Appendix J: SWMPP

City of Escondido
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Nutmeg Homes
Resolution No. SUB18-0005
Case No. ADM XX-XXXX/ENV XX-XXXX

2401 NUTMEG STREET
ESCONDIDO, CA 92026

ASSESSOR'S PARCEL NUMBER(S):
APN 224-260-23, 224-260-46, 224-260-47

ENGINEER OF WORK:

ROBERT D. DENTINO, RCE: 45629

PREPARED FOR:
Developer
ADJ HOLDINGS, LLC

Owner Listed:

PDP SWQMP PREPARED BY:

EXCEL ENGINEERING
440 STATE PLACE
ESCONDIDO, CA 92029
PH: 760-745-8118
FAX: 760-745-8134

DATE OF SWQMP:
JUNE 15, 2018

DATE OF SWQMP REVISION:
JANUARY 31, 2019

PLANS PREPARED BY:
ROBERT D. DENTINO
[440 STATE PLACE]
ESCONDIDO, CA 92029
760-745-8118

SWQMP APPROVED BY:

APPROVAL DATE:


ESCONDIDO
City of Choice

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TABLE OF CONTENTS

ATTACHMENTS

ACRONYMS

ACP	Alternative Compliance Project
APN	Assessor's Parcel Number
BMP	Best Management Practice
DMA	Drainage Management Area
EOW	Engineer of Work
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
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
SWDM	Storm Water Design Manual
SWQMP	Storm Water Quality Management Plan
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan

PDP SWQMP PREPARER'S CERTIFICATION PAGE

Project Name: Nutmeg Development
Permit Application Number:

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 Escondido Storm Water Design Manual, which is a design manual for compliance with the City of Escondido Municipal Code (Chapter 22, Article 2) and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100) requirements for storm water management.

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

12-31-2020
Engineer of Work's Signature, PE Number & Expiration Date

Robert D. Dentino
Print Name

Excel Engineering
Company

Date

Engineer's Seal:

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SUBMITTAL RECORD

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

Preliminary Design / Planning / CEQA

Submittal Number	Date	Summary of Changes
1	06/15/18	Initial Submittal
2		Second Submittal
3		

Final Design

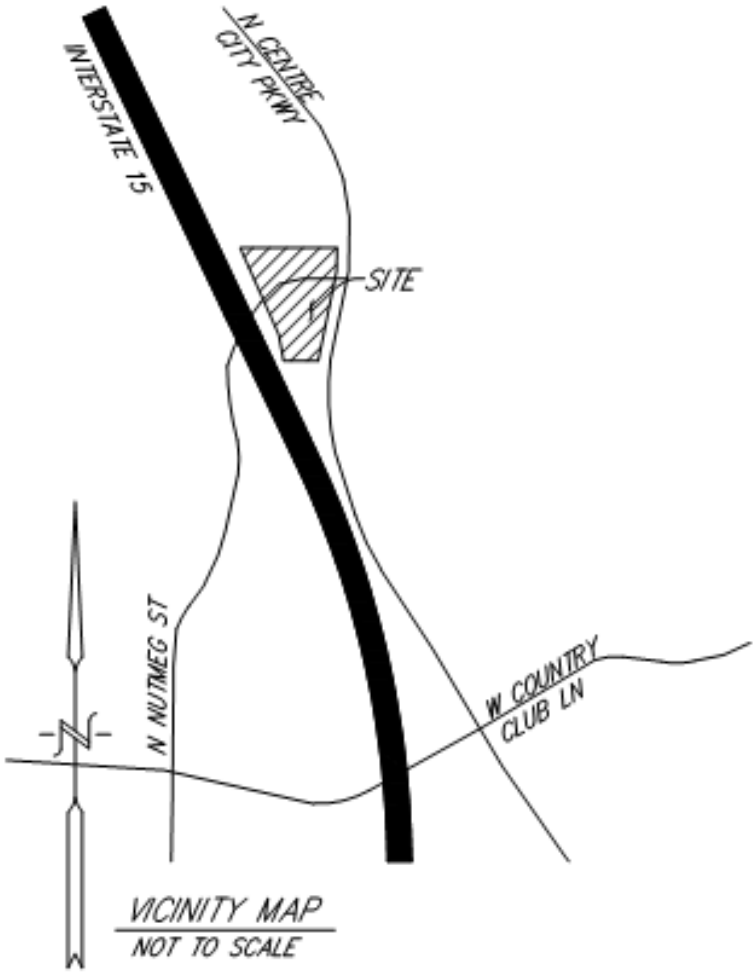
Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		
5		

Plan Changes

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

PROJECT VICINITY MAP

Project Name: NUTMEG STREET
Record ID: ADM xx-xxxx / ENV xx-xxxx



Step 1: Project type determination (Standard or Priority Development Project) (Form I-2a)

Project Summary Information	
Project Name	Nutmeg Development
Project Address	999 N. Broadway Escondido, CA 92026
Assessor's Parcel Number(s)	APN 224-260-23, 224-260-46, 224-60-47
Permit Application Number	
Project Watershed (Hydrologic Unit)	Select One: ☒Carlsbad 904 ☐San Dieguito 905
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	7.38 Acres (321483.11 Square Feet)
Area to be disturbed by the project (Project Area)	7.38 Acres (321483.11 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	5.69 Acres (248,070.2 Square Feet)
Project Proposed Pervious Area (subset of Project Area)	1.69 Acres (73,402.57 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	

Confirmation of Priority Development Project Determination
The project is (select one): ☒ New Development ☐ Redevelopment[1]
The total proposed newly created or replaced impervious area is: 248,070.2 ft^2

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

Solar energy farms that are not also one of the categories listed in Step 2b of Table 1-1. City staff must also determine that appropriate BMPs are provided to mitigate for downstream impacts due to significant changes to the existing hydrology

Is the project in any of the following categories, (a) through (f)?			
Yes ☒	No ☐	(a)	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.
Yes ☐	No ☒	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☒	No ☐	(c)	New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.
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 Co-permittees.*
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 ☒	(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: (iii) 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. (iv) 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 Storm Water Design Manual Section 1.4.2 for additional guidance.*

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

☐ No – the project is not a Priority Development Project (Standard Project).

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

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

The following is for **redevelopment PDPs only**:

The area of existing (pre-project) impervious area at the project site is: ___ ft^2 (A)
The total proposed newly created or replaced impervious area is ___ ft^2 (B)
Percent impervious surface created or replaced (B/A)*100: ____%
The percent impervious surface created or replaced is (select one based on the above calculation):

☐ less than or equal to fifty percent (50%) – **only newly created or replaced impervious areas are considered a PDP and subject to stormwater requirements**

OR

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

Step 1.1: Storm Water Quality Management Plan requirements

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

Step 1.2: Exemption to PDP definitions

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

Step 2: Construction Storm Water BMPs

Construction storm water BMPs shall be shown on the Grading Plan and (if applicable) included in the Storm Water Pollution Prevention Plan (SWPPP).

Step 3: City of Escondido PDP SWQMP Site Information Checklist (Form I-2a)

Step 3.1: 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 vacant lot. There are two directions of flow for this site. The flows north of Nutmeg Street on the Easterly side of the property drain to the North through an existing channel alongside Center City Parkway. There reminder of the site drains to a locations to the southwest either though and existing pipe or as surface flow around to a natural channel. Both the pipe flow and surface flow enter the natural channel in approximately the same location. Vegetation on site is of grasses and shrubs that have grown naturally.

Existing Land Cover Includes (select all that apply and provide each area on site):
☒Vegetative Cover 1.69 Acres (73,403 Square Feet)
☐Non-Vegetated Pervious Areas _____ Acres (_____ Square Feet)
☒Impervious Areas 5.69 Acres (248,070 Square Feet)

Description / Additional Information:
Shrubs and grasses are currently onsite that have grown naturally, a couple trees currently exist on 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) (or N/A for no infiltration BMPs):
☐GW Depth < 5 feet
☐5 feet < GW Depth < 10 feet
☒10 feet < GW Depth < 20 feet
☐GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):
☐Watercourses
☐Seeps
☐Springs
☐Wetlands
☒None
☐Other

Description / Additional Information:

Step 3.2: Description of Existing Site Drainage Patterns

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

(1) Whether existing drainage conveyance is natural or urban;
(2) Is runoff from offsite conveyed through the site? if yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site;
(3) Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels; and
(4) Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Describe existing site drainage patterns:

The project site is an existing vacant lot. There are two directions of flow for this site. The flows north of Nutmeg Street on the Easterly side of the property drain to the North through an existing channel alongside Center City Parkway. There reminder of the site drains to a locations to the southwest either though and existing pipe or as surface flow around to a natural channel. Both the pipe flow and surface flow enter the natural channel in approximately the same location. Vegetation on site is of grasses and shrubs that have grown naturally.

Step 3.3: Description of Proposed Site Development

Project Description / Proposed Land Use and/or Activities:

The project is proposing to install a high density residential area

The Hydromodification and Water Quality system proposed for this project is a bio-filtration basin located on North side of the project adjacent to the natural drainage outflow of the site. This system detains runoff in the basin surface and also the underdrain reservoir, filters the water quality flows through plant roots and a biologically active soil mix, and then releases it into the existing stormdrain 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.

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

Impervious features of the project includes: buildings, asphalt parking lot, concrete sidewalks, concrete driveways, concrete ribbon gutter, concrete curbs and concrete gutters.

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

Pervious features of the project includes: landscape areas and bio-filtration basins.

Does the project include grading and changes to site topography?

☒Yes

☐No

Description / Additional Information:

The existing site is lower than the street of Nutmeg, and it is proposed to fill the area and bring the surface of the site higher than Nutmeg Street and create drainage patterns that mimick existing conditions.

The project proposes eleven drainage management areas (DMA) to two points of compliance. The total area of those DMAs are approximately 7.38 acres. Two points of compliance (POC) are analyzed for both pre-development and mitigated post-development conditions. These POCs are labeled as POC 1 and, POC 2:

- DMAs (1, 3, 5-11) drains to POC 1 (Southwest corner)
- DMA-2 and DMA 4 drain to POC-2 (Northeast corner)

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

Change in Land Cover Type Summary			
Land Cover Type	Existing (acres or ft^2)	Proposed (acres or ft^2)	Percent Change
Vegetation	295,125	73,403	- 75%
Pervious (non-vegetated)	N/A	N/A	N/A
Impervious	26,347	248,070	+941%

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:

Drainage and the introduction of water quality facilities is challenging given that the site is very flat and currently all surface runoff drains overland to the street or to an offsite brow ditch. Additional challenges are present due to poor infiltration rates.

Wastes generated by impervious areas are anticipated. These include, but are not limited to the following: oil spills, nutrients, metals, oxygen demanding substances, trash, and fertilizer. Runoffs will be conveyed across the site by concrete ribbon gutters, curb and gutter or roof drains to the proposed bio-filtration facilities. The bio-filtration facilities will treat the runoff and remove pollutants. Modular Wetland is proposed to treat parts of the public street

Step 3.4: Potential Pollutant Source Areas

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
☐Other (provide description)

Description / Additional Information:

Step 3.5: 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):

Low flows capture in the proposed bio-filtration facilities will drain through a pipe to the closest existing storm drain system located on the northwest side corner of the interception of North Broadway and Lincoln Avenue. Peak flow will be release to the existing street curb and gutter through under sidewalk drainage facilities for basin along Lincoln Avenue. Peak flows for Basins along south side of the property will be release as the basins over top and drain to the existing concrete ditch to the south of the property.

