03/27 03:00:00	1973/03/29 07:00:00	53	0.023	55.02%	0.13
346	1983/01/24 18:00:00	1983/01/25 09:00:00	16	0.023	55.18%	0.13
347	1991/12/17 22:00:00	1991/12/19 17:00:00	44	0.023	55.34%	0.13
348	1985/03/02 13:00:00	1985/03/03 17:00:00	29	0.023	55.50%	0.13
349	1990/12/19 14:00:00	1990/12/20 20:00:00	31	0.023	55.66%	0.13
350	1977/12/23 03:00:00	1977/12/23 19:00:00	17	0.023	55.82%	0.13
351	1967/12/13 10:00:00	1967/12/14 02:00:00	17	0.023	55.98%	0.13
352	1988/12/15 13:00:00	1988/12/19 21:00:00	105	0.023	56.14%	0.13
353	1969/02/15 18:00:00	1969/02/16 10:00:00	17	0.023	56.30%	0.13
354	1971/12/03 00:00:00	1971/12/04 15:00:00	40	0.023	56.46%	0.13
355	1987/10/12 19:00:00	1987/10/13 10:00:00	16	0.023	56.62%	0.13
356	1996/03/04 23:00:00	1996/03/05 18:00:00	20	0.023	56.78%	0.13
357	1970/01/11 14:00:00	1970/01/12 17:00:00	28	0.023	56.94%	0.13
358	1994/11/10 12:00:00	1994/11/11 06:00:00	19	0.022	57.10%	0.13
359	2006/12/16 21:00:00	2006/12/17 16:00:00	20	0.022	57.26%	0.13
360	1983/01/23 00:00:00	1983/01/23 17:00:00	18	0.022	57.42%	0.13
361	1971/12/07 01:00:00	1971/12/07 16:00:00	16	0.022	57.58%	0.13
362	1964/09/24 14:00:00	1964/09/25 03:00:00	14	0.022	57.74%	0.12
363	1970/04/30 09:00:00	1970/04/30 22:00:00	14	0.022	57.89%	0.12
364	1973/12/01 15:00:00	1973/12/02 06:00:00	16	0.022	58.05%	0.12
365	1985/10/07 14:00:00	1985/10/08 03:00:00	14	0.022	58.21%	0.12
366	2001/05/29 15:00:00	2001/05/30 04:00:00	14	0.022	58.37%	0.12
367	1967/03/04 00:00:00	1967/03/05 01:00:00	26	0.022	58.53%	0.12
368	1990/02/04 11:00:00	1990/02/05 02:00:00	16	0.022	58.69%	0.12

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
369	1968/03/18 13:00:00	1968/03/19 04:00:00	16	0.022	58.85%	0.12
370	1996/12/06 04:00:00	1996/12/07 00:00:00	21	0.022	59.01%	0.12
371	1995/06/15 22:00:00	1995/06/17 23:00:00	50	0.022	59.17%	0.12
372	1969/04/05 20:00:00	1969/04/06 11:00:00	16	0.022	59.33%	0.12
373	1973/02/06 01:00:00	1973/02/08 00:00:00	48	0.022	59.49%	0.12
374	1992/12/04 14:00:00	1992/12/05 06:00:00	17	0.022	59.65%	0.12
375	1985/02/20 20:00:00	1985/02/21 11:00:00	16	0.022	59.81%	0.12
376	1996/12/22 15:00:00	1996/12/23 06:00:00	16	0.022	59.97%	0.12
377	1967/06/13 12:00:00	1967/06/14 04:00:00	17	0.022	60.13%	0.12
378	1977/01/28 17:00:00	1977/01/29 09:00:00	17	0.021	60.29%	0.12
379	1996/02/21 10:00:00	1996/02/22 18:00:00	33	0.021	60.45%	0.12
380	1974/01/20 17:00:00	1974/01/21 10:00:00	18	0.021	60.61%	0.12
381	1981/10/11 06:00:00	1981/10/11 20:00:00	15	0.021	60.77%	0.12
382	2000/11/10 09:00:00	2000/11/11 18:00:00	34	0.021	60.93%	0.12
383	1990/11/26 03:00:00	1990/11/26 19:00:00	17	0.021	61.08%	0.12
384	1997/02/10 19:00:00	1997/02/11 12:00:00	18	0.021	61.24%	0.12
385	1989/01/05 21:00:00	1989/01/06 13:00:00	17	0.021	61.40%	0.12
386	1977/05/24 06:00:00	1977/05/24 21:00:00	16	0.021	61.56%	0.12
387	2008/02/20 13:00:00	2008/02/21 02:00:00	14	0.021	61.72%	0.12
388	2005/01/28 16:00:00	2005/01/29 13:00:00	22	0.021	61.88%	0.12
389	1983/04/10 23:00:00	1983/04/13 12:00:00	62	0.021	62.04%	0.12
390	2006/10/14 04:00:00	2006/10/15 02:00:00	23	0.021	62.20%	0.12
391	1993/12/14 18:00:00	1993/12/15 17:00:00	24	0.021	62.36%	0.12
392	1970/12/09 05:00:00	1970/12/09 23:00:00	19	0.021	62.52%	0.12
393	1980/05/10 11:00:00	1980/05/11 01:00:00	15	0.021	62.68%	0.12
394	1965/03/15 02:00:00	1965/03/15 16:00:00	15	0.021	62.84%	0.11
395	1984/12/14 14:00:00	1984/12/15 03:00:00	14	0.021	63.00%	0.11
396	1971/04/23 07:00:00	1971/04/23 22:00:00	16	0.021	63.16%	0.11
397	1982/03/02 19:00:00	1982/03/03 12:00:00	18	0.021	63.32%	0.11
398	1977/02/22 01:00:00	1977/02/24 11:00:00	59	0.021	63.48%	0.11
399	2007/02/28 05:00:00	2007/02/28 18:00:00	14	0.021	63.64%	0.11
400	1975/04/17 03:00:00	1975/04/18 22:00:00	44	0.021	63.80%	0.11
401	1974/03/27 09:00:00	1974/03/27 23:00:00	15	0.02	63.96%	0.11
402	1969/12/08 19:00:00	1969/12/09 11:00:00	17	0.02	64.11%	0.11
403	2006/02/18 00:00:00	2006/02/19 17:00:00	42	0.02	64.27%	0.11
404	2004/01/28 06:00:00	2004/01/28 20:00:00	15	0.02	64.43%	0.11
405	1996/01/16 20:00:00	1996/01/17 12:00:00	17	0.02	64.59%	0.11
406	1990/05/28 05:00:00	1990/05/29 08:00:00	28	0.02	64.75%	0.11
407	1980/04/28 17:00:00	1980/04/30 06:00:00	38	0.019	64.91%	0.11
408	2004/11/29 12:00:00	2004/11/30 01:00:00	14	0.019	65.07%	0.11
409	1984/04/06 06:00:00	1984/04/06 19:00:00	14	0.019	65.23%	0.11
410	1968/05/12 05:00:00	1968/05/12 19:00:00	15	0.019	65.39%	0.11
411	1969/06/11 09:00:00	1969/06/11 23:00:00	15	0.019	65.55%	0.11
412	1994/11/16 08:00:00	1994/11/16 20:00:00	13	0.019	65.71%	0.11
413	1989/02/02 10:00:00	1989/02/02 23:00:00	14	0.019	65.87%	0.11
414	1990/03/11 03:00:00	1990/03/11 15:00:00	13	0.019	66.03%	0.11
415	2001/01/08 16:00:00	2001/01/09 11:00:00	20	0.019	66.19%	0.11

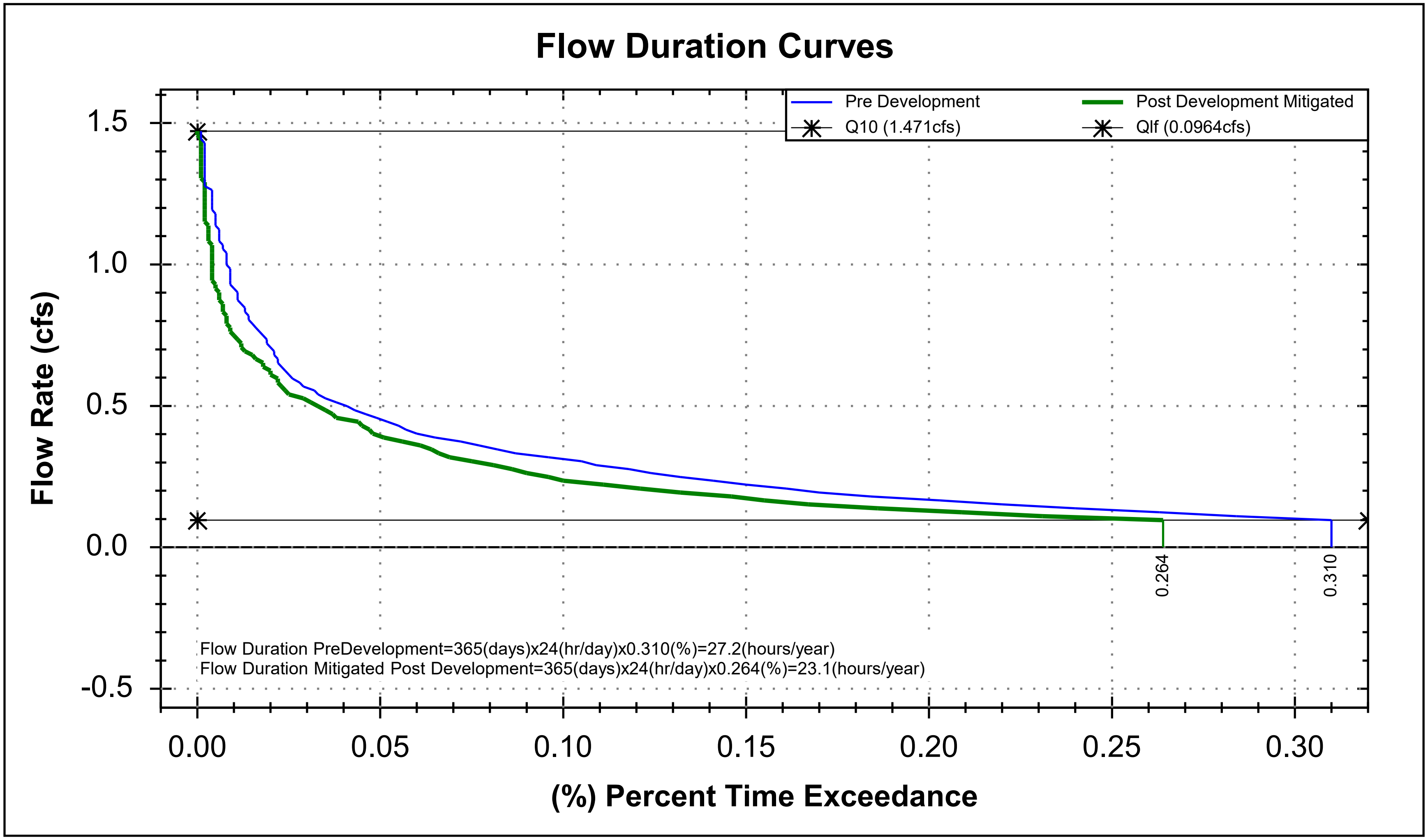
Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
416	1968/07/09 21:00:00	1968/07/10 09:00:00	13	0.019	66.35%	0.11
417	2008/05/23 19:00:00	2008/05/23 23:00:00	5	0.018	66.51%	0.11
418	1967/09/29 21:00:00	1967/09/30 12:00:00	16	0.018	66.67%	0.11
419	1968/03/13 22:00:00	1968/03/14 09:00:00	12	0.018	66.83%	0.11
420	1986/01/02 15:00:00	1986/01/03 03:00:00	13	0.018	66.99%	0.11
421	1967/11/28 10:00:00	1967/11/28 21:00:00	12	0.018	67.15%	0.11
422	1972/04/13 03:00:00	1972/04/13 19:00:00	17	0.018	67.30%	0.11
423	1986/12/20 06:00:00	1986/12/20 23:00:00	18	0.018	67.46%	0.11
424	1972/02/05 08:00:00	1972/02/06 19:00:00	36	0.018	67.62%	0.11
425	1993/11/11 05:00:00	1993/11/12 23:00:00	43	0.018	67.78%	0.11
426	1984/01/16 20:00:00	1984/01/17 08:00:00	13	0.018	67.94%	0.11
427	2004/04/17 15:00:00	2004/04/18 02:00:00	12	0.017	68.10%	0.11
428	1984/12/16 04:00:00	1984/12/16 14:00:00	11	0.017	68.26%	0.11
429	2006/12/27 08:00:00	2006/12/27 19:00:00	12	0.017	68.42%	0.11
430	1998/05/05 17:00:00	1998/05/06 06:00:00	14	0.017	68.58%	0.11
431	1995/05/06 05:00:00	1995/05/06 18:00:00	14	0.017	68.74%	0.1
432	1971/02/19 17:00:00	1971/02/20 17:00:00	25	0.017	68.90%	0.1
433	1982/02/16 09:00:00	1982/02/16 19:00:00	11	0.017	69.06%	0.1
434	1967/01/31 04:00:00	1967/01/31 14:00:00	11	0.017	69.22%	0.1
435	1966/09/30 00:00:00	1966/09/30 21:00:00	22	0.017	69.38%	0.1
436	1980/03/18 08:00:00	1980/03/19 05:00:00	22	0.017	69.54%	0.1
437	1998/01/19 17:00:00	1998/01/20 06:00:00	14	0.017	69.70%	0.1
438	1985/04/21 14:00:00	1985/04/22 12:00:00	23	0.017	69.86%	0.1
439	1975/03/25 10:00:00	1975/03/26 08:00:00	23	0.017	70.02%	0.1
440	2001/12/03 17:00:00	2001/12/04 05:00:00	13	0.017	70.18%	0.1
441	1995/12/13 08:00:00	1995/12/14 14:00:00	31	0.017	70.33%	0.1
442	2004/01/03 00:00:00	2004/01/03 08:00:00	9	0.017	70.49%	0.1
443	1991/03/11 06:00:00	1991/03/11 16:00:00	11	0.016	70.65%	0.1
444	1982/12/29 19:00:00	1982/12/30 20:00:00	26	0.016	70.81%	0.1
445	1992/10/30 19:00:00	1992/10/31 04:00:00	10	0.016	70.97%	0.1
446	1992/03/31 16:00:00	1992/04/01 02:00:00	11	0.016	71.13%	0.1
447	1993/11/30 06:00:00	1993/11/30 15:00:00	10	0.016	71.29%	0.1
448	1976/04/04 09:00:00	1976/04/05 09:00:00	25	0.016	71.45%	0.1
449	1981/04/02 06:00:00	1981/04/03 06:00:00	25	0.016	71.61%	0.1
450	1987/02/13 23:00:00	1987/02/14 10:00:00	12	0.016	71.77%	0.1
451	1992/03/08 01:00:00	1992/03/08 12:00:00	12	0.016	71.93%	0.1
452	1965/01/07 11:00:00	1965/01/07 22:00:00	12	0.016	72.09%	0.1
453	1972/09/06 05:00:00	1972/09/07 06:00:00	26	0.016	72.25%	0.1
454	2002/04/24 12:00:00	2002/04/24 23:00:00	12	0.016	72.41%	0.1
455	1989/01/07 16:00:00	1989/01/08 02:00:00	11	0.016	72.57%	0.1
456	1996/12/27 18:00:00	1996/12/28 15:00:00	22	0.016	72.73%	0.1
457	1989/03/02 23:00:00	1989/03/03 09:00:00	11	0.016	72.89%	0.1
458	1998/04/14 17:00:00	1998/04/16 04:00:00	36	0.016	73.05%	0.1
459	1989/01/04 12:00:00	1989/01/04 20:00:00	9	0.016	73.21%	0.1
460	2005/09/20 03:00:00	2005/09/20 09:00:00	7	0.016	73.37%	0.1
461	2002/03/07 15:00:00	2002/03/08 07:00:00	17	0.016	73.52%	0.1
462	1984/03/24 13:00:00	1984/03/24 19:00:00	7	0.016	73.68%	0.1