List any 303(d) impaired water bodies[2] 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
Escondido Creek	DDT, Enterococcus, Fecal Coliform, Manganese, Phosphate, Selenium,	N/A
Escondido Creek	Sulfates, Total Dissolved Solids, Total Nitrogen as N, Toxicity	N/A

Identification of Project Site Pollutants*

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

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

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

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

Pesticides	x		

Step 3.6: Hydromodification Management Requirements

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

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

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

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

☐No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA[3] for the watershed in which the project resides.

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

[3]The Watershed Management Area Analysis (WMAA) is an optional element for inclusion in the Water Quality Improvement Plans (WQIPs) described in the 2013 MS4 Permit [Provision B.3.b.(4)]. It is available online at the Project Clean Water website: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=248

Step 3.6.1: 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 manual been performed?

☐ 6.2.1 Verification of GLUs (classification that provides an estimate of sediment yield based on geology, hillslope, and land cover) 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 8 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:

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. The project has 4 POCs: POC 1 is on the Northwest far end of the project; runoff conveys at an existing curb & gutter and continue on its existing flow path. POC 2 is on the Southeast far end of the project where runoff conveys to an existing basin located adjacent to the westbound SR-78. POC 3 is located to the Southwest corner of the project where runoff conveys to an existing concrete ditch that runs west parallel to SR-78. POC 4 is located on the Northeast corner of the project where runoff conveys at an existing curb & gutter and continue on its existing flow path.
Has a geomorphic assessment been performed for the receiving channel(s)? ☒No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐Yes, the result is the low flow threshold is 0.1Q2 ☐Yes, the result is the low flow threshold is 0.3Q2 ☐Yes, the result is the low flow threshold is 0.5Q2 *If a geomorphic assessment has been performed, provide title, date, and preparer:* *Discussion / Additional Information: (optional)*

Step 3.7: 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.

Constraints that influences storm water management designs are that there is no fall to facilities that currently accept drainage from the site. All runoff drains overland, north to Lincoln Ave or overland south to a concrete ditch located off site in Caltrans right of way. To drain directly to the ditch would require construction of drainage facilities within Caltrans right of way.

Optional Additional Information or Continuation of Previous Sections As Needed

This space provided for additional information or continuation of information from previous sections as needed.

Step 4: Source Control BMP Checklist (Form I-2b)

Source Control BMPs

All development projects must implement source control BMPs 4.2.1 through 4.2.6 where applicable and feasible. See Chapter 4.2 and Appendix E of the City Storm Water Design Manual for information to implement source control BMPs shown in this checklist. The following checklists serve as guides only. Mark what elements are included in your project. See Storm Water Design Manual Chapter 4 and Appendix E for more information on determining appropriate BMPs for your project.

Answer each category below pursuant to the following:

- "Yes" means the project will implement the source control BMP as described in Chapter 4.2 and/or Appendix E of the City Storm Water Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification must be provided.

Source Control Requirement	Applied?		
SC-1 Prevention of Illicit Discharges into the MS4	☒Yes	☐No	☐N/A
☒ Direct irrigation water away from impervious surfaces ☐ Direct vehicle wash water away from impervious surfaces ☐ Other: _____ *Discussion / justification if SC-1 not implemented:*			
SC-2 Storm Drain Stenciling or Signage	☒Yes	☐No	☐N/A
☒ Stencil or stamp storm drains with anti-dumping message ☒ Post signs prohibiting illegal dumping ☐ Other *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
□ Store materials inside a covered enclosure □ Direct runoff from downspouts and roofs away from storage areas □ Other *Discussion / justification if SC-3 not implemented:*			

SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐Yes	☐No	☒N/A
□ Locate work area away from storm drains or catch basins □ Work over impermeable surfaces where spills and pollutants can be captured and removed *Discussion / justification if SC-4 not implemented:*			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒Yes	☐No	☐N/A
☒ Locate trash containers in a roofed, walled enclosure ☒ Locate trash containers away from storm drains *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):			
☐ A. On-site storm drain inlets	☒Yes	☐No	☐N/A
☐ B. Interior floor drains and elevator shaft sump pumps	☐Yes	☐No	☒N/A
☐ C. Interior parking garages	☐Yes	☐No	☒N/A
☐ D. Need for future indoor & structural pest control	☒Yes	☐No	☐N/A
☐ E. Landscape/outdoor pesticide use	☒Yes	☐No	☐N/A
☐ F. Pools, spas, ponds, fountains, and other water features	☐Yes	☐No	☒N/A
☐ G. Food service	☐Yes	☐No	☒N/A
☐ H. Refuse areas	☒Yes	☐No	☐N/A
☐ I. Industrial processes	☐Yes	☐No	☒N/A
☐ J. Outdoor storage of equipment or materials	☐Yes	☐No	☒N/A
☐ K. Vehicle and equipment cleaning	☐Yes	☐No	☒N/A
☐ L. Vehicle/equipment repair and maintenance	☐Yes	☐No	☒N/A
☐ M. Fuel dispensing areas	☐Yes	☐No	☒N/A
☐ N. Loading docks	☐Yes	☐No	☒N/A
☐ O. Fire sprinkler test water	☒Yes	☐No	☐N/A
☐ P. Miscellaneous drain or wash water	☐Yes	☐No	☒N/A
☐ Q. Plazas, sidewalks, and parking lots	☒Yes	☐No	☐N/A
Discussion / justification if 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.			

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

Step 5: Site Design BMP Checklist (Form I-2c)

Site Design BMPs

All development projects must implement site design BMPs SD-A through SD-H where applicable and feasible. See Chapter 4.3 and Appendix E of the City Storm Water Design Manual for information to implement site design BMPs shown in this checklist. The following checklists serve as guides only. Mark what elements are included in your project. See Storm Water Design Manual Chapter 4 and Appendix E for more information on determining appropriate BMPs for your project.

Answer each category below pursuant to the following:

- "Yes" means the project will implement the site design BMP as described in Chapter 4.3 and/or Appendix E of the City Storm Water Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification must be provided.

Site Design Requirement	Applied?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☐Yes	☐No	☒N/A
□ Maintain existing drainage patterns *Discussion / justification if SD-1 not implemented:* Existing paved parking lot and structures. No natural drainage pathways exist.			
SD-2 Conserve Natural Areas, Soils, and Vegetation	☐Yes	☐No	☒N/A
□ Preserve trees (see Zoning Code Art. 55 Grading & Erosion Control; Art. 62 Landscape Regulations) □ Avoid sensitive areas such as wetlands and waterways *Discussion / justification if SD-2 not implemented:* Existing paved parking lot and structures. No natural areas, soils or vegetation.			
SD-3 Minimize Impervious Area	☒Yes	☐No	☐N/A
☒ Install parking and driving aisles to minimum width required to meet standards *Discussion / justification if SD-3 not implemented:*			

SD-4 Minimize Soil Compaction	☐Yes	☐No	☒N/A
□ Avoid compaction in planned landscaped spaces □ Till and amend soil for improved infiltration capacity *Discussion / justification if SD-4 not implemented:* Existing paved parking lot and structures. Soil is already compacted.			
SD-5 Impervious Area Dispersion	☒Yes	☐No	☐N/A
☒ Drain rooftops, roads or sidewalks into adjacent landscape areas ☐ Drain impervious surfaces through pervious areas *Discussion / justification if SD-5 not implemented:*			
SD-6 Runoff Collection	☒Yes		
Discussion / justification if SD-6 not implemented:	☒Yes	☐No	☐N/A
SD-7 Landscaping with Native or Drought Tolerant Species			
Discussion / justification if SD-7 not implemented:	☒Yes	☐No	☐N/A
SD-8 Harvesting and Using Precipitation			
Discussion / justification if SD-8 not implemented: Harvest and reuse is not feasible per Worksheet B.3-1. See Attachment 1a for calculations	☐Yes	☒No	☐N/A

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

Step 6: PDP Structural BMPs (Form I-3)

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the Storm Water 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 Storm Water Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This may include requiring the project owner or project owner's representative and engineer of record to certify construction of the structural BMPs (see Section 8.2.3.2 of the Storm Water Design Manual). PDP structural BMPs must be maintained into perpetuity, and the City must confirm the maintenance (see Section 7 of the Storm Water Design Manual).

Use this section to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (Step 6.2) for each structural BMP within the project (copy the BMP summary information sheet [Step 6.2] as many times as needed to provide summary information for each individual structural BMP).

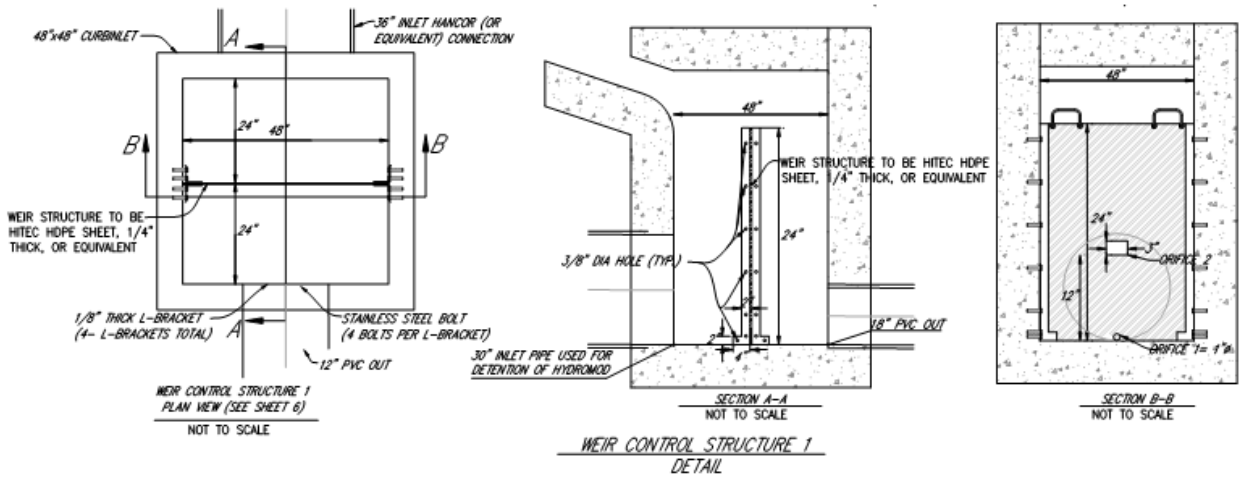
Step 6.1: Description of structural BMP strategy

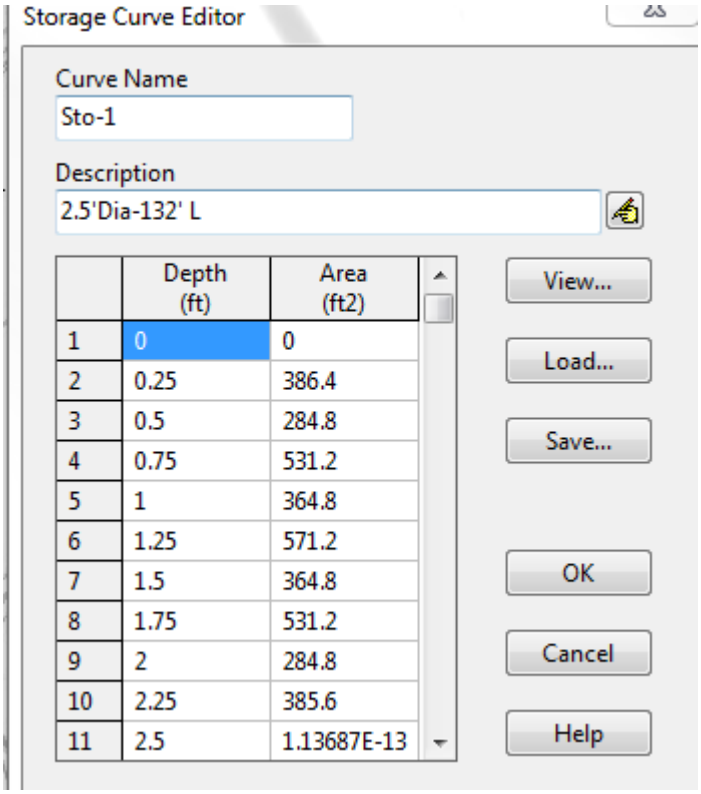
Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the Storm Water D*esign Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate. At the end of this discussion provide a summary of all the structural BMPs within the project including the type and number.*

(Continue on following page as necessary.)

Description of structural BMP strategy continued
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)

- This project is not “self-retaining” nor “self-retaining”, Runoff factor was adjusted to estimate DCV
- Harvest and Use is not feasible since Reclaimed water is available near by the location and the 0.25 DCV is greater than the 36 hour demand per form I-7.
- Infiltration is not feasible due to low percolation test conducted by the soil engineer.
- Based on the locations for storm water pollutant control BMP and the DMA delineations were developed during the site planning phase. The DCV was calculated.
- Sizing requirements was computed referred to Appendix B.5
- BMP was designed for the remaining DCV, therefore design BMP for the required size, per design criteria and considerations listed in the BMP manual and comply with pollutant control BMP sizing requirements.
- Based on pollutants generated by the type of the project and the 303(d) list at the receiving body, Biofiltration is selected to treat all the pollutants in the project before releasing the storm water to the public water body.
- The calculated footprints fit the site design and the constraints.
- The selected BMPs were sized and designed accordingly using design criteria and considerations from BMP manual fact sheets in Appendix E.
- The project has met the pollutant control performance standards.
- A detention pipe will be used as part of the system for BMP-A. this detention pipe will only be used for hydromodification control purposes but will have manholes in-order to provide access for maintenance. A weir plate would be used to impede the water up to a certain point and have an overflow to allow water in flooding conditions to continue through. The control for non-flood condition water will be two orifices as detailed out as seen below with the storage curve and the detail of the wier from the DMA Exhibit.





	Depth (ft)	Area (ft2)
1	0	0
2	0.25	386.4
3	0.5	284.8
4	0.75	531.2
5	1	364.8
6	1.25	571.2
7	1.5	364.8
8	1.75	531.2
9	2	284.8
10	2.25	385.6
11	2.5	1.13687E-13

- The Rock garden will be used at the North East corner of the property. This area is one of the few areas onsite that are being allowed to infiltrate. This will take in the overflow water from the public street and from the private BMP B.1 onsite and allow the lower flows to infiltrate into the soil and the higher flows to continue downstream (as it does in the existing condition) Further explanation will be expected in final engineering as this area is worked out with construction constraints and landscape. This BMP is only to be used for hydromodification.

- The Rain Gardens will be used in the Public right of way Nutmeg Street and Centre City Parkway. The rain Gardens are one of the few areas onsite that will have natural soil and no to little fill and will be allowed to infiltrate. The raingardens will meet treatment and hydromodification purposed to treat the public street sections that are to be replaced. Gravel section will be used to allow the water to fill and infiltrate while overflow water will pond and travel down Nutmeg as it does in the existing condition. It should be noted these rain gardens are still underdevelopment in the preliminary condition and are being worked out with Landscaping to determine the best course of action. In final engineering there will need to be more details explaining of construction.

Step 6.2: Structural BMP Checklist

(Copy this page as needed to provide information for each individual proposed structural BMP)	
Structural BMP ID No. **BMP A**	
Construction Plan Sheet No.	
Type of structural BMP: ☐Retention by harvest and use (HU-1) ☐Retention by infiltration basin (INF-1) ☐Retention by bioretention (INF-2) ☐Retention by permeable pavement (INF-3) ☐Partial retention by biofiltration with partial retention (PR-1) ☐Biofiltration (BF-1) ☒Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐Detention pond or vault for hydromodification management ☐Other (describe in discussion section below)	
Purpose: ☐Pollutant control only ☐Hydromodification control only ☒Combined pollutant control and hydromodification control ☐Pre-treatment/forebay for another structural BMP ☐Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☒Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☒Property Owner ☐City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	
Discussion (as needed): *(Continue on subsequent pages as necessary)*	

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

Structural BMP ID No. **BMP B1**

Construction Plan Sheet No.

Type of structural BMP:

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

Purpose:

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☒Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☒Property Owner ☐City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

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

BMP ID No. **BMP C**

Construction Plan Sheet No.

Type of structural BMP:

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

Purpose:

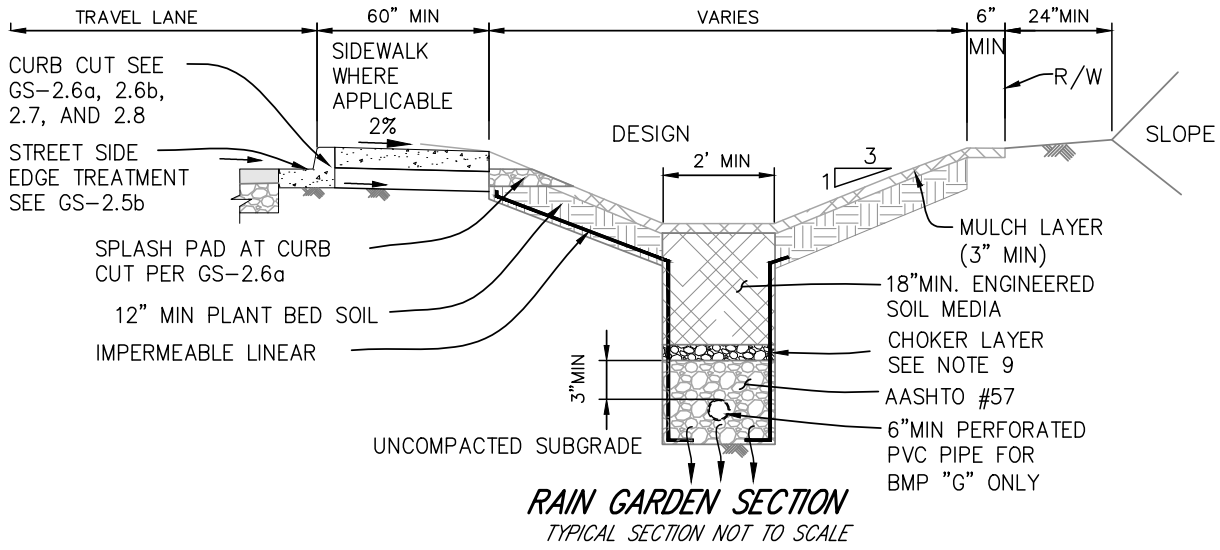
☐Pollutant control only
☐Hydromodification control only
☒Combined pollutant control and hydromodification control
☐Pre-treatment/forebay for another structural BMP
☐Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☐Property Owner ☒City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☐Property Owner ☒City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

BMP-C is a Green Streets BMP and is considered a Site BMP

The bottom of the rain garden shall extend down to the native soil and be allowed to infiltrate per Geotechnical engineers recommendations. Final infiltration data shall be obtained in Final engineering.



RAIN GARDEN SECTION

TYPICAL SECTION NOT TO SCALE

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

Structural BMP ID No. **BMP D**

Construction Plan Sheet No.

Type of structural BMP:

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

Purpose:

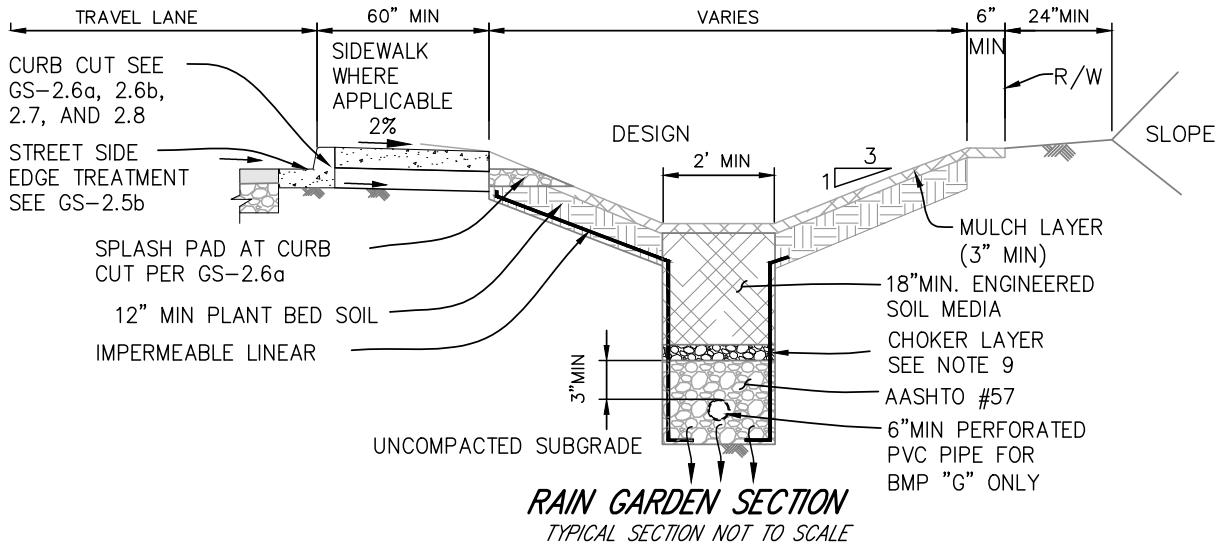
☐Pollutant control only
☐Hydromodification control only
☒Combined pollutant control and hydromodification control
☐Pre-treatment/forebay for another structural BMP
☐Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☐Property Owner ☒City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☐Property Owner ☒City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

BMP-D is a Green Streets BMP and is considered a Site BMP

The bottom of the rain garden shall extend down to the native soil and be allowed to infiltrate per Geotechnical engineers recommendations. Final infiltration data shall be obtained in Final engineering.



RAIN GARDEN SECTION

TYPICAL SECTION NOT TO SCALE

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

BMP ID No. **BMP E**

Construction Plan Sheet No.

Type of structural BMP:

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

Purpose:

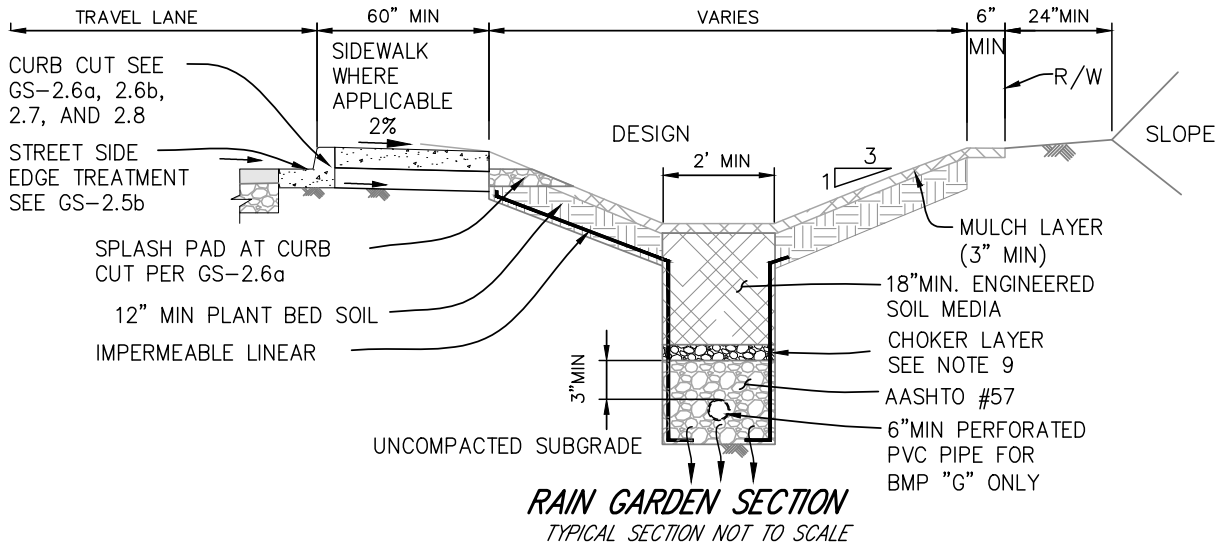
☐Pollutant control only
☐Hydromodification control only
☒Combined pollutant control and hydromodification control
☐Pre-treatment/forebay for another structural BMP
☐Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☐Property Owner ☒City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☐Property Owner ☒City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

BMP-E is a Green Streets BMP and is considered a Site BMP

The bottom of the rain garden shall extend down to the native soil and be allowed to infiltrate per Geotechnical engineers recommendations. Final infiltration data shall be obtained in Final engineering.