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
463	1985/08/10 14:00:00	1985/08/10 20:00:00	7	0.016	73.84%	0.1
464	1986/09/18 11:00:00	1986/09/18 17:00:00	7	0.016	74.00%	0.1
465	2000/10/21 18:00:00	2000/10/22 01:00:00	8	0.016	74.16%	0.1
466	1967/09/02 21:00:00	1967/09/03 06:00:00	10	0.016	74.32%	0.1
467	1995/05/14 22:00:00	1995/05/15 08:00:00	11	0.016	74.48%	0.1
468	1998/03/06 17:00:00	1998/03/07 04:00:00	12	0.016	74.64%	0.1
469	1992/10/23 05:00:00	1992/10/23 15:00:00	11	0.016	74.80%	0.1
470	1971/10/24 11:00:00	1971/10/25 21:00:00	35	0.015	74.96%	0.1
471	1974/02/18 16:00:00	1974/02/20 03:00:00	36	0.015	75.12%	0.1
472	1975/02/14 05:00:00	1975/02/14 13:00:00	9	0.015	75.28%	0.1
473	2003/12/07 23:00:00	2003/12/08 08:00:00	10	0.015	75.44%	0.1
474	1973/12/22 03:00:00	1973/12/22 11:00:00	9	0.015	75.60%	0.1
475	1979/11/05 14:00:00	1979/11/05 22:00:00	9	0.015	75.76%	0.1
476	1984/12/18 14:00:00	1984/12/20 01:00:00	36	0.015	75.92%	0.1
477	1970/01/15 02:00:00	1970/01/15 10:00:00	9	0.015	76.08%	0.09
478	1971/11/15 16:00:00	1971/11/16 00:00:00	9	0.015	76.24%	0.09
479	1997/12/21 17:00:00	1997/12/22 03:00:00	11	0.015	76.40%	0.09
480	1998/01/04 17:00:00	1998/01/05 03:00:00	11	0.015	76.56%	0.09
481	1982/02/08 03:00:00	1982/02/08 11:00:00	9	0.015	76.71%	0.09
482	1980/12/11 14:00:00	1980/12/11 22:00:00	9	0.015	76.87%	0.09
483	1973/12/20 14:00:00	1973/12/20 22:00:00	9	0.015	77.03%	0.09
484	1973/01/30 13:00:00	1973/01/30 21:00:00	9	0.015	77.19%	0.09
485	1997/01/02 01:00:00	1997/01/02 09:00:00	9	0.015	77.35%	0.09
486	1973/01/25 21:00:00	1973/01/26 05:00:00	9	0.015	77.51%	0.09
487	1968/03/17 02:00:00	1968/03/17 10:00:00	9	0.015	77.67%	0.09
488	1980/05/01 23:00:00	1980/05/02 07:00:00	9	0.015	77.83%	0.09
489	1983/11/18 02:00:00	1983/11/18 10:00:00	9	0.015	77.99%	0.09
490	2003/11/16 01:00:00	2003/11/16 11:00:00	11	0.015	78.15%	0.09
491	1967/12/08 01:00:00	1967/12/08 09:00:00	9	0.015	78.31%	0.09
492	1975/12/20 00:00:00	1975/12/20 08:00:00	9	0.015	78.47%	0.09
493	1991/12/10 00:00:00	1991/12/11 11:00:00	36	0.015	78.63%	0.09
494	1969/11/15 21:00:00	1969/11/16 05:00:00	9	0.015	78.79%	0.09
495	2007/02/11 12:00:00	2007/02/11 21:00:00	10	0.015	78.95%	0.09
496	1966/03/02 10:00:00	1966/03/02 18:00:00	9	0.015	79.11%	0.09
497	1982/02/05 14:00:00	1982/02/05 22:00:00	9	0.015	79.27%	0.09
498	1973/05/31 09:00:00	1973/05/31 17:00:00	9	0.015	79.43%	0.09
499	1971/10/30 10:00:00	1971/10/30 18:00:00	9	0.015	79.59%	0.09
500	1978/01/26 10:00:00	1978/01/26 18:00:00	9	0.015	79.74%	0.09
501	1971/10/22 13:00:00	1971/10/22 21:00:00	9	0.015	79.90%	0.09
502	1982/10/31 15:00:00	1982/10/31 23:00:00	9	0.015	80.06%	0.09
503	1972/06/10 02:00:00	1972/06/10 10:00:00	9	0.015	80.22%	0.09
504	1979/01/29 09:00:00	1979/01/29 17:00:00	9	0.015	80.38%	0.09
505	1971/06/05 14:00:00	1971/06/05 22:00:00	9	0.015	80.54%	0.09
506	1973/02/21 09:00:00	1973/02/21 17:00:00	9	0.015	80.70%	0.09
507	1972/10/17 09:00:00	1972/10/17 17:00:00	9	0.015	80.86%	0.09
508	1967/04/28 19:00:00	1967/04/29 03:00:00	9	0.015	81.02%	0.09
509	1990/08/09 16:00:00	1990/08/10 00:00:00	9	0.015	81.18%	0.09

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
510	1989/09/17 04:00:00	1989/09/17 13:00:00	10	0.015	81.34%	0.09
511	2006/03/08 06:00:00	2006/03/08 13:00:00	8	0.015	81.50%	0.09
512	1967/03/11 09:00:00	1967/03/11 17:00:00	9	0.015	81.66%	0.09
513	1971/06/02 12:00:00	1971/06/02 20:00:00	9	0.015	81.82%	0.09
514	1975/04/23 15:00:00	1975/04/23 23:00:00	9	0.015	81.98%	0.09
515	2001/11/29 17:00:00	2001/11/30 02:00:00	10	0.015	82.14%	0.09
516	1978/05/01 11:00:00	1978/05/01 19:00:00	9	0.015	82.30%	0.09
517	1977/01/21 15:00:00	1977/01/21 23:00:00	9	0.015	82.46%	0.09
518	1973/05/28 10:00:00	1973/05/28 18:00:00	9	0.015	82.62%	0.09
519	1970/01/10 01:00:00	1970/01/10 09:00:00	9	0.015	82.78%	0.09
520	1966/10/18 12:00:00	1966/10/18 20:00:00	9	0.015	82.93%	0.09
521	1977/04/02 01:00:00	1977/04/02 09:00:00	9	0.015	83.09%	0.09
522	1973/12/16 15:00:00	1973/12/16 23:00:00	9	0.015	83.25%	0.09
523	1981/03/14 02:00:00	1981/03/14 09:00:00	8	0.015	83.41%	0.09
524	1982/09/22 13:00:00	1982/09/22 20:00:00	8	0.015	83.57%	0.09
525	1968/02/10 04:00:00	1968/02/10 11:00:00	8	0.015	83.73%	0.09
526	1983/03/15 10:00:00	1983/03/15 17:00:00	8	0.015	83.89%	0.09
527	1985/10/22 00:00:00	1985/10/22 08:00:00	9	0.015	84.05%	0.09
528	1969/12/26 10:00:00	1969/12/26 17:00:00	8	0.015	84.21%	0.09
529	1985/03/12 11:00:00	1985/03/12 18:00:00	8	0.015	84.37%	0.09
530	1982/03/12 14:00:00	1982/03/12 21:00:00	8	0.015	84.53%	0.09
531	1971/11/29 06:00:00	1971/11/29 13:00:00	8	0.015	84.69%	0.09
532	1969/06/17 09:00:00	1969/06/17 16:00:00	8	0.015	84.85%	0.09
533	1966/02/25 03:00:00	1966/02/25 10:00:00	8	0.015	85.01%	0.08
534	1996/11/29 02:00:00	1996/11/29 09:00:00	8	0.015	85.17%	0.08
535	1971/11/13 13:00:00	1971/11/13 20:00:00	8	0.015	85.33%	0.08
536	1968/12/01 11:00:00	1968/12/01 18:00:00	8	0.014	85.49%	0.08
537	1985/01/09 13:00:00	1985/01/09 20:00:00	8	0.014	85.65%	0.08
538	1972/04/21 09:00:00	1972/04/21 16:00:00	8	0.014	85.81%	0.08
539	1968/01/10 05:00:00	1968/01/10 12:00:00	8	0.014	85.96%	0.08
540	1966/03/24 19:00:00	1966/03/25 02:00:00	8	0.014	86.12%	0.08
541	1966/03/13 15:00:00	1966/03/13 22:00:00	8	0.014	86.28%	0.08
542	1979/03/13 10:00:00	1979/03/13 17:00:00	8	0.014	86.44%	0.08
543	2006/11/27 12:00:00	2006/11/28 07:00:00	20	0.014	86.60%	0.08
544	1981/12/21 04:00:00	1981/12/21 11:00:00	8	0.014	86.76%	0.08
545	1994/11/18 05:00:00	1994/11/18 12:00:00	8	0.014	86.92%	0.08
546	1969/04/03 02:00:00	1969/04/03 09:00:00	8	0.014	87.08%	0.08
547	1979/11/04 07:00:00	1979/11/04 14:00:00	8	0.014	87.24%	0.08
548	2002/01/28 04:00:00	2002/01/29 15:00:00	36	0.014	87.40%	0.08
549	2002/03/16 07:00:00	2002/03/16 15:00:00	9	0.014	87.56%	0.08
550	1987/11/14 03:00:00	1987/11/14 10:00:00	8	0.014	87.72%	0.08
551	1978/04/26 09:00:00	1978/04/26 16:00:00	8	0.014	87.88%	0.08
552	1971/05/03 09:00:00	1971/05/03 16:00:00	8	0.014	88.04%	0.08
553	2008/01/21 09:00:00	2008/01/21 16:00:00	8	0.014	88.20%	0.08
554	1967/03/29 06:00:00	1967/03/29 12:00:00	7	0.014	88.36%	0.08
555	1990/03/28 18:00:00	1990/03/29 00:00:00	7	0.014	88.52%	0.08
556	1972/11/08 01:00:00	1972/11/08 07:00:00	7	0.014	88.68%	0.08

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
557	1990/03/12 19:00:00	1990/03/13 01:00:00	7	0.014	88.84%	0.08
558	1981/05/27 01:00:00	1981/05/27 07:00:00	7	0.014	89.00%	0.08
559	1978/09/19 13:00:00	1978/09/19 19:00:00	7	0.014	89.15%	0.08
560	1981/01/11 17:00:00	1981/01/11 23:00:00	7	0.014	89.31%	0.08
561	1994/04/24 04:00:00	1994/04/24 11:00:00	8	0.014	89.47%	0.08
562	1966/05/10 05:00:00	1966/05/10 08:00:00	4	0.014	89.63%	0.08
563	1967/06/09 07:00:00	1967/06/09 10:00:00	4	0.014	89.79%	0.08
564	1967/07/26 21:00:00	1967/07/27 00:00:00	4	0.014	89.95%	0.08
565	1968/06/07 07:00:00	1968/06/07 10:00:00	4	0.014	90.11%	0.08
566	1968/09/13 11:00:00	1968/09/13 14:00:00	4	0.014	90.27%	0.08
567	1968/10/30 10:00:00	1968/10/30 13:00:00	4	0.014	90.43%	0.08
568	1969/08/10 05:00:00	1969/08/10 08:00:00	4	0.014	90.59%	0.08
569	1969/09/07 00:00:00	1969/09/07 03:00:00	4	0.014	90.75%	0.08
570	1972/06/07 04:00:00	1972/06/07 08:00:00	5	0.014	90.91%	0.08
571	1972/06/22 13:00:00	1972/06/22 18:00:00	6	0.014	91.07%	0.08
572	1972/10/11 15:00:00	1972/10/11 18:00:00	4	0.014	91.23%	0.08
573	1973/04/21 10:00:00	1973/04/21 13:00:00	4	0.014	91.39%	0.08
574	1973/05/23 15:00:00	1973/05/23 18:00:00	4	0.014	91.55%	0.08
575	1974/06/08 12:00:00	1974/06/08 15:00:00	4	0.014	91.71%	0.08
576	1975/05/20 02:00:00	1975/05/20 05:00:00	4	0.014	91.87%	0.08
577	1975/06/07 14:00:00	1975/06/07 17:00:00	4	0.014	92.03%	0.08
578	1975/10/28 22:00:00	1975/10/29 01:00:00	4	0.014	92.19%	0.08
579	1976/09/03 17:00:00	1976/09/03 20:00:00	4	0.014	92.34%	0.08
580	1977/05/05 21:00:00	1977/05/06 00:00:00	4	0.014	92.50%	0.08
581	1977/08/12 11:00:00	1977/08/12 14:00:00	4	0.014	92.66%	0.08
582	1977/10/06 03:00:00	1977/10/06 06:00:00	4	0.014	92.82%	0.08
583	1977/11/06 02:00:00	1977/11/06 05:00:00	4	0.014	92.98%	0.08
584	1979/05/19 15:00:00	1979/05/19 18:00:00	4	0.014	93.14%	0.08
585	1979/08/13 15:00:00	1979/08/13 18:00:00	4	0.014	93.30%	0.08
586	1979/12/22 10:00:00	1979/12/22 14:00:00	5	0.014	93.46%	0.08
587	1980/04/21 04:00:00	1980/04/21 07:00:00	4	0.014	93.62%	0.08
588	1980/10/26 10:00:00	1980/10/26 13:00:00	4	0.014	93.78%	0.08
589	1981/05/16 11:00:00	1981/05/16 14:00:00	4	0.014	93.94%	0.08
590	1981/10/01 02:00:00	1981/10/01 05:00:00	4	0.014	94.10%	0.08
591	1981/10/28 23:00:00	1981/10/29 05:00:00	7	0.014	94.26%	0.08
592	1982/05/11 08:00:00	1982/05/11 11:00:00	4	0.014	94.42%	0.08
593	1982/05/26 13:00:00	1982/05/26 18:00:00	6	0.014	94.58%	0.08
594	1982/09/16 13:00:00	1982/09/16 16:00:00	4	0.014	94.74%	0.08
595	1982/10/26 10:00:00	1982/10/26 13:00:00	4	0.014	94.90%	0.08
596	1983/08/07 09:00:00	1983/08/07 12:00:00	4	0.014	95.06%	0.08
597	1986/08/18 06:00:00	1986/08/18 09:00:00	4	0.014	95.22%	0.08
598	1990/08/06 00:00:00	1990/08/06 03:00:00	4	0.014	95.37%	0.08
599	1991/07/31 11:00:00	1991/07/31 14:00:00	4	0.014	95.53%	0.08
600	2005/01/27 00:00:00	2005/01/27 06:00:00	7	0.014	95.69%	0.08
601	1987/11/20 16:00:00	1987/11/20 22:00:00	7	0.014	95.85%	0.08
602	2007/03/21 10:00:00	2007/03/21 16:00:00	7	0.014	96.01%	0.08
603	1992/10/29 03:00:00	1992/10/29 07:00:00	5	0.013	96.17%	0.08

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
604	2007/10/13 07:00:00	2007/10/13 12:00:00	6	0.013	96.33%	0.08
605	1987/12/30 03:00:00	1987/12/30 09:00:00	7	0.013	96.49%	0.07
606	2000/11/22 21:00:00	2000/11/23 02:00:00	6	0.013	96.65%	0.07
607	2005/03/19 07:00:00	2005/03/20 10:00:00	28	0.013	96.81%	0.07
608	2000/02/11 20:00:00	2000/02/11 23:00:00	4	0.013	96.97%	0.07
609	2001/12/14 20:00:00	2001/12/14 22:00:00	3	0.013	97.13%	0.07
610	1991/09/20 18:00:00	1991/09/20 18:00:00	1	0.012	97.29%	0.07
611	1985/05/30 15:00:00	1985/05/30 20:00:00	6	0.012	97.45%	0.07
612	1992/05/22 17:00:00	1992/05/22 23:00:00	7	0.012	97.61%	0.07
613	2007/05/23 02:00:00	2007/05/23 02:00:00	1	0.012	97.77%	0.07
614	1989/11/26 21:00:00	1989/11/26 22:00:00	2	0.012	97.93%	0.07
615	1985/06/03 03:00:00	1985/06/03 06:00:00	4	0.012	98.09%	0.07
616	2006/07/29 05:00:00	2006/07/29 09:00:00	5	0.012	98.25%	0.07
617	1998/03/15 20:00:00	1998/03/15 21:00:00	2	0.012	98.41%	0.07
618	1984/11/13 10:00:00	1984/11/13 10:00:00	1	0.011	98.56%	0.07
619	1987/05/20 08:00:00	1987/05/20 08:00:00	1	0.011	98.72%	0.07
620	1987/07/18 00:00:00	1987/07/18 00:00:00	1	0.011	98.88%	0.07
621	1987/10/07 09:00:00	1987/10/07 09:00:00	1	0.011	99.04%	0.07
622	1992/10/21 16:00:00	1992/10/21 16:00:00	1	0.011	99.20%	0.07
623	2008/05/22 15:00:00	2008/05/22 15:00:00	1	0.011	99.36%	0.07
624	1994/12/23 00:00:00	1994/12/23 00:00:00	1	0.011	99.52%	0.07
625	2000/01/01 22:00:00	2000/01/02 00:00:00	3	0.011	99.68%	0.07
626	1966/01/20 04:00:00	1966/01/20 04:00:00	1	0.011	99.84%	0.07
--End of Data-----------------						


Flow Duration Curves
Pre Development
Post Development Mitigated
Q10 (1.471cfs)
Qlf (0.0964cfs)
Flow Rate (cfs)
1.5
1.0
0.5
0.0
-0.5
0.264
0.310
Flow Duration PreDevelopment=365(days)x24(hr/day)x0.310(%)=27.2(hours/year)
Flow Duration Mitigated Post Development=365(days)x24(hr/day)x0.264(%)=23.1(hours/year)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
(%) Percent Time Exceedance

Compare Post-Development Curve to Pre-Development Curve

post-development SWMM file: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-post.out
post-development time stamp: 2/11/2020 11:31:23 AM
Compared to:
pre-development SWMM file: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-pre.out
pre-development time stamp: 2/3/2020 10:12:51 AM

Post PT #	Flow Rate	Post Dev % Exceed	Pre Dev % Exceed	%Ex post < %Ex pre	%Ex post > %Ex pre	%Ex post > 110% %Ex pre	Pass/Fail
0	0.10	0.26	0.31	TRUE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
1	0.11	0.23	0.28	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
2	0.12	0.21	0.26	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
3	0.14	0.19	0.24	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
4	0.15	0.17	0.22	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
5	0.17	0.16	0.20	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
6	0.18	0.15	0.18	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
7	0.19	0.13	0.17	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
8	0.21	0.12	0.16	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
9	0.22	0.11	0.15	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
10	0.24	0.10	0.14	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
11	0.25	0.10	0.13	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
12	0.26	0.09	0.12	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
13	0.28	0.09	0.12	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
14	0.29	0.08	0.11	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
15	0.31	0.08	0.11	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
16	0.32	0.07	0.10	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
17	0.33	0.07	0.09	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
18	0.35	0.06	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
19	0.36	0.06	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
20	0.37	0.06	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
21	0.39	0.05	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
22	0.40	0.05	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
23	0.42	0.05	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
24	0.43	0.05	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
25	0.44	0.04	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
26	0.46	0.04	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
27	0.47	0.04	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
28	0.49	0.04	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
29	0.50	0.03	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
30	0.51	0.03	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
31	0.53	0.03	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration

Post PT #	Flow Rate	Post Dev % Exceed	Pre Dev % Exceed	%Ex post < %Ex pre	%Ex post > %Ex pre	%Ex post > 110% %Ex pre	Pass/Fail
32	0.54	0.03	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
33	0.56	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
34	0.57	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
35	0.58	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
36	0.60	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
37	0.61	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
38	0.62	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
39	0.64	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
40	0.65	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
41	0.67	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
42	0.68	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
43	0.69	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
44	0.71	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
45	0.72	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
46	0.74	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
47	0.75	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
48	0.76	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
49	0.78	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
50	0.79	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
51	0.81	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
52	0.82	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
53	0.83	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
54	0.85	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
55	0.86	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
56	0.87	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
57	0.89	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
58	0.90	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
59	0.92	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
60	0.93	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
61	0.94	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
62	0.96	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
63	0.97	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
64	0.99	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
65	1.00	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
66	1.01	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
67	1.03	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
68	1.04	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
69	1.06	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
70	1.07	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
71	1.08	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration

Post PT #	Flow Rate	Post Dev % Exceed	Pre Dev % Exceed	%Ex post < %Ex pre	%Ex post > %Ex pre	%Ex post > 110% %Ex pre	Pass/Fail
72	1.10	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
73	1.11	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
74	1.12	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
75	1.14	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
76	1.15	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
77	1.17	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
78	1.18	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
79	1.19	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
80	1.21	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
81	1.22	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
82	1.24	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
83	1.25	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
84	1.26	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
85	1.28	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
86	1.29	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
87	1.31	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
88	1.32	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
89	1.33	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
90	1.35	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
91	1.36	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
92	1.37	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
93	1.39	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
94	1.40	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
95	1.42	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
96	1.43	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
97	1.44	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
98	1.46	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
99	1.47	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration

Duration Table Summary at Project Discharge Point				
file name: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-pre.out				
time stamp: 2/3/2020 10:12:51 AM				
DISCHARGE		Number of periods when discharge was equal to or greater than DISCHARGE column but less than that shown on the next line		
Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
1	0.10	99	1186	0.310
2	0.11	82	1087	0.284
3	0.12	88	1005	0.263
4	0.14	75	917	0.240
5	0.15	65	842	0.220
6	0.17	73	777	0.203
7	0.18	54	704	0.184
8	0.19	34	650	0.170
9	0.21	42	616	0.161
10	0.22	35	574	0.150
11	0.24	33	539	0.141
12	0.25	33	506	0.132
13	0.26	22	473	0.124
14	0.28	34	451	0.118
15	0.29	17	417	0.109
16	0.30	32	400	0.105
17	0.32	34	368	0.096
18	0.33	21	334	0.087
19	0.35	18	313	0.082
20	0.36	18	295	0.077
21	0.37	28	277	0.072
22	0.39	19	249	0.065
23	0.40	11	230	0.060
24	0.42	8	219	0.057
25	0.43	11	211	0.055
26	0.44	12	200	0.052
27	0.46	12	188	0.049
28	0.47	10	176	0.046
29	0.49	10	166	0.043
30	0.50	9	156	0.041
31	0.51	12	147	0.038
32	0.53	7	135	0.035
33	0.54	6	128	0.033
34	0.55	11	122	0.032
35	0.57	5	111	0.029
36	0.58	8	106	0.028
37	0.60	3	98	0.026
38	0.61	4	95	0.025
39	0.62	4	91	0.024
40	0.64	1	87	0.023
41	0.65	1	86	0.022
42	0.67	5	85	0.022
43	0.68	1	80	0.021
44	0.69	2	79	0.021
45	0.71	4	77	0.020
46	0.72	1	73	0.019
47	0.74	4	72	0.019
48	0.75	2	68	0.018
49	0.76	4	66	0.017
50	0.78	3	62	0.016
51	0.79	4	59	0.015

Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
52	0.80	2	55	0.014
53	0.82	5	53	0.014
54	0.83	0	48	0.013
55	0.85	3	48	0.013
56	0.86	1	45	0.012
57	0.87	1	44	0.011
58	0.89	2	43	0.011
59	0.90	1	41	0.011
60	0.92	4	40	0.010
61	0.93	0	36	0.009
62	0.94	1	36	0.009
63	0.96	0	35	0.009
64	0.97	2	35	0.009
65	0.99	1	33	0.009
66	1.00	1	32	0.008
67	1.01	0	31	0.008
68	1.03	1	31	0.008
69	1.04	3	30	0.008
70	1.05	2	27	0.007
71	1.07	2	25	0.007
72	1.08	1	23	0.006
73	1.10	0	22	0.006
74	1.11	0	22	0.006
75	1.12	1	22	0.006
76	1.14	2	21	0.005
77	1.15	1	19	0.005
78	1.17	0	18	0.005
79	1.18	2	18	0.005
80	1.19	0	16	0.004
81	1.21	0	16	0.004
82	1.22	2	16	0.004
83	1.24	0	14	0.004
84	1.25	0	14	0.004
85	1.26	5	14	0.004
86	1.28	1	9	0.002
87	1.29	0	8	0.002
88	1.30	0	8	0.002
89	1.32	0	8	0.002
90	1.33	1	8	0.002
91	1.35	0	7	0.002
92	1.36	0	7	0.002
93	1.37	1	7	0.002
94	1.39	0	6	0.002
95	1.40	0	6	0.002
96	1.42	0	6	0.002
97	1.43	1	6	0.002
98	1.44	0	5	0.001
99	1.46	0	5	0.001
100	1.47	0	5	0.001
---------End of Data-----------------				

Duration Table Summary at Project Discharge Point

file name: Q:\08\08067\gp\gp10\Storm\tm\SWMM\Current\Inps\Current SWMM\08067-Hollandia-post.out
time stamp: 2/11/2020 11:31:23 AM

DISCHARGE		Number of periods when discharge was equal to or greater than DISCHARGE column but less than that shown on the next line		
Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
1	0.10	128	1011	0.264
2	0.11	82	883	0.231
3	0.12	89	801	0.209
4	0.14	74	712	0.186
5	0.15	46	638	0.167
6	0.17	33	592	0.155
7	0.18	53	559	0.146
8	0.19	43	506	0.132
9	0.21	38	463	0.121
10	0.22	42	425	0.111
11	0.24	15	383	0.100
12	0.25	23	368	0.096
13	0.26	17	345	0.090
14	0.28	19	328	0.086
15	0.29	21	309	0.081
16	0.30	24	288	0.075
17	0.32	12	264	0.069
18	0.33	7	252	0.066
19	0.35	11	245	0.064
20	0.36	19	234	0.061
21	0.37	19	215	0.056
22	0.39	12	196	0.051
23	0.40	3	184	0.048
24	0.42	8	181	0.047
25	0.43	5	173	0.045
26	0.44	23	168	0.044
27	0.46	3	145	0.038
28	0.47	7	142	0.037
29	0.49	10	135	0.035
30	0.50	7	125	0.033
31	0.51	8	118	0.031
32	0.53	13	110	0.029
33	0.54	5	97	0.025
34	0.55	3	92	0.024
35	0.57	3	89	0.023
36	0.58	2	86	0.022
37	0.60	7	84	0.022
38	0.61	2	77	0.020
39	0.62	7	75	0.020
40	0.64	1	68	0.018
41	0.65	4	67	0.018
42	0.67	5	63	0.016
43	0.68	10	58	0.015
44	0.69	2	48	0.013
45	0.71	0	46	0.012
46	0.72	3	46	0.012
47	0.74	5	43	0.011
48	0.75	3	38	0.010
49	0.76	1	35	0.009
50	0.78	4	34	0.009
51	0.79	0	30	0.008

Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
52	0.80	1	30	0.008
53	0.82	2	29	0.008
54	0.83	1	27	0.007
55	0.85	0	26	0.007
56	0.86	2	26	0.007
57	0.87	0	24	0.006
58	0.89	2	24	0.006
59	0.90	3	22	0.006
60	0.92	0	19	0.005
61	0.93	3	19	0.005
62	0.94	0	16	0.004
63	0.96	0	16	0.004
64	0.97	0	16	0.004
65	0.99	0	16	0.004
66	1.00	1	16	0.004
67	1.01	1	15	0.004
68	1.03	0	14	0.004
69	1.04	0	14	0.004
70	1.05	0	14	0.004
71	1.07	1	14	0.004
72	1.08	0	13	0.003
73	1.10	2	13	0.003
74	1.11	0	11	0.003
75	1.12	0	11	0.003
76	1.14	2	11	0.003
77	1.15	0	9	0.002
78	1.17	1	9	0.002
79	1.18	0	8	0.002
80	1.19	0	8	0.002
81	1.21	1	8	0.002
82	1.22	0	7	0.002
83	1.24	1	7	0.002
84	1.25	0	6	0.002
85	1.26	0	6	0.002
86	1.28	0	6	0.002
87	1.29	1	6	0.002
88	1.30	1	5	0.001
89	1.32	0	4	0.001
90	1.33	0	4	0.001
91	1.35	0	4	0.001
92	1.36	1	4	0.001
93	1.37	1	3	0.001
94	1.39	0	2	0.001
95	1.40	0	2	0.001
96	1.42	0	2	0.001
97	1.43	0	2	0.001
98	1.44	1	2	0.001
99	1.46	0	1	0.000
100	1.47	0	1	0.000
---------End of Data-----------------				

END OF STATISTICS ANALYSIS

SWMM STORAGE CURVES

Pond Report

Pond No. 1 - BMP-3B1 (PIPE OUT)

Pond Data

UG Chambers -Invert elev. = 610.04 ft, Rise x Span = 2.50 x 2.50 ft, Barrel Len = 153.52 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	610.04	n/a	0	0
0.25	610.29	n/a	39	39
0.50	610.54	n/a	68	107
0.75	610.79	n/a	83	190
1.00	611.04	n/a	91	282
1.25	611.29	n/a	95	377
1.50	611.54	n/a	95	472
1.75	611.79	n/a	91	564
2.00	612.04	n/a	83	646
2.25	612.29	n/a	68	715
2.50	612.54	n/a	39	754

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .000	.000	.000	n/a
Orifice Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	610.04	---	---	---	---	---	---	---	---	---	---	0.000
0.25	39	610.29	---	---	---	---	---	---	---	---	---	---	0.000
0.50	107	610.54	---	---	---	---	---	---	---	---	---	---	0.000
0.75	190	610.79	---	---	---	---	---	---	---	---	---	---	0.000
1.00	282	611.04	---	---	---	---	---	---	---	---	---	---	0.000
1.25	377	611.29	---	---	---	---	---	---	---	---	---	---	0.000
1.50	472	611.54	---	---	---	---	---	---	---	---	---	---	0.000
1.75	564	611.79	---	---	---	---	---	---	---	---	---	---	0.000
2.00	646	612.04	---	---	---	---	---	---	---	---	---	---	0.000
2.25	715	612.29	---	---	---	---	---	---	---	---	---	---	0.000
2.50	754	612.54	---	---	---	---	---	---	---	---	---	---	0.000

Pond Report

Pond No. 2 - BMP-3B2 (DETENTION PIPE SYSTEM)

Pond Data

UG Chambers - Invert elev. = 610.04 ft, Rise x Span = 2.50 x 2.50 ft, Barrel Len = 143.00 ft, No. Barrels = 7, Slope = 0.00%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	610.04	n/a	0	0
0.25	610.29	n/a	269	269
0.50	610.54	n/a	467	735
0.75	610.79	n/a	567	1,303
1.00	611.04	n/a	625	1,928
1.25	611.29	n/a	653	2,581
1.50	611.54	n/a	653	3,234
1.75	611.79	n/a	625	3,858
2.00	612.04	n/a	567	4,426
2.25	612.29	n/a	466	4,892
2.50	612.54	n/a	268	5,160

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .000	.000	.000	n/a
Orifice Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	610.04	---	---	---	---	---	---	---	---	---	---	0.000
0.25	269	610.29	---	---	---	---	---	---	---	---	---	---	0.000
0.50	735	610.54	---	---	---	---	---	---	---	---	---	---	0.000
0.75	1,303	610.79	---	---	---	---	---	---	---	---	---	---	0.000
1.00	1,928	611.04	---	---	---	---	---	---	---	---	---	---	0.000
1.25	2,581	611.29	---	---	---	---	---	---	---	---	---	---	0.000
1.50	3,234	611.54	---	---	---	---	---	---	---	---	---	---	0.000
1.75	3,858	611.79	---	---	---	---	---	---	---	---	---	---	0.000
2.00	4,426	612.04	---	---	---	---	---	---	---	---	---	---	0.000
2.25	4,892	612.29	---	---	---	---	---	---	---	---	---	---	0.000
2.50	5,160	612.54	---	---	---	---	---	---	---	---	---	---	0.000

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 02 / 11 / 2020

Pond No. 3 - BMP-2B (DETENTION PIPE SYSTEM)

Pond Data

UG Chambers -Invert elev. = 607.08 ft, Rise x Span = 2.00 x 2.00 ft, Barrel Len = 96.40 ft, No. Barrels = 5, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	607.08	n/a	0	0
0.20	607.28	n/a	79	79
0.40	607.48	n/a	137	216
0.60	607.68	n/a	167	382
0.80	607.88	n/a	183	566
1.00	608.08	n/a	192	757
1.20	608.28	n/a	192	949
1.40	608.48	n/a	183	1,133
1.60	608.68	n/a	166	1,299
1.80	608.88	n/a	137	1,436
2.00	609.08	n/a	79	1,515

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .000	.000	.000	n/a
Orifice Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	607.08	---	---	---	---	---	---	---	---	---	---	0.000
0.20	79	607.28	---	---	---	---	---	---	---	---	---	---	0.000
0.40	216	607.48	---	---	---	---	---	---	---	---	---	---	0.000
0.60	382	607.68	---	---	---	---	---	---	---	---	---	---	0.000
0.80	566	607.88	---	---	---	---	---	---	---	---	---	---	0.000
1.00	757	608.08	---	---	---	---	---	---	---	---	---	---	0.000
1.20	949	608.28	---	---	---	---	---	---	---	---	---	---	0.000
1.40	1,133	608.48	---	---	---	---	---	---	---	---	---	---	0.000
1.60	1,299	608.68	---	---	---	---	---	---	---	---	---	---	0.000
1.80	1,436	608.88	---	---	---	---	---	---	---	---	---	---	0.000
2.00	1,515	609.08	---	---	---	---	---	---	---	---	---	---	0.000

BMP-3B2		STORAGE: D= 2.5' 7 BARRELS					SWMM CURVE		
Elevation	Row	Depth		Volume	Area		Depth	Area	
610.04	0	0		0	0		0	0	
610.29	1	0.25		269	2152		0.25	2152	269
610.54	2	0.5		467	1584		0.5	1584	467
610.79	3	0.75		567	2952		0.75	2952	567
611.04	4	1		625	2048		1	2048	625
611.29	5	1.25		653	3176		1.25	3176	653
611.54	6	1.5		653	2048		1.5	2048	653
611.79	7	1.75		625	2952		1.75	2952	625
612.04	8	2		567	1584		2	1584	567
612.29	9	2.25		466	2144		2.25	2144	466
612.54	10	2.5		268	0		2.5	0	268
			SUM =	5160				SUM =	5160

BMP-3B-1 (DETENTION PIPE SYSTEM)

BMP-3B2		STORAGE: D= 2.5', L=209.6', 0% SLOPE					SWMM CURVE		
Elevation	Row	Depth		Volume	Area		Depth	Area	
610.04	0	0		0	0		0	0	
610.29	1	0.25		39.2	313.6		0.25	313.6	39.2
610.54	2	0.5		107	542.4		0.5	542.4	107
610.79	3	0.75		190	977.6		0.75	977.6	190
611.04	4	1		282	1278.4		1	1278.4	282
611.29	5	1.25		377	1737.6		1.25	1737.6	377
611.54	6	1.5		472	2038.4		1.5	2038.4	472
611.79	7	1.75		564	2473.6		1.75	2473.6	564
612.04	8	2		646	2694.4		2	2694.4	646
612.29	9	2.25		715	3025.6		2.25	3025.6	715
612.54	10	2.5		754	3006.4		2.5	3006.4	754
			SUM =	4146.2				SUM =	4146.2

BMP-3B-2 (PIPE OUT)

BMP-3B2							SWMM CURVE		
Elevation	Row	Depth		Volume	Area		Depth	Area	
610.04	0	0		0	0		0	0	
610.29	1	0.25		308.2	2465.6		0.25	2465.6	308.2
610.54	2	0.5		574	2126.4		0.5	2126.4	574
610.79	3	0.75		757	3929.6		0.75	3929.6	757
611.04	4	1		907	3326.4		1	3326.4	907
611.29	5	1.25		1030	4913.6		1.25	4913.6	1030
611.54	6	1.5		1125	4086.4		1.5	4086.4	1125
611.79	7	1.75		1189	5425.6		1.75	5425.6	1189
612.04	8	2		1213	4278.4		2	4278.4	1213
612.29	9	2.25		1181	5169.6		2.25	5169.6	1181
612.54	10	2.5		1022	3006.4		2.5	3006.4	1022
			SUM =	9306.2				SUM =	9306.2

BMP-3B (TOTAL)

BMP-2B1		STORAGE: D=2' X BARRELS					SWMM CURVE		
Elevation	Row	Depth		Volume	Area		Depth	Area	
606.84	0	0		0	0		0	0	
607.04	1	0.2		79	790		0.2	790	79
607.24	2	0.4		137	580		0.4	580	137
607.44	3	0.6		167	1090		0.6	1090	167
607.64	4	0.8		183	740		0.8	740	183
607.84	5	1		192	1180		1	1180	192
608.04	6	1.2		192	740		1.2	740	192
608.24	7	1.4		183	1090		1.4	1090	183
608.44	8	1.6		166	570		1.6	570	166
608.64	9	1.8		137	800		1.8	800	137
608.84	10	2		78.7	13		2	13	81.3
				1514.7					1517.3

BMP-2B-1 (DETENTION PIPE SYSTEM)

BMP-2B-2							SWMM CURVE		
Elevation	Row	Depth		Volume	Area		Depth	Area	
N/A	0	0		0	0		0	0	
N/A	1	2.26		9.04	8		2.26	8	9.04
								0	
				9.04					9.04

BMP-2B-2 (BUBBLER/WEIR)

BMP-2B-3							Swmm	

BMP-2B-3 (TOTAL)

Elevation	Row	Depth		Volume	Area		Depth	Area	
N/A	0	0		0	0		0	0	
N/A	1	0.2		79	790		0.2	790	79
N/A	2	0.4		137	580		0.4	580	137
N/A	3	0.6		167	1090		0.6	1090	167
N/A	4	0.8		183	740		0.8	740	183
N/A	5	1		192	1180		1	1180	192
N/A	6	1.2		192	740		1.2	740	192
N/A	7	1.4		183	1090		1.4	1090	183
N/A	8	1.6		166	570		1.6	570	166
N/A	9	1.8		137	800		1.8	800	137
N/A	10	2		78.7	13		2	13	81.3
N/A	11	2.26		9.04	56.53846		2.26	56.53846	9.04
N/A	12	3.26		169	281.4615		3.26	281.4615	169
			SUM	1692.74					1695.34

Attachment C SWMM Input Data Summary and Detail

PRE-DEVELOPMENT- INP

```
[TITLE]
;;Project Title/Notes
16-011-Pre-Dev-Subcats

[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           09/24/1964
START_TIME           00:00:00
REPORT_START_DATE    09/24/1964
REPORT_START_TIME    00:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

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

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.06   0.08   0.11   0.15   0.17   0.19   0.19   0.18   0.15   0.11   0.08   0.06
DRY_ONLY         NO

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