RAIN GARDEN SECTION

TYPICAL SECTION NOT TO SCALE

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

BMP ID No. **BMP F**

Construction Plan Sheet No.

Type of structural BMP:

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

Purpose:

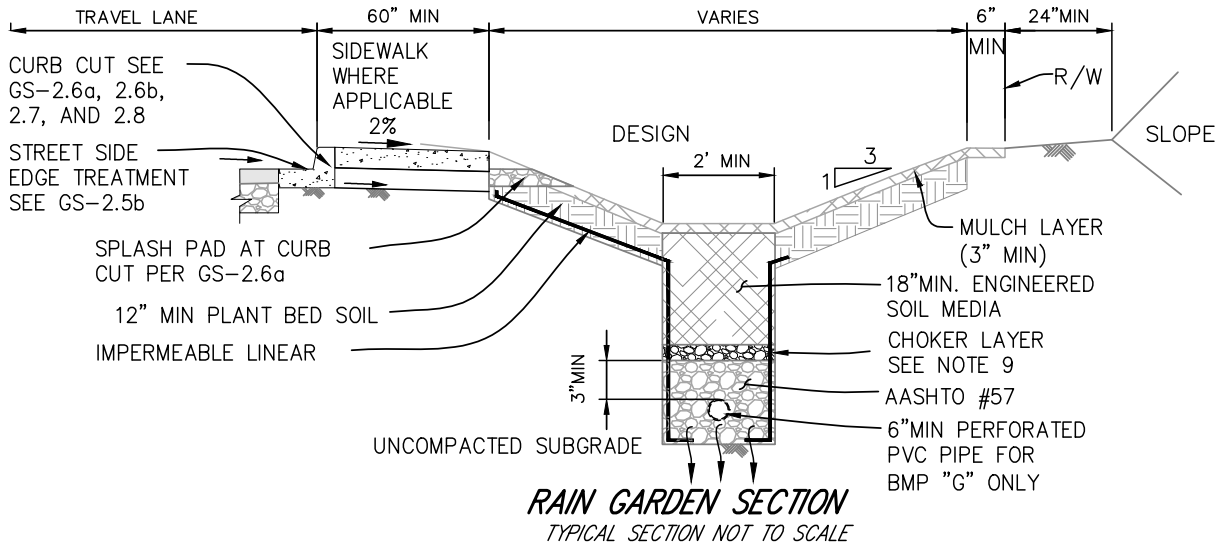
☐ Pollutant control only
☐ Hydromodification control only
☒ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐ HOA ☐ Property Owner ☒ City ☐ Other (describe)
Who will maintain this BMP into perpetuity?	☐ HOA ☐ Property Owner ☒ City ☐ Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

BMP-F is a Green Streets BMP and is considered a Site BMP

The bottom of the rain garden shall extend down to the native soil and be allowed to infiltrate per Geotechnical engineers recommendations. Final infiltration data shall be obtained in Final engineering.



RAIN GARDEN SECTION

TYPICAL SECTION NOT TO SCALE

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

BMP ID No. **BMP G**

Construction Plan Sheet No.

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

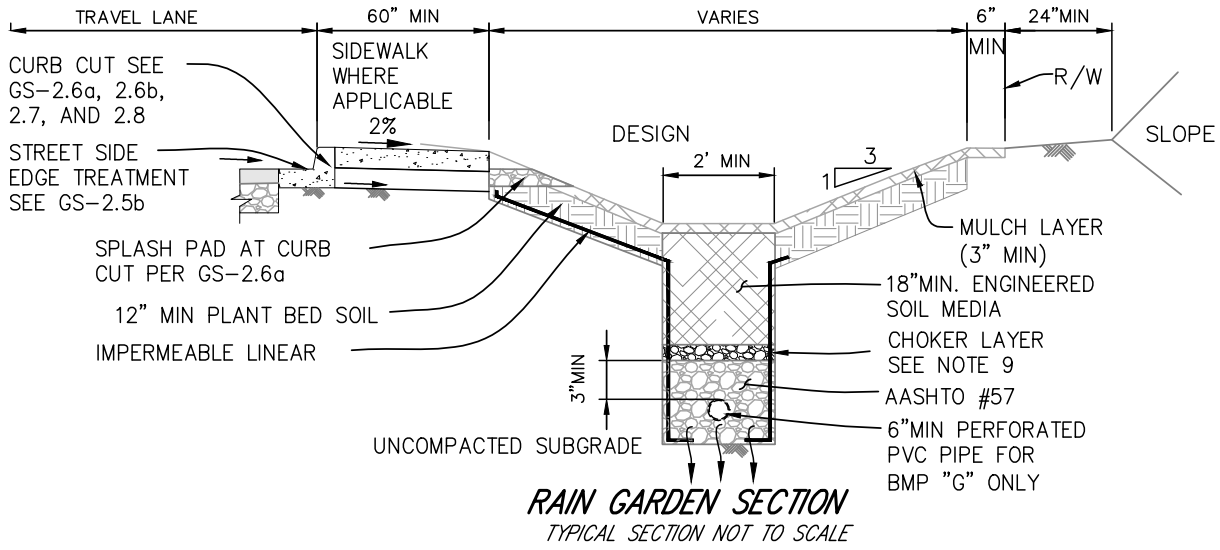
Purpose:
☐Pollutant control only
☐Hydromodification control only
☒Combined pollutant control and hydromodification control
☐Pre-treatment/forebay for another structural BMP
☐Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☐Property Owner ☒City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☐Property Owner ☒City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

BMP-G is a Green Streets BMP and is considered a Site BMP

The bottom of the rain garden shall extend down to the native soil and be allowed to infiltrate per Geotechnical engineers recommendations. Final infiltration data shall be obtained in Final engineering.



RAIN GARDEN SECTION

TYPICAL SECTION NOT TO SCALE

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

Structural BMP ID No. **BMP H**

Construction Plan Sheet No.

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☒Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☒Property Owner ☐City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

(Copy this page as needed to provide information for each individual proposed structural BMP)	
Structural BMP ID No. **BMP I**	
Construction Plan Sheet No.	
Type of structural BMP: ☐Retention by harvest and use (HU-1) ☐Retention by infiltration basin (INF-1) ☐Retention by bioretention (INF-2) ☐Retention by permeable pavement (INF-3) ☐Partial retention by biofiltration with partial retention (PR-1) ☐Biofiltration (BF-1) ☒Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐Detention pond or vault for hydromodification management ☐Other (describe in discussion section below)	
Purpose: ☐Pollutant control only ☐Hydromodification control only ☒Combined pollutant control and hydromodification control ☐Pre-treatment/forebay for another structural BMP ☐Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☒Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☒Property Owner ☐City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	
Discussion (as needed): *(Continue on subsequent pages as necessary)*	

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

Structural BMP ID No. **BMP J**

Construction Plan Sheet No.

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☒Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☒Property Owner ☐City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

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

BMP ID No. **BMP K**

Construction Plan Sheet No.

Type of structural BMP:

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

Purpose:

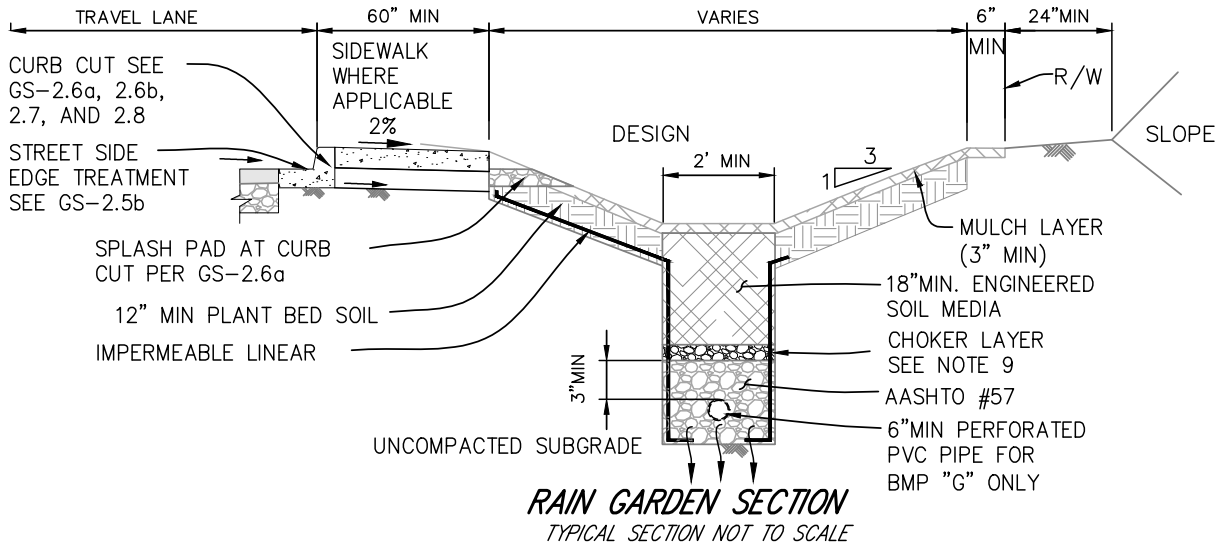
☐Pollutant control only
☐Hydromodification control only
☒Combined pollutant control and hydromodification control
☐Pre-treatment/forebay for another structural BMP
☐Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☐Property Owner ☒City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☐Property Owner ☒City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

BMP-K is a Green Streets BMP and is considered a Site BMP

The bottom of the rain garden shall extend down to the native soil and be allowed to infiltrate per Geotechnical engineers recommendations. Final infiltration data shall be obtained in Final engineering.



RAIN GARDEN SECTION

TYPICAL SECTION NOT TO SCALE

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

BMP ID No. **BMP B-2**

Construction Plan Sheet No.

Type of structural BMP:

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

Purpose:

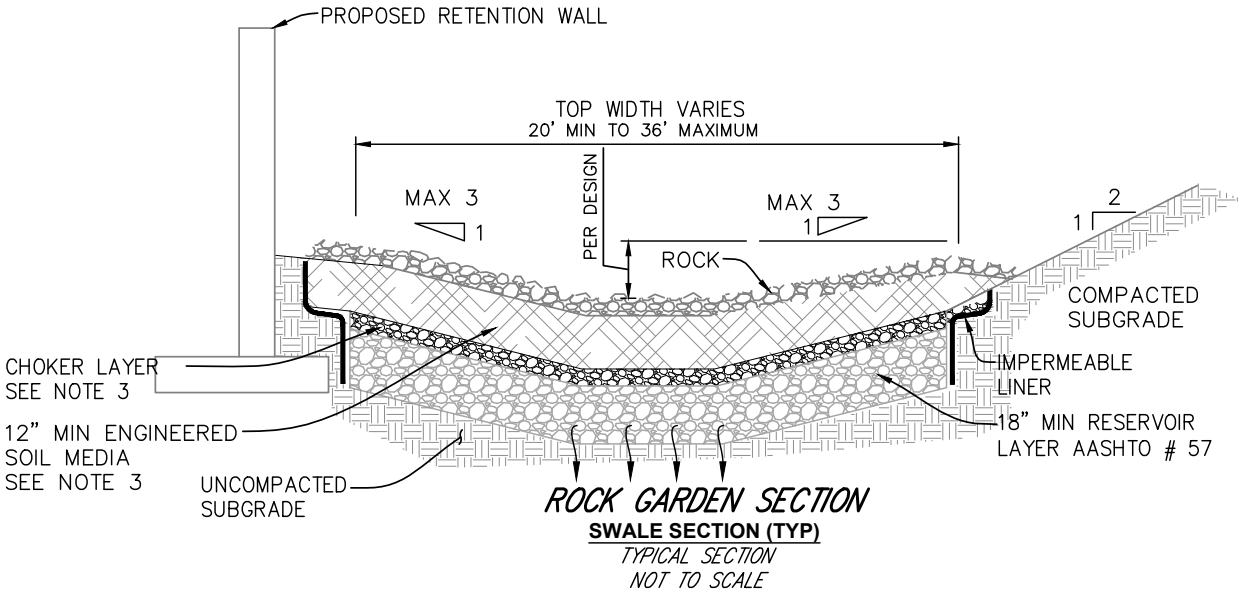
☐Pollutant control only
☒Hydromodification control only
☐Combined pollutant control and hydromodification control
☐Pre-treatment/forebay for another structural BMP
☐Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Robert Dentino EXCEL ENGINEERING 440 State Place, Escondido, CA 92029
Who will be the final owner of this BMP?	☐HOA ☐Property Owner ☒City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ☐Property Owner ☒City ☐Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the SW DM. Attach the appropriate maintenance agreement in Attachment 3.	

Discussion (as needed):
(Continue on subsequent pages as necessary)

BMP-B-2 is a Green Streets BMP and is considered a Site BMP

The bottom of the Rock Garden shall extend down to the native soil and be allowed to infiltrate per Geotechnical engineers recommendations. Final infiltration data shall be obtained in Final engineering.



ROCK GARDEN SECTION

SWALE SECTION (TYP)

TYPICAL SECTION
NOT TO SCALE

Step 6.3: Offsite Alternative Compliance Participation Form

THIS FORM IS NOT APPLICABLE AT THIS TIME: An Alternative Compliance Program is under consideration by the City of Escondido.	
PDP INFORMATION	
Record ID:	
Assessor's Parcel Number(s) [APN(s)]	
What are your PDP Pollutant Control Debits? *See Attachment 1 of the PDP SWQMP	
What are your PDP HMP Debits? (if applicable) *See Attachment 2 of the PDP SWQMP	
ACP Information	
Record ID:	
Assessor's Parcel Number(s) [APN(s)]	
Project Owner/Address	
What are your ACP Pollutant Control Credits? *See Attachment 1 of the ACP SWQMP	
What are your ACP HMP Debits? (if applicable) *See Attachment 2 of the ACP SWQMP	
Is your ACP in the same watershed as your PDP? ☐Yes ☐No	Will your ACP project be completed prior to the completion of the PDP? ☐Yes ☐No
Does your ACP account for all Deficits generated by the PDP? ☐Yes ☐No (PDP and/or ACP must be redesigned to account for all deficits generated by the PDP.)	What is the difference between your PDP debits and ACP Credits? *(ACP Credits -Total PDP Debits = Total Earned Credits) _____

ATTACHMENT 1

BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 1a	Storm Water Pollutant Control Worksheet Calculations -Worksheet B.2-1 (Required) -Worksheet B.3-1 (Form I-4) -Worksheet B.4-1 (if applicable) -Worksheet B.5-1 (if applicable) -Worksheet B.5-2 (if applicable) -Worksheet B.5-3 (if applicable) -Worksheet B.6-1 (if applicable) -Summary Worksheet (optional)	☒Included -Worksheet B.1-1 in lieu of Worksheet B.2-1
Attachment 1b	Form I-5, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the Storm Water Design Manual to complete Form I-5.	☒Included ☐Not included because the entire project will use harvest and use BMPs
Attachment 1c	Form I-6, Factor of Safety and Design Infiltration Rate Worksheet (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the Storm Water Design Manual to complete Form I-6.	☒Included ☐Not included because the entire project will use harvest and use BMPs
Attachment 1d	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☒Included
Attachment 1e	Individual Structural BMP DMA Mapbook (Required) -Place each map on 8.5”x11” paper. -Show at a minimum the DMA, Structural BMP, and any existing hydrologic features within the DMA.	☒Included
Attachment 1f	MWS documentation	☒Included

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ATTACHMENT 1A

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

Category	#	Description	Value	Units
Capture & Use Inputs	0	Design Capture Volume for Entire Project Site	1,189	cubic-feet
	1	Proposed Development Type	Residential	unitless
	2	Number of Residents or Employees at Proposed Development	350	#
	3	Total Planted Area within Development	142,464	sq-ft
	4	Water Use Category for Proposed Planted Areas	Low	unitless
Infiltration Inputs	5	Is Average Site Design Infiltration Rate ≤0.500 Inches per Hour?	No	yes/no
	6	Is Average Site Design Infiltration Rate ≤0.010 Inches per Hour?	No	yes/no
	7	Is Infiltration of the Full DCV Anticipated to Produce Negative Impacts?	Yes	yes/no
	8	Is Infiltration of Any Volume Anticipated to Produce Negative Impacts?	Yes	yes/no
Calculations	9	36-Hour Toilet Use Per Resident or Employee	1.86	cubic-feet
	10	Subtotal: Anticipated 36 Hour Toilet Use	653	cubic-feet
	11	Anticipated 1 Acre Landscape Use Over 36 Hours	52.14	cubic-feet
	12	Subtotal: Anticipated Landscape Use Over 36 Hours	171	cubic-feet
	13	Total Anticipated Use Over 36 Hours	823	cubic-feet
	14	Total Anticipated Use / Design Capture Volume	0.69	cubic-feet
	15	Are Full Capture and Use Techniques Feasible for this Project?	No	unitless
	16	Is Full Retention Feasible for this Project?	No	yes/no
	17	Is Partial Retention Feasible for this Project?	No	yes/no
Result	18	Feasibility Category	5	1, 2, 3, 4, 5

Worksheet B.3-1 General Notes:

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

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

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

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

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

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

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

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

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	BMP-A	BMP-B1	BMP-C	BMP-D	BMP-E	BMP-F	BMP-G	BMP-H	BMP-I	BMP-J	unitless
	1	Basin Drains to the Following BMP Type	Biofiltration	Biofiltration	Retention	Retention	Retention	Retention	Retention	Biofiltration	Biofiltration	Biofiltration	unitless
	2	85th Percentile 24-hr Storm Depth	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.280	0.980	0.280	0.280	0.980	0.000			in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	18,398	35,832	638	11,636	8,384	15,943	13,202	42,487	41,492	59,982	sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)	0					0					sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)	0	0	0	0	0			0			sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)	18,541	17,446	2,514	2,934	1,169	2,024	4,880	18,825	18,095	16,953	sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	0	0							2,558	11,581	sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	12	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	13	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	14	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	16	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	17	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	18	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	19	Number of Tree Wells Proposed per SD-A											#
	20	Average Mature Tree Canopy Diameter											ft
	21	Number of Rain Barrels Proposed per SD-E											#
	22	Average Rain Barrel Size											gal
Treatment Train Inputs & Calculations	23	Does BMP Overflow to Stormwater Features in Downstream Drainage?	No	No	No	No	No	No	No	No	No	No	unitless
	24	Identify Downstream Drainage Basin Providing Treatment in Series											unitless
	25	Percent of Upstream Flows Directed to Downstream Dispersion Areas											percent
	26	Upstream Impervious Surfaces Directed to Dispersion Area (Ci=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
	27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
Initial Runoff Factor Calculation	28	Total Tributary Area	36,939	53,278	3,152	14,570	9,553	17,968	18,081	61,313	62,146	88,516	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.56	0.68	0.37	0.77	0.82	0.82	0.72	0.69	0.68	0.69	unitless
	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	31	Initial Weighted Runoff Factor	0.56	0.68	0.37	0.77	0.82	0.82	0.72	0.69	0.68	0.69	unitless
	32	Initial Design Capture Volume	1,189	2,083	67	645	450	847	749	2,433	2,430	3,512	cubic-feet
Dispersion Area Adjustments	33	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	34	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	37	Runoff Factor After Dispersion Techniques	0.56	0.68	0.37	0.77	0.82	0.82	0.72	0.69	0.68	0.69	unitless
	38	Design Capture Volume After Dispersion Techniques	1,189	2,083	67	645	450	847	749	2,433	2,430	3,512	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	40	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	41	Final Adjusted Runoff Factor	0.56	0.68	0.37	0.77	0.82	0.82	0.72	0.69	0.68	0.69	unitless
	42	Final Effective Tributary Area	20,686	36,229	1,166	11,219	7,833	14,734	13,018	42,306	42,259	61,076	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	1,189	2,083	67	645	450	847	749	2,433	2,430	3,512	cubic-feet

Worksheet B.1-1 General Notes:

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

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

Category	#	Description	*iii*	*iv*	*v*	*vi*	*vii*	Units
BMP Inputs	0	Drainage Basin ID or Name	BMP-C	BMP-D	BMP-E	BMP-F	BMP-G	unitless
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.280	0.980	0.280	0.280	0.980	in/hr
	2	Design Capture Volume Tributary to BMP	67	645	450	847	749	cubic-feet
	3	Is Retention BMP Vegetated or Non-Vegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless
	4	Provided Surface Area	144	336	400	600	425	sq-ft
	5	Provided Surface Ponding Depth	6	6	6	6	6	inches
	6	Provided Soil Media Thickness	18	18	18	18	18	inches
	7	Provided Gravel Storage Thickness	12	18	12	48	24	inches
Infiltration Calculations	8	Volume Infiltrated Over 6 Hour Storm	20	165	56	84	208	cubic-feet
	9	Soil Media Pore Space	0.25	0.25	0.25	0.25	0.25	unitless
	10	Gravel Pore Space	0.40	0.40	0.40	0.40	0.40	unitless
	11	Effective Depth of Retention Storage	15.3	17.7	15.3	29.7	20.1	inches
	12	Drawdown Time for Surface Ponding (Post-Storm)	21	6	21	21	6	hours
	13	Drawdown Time for Entire Basin (Including 6 Hour Storm)	61	24	61	112	27	hours
	14	Volume Retained by BMP	204	660	566	1,569	920	cubic-feet
	15	Fraction of DCV Retained	3.00	1.02	1.26	1.85	1.23	ratio
	16	Percentage of Performance Requirement Satisfied	1.00	1.00	1.00	1.00	1.00	ratio
	17	Fraction of DCV Retained (normalized to 36-hr drawdown)	1.00	1.00	1.00	1.00	1.00	ratio
	18	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	unitless
Result	19	**Deficit of Effectively Treated Stormwater**	**0**	**0**	**0**	**0**	**0**	cubic-feet

Worksheet B.4-1 General Notes:

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

Automated Worksheet B.5-1: Sizing Lined or Unlined Biofiltration BMPs (V1.3)