```
;;-------------- --------- ------ ------ ----------
Escondido        INTENSITY 1:00     1.0      FILE       "R:\Rain gage dat\Escondido ALERT Station.dat" Escondido  IN

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
DMA-D            Escondido        POC-1            1.42412764 0        490      0.5      0
DMA-B            Escondido        POC-1            0.060215794 0        15       0.9      0
DMA-A            Escondido        POC-1            0.329407713 0        53       1        0
DMA-C            Escondido        POC-1            0.469421488 0        250      1.8      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-D            0.012      0.15       0.05       0.1        25         OUTLET
DMA-B            0.012      0.15       0.05       0.1        25         OUTLET
DMA-A            0.012      0.15       0.05       0.1        25         OUTLET
DMA-C            0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-D            9          0.01875    0.33
DMA-B            9          0.01875    0.33
DMA-A            9          0.01875    0.33
DMA-C            9          0.01875    0.33

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

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

[TAGS]

[MAP]
DIMENSIONS 6269947.540 2002490.876 6271386.930 2004024.087
Units      Feet

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            6270268.069        2003084.091

[VERTICES]
```

```
;;Link           X-Coord            Y-Coord           
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord           
;;-------------- ------------------ ------------------
DMA-D            6270732.954        2003813.720       
DMA-D            6270723.793        2003799.170       
DMA-D            6270714.631        2003784.619       
DMA-D            6270696.308        2003755.518       
DMA-D            6270610.082        2003721.027       
DMA-D            6270491.520        2003660.668       
DMA-D            6270416.043        2003596.404       
DMA-D            6270418.228        2003470.970       
DMA-D            6270404.893        2003289.780       
DMA-D            6270119.454        2003293.125       
DMA-D            6270119.454        2003260.790       
DMA-D            6270432.768        2003256.330       
DMA-D            6270432.768        2003474.869       
DMA-D            6270452.838        2003478.214       
DMA-D            6270452.838        2003448.109       
DMA-D            6270463.988        2003448.109       
DMA-D            6270466.218        2003461.489       
DMA-D            6270656.883        2003454.799       
DMA-D            6270661.343        2003297.585       
DMA-D            6270734.933        2003293.125       
DMA-D            6270736.048        2003223.995       
DMA-D            6270755.764        2003215.052       
DMA-D            6270756.762        2003117.266       
DMA-D            6270815.633        2003289.888       
DMA-D            6270888.473        2003290.886       
DMA-D            6270905.408        2003764.140       
DMA-D            6270845.049        2003800.787       
DMA-D            6270814.870        2003874.079       
DMA-B            6270983.712        2003589.387       
DMA-B            6270932.824        2003569.431       
DMA-B            6270979.721        2003526.525       
DMA-B            6270978.723        2003396.809       
DMA-B            6270946.793        2003391.820       
DMA-B            6270929.830        2003259.111       
DMA-B            6270624.500        2003258.113       
DMA-B            6270625.498        2003168.310       
DMA-B            6270326.154        2003174.297       
DMA-B            6270325.156        2003009.658       
DMA-B            6270504.762        2003005.667       
DMA-B            6270506.758        2002974.734       
DMA-B            6270305.200        2002949.789       
DMA-B            6270220.386        2002952.783       
DMA-B            6270200.030        2002947.219       
DMA-B            6270176.458        2002947.219       
```

DMA-B	6270162.513	2002949.789
DMA-B	6270146.548	2002950.787
DMA-B	6270147.546	2003024.625
DMA-B	6270099.651	2003031.610
DMA-B	6270096.657	2003103.452
DMA-B	6270052.754	2003102.454
DMA-B	6270047.764	2003079.505
DMA-B	6269986.898	2003079.505
DMA-B	6269971.565	2002872.878
DMA-B	6269973.378	2002842.053
DMA-B	6270006.016	2002816.668
DMA-B	6270033.214	2002816.668
DMA-B	6270323.328	2002885.570
DMA-B	6270455.693	2002912.768
DMA-B	6270566.298	2002925.461
DMA-B	6270664.212	2002934.527
DMA-B	6270749.433	2002939.966
DMA-B	6270818.335	2002938.153
DMA-B	6270945.795	2002938.813
DMA-B	6271003.669	2003073.518
DMA-B	6271048.570	2003128.398
DMA-B	6271074.513	2003166.314
DMA-B	6271131.389	2003171.303
DMA-B	6271119.415	2003226.183
DMA-B	6271081.498	2003219.198
DMA-B	6271068.526	2003262.104
DMA-B	6271081.498	2003431.732
DMA-B	6271127.397	2003538.498
DMA-B	6270992.693	2003562.446
DMA-A	6270547.037	2003400.625
DMA-A	6270579.674	2003112.324
DMA-A	6270547.037	2003110.511
DMA-A	6270550.663	2003097.818
DMA-A	6270519.838	2003099.632
DMA-A	6270516.212	2003088.752
DMA-A	6270514.399	2003077.873
DMA-A	6270499.893	2003076.060
DMA-A	6270494.454	2003043.422
DMA-A	6270478.135	2003043.422
DMA-A	6270470.882	2003083.313
DMA-A	6270458.189	2003083.313
DMA-A	6270447.310	2003115.951
DMA-A	6270405.606	2003117.764
DMA-A	6270405.606	2003183.039
DMA-A	6270336.704	2003188.479
DMA-A	6270331.265	2003164.907
DMA-A	6270324.012	2003164.907
DMA-A	6270273.242	2003164.907
DMA-A	6270280.495	2003654.474
DMA-A	6270527.091	2003649.035

```
DMA-A            6270545.223        2003661.727
DMA-C            6270375.434        2003796.794
DMA-C            6270373.726        2003762.643
DMA-C            6270383.972        2003762.643
DMA-C            6270387.387        2003776.303
DMA-C            6270581.193        2003771.180
DMA-C            6270580.339        2003612.379
DMA-C            6270656.324        2003612.379
DMA-C            6270659.740        2003534.686
DMA-C            6270675.961        2003535.540
DMA-C            6270669.985        2003152.197
DMA-C            6270374.580        2003158.173
DMA-C            6270372.873        2002991.688
DMA-C            6270556.433        2002989.981
DMA-C            6270553.872        2002958.391
DMA-C            6270494.108        2002952.415
DMA-C            6270338.722        2002931.070
DMA-C            6270198.704        2002933.632
DMA-C            6270196.142        2003007.910
DMA-C            6270148.331        2003016.447
DMA-C            6270146.624        2003441.625
DMA-C            6270101.374        2003441.625
DMA-C            6270100.520        2003292.215
DMA-C            6270050.147        2003297.338
DMA-C            6270054.416        2003579.936
DMA-C            6270103.081        2003577.375
DMA-C            6270102.227        2003469.800
DMA-C            6270154.307        2003470.653
DMA-C            6270157.723        2003577.375
DMA-C            6270354.090        2003575.667
DMA-C            6270353.236        2003795.086

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

PRE-DEVELOPMENT- RPT

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

16-011-Pre-Dev-Subcats


*********************
Rainfall File Summary
*********************
Station    First        Last         Recording   Periods    Periods    Periods
ID         Date         Date         Frequency  w/Precip    Missing    Malfunc.
-------------------------------------------------------------------------------
Escondido  09/24/1964   05/23/2008      60 min      7025          0          0


*********************************************************
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 ............ 09/24/1964 00:00:00
Ending Date .............. 05/23/2008 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 01:00:00
Dry Time Step ............ 01:00:00


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......       116.290       611.200
Evaporation Loss .........         4.307        22.639
Infiltration Loss ........        83.129       436.911
Surface Runoff ...........        32.905       172.942
Final Storage ............         0.000         0.000
```

Continuity Error (%) ..... -3.484

**************************	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	32.905	10.722
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	32.905	10.722
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-D	611.20	0.00	22.65	439.01	0.00	169.18	169.18	6.54	1.12	0.277
DMA-B	611.20	0.00	22.61	440.32	0.00	167.67	167.67	0.27	0.05	0.274
DMA-A	611.20	0.00	23.67	439.26	0.00	164.30	164.30	1.47	0.25	0.269
DMA-C	611.20	0.00	21.87	428.47	0.00	191.08	191.08	2.44	0.40	0.313

Analysis begun on: Mon Feb 3 10:12:19 2020
Analysis ended on: Mon Feb 3 10:12:51 2020
Total elapsed time: 00:00:32

POST-DEVELOPMENT- INP

```
[TITLE]
;;Project Title/Notes
08-067-POST-Dev-Subcats

[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           09/24/1964
START_TIME           00:00:00
REPORT_START_DATE    09/24/1964
REPORT_START_TIME    00:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

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

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.06   0.08   0.11   0.15   0.17   0.19   0.19   0.18   0.15   0.11   0.08   0.06
DRY_ONLY         NO

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

```
;;-------------- --------- ------ ------ ----------
Escondido        INTENSITY 1:00     1.0      FILE       "R:\Rain gage dat\Escondido ALERT Station.dat" Escondido  IN

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
BMP-1            Escondido        POC-1            0.009003382 0        6        0.5      0
DMA-A            Escondido        BMP-1            0.320403669 100      261.6    0.5      0
DMA-B            Escondido        POC-1            0.060215794 100      15       0.9      0
DMA-C            Escondido        BMP-2B           0.469421488 100      250      1.8      0
DMA-D            Escondido        BMP-3B           1.42412764 100      490      0.5      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
BMP-1            0.012      0.15       0.05       0.1        25         OUTLET
DMA-A            0.012      0.15       0.05       0.1        25         OUTLET
DMA-B            0.012      0.15       0.05       0.1        25         OUTLET
DMA-C            0.012      0.15       0.05       0.1        25         OUTLET
DMA-D            0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
BMP-1            9          0.01875    0.33
DMA-A            9          0.01875    0.33
DMA-B            9          0.01875    0.33
DMA-C            9          0.01875    0.33
DMA-D            9          0.01875    0.33

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
BMP-1            BC
BMP-1            SURFACE    7          0.01       0          0          5
BMP-1            SOIL       21         0.4        0.2        0.1        5          5          1.5
BMP-1            STORAGE    12         0.67       0          0
BMP-1            DRAIN      0.212244661058695 0.5       3          6          0          0

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile
DrainTo          FromPerv
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- ------------------------
---------------- ----------
BMP-1            BMP-1            1       392.19     0          0          0          0
"Q:\08\08067\gp\gp9\Storm\SWMM\Current\BMP-A.txt" *                0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
```

```
POC-1            0          FREE                            NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi      Ksat
IMD
;;-------------- -------- ---------- ----------- ---------- ---------------------------- -------- --------          --------
--------
BMP-3B           0        2.5        0          TABULAR    BMP-3-MWS                    0        0
BMP-2B           0        3.26       0          TABULAR    BMP-2-MWS                    0        0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff     Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- ----------
Orifice2         BMP-2B           POC-1            SIDE         0          0.61       NO       0
Orifice-3        BMP-3B           POC-1            SIDE         0          0.61       NO       0
1                BMP-3B           POC-1            SIDE         2.75       0.61       NO       0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff     Gated    EndCon   EndCoeff   Surcharge
RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- -------- ---------- ----------
---------- ---------- ----------------
Weir3            BMP-3B           POC-1            SIDEFLOW     2          3.33       NO       0        0          YES
Weir2            BMP-2B           POC-1            TRANSVERSE   2.26       3.33       NO       0        0          YES

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
Orifice2         CIRCULAR     0.041666667      0          0          0
Orifice-3        CIRCULAR     0.0575           0          0          0
1                CIRCULAR     0.041667         0          0          0
Weir3            RECT_OPEN    5.52             4          0          0
Weir2            RECT_OPEN    1                2          0          0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
BMP-2-MWS        Storage    0          0
BMP-2-MWS                   0.2        790
BMP-2-MWS                   0.4        580
BMP-2-MWS                   0.6        1090
BMP-2-MWS                   0.8        740
BMP-2-MWS                   1          1180
BMP-2-MWS                   1.2        740
BMP-2-MWS                   1.4        1090
BMP-2-MWS                   1.6        570
BMP-2-MWS                   1.8        800
BMP-2-MWS                   2          13
BMP-2-MWS                   2.26       56.53846154
BMP-2-MWS                   2.76       43.46153846
```

```
BMP-2-MWS                      3.26       256.5384615
;
;10-2-2020: Hydrograph for 3B1 + 3B2
BMP-3-MWS        Storage    0          0
BMP-3-MWS                   0.25       2465.6
BMP-3-MWS                   0.5        2126.4
BMP-3-MWS                   0.75       3929.6
BMP-3-MWS                   1          3326.4
BMP-3-MWS                   1.25       4913.6
BMP-3-MWS                   1.5        4086.4
BMP-3-MWS                   1.75       5425.6
BMP-3-MWS                   2          4278.4
BMP-3-MWS                   2.25       5169.6
BMP-3-MWS                   2.5        3006.4

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

[TAGS]

[MAP]
DIMENSIONS 6269868.290 2002581.283 6271353.589 2003838.673
Units      Feet

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            6270313.017        2002775.834
BMP-3B           6270590.556        2003660.320
BMP-2B           6270345.958        2002932.894

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Orifice2         6270443.073        2002891.692
Orifice2         6270412.203        2002790.211
Orifice-3        6270408.381        2003651.402
Orifice-3        6270291.178        2003599.170
1                6270381.628        2003692.169
1                6270251.685        2003638.663
Weir3            6270362.519        2003724.017
Weir3            6270203.275        2003665.416
Weir2            6270373.847        2002844.686
Weir2            6270355.117        2002794.737

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
```

```
;;-------------- ------------------ ------------------
BMP-1            6270500.834        2002754.426
BMP-1            6270488.054        2002767.206
BMP-1            6270488.054        2002792.766
BMP-1            6270513.614        2002792.766
BMP-1            6270513.614        2002767.206
BMP-1            6270500.834        2002754.426
DMA-A            6270555.910        2002932.674
DMA-A            6270587.051        2002932.674
DMA-A            6270585.805        2002852.954
DMA-A            6270676.735        2002851.708
DMA-A            6270674.244        2002826.796
DMA-A            6270634.384        2002826.796
DMA-A            6270633.139        2002836.761
DMA-A            6270621.928        2002836.761
DMA-A            6270621.928        2002806.866
DMA-A            6270552.173        2002810.603
DMA-A            6270552.173        2002800.638
DMA-A            6270416.401        2002800.638
DMA-A            6270416.401        2002865.410
DMA-A            6270398.664        2002867.831
DMA-A            6270369.067        2002870.393
DMA-A            6270370.313        2002933.919
DMA-A            6270370.313        2002997.446
DMA-A            6270371.558        2003126.990
DMA-A            6270371.475        2003128.430
DMA-A            6270372.859        2003127.045
DMA-A            6270372.859        2003127.045
DMA-A            6270557.013        2003127.045
DMA-B            6270590.374        2002728.947
DMA-B            6270577.594        2002741.727
DMA-B            6270577.594        2002767.287
DMA-B            6270603.154        2002767.287
DMA-B            6270603.154        2002741.727
DMA-B            6270590.374        2002728.947
DMA-C            6270363.975        2003062.358
DMA-C            6270351.195        2003075.138
DMA-C            6270351.195        2003100.698
DMA-C            6270376.755        2003100.698
DMA-C            6270376.755        2003075.138
DMA-C            6270363.975        2003062.358
DMA-D            6270586.734        2003161.726
DMA-D            6270573.954        2003174.506
DMA-D            6270573.954        2003200.066
DMA-D            6270599.514        2003200.066
DMA-D            6270599.514        2003174.506
DMA-D            6270586.734        2003161.726

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
```

```
;;-------------- ------------------ ------------------


[BACKDROP]
FILE       "Q:\08\08067\gp\gp9\Storm\SWMM\Current\Inps\Current SWMM-JEN\Post Development.JPG"
DIMENSIONS 6270191.810 2002581.283 6271030.070 2003838.673

[PROFILES]
;;Name           Links
;;-------------- ----------
"continuous simulation" 9 10 11 15
```

POST-DEVELOPMENT-RPT

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

08-067-POST-Dev-Subcats


*********************
Rainfall File Summary
*********************
Station    First        Last         Recording   Periods    Periods    Periods
ID         Date         Date         Frequency  w/Precip    Missing    Malfunc.
-------------------------------------------------------------------------------
Escondido  09/24/1964   05/23/2008      60 min      7025          0          0


*********************************************************
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 ............ 09/24/1964 00:00:00
Ending Date .............. 05/23/2008 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 01:00:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 60.00 sec


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Initial LID Storage ......         0.002         0.008
Total Precipitation ......       116.290       611.200
```

```
  Evaporation Loss .........        16.162        84.945
  Infiltration Loss ........         0.000         0.000
  Surface Runoff ...........        97.427       512.060
  LID Drainage .............        11.067        58.166
  Final Storage ............         0.016         0.085
  Continuity Error (%) .....        -7.207


  **************************        Volume        Volume
  Flow Routing Continuity        acre-feet      10^6 gal
  **************************     ---------     ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......       108.487        35.352
  Groundwater Inflow .......         0.000         0.000
  RDII Inflow ..............         0.000         0.000
  External Inflow ..........         0.000         0.000
  External Outflow .........       108.455        35.342
  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 ......         0.017         0.005
  Continuity Error (%) .....         0.014


  ********************************
  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
```

Subcatchment	Precip in	Runon in	Evap in	Infil in	Runoff in	Runoff in	Runoff in	Runoff 10^6 gal	Runoff CFS	Runoff Coeff
BMP-1	611.20	20484.84	952.75	0.00	0.00	0.00	20145.00	4.92	0.27	0.955
DMA-A	611.20	0.00	79.76	0.00	575.70	0.00	575.70	5.01	0.28	0.942
DMA-B	611.20	0.00	82.64	0.00	572.57	0.00	572.57	0.94	0.05	0.937
DMA-C	611.20	0.00	79.42	0.00	576.17	0.00	576.17	7.34	0.42	0.943
DMA-D	611.20	0.00	82.54	0.00	572.70	0.00	572.70	22.15	1.26	0.937

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
BMP-1	BMP-1	21096.04	952.77	0.00	5394.89	14750.72	2.10	7.68	-0.04

****
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
POC-1	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
BMP-3B	STORAGE	0.14	2.25	2.25	10332 17:09	2.24
BMP-2B	STORAGE	0.08	2.41	2.41	10332 17:01	2.41

****
Node Inflow Summary
****

	Maximum	Maximum	Lateral	Total	Flow

Node	Type	Lateral Inflow CFS	Total Inflow CFS	Time of Max Occurrence days hr:min	Inflow Volume 10^6 gal	Inflow Volume 10^6 gal	Balance Error Percent
POC-1	OUTFALL	0.28	1.59	10332 17:07	5.86	35.3	0.000
BMP-3B	STORAGE	1.26	1.26	15676 07:01	22.1	22.1	0.002
BMP-2B	STORAGE	0.42	0.42	15676 07:01	7.34	7.34	0.063

****
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
BMP-3B	0.367	4	0	0	8.302	89	10332 17:08	1.08
BMP-2B	0.055	3	0	0	1.535	94	10332 17:01	0.40

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
POC-1	17.44	0.02	1.59	35.339
System	17.44	0.02	1.59	35.339

****
Link Flow Summary
****

	Maximum |Flow|	Time of Max Occurrence	Maximum |Veloc|	Max/ Full	Max/ Full

```
  Link                 Type           CFS  days hr:min    ft/sec     Flow   Depth
  -----------------------------------------------------------------------------
  Orifice2             ORIFICE       0.01  10332  17:01                       0.00
  Orifice-3            ORIFICE       0.02  10332  17:09                       0.00
  1                    ORIFICE       0.00      0  00:00                      0.00
  Weir3                WEIR          1.06  10332  17:09                       0.00
  Weir2                WEIR          0.39  10332  17:01                       0.00


  *************************
  Conduit Surcharge Summary
  *************************

  No conduits were surcharged.


  Analysis begun on:  Tue Feb 11 11:30:24 2020
  Analysis ended on:  Tue Feb 11 11:31:23 2020
  Total elapsed time: 00:00:59
```

Attachment D SWMM Drawdown Calculations and Summary

Underdrain and Drawdown Results

The following table summarizes the underdrain coefficients used for each of the BMP units and translates the C factor coefficient to an equivalent round orifice diameter based on 1/16th inch increments. The drawdown equations are based on standard falling head drawdown theory. The primary drawdown number of interest is the surface drawdown based on vector concerns. The various soil and gravel storage layer calculations consider the void ratio and porosity of the respective layer. It should be noted that these drawdown calculations only consider the volume of water within the bioretention units. If the bioretention unit utilizes any storage above the berm height, then that storage drawdown is in addition to the values shown in the table below. Those calculations, if present, are shown elsewhere in the report. The derivation and explanation of the equations used to determine the values displayed in the chart are discussed in the following two sections of this portion of the report.

Sub Cat Name*	LID Process*	LID Area (sf)*	Orifice D (1/16in)	Orifice D (in)	UD C factor*	T surf (in)*	T soil (in)*	T store (in)*	n (soil)*	e (store)*	Drawdown surface (hr)	Drawdown Soil (hr)	Drawdown Storage (hr)	Drawdown total (hr)
BMP-1	BMP-1	392.19	8	0.5	0.212244661	8	18	12	0.4	0.67	6.5	7.6	13.1	27.2

The character * in the column heading indicates that the values was read directly from the SWMM inp file.
Assume: orifice coefficient C_o = 0.61, void ratio for surface = 1.0, centroid of underdrain orifice is located at h=0

Underdrain C Factor Equations

Based on the slotted drain example in the SWMM Drain Advisor (EPA SWMM 5.1 Help/Contents/Reference/Special Dialog Forms/LID Editors/LID Control Editor/LID Drain System/Drain Advisor) the underdrain coefficient C is the ratio of the orifice area (total slot area) to the LID area times a constant (60,000).

SWMM Ex: If the drain consists of slotted pipes where the slots act as orifices, then the drain exponent would be 0.5 and the drain coefficient would be 60,000 times the ratio of total slot area to LID area. For example, drain pipe with five 1/4" diameter holes per foot spaced 50 feet apart would have an area ratio of 0.000035 and a drain coefficient of 2.

The 60,000 constant in the above example corresponds to the combined constants in the standard orifice equation:

(Standard Orifice Equation)

$$q=C_oA_o\sqrt{2g}\,\sqrt{h}\ (cfs)$$

and

(SWMM Underdrain Equation (per unit area))

$$q=q/A_{LID}$$

$$or$$

$$q=C_oA_o/A_{LID}\sqrt{2g}\,\sqrt{h}\ (cfs/sf)$$

With a Co=0.6 and converting $\sqrt{2g}$ to units of inches and hours the constant becomes 60,046.

So the underdrain C factor per unit area of the LID becomes:

$$C=60{,}046\ A_o/A_{LID}\ (in^{\wedge 1/2}/hr)$$

$$and$$

$$q=C^*h^{1/2}$$

Drawdown Equations

The drawdown equations presented in the chart are the drawdown times for the respective layers within the bioretention unit (only). If the bioretention unit includes storage ponding above the berm height, then the drawdown time for the storage portion is in addition to the values shown in the chart. Those calculations (if present) are shown elsewhere in the report. For most cases the storage drawdown time will be comparatively short as compared to the bioretention drawdown times.

To derive a general formula that relates drawdown time for each layer of the bioretention unit in terms of the SWMM C factor, we set the change in water volume with respect to time equal to the standard orifice equation (found in the County Hydraulics manual):

$$q = \frac{dh}{dt}\, nAp = CoAo\sqrt{2gh}$$

Where n = porosity of the layer, A_P = area of the BMP unit, Co = orifice coefficient, Ao = area of the orifice, and g = gravity constant. The porosity n for the surface layer is 1.0, and the values for the soil and storage layers read from the SWMM LID definitions.

Solving the definite integral from h1 to h2

$$\int_{h=h1}^{h=h2} h^{-0.5} dh = \int_{t=0}^{t=T} \frac{CoAo\sqrt{2g}}{nAp}\; dt$$

$$2(\sqrt{h2} - \sqrt{h1}) = \frac{CoAo\sqrt{2g}}{nAp}\;(T)$$

$$Or$$

$$2n\left(\sqrt{h2} - \sqrt{h1}\right) = C\;(T)$$

$$where: C = \frac{CoAo\sqrt{2g}}{Ap} \quad (in^{\wedge 1/2}/hr)$$

Solving for T:

$$T = \frac{2n\left(\sqrt{h2} - \sqrt{h1}\right)}{C} \quad (hr)$$

Where h2(in) is the total beginning head above the underdrain orifice at t=0 and h1(in) is the total ending head above the orifice at t=T. Ex: h2 for surface = depth of gravel storage plus depth of soil layer plus berm height, and h1 for surface = depth of gravel storage plus depth of soil layer.

Attachment E SWMM Hydrologic Soil Classification Attachment of Web Soil Survey

Hydrologic Soil Group—San Diego County Area, California
(BD)

Map Scale: 1:1,040 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

N

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

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

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HrC	Huerhuero loam, 2 to 9 percent slopes	D	2.3	100.0%
Totals for Area of Interest			**2.3**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ATTACHMENT 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Indicate which Items are Included behind this cover sheet:

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

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

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

Attachment 3a must identify:

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

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

☑ **Final Design level submittal:**

Attachment 3a must identify:

☑ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
☑ How to access the structural BMP(s) to inspect and perform maintenance
☑ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
☑ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
☑ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
☑ Recommended equipment to perform maintenance
☑ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

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

Attachment 3

Operation and Maintenance Information

Maintenance Responsibility

The maintenance of the storm drain system and the biofiltration area shall be under Holldandia Farms Inc.

Categories of Project BMPs

Vegetated Filtration BMPs

1. Biofiltration (BF-1)
2. Biofiltration with Nutrient Sensitive Media Design (BF-2)
3. Modular Wetlands Unit (BF-3)

Maintenance Indicators and Actions

Maintenance of Vegetated BMPs

1. Biofiltration (BF-1)
2. Biofiltration with Nutrient Sensitive Media Design (BF-2)

Note that these BMPs typically include a surface ponding layer as part of their function which may take 96 hours to drain following a storm event.

Typical Maintenance Indicator	Maintenance Actions
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.
Overgrown vegetation	Mow or trim as appropriate, but not less than the design height of the vegetation per original plans when applicable (e.g. a vegetated swale may require a minimum vegetation height).
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.
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.
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.