Category	#	Description	*i*	*ii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	BMP-A	BMP-B1	BMP-H	BMP-I	BMP-J	sq-ft
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000	0.000	0.000	in/hr
	2	Effective Tributary Area	20,686	36,229	42,306	42,259	61,076	sq-ft
	3	Minimum Biofiltration Footprint Sizing Factor	0.030	0.030	0.030	0.030	0.030	ratio
	4	Design Capture Volume Tributary to BMP	1,189	2,083	2,433	2,430	3,512	cubic-feet
	5	Is Biofiltration Basin Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined	Lined	unitless
	6	Provided Biofiltration BMP Surface Area	1,523	1,249	1,704	1,275	3,131	sq-ft
	7	Provided Surface Ponding Depth	6	6	6	6	6	inches
	8	Provided Soil Media Thickness	18	18	18	18	18	inches
	9	Provided Depth of Gravel Above Underdrain Invert	12	12	60	60	60	inches
	10	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	0.50	1.20	0.50	0.63	0.75	inches
	11	Provided Depth of Gravel Below the Underdrain	3	3	3	3	3	inches
Retention Calculations	12	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	cubic-feet
	13	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	unitless
	14	Gravel Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	unitless
	15	Effective Retention Depth	0.90	0.90	0.90	0.90	0.90	inches
	16	Calculated Retention Storage Drawdown (Including 6 Hr Storm)	120	120	120	120	120	hours
	17	Volume Retained by BMP	114	94	128	96	235	cubic-feet
	18	Fraction of DCV Retained	0.10	0.04	0.05	0.04	0.07	ratio
	19	Portion of Retention Performance Standard Satisfied	0.12	0.05	0.06	0.05	0.08	ratio
	20	Fraction of DCV Retained (normalized to 36-hr drawdown)	0.06	0.02	0.03	0.02	0.04	ratio
	21	Design Capture Volume Remaining for Biofiltration	1,118	2,041	2,360	2,381	3,372	cubic-feet
Biofiltration Calculations	22	Max Hydromod Flow Rate through Underdrain	0.0113	0.0650	0.0173	0.0271	0.0390	CFS
	23	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.32	2.25	0.44	0.92	0.54	in/hr
	24	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	in/hr
	25	Soil Media Filtration Rate to be used for Sizing	0.32	2.25	0.44	0.92	0.54	in/hr
	26	Depth Biofiltered Over 6 Hour Storm	1.93	13.48	2.64	5.51	3.23	inches
	27	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	unitless
	28	Effective Depth of Biofiltration Storage	14.40	14.40	33.60	33.60	33.60	inches
	29	Drawdown Time for Surface Ponding	19	3	14	7	11	hours
	30	Drawdown Time for Effective Biofiltration Depth	45	6	76	37	62	hours
	31	Total Depth Biofiltered	16.33	27.88	36.24	39.11	36.83	inches
	32	Option 1 - Biofilter 1.50 DCV: Target Volume	1,677	3,062	3,540	3,572	5,058	cubic-feet
	33	Option 1 - Provided Biofiltration Volume	1,677	2,902	3,540	3,572	5,058	cubic-feet
	34	Option 2 - Store 0.75 DCV: Target Volume	839	1,531	1,770	1,786	2,529	cubic-feet
	35	Option 2 - Provided Storage Volume	839	1,499	1,770	1,786	2,529	cubic-feet
	36	Portion of Biofiltration Performance Standard Satisfied	1.00	0.98	1.00	1.00	1.00	ratio
Result	37	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	yes/no
	38	Overall Portion of Performance Standard Satisfied	1.00	1.00	1.00	1.00	1.00	ratio
	39	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	unitless
	40	**Deficit of Effectively Treated Stormwater**	**0**	**0**	**0**	**0**	**0**	cubic-feet

Worksheet B.5-1 General Notes:

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

Summary of Stormwater Pollutant Control Calculations (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
General Info	0	Drainage Basin ID or Name	BMP-A	BMP-B1	BMP-C	BMP-D	BMP-E	BMP-F	BMP-G	BMP-H	BMP-I	BMP-J	unitless
	1	85th Percentile Storm Depth	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.280	0.980	0.280	0.280	0.980	0.000	0.000	0.000	in/hr
	3	Total Tributary Area	36,939	53,278	3,152	14,570	9,553	17,968	18,081	61,313	62,146	88,516	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	2,124	3,063	181	838	549	1,033	1,040	3,525	3,573	5,090	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.56	0.68	0.37	0.77	0.82	0.82	0.72	0.69	0.68	0.69	unitless
	6	Initial Design Capture Volume	1,189	2,083	67	645	450	847	749	2,433	2,430	3,512	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	0	0	0	0	0	0	0	0	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	0	0	0	0	0	0	0	0	0	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	20,686	36,229	1,166	11,219	7,833	14,734	13,018	42,306	42,259	61,076	square feet
	10	Final Design Capture Volume Tributary to BMP	1,189	2,083	67	645	450	847	749	2,433	2,430	3,512	cubic-feet
	11	Basin Drains to the Following BMP Type	Biofiltration	Biofiltration	Retention	Retention	Retention	Retention	Retention	Biofiltration	Biofiltration	Biofiltration	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	71	42	67	645	450	847	749	73	49	140.48	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	0.06	0.02	1.00	1.00	1.00	1.00	1.00	0.03	0.02	0.04	fraction
	14	Percent of Average Annual Runoff Retention Provided	9.1%	3.0%	80.4%	80.4%	80.4%	80.4%	80.4%	4.6%	3.0%	6.1%	%
	15	Percent of Average Annual Runoff Retention Required	1.5%	1.5%	34.1%	80.0%	34.1%	34.1%	80.0%	1.5%	1.5%	1.5%	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	0	0	0	0	0	0	0	0	0	0	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	0	0	0	0	0	0	0	0	0	0	cubic-feet

Summary Notes:

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

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

False

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

Category	#	Description	*i*	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	BMP-K	unitless
	1	Basin Drains to the Following BMP Type	Retention	unitless
	2	85th Percentile 24-hr Storm Depth	0.69	inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.280	in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	200	sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)	0	sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)	0	sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)		sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)		sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)		sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	2,180	sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	yes/no
	12	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)		sq-ft
	13	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)		sq-ft
	14	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)		sq-ft
	15	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)		sq-ft
	16	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)		sq-ft
	17	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)		sq-ft
	18	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)		sq-ft
	19	Number of Tree Wells Proposed per SD-A		#
	20	Average Mature Tree Canopy Diameter		ft
	21	Number of Rain Barrels Proposed per SD-E		#
	22	Average Rain Barrel Size		gal
Treatment Train Inputs & Calculations	23	Does BMP Overflow to Stormwater Features in Downstream Drainage?	No	unitless
	24	Identify Downstream Drainage Basin Providing Treatment in Series		unitless
	25	Percent of Upstream Flows Directed to Downstream Dispersion Areas		percent
	26	Upstream Impervious Surfaces Directed to Dispersion Area (Ci=0.90)	0	cubic-feet
	27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0	cubic-feet
Initial Runoff Factor Calculation	28	Total Tributary Area	2,380	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.35	unitless
	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	unitless
	31	Initial Weighted Runoff Factor	0.35	unitless
	32	Initial Design Capture Volume	48	cubic-feet
Dispersion Area Adjustments	33	Total Impervious Area Dispersed to Pervious Surface	0	sq-ft
	34	Total Pervious Dispersion Area	0	sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	ratio
	37	Runoff Factor After Dispersion Techniques	0.35	unitless
	38	Design Capture Volume After Dispersion Techniques	48	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	cubic-feet
	40	Total Rain Barrel Volume Reduction	0	cubic-feet
Results	41	Final Adjusted Runoff Factor	0.35	unitless
	42	Final Effective Tributary Area	833	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	48	cubic-feet

Worksheet B.1-1 General Notes:

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

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

Category	#	Description	*i*	*iii*	Units
BMP Inputs	0	Drainage Basin ID or Name	BMP-K	BMP-B.2	unitless
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.280	0.980	in/hr
	2	Design Capture Volume Tributary to BMP	48	0	cubic-feet
	3	Is Retention BMP Vegetated or Non-Vegetated?	Vegetated	Non-Vegetated	unitless
	4	Provided Surface Area	48	820	sq-ft
	5	Provided Surface Ponding Depth	4	24	inches
	6	Provided Soil Media Thickness	18	12	inches
	7	Provided Gravel Storage Thickness	12	72	inches
Infiltration Calculations	8	Volume Infiltrated Over 6 Hour Storm	7	0	cubic-feet
	9	Soil Media Pore Space	0.25	0.40	unitless
	10	Gravel Pore Space	0.40	0.40	unitless
	11	Effective Depth of Retention Storage	13.3	57.6	inches
	12	Drawdown Time for Surface Ponding (Post-Storm)	14	24	hours
	13	Drawdown Time for Entire Basin (Including 6 Hour Storm)	54	65	hours
	14	Volume Retained by BMP	60	3,936	cubic-feet
	15	Fraction of DCV Retained	1.25	0.00	ratio
	16	Percentage of Performance Requirement Satisfied	1.00	0.00	ratio
	17	Fraction of DCV Retained (normalized to 36-hr drawdown)	1.00	0.00	ratio
	18	This BMP Overflows to the Following Drainage Basin	-	-	unitless
Result	19	**Deficit of Effectively Treated Stormwater**	**0**	**n/a**	cubic-feet

Worksheet B.4-1 General Notes:

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

Summary of Stormwater Pollutant Control Calculations (V1.3)

Category	#	Description	*i*	Units
General Info	0	Drainage Basin ID or Name	BMP-K	unitless
	1	85th Percentile Storm Depth	0.69	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.280	in/hr
	3	Total Tributary Area	2,380	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	137	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.35	unitless
	6	Initial Design Capture Volume	48	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	833	square feet
	10	Final Design Capture Volume Tributary to BMP	48	cubic-feet
	11	Basin Drains to the Following BMP Type	Retention	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	48	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	1.00	fraction
	14	Percent of Average Annual Runoff Retention Provided	80.4%	%
	15	Percent of Average Annual Runoff Retention Required	34.1%	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	100.0%	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	0	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	0	cubic-feet

Summary Notes:

All fields in this summary worksheet are populated based on previous user inputs. If applicable, drainage basin elements that require revisions and/or supplemental information outside the scope of these worksheets are highlighted in orange

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

False

ATTACHMENT 1B

Categorization of Infiltration Feasibility Condition	Form I-8

Part 1 - Full Infiltration Feasibility Screening Criteria

Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

Note that it is not necessary to investigate each and every criterion in the worksheet if infiltration is precluded. Instead a letter of justification from a geotechnical professional familiar with the local conditions substantiating any geotechnical issues will be required.

Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:

Based on review of soil survey maps, the on-site materials consist of NRCS Soil Group D and C. According to Table G.1-5 of the County of San Diego Storm Water BMP Design Manual (dated February 2016), Soil Group D has a potential infiltration rate ranging between 0 and 0.02 inches per hour. Additionally, in-situ testing indicated infiltration rates of between 0 and 0.15 inches per hour.

The Northeast corner of the Site is Soil Group "C" is not placed on any fill and is being used for infiltration for BMP, per percolation tests and geotechnical information.

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 must be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:

As noted above, the infiltration rate at the site is not greater than 0.5 inches per hour.

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

*Infiltration will be allowed Per Geotech in the following locations that will have little to no fill DMA-3 Through DMA -7, DMA-12 12, BMP-D, and BMP-B.1. An signed letter will follow in final engineering.

Form I-8 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: As noted above, the infiltration rate at the site is not greater than 0.5 inches per hour. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: As noted above, the infiltration rate at the site is not greater than 0.5 inches per hour. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result *	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		NO

*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

*Infiltration will be allowed Per Geotech in the following locations that will have little to no fill DMA-3 Through DMA -7, DMA-12 12, BMP-D, and BMP-B.1. An signed letter will follow in final engineering.

Form I-8 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 must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	

Provide basis:

Based on review of soil survey maps, the on-site materials consist of NRCS Soil Group D. According to Table G.1-5 of the County
of San Diego Storm Water BMP Design Manual (dated February 2016), Soil Group D has a potential infiltration rate ranging between 0 and 0.02 inches per hour. Additionally, in-situ testing indicated infiltration rates of between 0 and 0.15 inches per hour.