Standing water in vegetated swales	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, loosening or replacing top soil to allow for better infiltration, or minor re-grading for proper drainage. 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 bioretention, biofiltration with partial retention, or biofiltration areas, or flow-through planter boxes for longer than 96 hours following a storm event	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains (where applicable), or repairing/replacing clogged or compacted soils.
Obstructed inlet or outlet structure / underdrain clogged	Clear obstructions/blockage
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.
Presence of mosquitos/larvae	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

3. Modular Wetlands Unit (BF-3)

Please refer to appendix A for maintenance guidance of Modular Wetlands Unit by manufacturer.

Inspection/Maintenance Access

Biofiltration areas on this project locate at curbside and are easily accessed.

Inspection Features

The discharge of the respective storm drain system to the biofiltration area is through specially designed discharge structures. Inspections shall include visual observations that the discharge points are free from obstructions.

Maintenance Thresholds

The design drawdown times of the various biofiltration areas will be calculated during detail design of the project. The drawdown time will be controlled by a restrictor orifice not the soil permeability. If standing water remains in the Biofiltration area longer than about a day (26 hours) then that indicates that either the discharge orifice is clogged, or the soil media is getting clogged. In either case maintenance operations shall be initiated at this point.

Recommended Maintenance Equipment

For regular maintenance of the Biofiltration area, typical landscape maintenance equipment is to be expected. This would include items such as lawn mowers, string trimmers, hedge trimmers, racks, shovels, wheel barrows, etc. Lawn care equipment would be used for trimming the vegetation, and the shovels, brooms, wheel barrows, etc. would be used to remove silt and sediment build up. It is assumed that typical lawn care equipment will be fitted with low-impact “turf” type tires or treads.

For major maintenance such as the excavation and reestablishment of the various biofiltration layers, typical equipment might include backhoe loaders, dump trucks, and other similar equipment. All such equipment shall be fitted with low impact tires or treads, and/or protective mats shall be placed along the access route to prevent damage to the access road vegetation.

Specialized Maintenance Training

For the regular maintenance of the vegetation and removal of silt and sediment buildup, no specialized training other than that of a typical lawn care professional is required. For the major maintenance of the Biofiltration unit, all workers assigned to BMP overhaul shall be well versed in the design and function of the specific BMP, and the specific details of the original project plans.

E.7 HU-1 Cistern

MS4 Permit Category
Retention
Manual Category
Harvest and Use
Applicable Performance Standards
Pollutant Control Flow Control
Primary Benefits
Volume Reduction Peak Flow Attenuation

Photo Credit: Water Environment Research Foundation: WERF.org

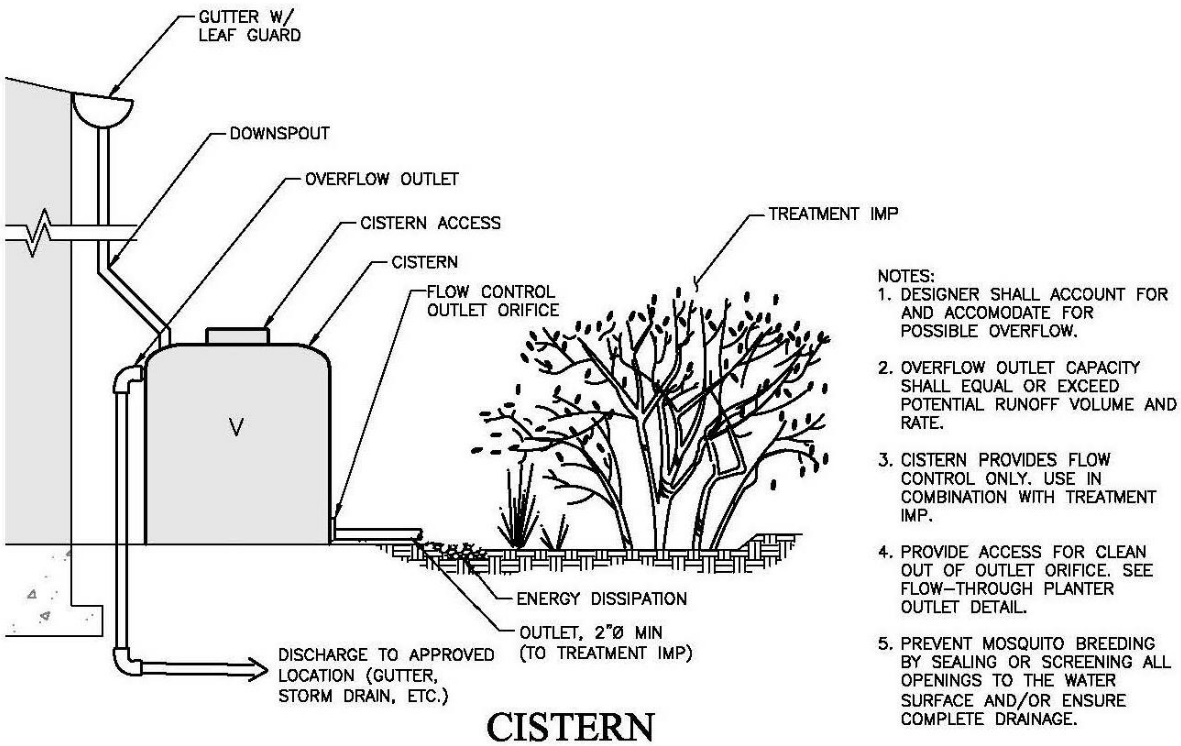
Description

Cisterns are containers that can capture rooftop runoff and store it for future use. With controlled timing and volume release, the captured rainwater can be used for irrigation or alternative grey water between storm events, thereby reducing runoff volumes and associated pollutants to downstream water bodies. Cisterns are larger systems (generally>100 gallons) that can be self-contained aboveground or below ground systems. Treatment can be achieved when cisterns are used as part of a treatment train along with other BMPs that use captured flows in applications that do not result in discharges into the storm drain system. Rooftops are the ideal tributary areas for cisterns.

Typical cistern components include:

- Storage container, barrel or tank for holding captured flows
- Inlet and associated valves and piping
- Outlet and associated valves and piping
- Overflow outlet

- Optional pump
- Optional first flush diverters
- Optional roof, supports, foundation, level indicator, and other accessories



Source: City of San Diego Storm Water Standards

Design Adaptations for Project Goals

Site design BMP to reduce effective impervious area and DCV. Cisterns can be used as a site design feature to reduce the effective impervious area of the site by removing roof runoff from the site discharge. This can reduce the DCV and flow control requirements for the site.

Harvest and use for storm water pollutant control. Typical uses for captured flows include irrigation, toilet flushing, cooling system makeup, and vehicle and equipment washing.

Integrated storm water flow control and pollutant control configuration. Cisterns provide flow control in the form of volume reduction and/or peak flow attenuation and storm water treatment through elimination of discharges of pollutants. Additional flow control can be achieved by sizing the cistern to include additional detention storage and/or real-time automated flow release controls.

Design Criteria and Considerations

Cisterns must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

	Siting and Design	*Intent/Rationale*
☐	Cisterns are sized to detain the full DCV of contributing area and empty within 36 hours.	Draining the cistern makes the storage volume available to capture the next storm. The applicant has an option to use a different drawdown time up to 96 hours if the volume of the facility is adjusted using the percent capture method in Appendix B.4.2.
☐	Cisterns are fitted with a flow control device such as an orifice or a valve to limit outflow in accordance with drawdown time requirements.	Flow control provides flow attenuation benefits and limits cistern discharge to downstream facilities during storm events.
☐	Cisterns are designed to drain completely, leaving no standing water, and all entry points are fitted with traps or screens, or sealed.	Complete drainage and restricted entry prevents mosquito habitat.
☐	Leaf guards and/or screens are provided to prevent debris from accumulating in the cistern.	Leaves and organic debris can clog the outlet of the cistern.
☐	Access is provided for maintenance and the cistern outlets are accessible and designed to allow easy cleaning.	Properly functioning outlets are needed to maintain proper flow control in accordance with drawdown time requirements.
☐	Cisterns must be designed and sited such that overflow will be conveyed safely overland to the storm drain system or discharge point.	Safe overflow conveyance prevents flooding and damage of property.

Conceptual Design and Sizing Approach for Site Design and Storm Water Pollutant Control

1. Calculate the DCV for site design per Appendix B.
2. Determine the locations on the site where cisterns can be located to capture and detain the DCV from roof areas without subsequent discharge to the storm drain system. Cisterns are best located in close proximity to building and other roofed structures to minimize piping. Cisterns can also be used as part of a treatment train upstream by increasing pollutant control through delayed runoff to infiltration BMPs such as bioretention without underdrain

facilities.

3. Use the sizing worksheet in Appendix B.3 to determine if full or partial capture of the DCV is achievable.
4. The remaining DCV to be treated should be calculated for use in sizing downstream BMP(s).

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or duration will typically require significant cistern volumes, and therefore the following steps should be taken prior to determination of site design and storm water pollutant control. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that cistern siting and design criteria have been met. Design for flow control can be achieved using various design configurations, shapes, and quantities of cisterns.
2. Iteratively determine the cistern storage volume required to provide detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control valve operation.
3. Verify that the cistern is drawdown within 36 hours. The drawdown time can be estimated by dividing the storage volume by the rate of use of harvested water.
4. If the cistern cannot fully provide the flow rate and duration control required by this manual, a downstream structure with additional storage volume or infiltration capacity such as a biofiltration can be used to provide remaining flow control.

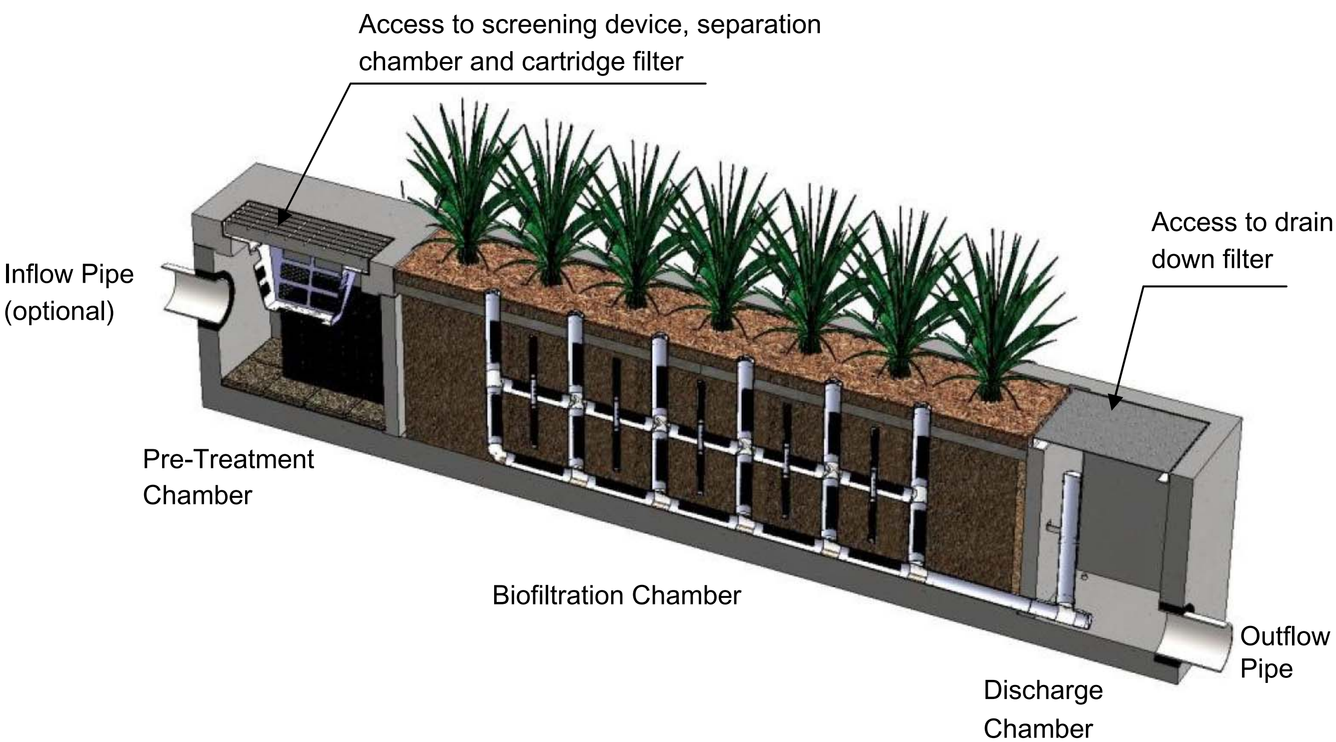
APPENDIX A

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- <u>Remove Trash from Screening Device</u> – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- <u>Remove Sediment from Separation Chamber</u> – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- <u>Replace Cartridge Filter Media</u> – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- <u>Replace Drain Down Filter Media</u> – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- <u>Trim Vegetation</u> – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

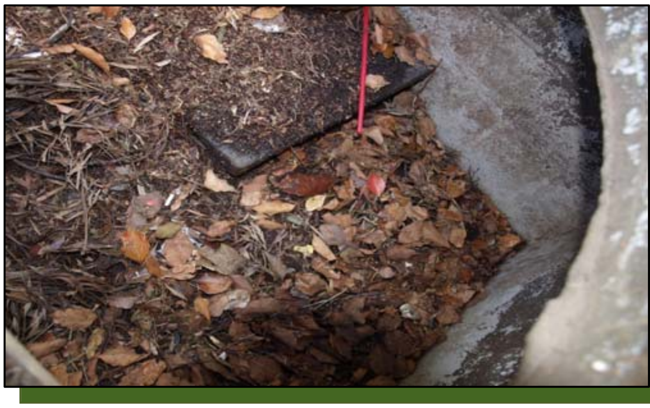
5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.



Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.

Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name ______________________

Project Address ______________________
(city) (Zip Code)

Owner / Management Company ______________________

Contact ______________________ Phone ( ) –

Inspector Name ______________________ Date ___/___/_____ Time ________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition ______________________ Additional Notes ______________________

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): __________ Size (22', 14' or etc.): __________

Structural Integrity:	Yes	No	Comments	
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?				
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?				
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?				
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?				
Working Condition:				
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?				
Is there standing water in inappropriate areas after a dry period?				
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?				
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.				Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:	
Any signs of improper functioning in the discharge chamber? Note issues in comments section.				
Other Inspection Items:				
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?				
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.				
Is there a septic or foul odor coming from inside the system?				

Waste:	Yes	No
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

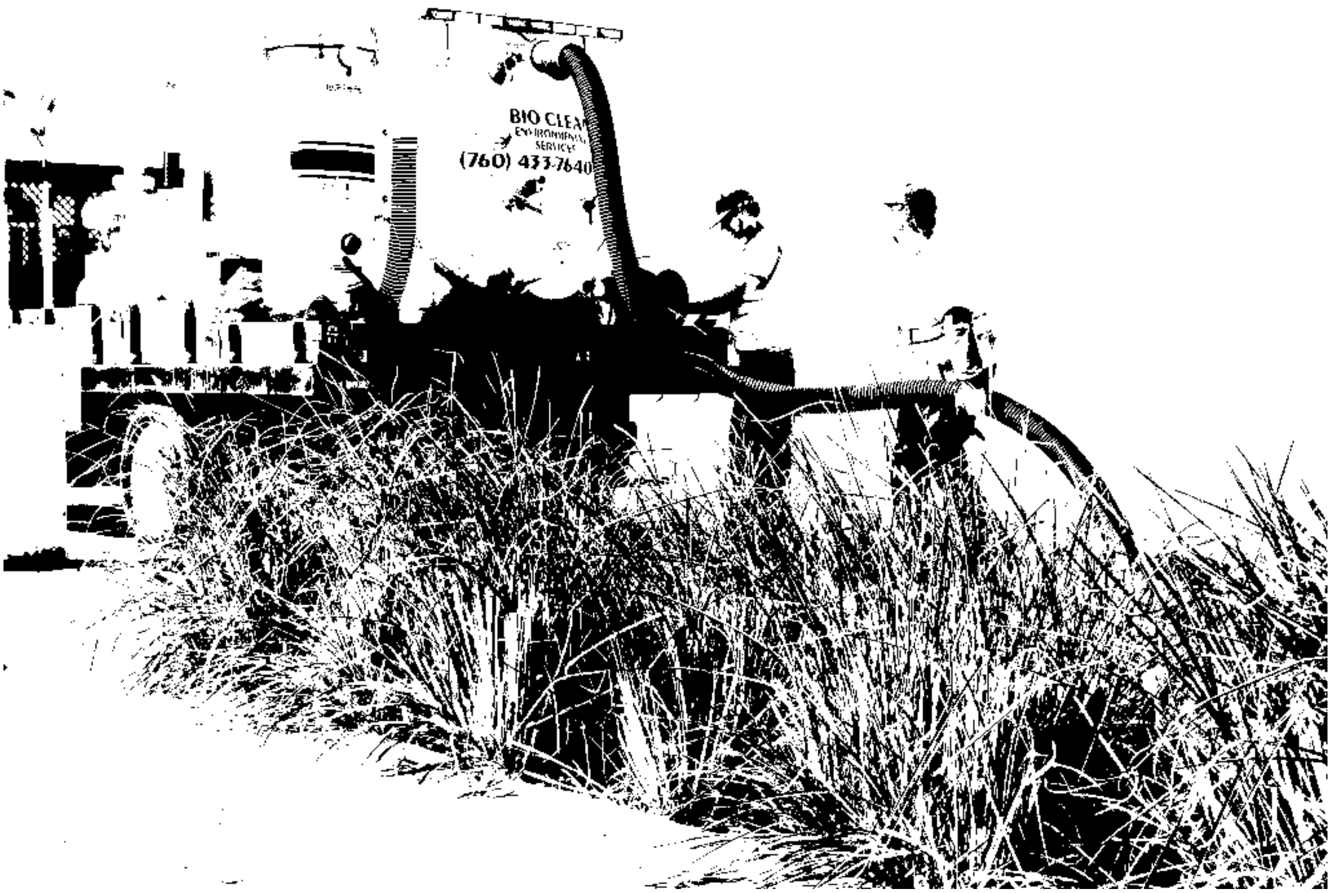
Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: ______________________

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report



Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Project Name ______________________________

Project Address ______________________________ (city) (Zip Code)

Owner / Management Company ______________________________

Contact ______________________________ Phone ( ) –

Inspector Name ______________________________ Date ____ / ____ / ______ Time __________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition ______________________________ Additional Notes ______________________________

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

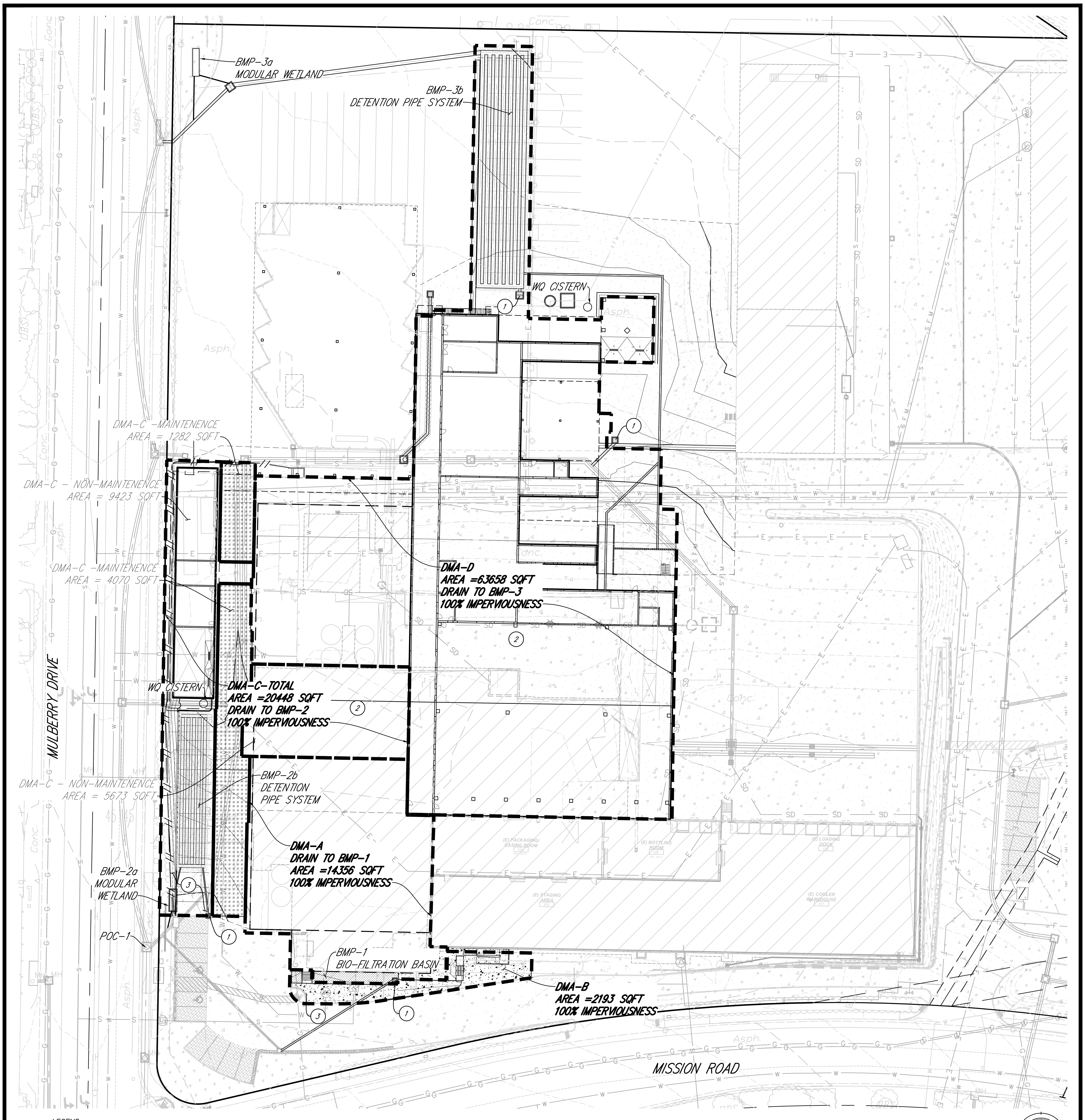
ATTACHMENT 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

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

The plans must identify:

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



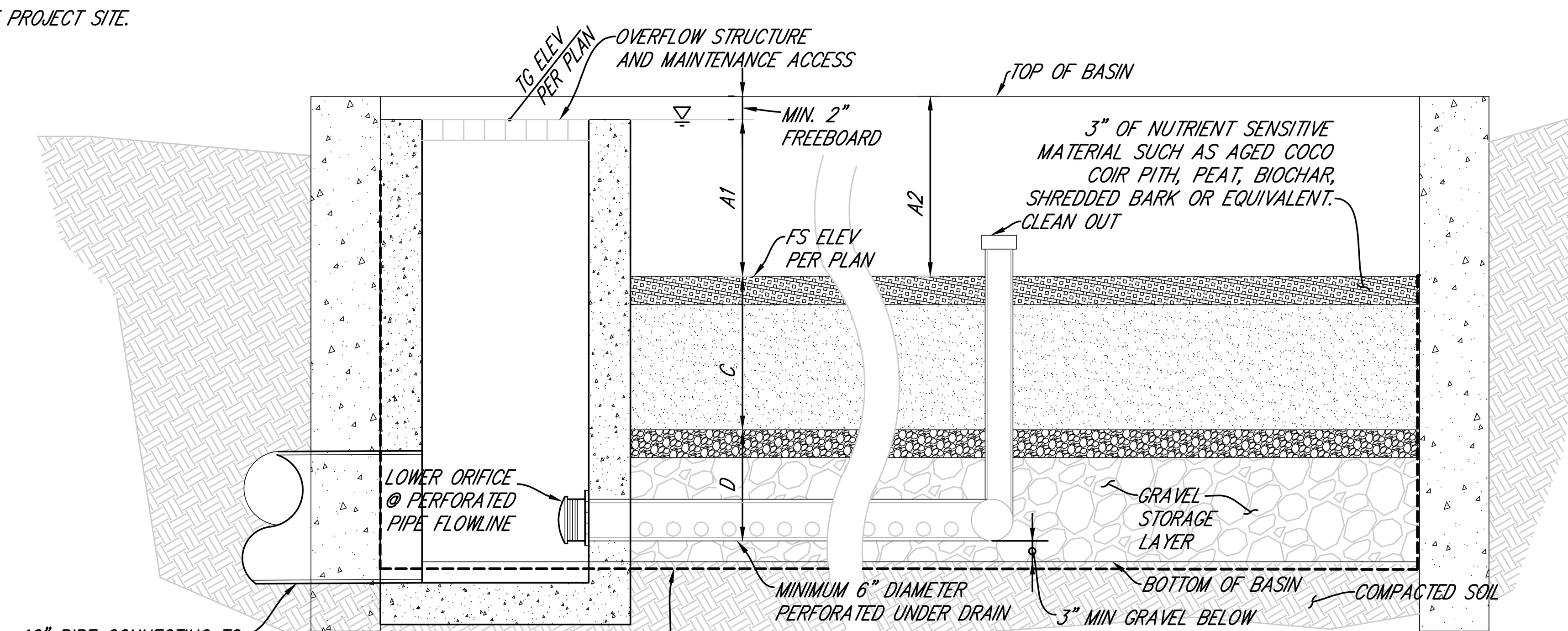
LEGEND

NAME	SYMBOL
EXISTING MAJOR CONTOUR (SURVEYED)	
EXISTING MAJOR CONTOUR (SanGIS)	
PROPOSED MAJOR CONTOUR	
BASIN DELINEATION	
EXISTING DRIVEWAY TREATED IN LIEU OF PROPOSED SIDEWALK IN DMA-B	

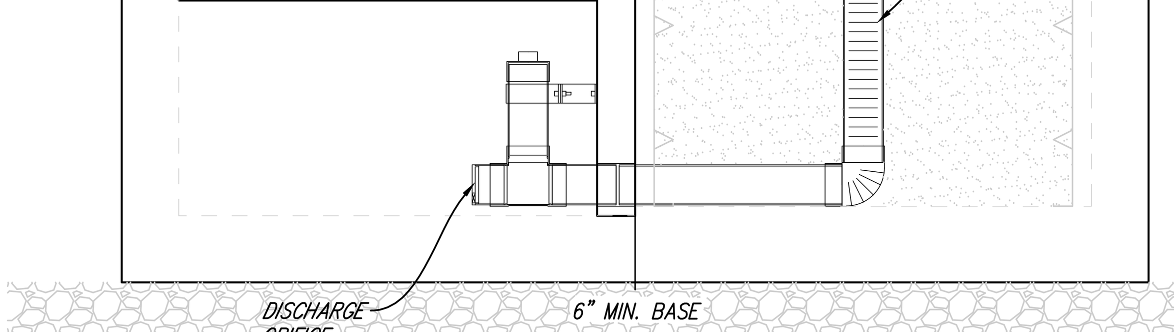
NOTES:
1. ADDITIONAL AREA WITHIN DMA-C TO COMPENSATE FOR UNTREATABLE RUN OFF FROM DMA-B.
2. BMP 2b AND 3b ARE DETENTION PIPES THAT ACT AS FOREBAYS FOR HYDROMODIFICATION CONTROL.
3. UNDERLYING HYDROLOGIC SOIL GROUP FOR THIS SITE IS TYPE "D".
4. APPROXIMATE DEPTH TO GROUND WATER IS MORE THAN 20 FT.
5. THERE IS NO CRITICAL COARSE SEDIMENT YIELD AREA WITHIN THE PROJECT SITE.

DMA:
UNDERLYING SOIL GROUP: D
APPROXIMATE DEPTH TO GROUNDWATER: 4FT-8FT

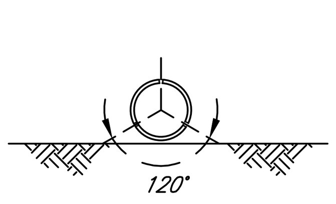
NO.	SOURCE CONTROL BMPs	IMPLEMENTATION
1	INLET STENCILING	MARK INLET WITH THE WORDS : "NO DUMPING! DRAINS TO WATERWAYS"
2	PREVENTION OF ILLICIT DISCHARGES	ALL INDUSTRIAL PROCESSES TO BE PERFORMED INDOORS. NO PROCESSES TO DRAIN TO EXTERIOR OR TO STORM DRAIN SYSTEM.
3	SIDE WALK/PARKING LOT MAINTENANCE	SWEEP REGULARLY TO PREVENT ACCUMULATION OF LITTER & DEBRIS



BMP-1 BIOFILTRATION PLANTER DETAIL
NOT TO SCALE
* NOTE: SOIL MEDIA AND PLANTING METHODS SHALL MEET THE BF-2 DESIGN CRITERIA



BMP-2a AND BMP-3a MODULAR WETLAND DETAIL
NOT TO SCALE



6" PVC PIPE PERFORATION LAYOUT DETAIL
NOT TO SCALE

BIO-BASIN SUMMARY TABLE

BMP ID	SURFACE FOOTPRINT (SQFT)	A1 (INCH)	A2 (INCH)	C (INCH)	D (INCH)	RISER SIZE (INCH)	ORIFICES DIAMETER		IMPERMEABLE LINER
							UPPER (INCH)	LOWER (INCH)	
BMP-1	392	7	9	21	9	24X24	N/A	0.5	YES

* FREEBOARD=A2-A1

MODULAR WETLAND SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT		PROVIDED TREATMENT		ORIFICE OUT (INCH)
				VALUE	UNITS	VALUE	UNITS	
BMP-2a	MWS-L-4-8	606.71	606.21	1495	CF	1692	CF	0.50
BMP-3a	MWS-L-4-6	610.04	609.54	4650	CF	9306	CF	0.69

DETENTION PIPE SYSTEM SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT		PROVIDED TREATMENT		ORIFICE OUT (INCH)
				VALUE	UNITS	VALUE	UNITS	
BMP-2b	N/A	606.84	606.84	1495	CF	1692 CF	CF	N/A
BMP-3b	N/A	610.06	610.04	4650	CF	9306 CF	CF	N/A

SUMMARY OF DMAs

DMA ID NO.	AREA (SQFT)	DMA TYPE
DMA-A	14,356	DRAIN TO BMP
DMA-B	2,193	N/A*
DMA-C	20,448	DRAIN TO BMP
DMA-D	63,658	DRAIN TO BMP

*DMA-B TREATMENT AREA IS INCLUDED IN DMA-C. THUS, DMA-C TREATMENT AREA IS INCREASED BY AT LEAST THE AMOUNT REQUIRED TO BE TREATED IN DMA-B.

HOLLANDIA RE-DEVELOPMENT
DMA EXHIBIT

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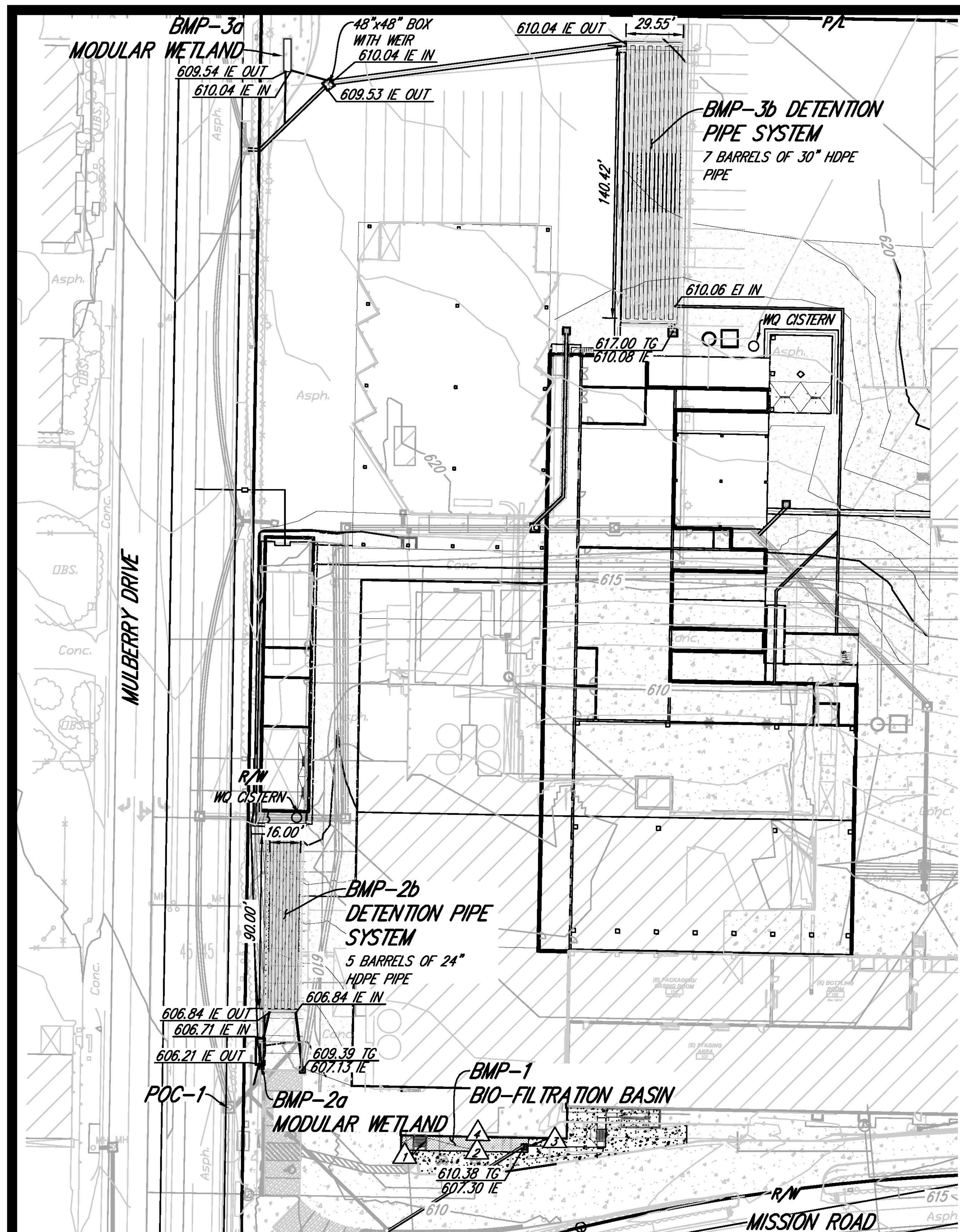
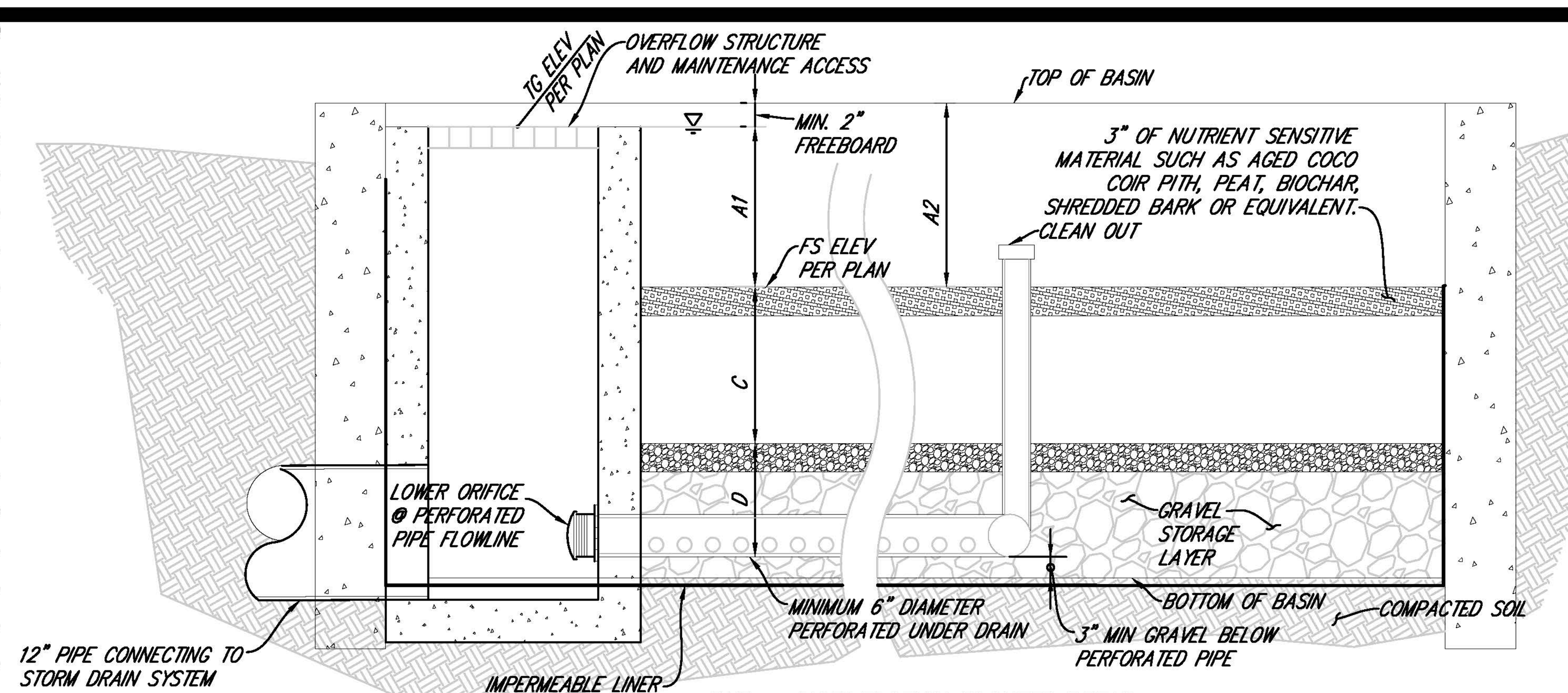


BMP-2b AND BMP-3b
DETENTION PIPE SYSTEM DETAIL



BMP-1 BIOFILTRATION PLANTER DETAIL
NOT TO SCALE

* NOTE: SOIL MEDIA AND PLANTING METHODS SHALL MEET THE BF-2 DESIGN CRITERIA

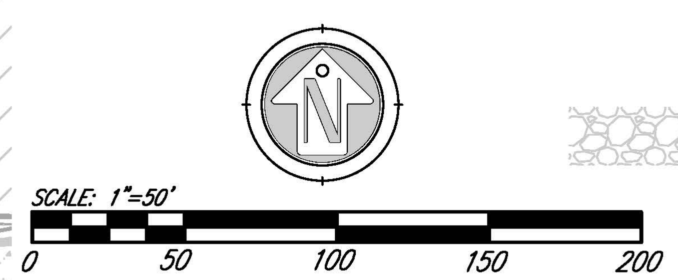
BIO-BASIN SUMMARY TABLE

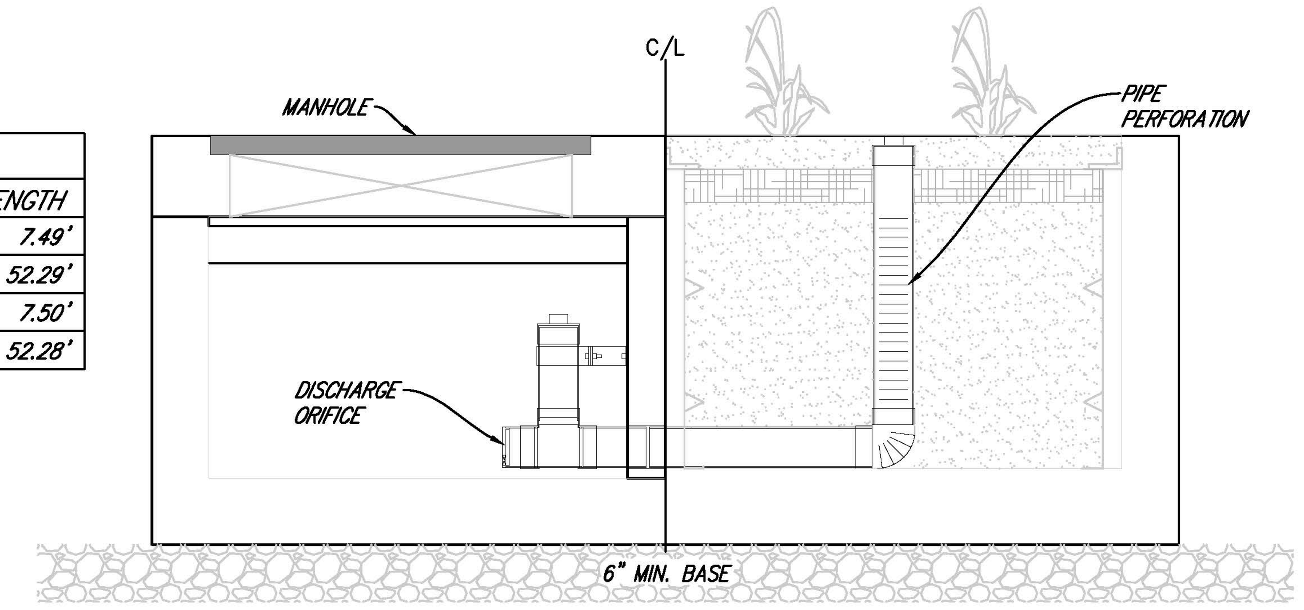
BMP ID	SURFACE FOOTPRINT (SQFT)	A1 (INCH)	A2 (INCH)	C (INCH)	D (INCH)	RISER SIZE (INCH)	ORIFICES DIAMETER UPPER (INCH)	ORIFICES DIAMETER LOWER (INCH)	IMPERMEABLE LINER
BMP-1	392	7	9	21	9	24X24	N/A	0.5	YES

* FREEBOARD=A2-A1

BMP-1

NO	DELTA/BRG	RADIUS	LENGTH
1	N01°08'54"E	--	7.49'
2	N88°54'46"W	--	52.29'
3	N01°05'14"E	--	7.50'
4	N88°55'16"W	--	52.28'





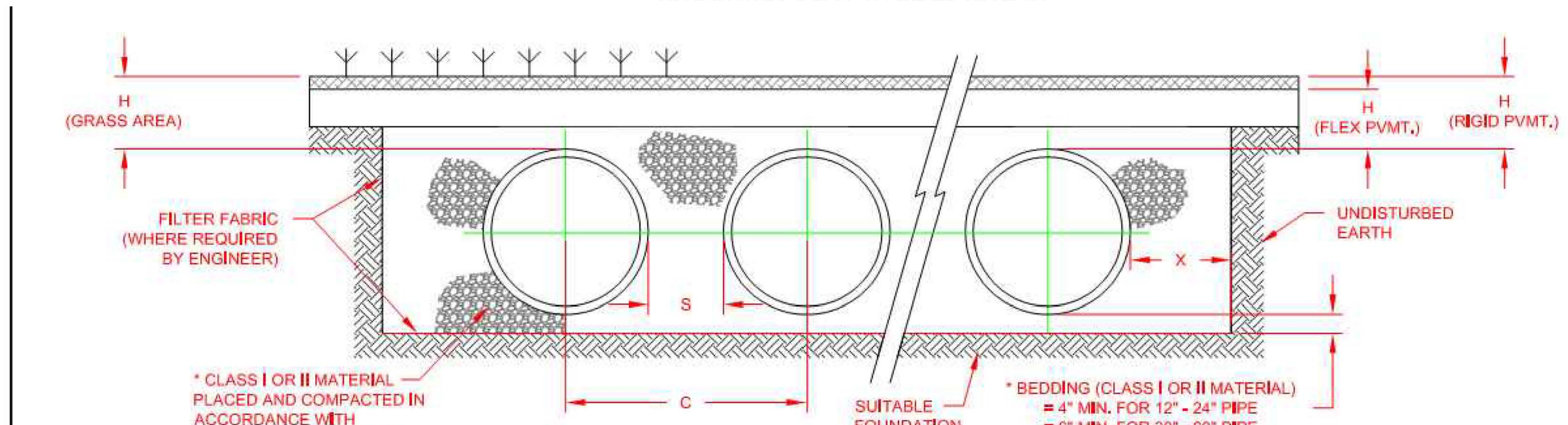