*Infiltration will be allowed Per Geotech in the following locations that will have little to no fill DMA-3 Through DMA -7, DMA-12 12, BMP-D, and BMP-B.1. An signed letter will follow in final engineering.

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.

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 must be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	

Provide basis:

Based on review of soil survey maps, the on-site materials consist of NRCS Soil Group D. According to Table G.1-5 of the County
of San Diego Storm Water BMP Design Manual (dated February 2016), Soil Group D has a potential infiltration rate ranging
between 0 and 0.02 inches per hour. Additionally, in-situ testing indicated infiltration rates of between 0 and 0.15 inches per hour. Infiltration in IT-3 could saturate the clayey on-site soils adjacent to
or beneath the buildings foundation, which could result in reduction of shear strength, loss of adequate bearing capacity, and increase potential for settlement.

*Infiltration will be allowed Per Geotech in the following locations that will have little to no fill DMA-3 Through DMA -7, DMA-12 12, BMP-D, and BMP-B.1. An signed letter will follow in final engineering.

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.

*Infiltration will be allowed Per Geotech in the following locations that will have little to no fill DMA-3 Through DMA -7, DMA-12 12, BMP-D, and BMP-B.1. An signed letter will follow in final engineering.

Form I-8 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 must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Infiltration in any appreciable quantity is not anticipated to pose a significant risk for groundwater related concerns. 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 must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Infiltration is not anticipated to violate downstream water rights. 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 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**	**Partial** in approved areas DMA-3-7, 12, BMP-D, and BMP-B.1	

*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

*Infiltration will be allowed Per Geotech in the following locations that will have little to no fill DMA-3 Through DMA -7, DMA-12 12, BMP-D, and BMP-B.1. An signed letter will follow in final engineering.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Form I-5 Certification

The Geotechnical Engineer certifies they completed Form I-5 except Criteria 4 & 8 (see Appendix C.4.3).

Professional Geotechnical Engineer's Printed Name:

_____

Professional Geotechnical Engineer's Signed Name:

_____

Date: _____

[SEAL]

The Project Design Engineer certifies they completed Criteria 4 & 8 (see Appendix C.4.4).

Professional Project Design Engineer's Printed Name:

_____

Professional Project Design Engineer's Signed Name:

_____

Date: _____

[SEAL]

ATTACHMENT 1C

Factor of Safety and Design Infiltration Rate Worksheet				Form I-6	
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25		
		Predominant soil texture	0.25		
		Site soil variability	0.25		
		Depth to groundwater / impervious layer	0.25		
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			
B	Design	Level of pretreatment/ expected sediment loads	0.5		
		Redundancy/resiliency	0.25		
		Compaction during construction	0.25		
		Design Safety Factor, $S_B = \Sigma p$			
Combined Safety Factor, $S_{total} = S_A \times S_B$					
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$					
Supporting Data					
Briefly describe infiltration test and provide reference to test forms:					

Factor of Safety and Design Infiltration Rate Worksheet	Form I-6 Certification

The Geotechnical Engineer certifies they completed Form I-6 (see Appendix C.4.3).

Professional Geotechnical Engineer's Printed Name:

_____

Professional Geotechnical Engineer's Signed Name:

_____

Date: _____

[SEAL]

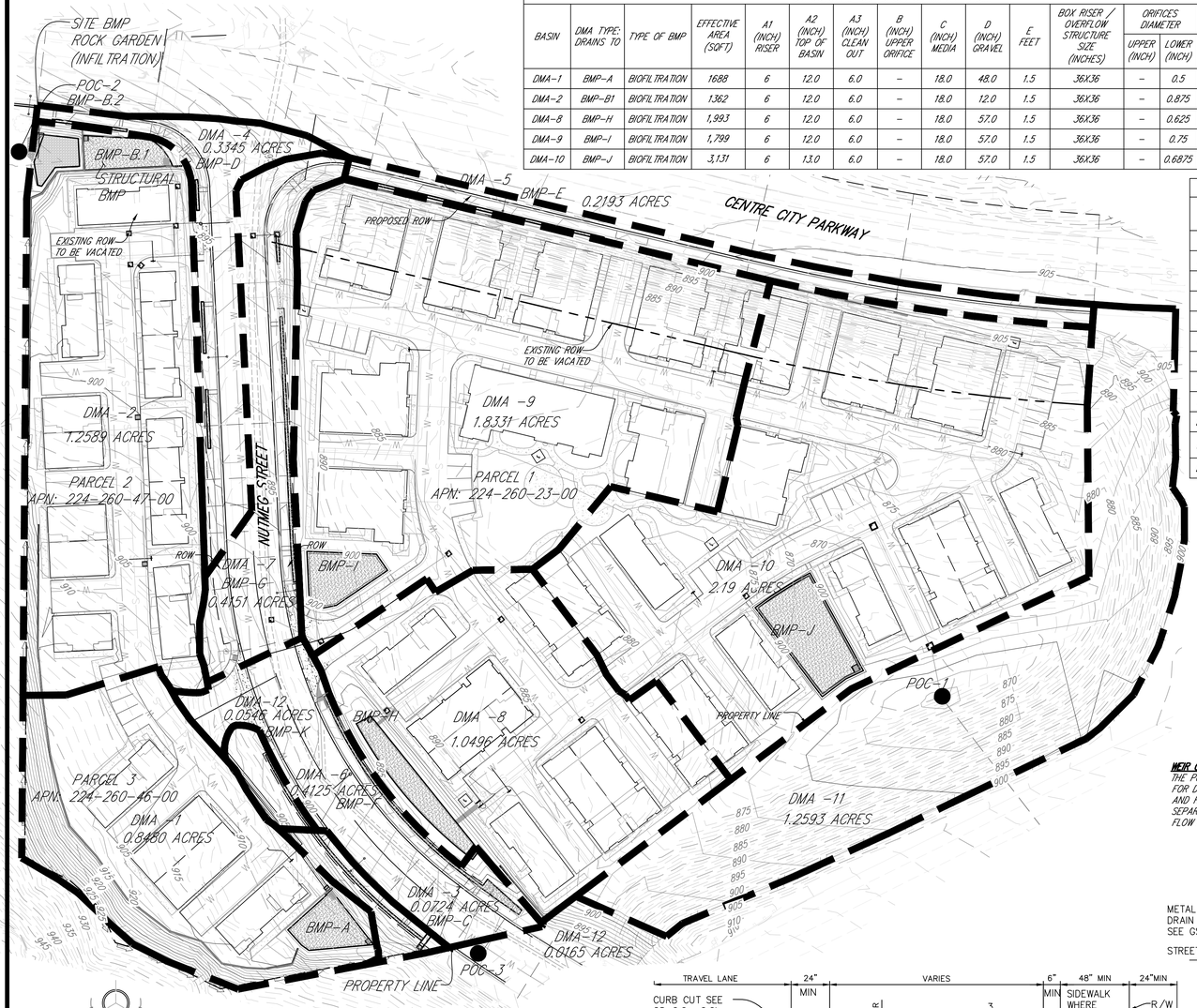
ATTACHMENT 1D

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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

The DMA Exhibit must identify:

☒ Underlying hydrologic soil group
☒ Approximate depth to groundwater
☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☒ Critical coarse sediment yield areas to be protected
☒ Existing topography and impervious areas
☒ Existing and proposed site drainage network and connections to drainage offsite
☒ Proposed demolition
☒ Proposed grading
☒ Proposed impervious features
☒ Proposed design features and surface treatments used to minimize imperviousness
☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
☒ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Step 3.5)
☒ Structural BMPs (identify location, structural BMP ID#, type of BMP, and size/detail)



SCALE 1:50

0 50 100 150 200

STRUCTURAL BIO-BASIN SUMMARY TABLE

BASIN	DMA TYPE: DRAINS TO	TYPE OF BMP	EFFECTIVE AREA (SQFT)	A1 (INCH) RISER	A2 (INCH) TOP OF BASIN	A3 (INCH) CLEAN OUT	B (INCH) UPPER ORIFICE	C (INCH) MEDIA	D (INCH) GRAVEL	E FEET	BOX RISER / OVERFLOW STRUCTURE SIZE (INCHES)	ORIFICES DIAMETER		IMPERMEABLE LINER?
												UPPER (INCH)	LOWER (INCH)	
DMA-1	BMP-A	BIOFILTRATION	1688	6	12.0	6.0	–	18.0	48.0	1.5	36X36	–	0.5	YES
DMA-2	BMP-B1	BIOFILTRATION	1,362	6	12.0	6.0	–	18.0	12.0	1.5	36X36	–	0.875	YES
DMA-8	BMP-H	BIOFILTRATION	1,993	6	12.0	6.0	–	18.0	57.0	1.5	36X36	–	0.625	YES
DMA-9	BMP-I	BIOFILTRATION	1,799	6	12.0	6.0	–	18.0	57.0	1.5	36X36	–	0.75	YES
DMA-10	BMP-J	BIOFILTRATION	3,131	6	13.0	6.0	–	18.0	57.0	1.5	36X36	–	0.6875	YES

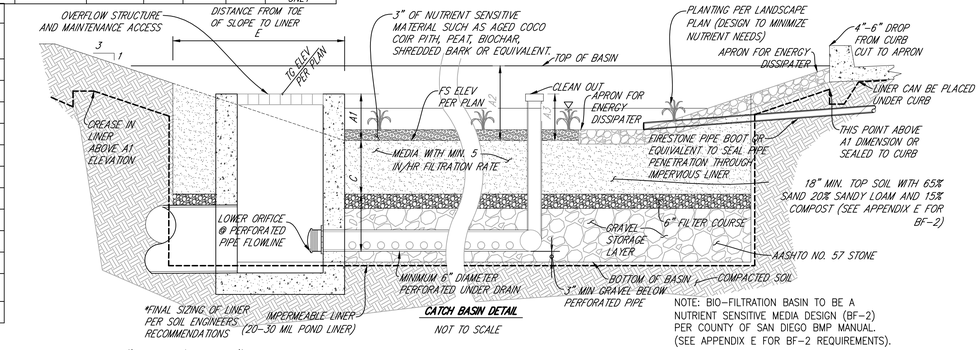
SITE BMP SUMMARY TABLE

BASIN	DMA TYPE: DRAINS TO	TYPE OF BMP	EFFECTIVE AREA (SQFT)	POND (IN)	MEDIA (IN)	G GRAVEL (IN)	IMPERMEABLE LINER?
*BMP-D, BMP-B.1	BMP-B.2	ROCK GARDEN	820	4-6	–	60.0	NO
DMA-3	BMP-C	RAIN GARDEN	144	4-6	18.0	36.0	SIDEWALLS ONLY
DMA-4	BMP-D	RAIN GARDEN	347	4-6	—	18.0	SIDEWALLS ONLY
DMA-5	BMP-E	RAIN GARDEN	400	4-6	18.0	18.0	SIDEWALLS ONLY
DMA-6	BMP-F	RAIN GARDEN	580	4-6	18.0	48.0	SIDEWALLS ONLY
DMA-7	BMP-G	RAIN GARDEN	275	4-6	18.0	48.0	SIDEWALLS ONLY

*NOTE: BMP-D AND BMP-B.1 ARE DRAINING TO AN ADDITIONAL AREA TO ALLOW FOR INFILTRATION. THIS BASIN IS NOT USED FOR CLEANING, HOWEVER EXTRA RETENTION OF FLOOD CONDITIONS MAY ALLOW FOR ADDITIONAL CLEANING. THIS BASIN IS ONLY BEING USED FOR STORAGE FOR HYDROMODIFICATION.