BMP-2 AND BMP-3 MODULAR WETLAND DETAIL
NOT TO SCALE

MODULAR WETLAND SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT VALUE	REQUIRED TREATMENT UNITS	PROVIDED TREATMENT VALUE	PROVIDED TREATMENT UNITS	ORIFICE OUT (INCH)
BMP-2a	MWS-L-4-8	606.71	606.21	1495	CF	1692	CF	0.50
BMP-3a	MWS-L-4-6	610.04	609.54	4650	CF	9306	CF	0.69

DETENTION PIPE SYSTEM SUMMARY TABLE

BMP ID NO.	MODEL ID.	IE IN	IE OUT	REQUIRED TREATMENT VALUE	REQUIRED TREATMENT UNITS	PROVIDED TREATMENT VALUE	PROVIDED TREATMENT UNITS	ORIFICE OUT (INCH)
BMP-2b	N/A	606.84	606.84	1495	CF	1692 CF	CF	N/A
BMP-3b	N/A	610.06	610.04	4650	CF	9306 CF	CF	N/A



NOTES:

1. ALL REFERENCES TO CLASS I OR II MATERIAL ARE PER ASTM D2321 "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST EDITION.
2. ALL RETENTION AND DETENTION SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, LATEST EDITION AND THE MANUFACTURER'S PUBLISHED INSTALLATION GUIDELINES.
3. MEASURES SHOULD BE TAKEN TO PREVENT THE MIGRATION OF NATIVE FINES INTO THE BACKFILL MATERIAL, WHEN REQUIRED. SEE ASTM D2321.
4. FILTER FABRIC: A GEOTEXTILE FABRIC MAY BE USED AS SPECIFIED BY THE ENGINEER TO PREVENT THE MIGRATION OF FINES FROM THE NATIVE SOIL INTO THE SELECT BACKFILL MATERIAL.
5. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
6. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I OR II. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm).
7. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I OR II IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
8. MINIMUM COVER: MINIMUM COVER OVER ALL RETNETION/DETENTION SYSTEMS IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER IS 12" UP TO 36" DIAMETER PIPE AND 24" OF COVER FOR 42" - 60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

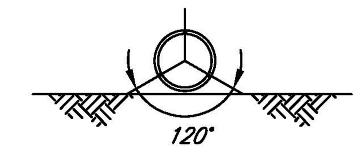
NOMINAL DIAMETER	NOMINAL O.D.	TYPICAL SPACING "S"	TYPICAL SPACING "C"	TYPICAL SIDE WALL "X"	H (NON-TRAFFIC)	H (TRAFFIC)
12" (300 MM)	14.5" (368 MM)	11" (279 MM)	25.4" (645 MM)	8" (203 MM)	12" (292 MM)	12" (292 MM)
15" (375 MM)	18" (457 MM)	12" (292 MM)	28.9" (734 MM)	8" (203 MM)	12" (292 MM)	12" (292 MM)
18" (450 MM)	21" (533 MM)	17" (434 MM)	33.9" (862 MM)	9" (229 MM)	12" (292 MM)	12" (292 MM)
24" (600 MM)	28" (711 MM)	13" (330 MM)	40.7" (1034 MM)	10" (254 MM)	12" (292 MM)	12" (292 MM)
30" (750 MM)	36" (914 MM)	18" (457 MM)	53.1" (1347 MM)	18" (457 MM)	12" (292 MM)	12" (292 MM)
36" (900 MM)	42" 1067 MM)	22" (559 MM)	63" (1600 MM)	18" (457 MM)	12" (292 MM)	12" (292 MM)
42" (1050 MM)	48" (1219 MM)	24" (610 MM)	71.9" (1826 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)
48" (1200 MM)	54" (1372 MM)	25" (635 MM)	78.5" (1994 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)
60" (1500 MM)	67" (1702 MM)	24" (610 MM)	90" (2286 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)

* CLASS I BACKFILL REQUIRED AROUND 60" DIAMETER FITTINGS.

REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D
3	REVISED 18" SPACING	TJR	01/05/09	CKS

HANCOR, INC. HAS PREPARED THIS DETAIL BASED ON INFORMATION PROVIDED TO HANCOR. THIS DRAWING IS INTENDED TO DEPICT THE COMPONENTS AS REQUESTED. HANCOR HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICES FOR THIS PROJECT, NOR HAS HANCOR INDEPENDENTLY VERIFIED THE INFORMATION SUPPLIED. THE INSTALLATION DETAILS PROVIDED HEREIN ARE GENERAL RECOMMENDATIONS AND ARE NOT SPECIFIC FOR THIS PROJECT. THE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION. IT IS THE DESIGN ENGINEERS RESPONSIBILITY TO ENSURE THE DETAILS PROVIDED HEREIN MEETS OR EXCEEDS THE APPLICABLE NATIONAL, STATE, OR LOCAL REQUIREMENTS AND TO ENSURE THAT THE DETAILS PROVIDED HEREIN ARE ACCEPTABLE FOR THIS PROJECT.

TYPICAL RET/DET CROSS SECTION DETAIL
DRAWING NUMBER: STD-702
Hancor
401 OLIVE ST. FINDLAY, OHIO 45839
AWM 07.25.06 NTS OF



6" PVC PIPE PERFORATION LAYOUT DETAIL
NOT TO SCALE

PERMANENT WATER QUALITY TREATMENT FACILITY

KEEPING OUR WATER WAYS CLEAN
MAINTAIN WITH CARE - NO MODIFICATIONS WITHOUT AGENCY APPROVAL

DETAIL
WATER QUALITY SIGN- PLACED AT EACH BIOFILTRATION BASIN

NOTE: ALL BIOFILTRATION AREAS WILL HAVE A SIGN POSTED TO BE VISIBLE AT ALL TIMES.

DETAIL
"NO DUMPING" AT CATCH BASINS

NOTE: ALL CATCH BASINS WITH GRATES SHALL BE STENCILED WITH CITY REQUIRED ITEM PER ABOVE DETAIL:

(DAS MANUFACTURING #SDO OR EQUIVALENT)

SITE SPECIFIC DATA

PROJECT NUMBER		8380	
ORDER NUMBER		----	
PROJECT NAME		HOLLANDIA DAIRY REDEVELOPMENT	
PROJECT LOCATION		SAN MARCOS, CA	
STRUCTURE ID		BMP-2A	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
1495		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			N/A
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	606.71	PVC	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	606.20	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	609.52	609.52	609.52
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	36" X 36"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			1.82
ORIFICE SIZE (DIA. INCHES)			ø0.50"

NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO SET UPSTREAM BYPASS AT 6

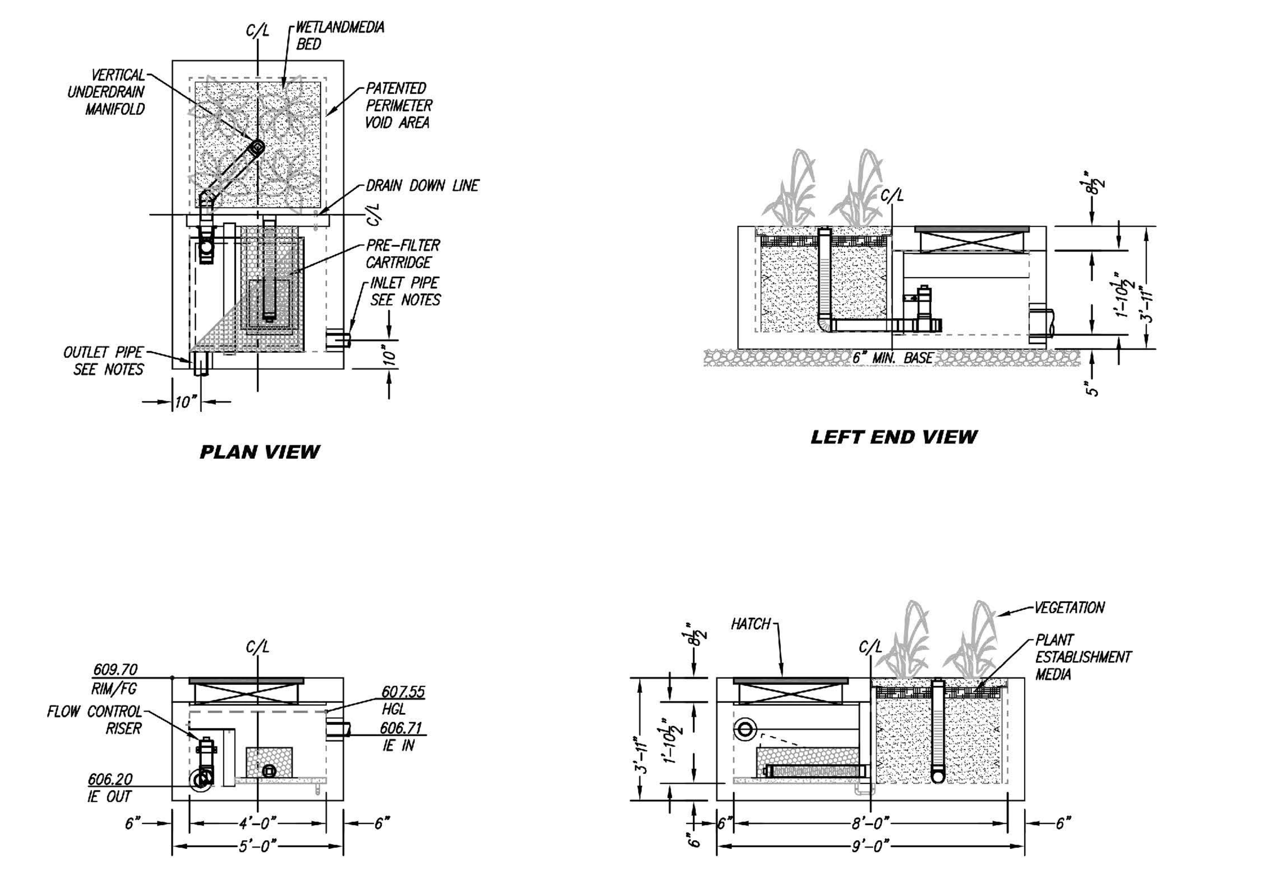
INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

4/22/19GSCHIPPER



4651

REQUIRED TREATMENT VOLUME (CF)	1495
DRAINDOWN DURATION (HOURS)	12
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	7.97
OPERATING HEAD (FT)	2.1
WETLANDMEDIA INFILTRATION RATE (IN/HR)	26
OR	
WETLANDMEDIA LOADING RATE (GPM/SF)	0.26

MODULAR WETLANDS
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

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Bio Clean
A Forterra Company

MWS-L-4-8-3'-1"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA

PROJECT NUMBER		8380	
ORDER NUMBER		----	
PROJECT NAME		HOLLANDIA DAIRY REDEVELOPMENT	
PROJECT LOCATION		SAN MARCOS, CA	
STRUCTURE ID		BMP-3A	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
4651		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			N/A
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	610.04	PVC	4"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	609.54	PVC	4"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	609.52	609.52	609.52
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	36" X 36"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			1.82
ORIFICE SIZE (DIA. INCHES)			ø0.69"

NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO SET UPSTREAM BYPASS AT 610.04

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
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GENERAL NOTES

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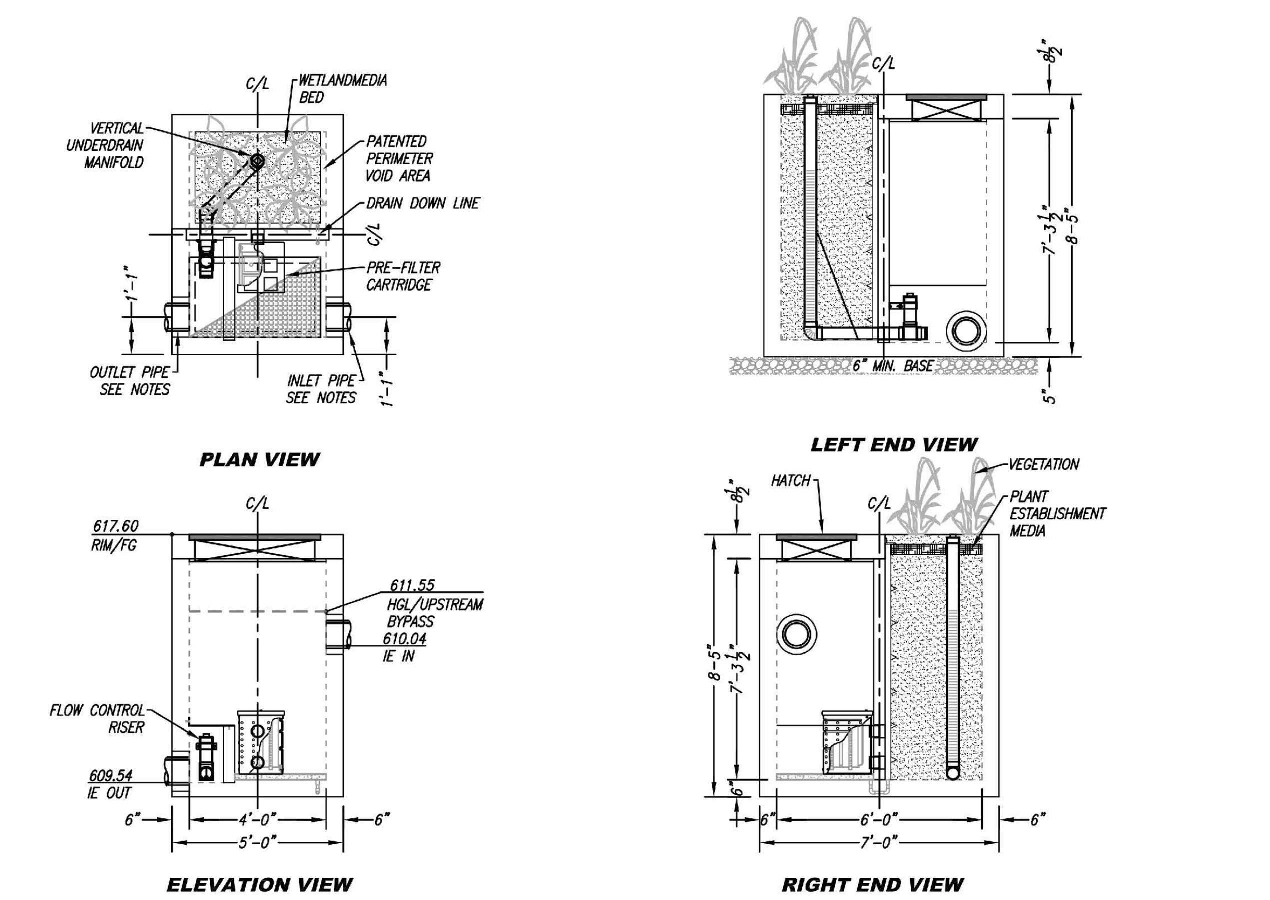
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



REQUIRED TREATMENT VOLUME (CF)	4651
DRAINDOWN DURATION (HOURS)	10
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	12.02
OPERATING HEAD (FT)	4.9
WETLANDMEDIA INFILTRATION RATE (IN/HR)	26
WETLANDMEDIA LOADING RATE (GPM/SF)	0.26

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Bio Clean
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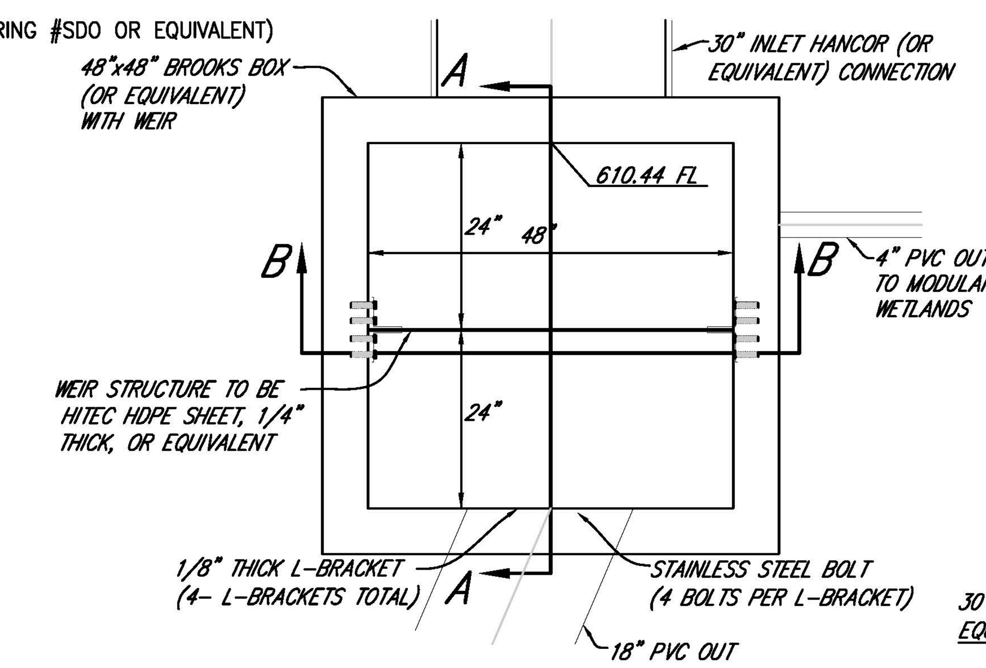
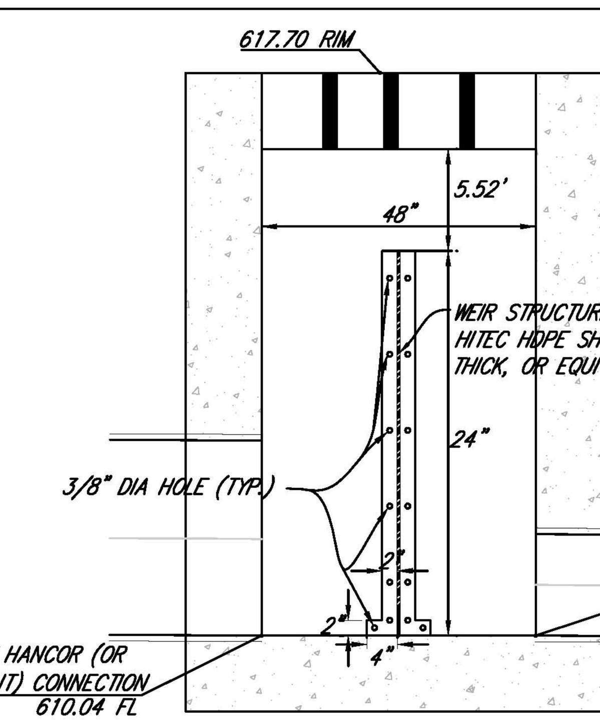
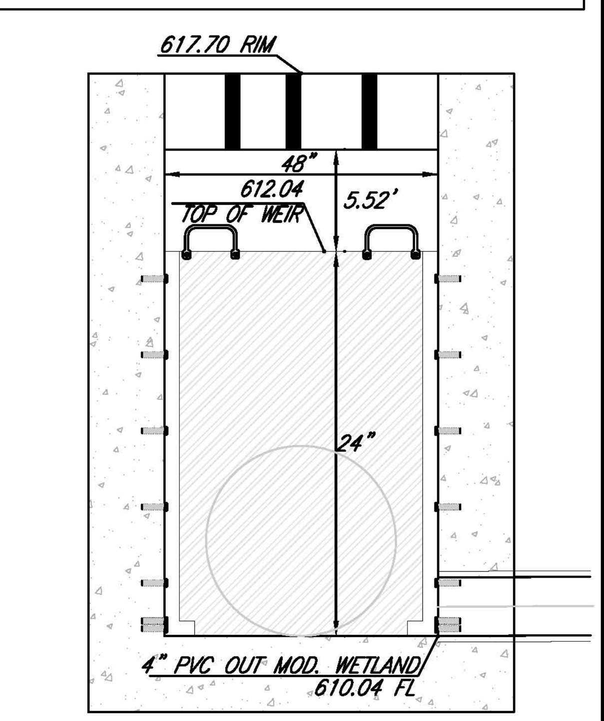
MWS-L-4-6-7'-2"-V-HC
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL



WEIR CONTROL STRUCTURE
PLAN VIEW (SEE SHEET 1)
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

WEIR CONTROL STRUCTURE DETAIL
NOT TO SCALE

WEIR CONTROL NOTE:
THE PURPOSE OF THIS STRUCTURE IS FOR DETENTION FOR WATER QUALITY AND HYDROMODIFICATION FLOW CONTROL SEPARATE FROM TYPICAL BIOFILTRATION FLOW MODELING.

HOLLANDIA RE-DEVELOPMENT
WATER QUALITY SHEET
SHEET ----

END OF REPORT