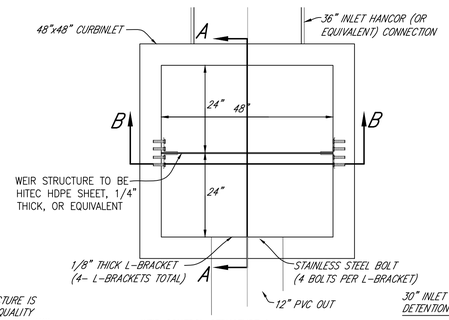
DMA SUMMARY TABLE

DMA	DMA TO BE TREATED BY:	AREA (ACRES)
DMA-1	BIOFILTRATION	0.848003
DMA-2	BIOFILTRATION	1.2589
DMA-3	SITE BMP	0.1137
DMA-4	SITE BMP	0.3345
DMA-5	SITE BMP	0.2193
DMA-6	SITE BMP	0.4093
DMA-7	SITE BMP	0.4151
DMA-8	BIOFILTRATION	1.0496
DMA-9	BIOFILTRATION	1.8331
DMA-10	BIOFILTRATION	2.1900
DMA-11	SELF MITIGATION	1.2593
DMA-12	SITE BMP	0.0546



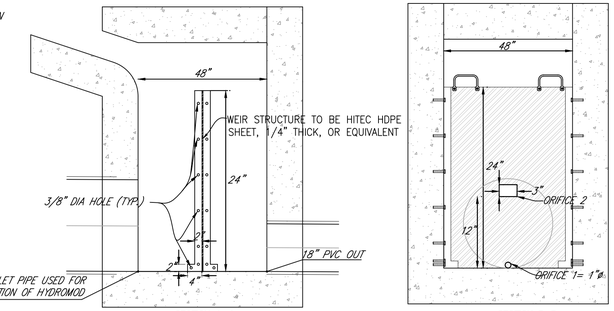
CATCH BASIN DETAIL
NOT TO SCALE

NOTE: BIO-FILTRATION BASIN TO BE A NUTRIENT SENSITIVE MEDIA DESIGN (BF-2) PER COUNTY OF SAN DIEGO BMP MANUAL. (SEE APPENDIX E FOR BF-2 REQUIREMENTS).



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

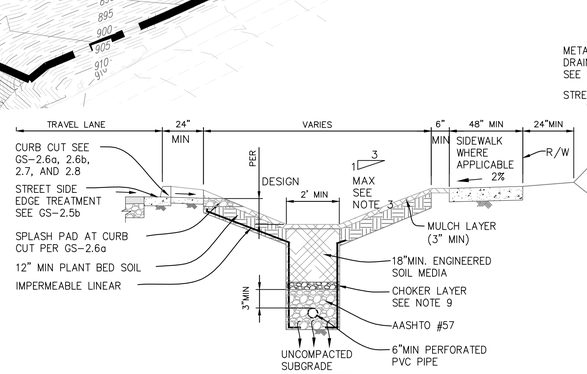
WEIR CONTROL STRUCTURE 1 PLAN VIEW (SEE SHEET 6)
NOT TO SCALE



SECTION A-A
NOT TO SCALE

SECTION B-B
NOT TO SCALE

WEIR CONTROL STRUCTURE 1 DETAIL



CLOSE SECTION

RAIN GARDEN SECTION
TYPICAL SECTION
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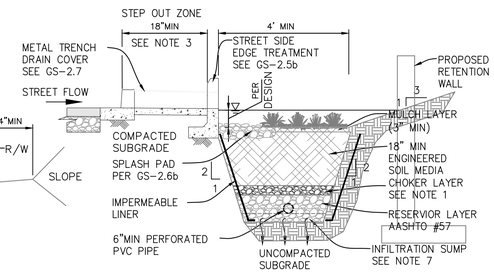
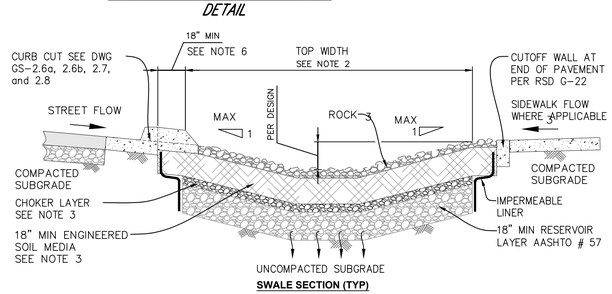


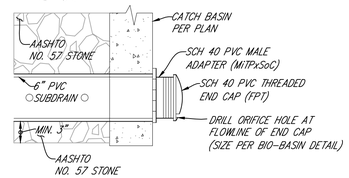
SECTION A A

RAIN GARDEN SECTION
TYPICAL SECTION
NOT TO SCALE



SWALE SECTION (TYP)

RAIN GARDEN SECTION
TYPICAL SECTION
NOT TO SCALE



ORIFICE DETAIL
NOT TO SCALE

6" PVC PIPE PERFORATION LAYOUT DETAIL
NOT TO SCALE

SITE INFORMATION
HYDROLOGIC SOIL TYPE C AND D
GREATER THAN 40' TO GROUNDWATER

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)

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.

NOTES:

1. *MATERIALS AND CONSTRUCTION SHALL MEET CURRENT APPROVED COUNTY SPECIFICATION FOR PLANTING AND ENGINEERED SOIL MEDIA.*
2. *STEP OUT ZONE REQUIRED WHEN PARALLEL PARKING IS PROVIDED. INSTALLATION MAY BE STANDARD CONCRETE SIDEWALK OR PAVEMENT BASED ON SURROUNDING CONDITIONS.*
3. *SIDE SLOPES STEEPER THAN 3:1 MAY BE ALLOWED WITH COUNTY APPROVAL.*
4. *TREES AND PLANTS SHALL BE INSTALLED IN ACCORDANCE WITH DESIGN PLANS.*
5. *BOTTOM OF SWALES SHALL BE AT LEAST 10' ABOVE THE SEASONAL HIGH WATER TABLE OR 2' ABOVE BEDROCK, AS DETERMINED BY GEOTECHNICAL INVESTIGATION.*
6. *OFFSET TO SWALES MAY BE REDUCED IF ALTERNATIVE EDGE TREATMENT IS USED, SEE DWG GS-2.5*
7. *DEPTH OF INFILTRATION SUMP AS SHOWN ON DESIGN PLANS SHOULD BE SIZED TO ADDRESS STORMWATER REQUIREMENTS.*
8. *INSTALL TRAFFIC BARRIER AS NECESSARY BASED ON ROADWAY DESIGN.*
9. *CHOKER LAYER IS OPTIONAL PER GEOTECHNICAL ENGINEER RECOMMENDATION.*

NOTES:

1. CHOKER LAYER IS OPTIONAL PER GEOTECHNICAL ENGINEER RECOMMENDATION.
2. MATERIALS AND CONSTRUCTION SHALL MEET CURRENT SPECIFICATION FOR PLANTING AND ENGINEERED SOIL MEDIA.
3. STEP OUT ZONE REQUIRED WHEN PARALLEL PARKING IS PROVIDED. INSTALLATION MAY BE STANDARD CONCRETE SIDEWALK OR PAVEMENT BASED ON SURROUNDING CONDITIONS.
4. FOR EDGE TREATMENT OPTIONS SEE DWG GS-2.5
5. PLANTINGS SHALL BE INSTALLED IN ACCORDANCE WITH DESIGN PLAN.
6. BOTTOM OF RAIN GARDEN SHALL BE AT LEAST 10' ABOVE THE SEASONAL HIGH WATER TABLE OR 2' ABOVE BEDROCK, AS DETERMINED BY GEOTECHNICAL INVESTIGATION.
7. DEPTH OF INFILTRATION SUMP AS SHOWN ON DESIGN PLANS SHOULD BE SIZED TO ADDRESS STORMWATER MANAGEMENT REQUIREMENTS.
8. OUTLET REQUIRED AS SPECIFIED BY PLANS.

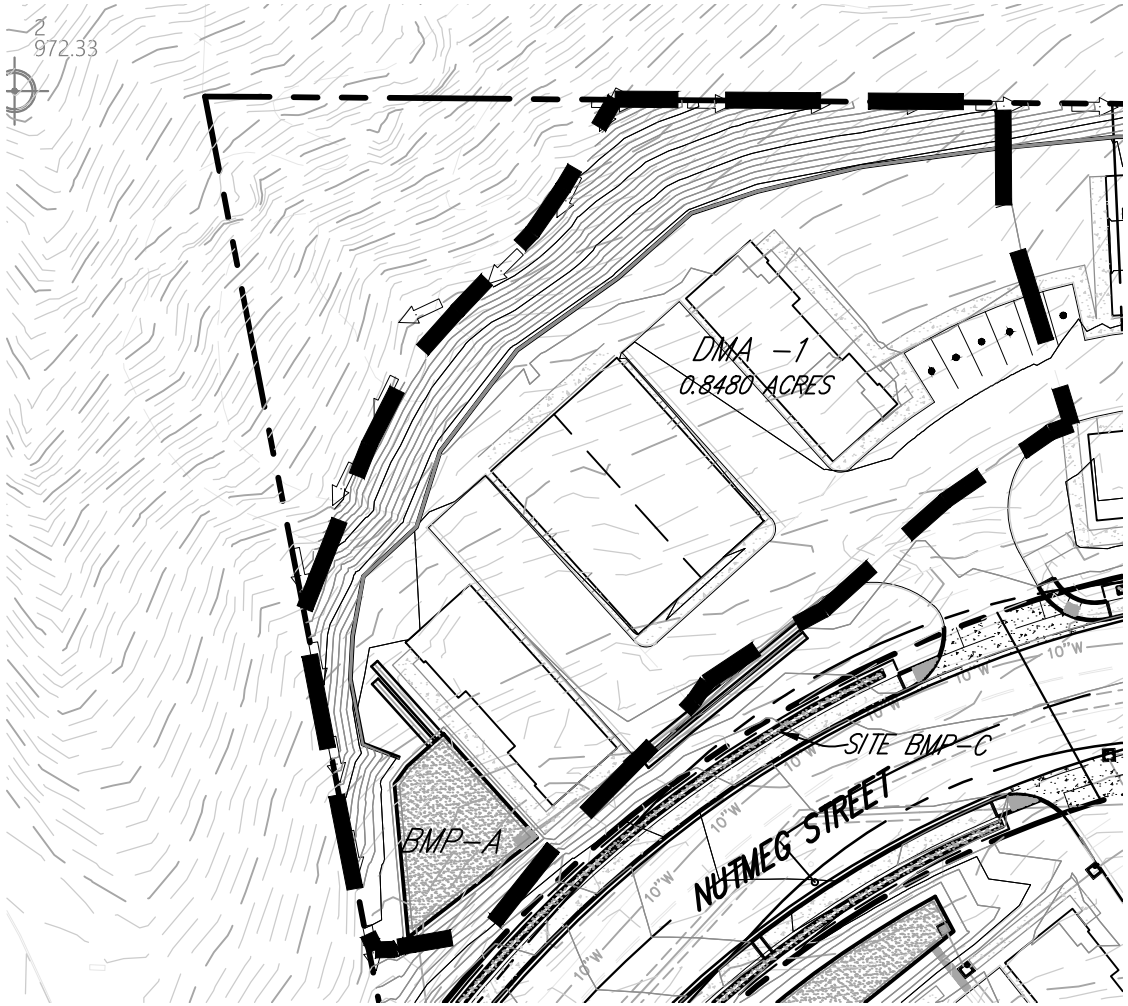
NOTES:

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED SWALE AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.
2. DIMENSIONS:
   a. WIDTH 4' MINIMUM.
   b. DEPTH FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION; SIMPLIFIED: 6"–18".
   c. LONGITUDINAL SLOPE OF SWALE: 2.5% MAX.
3. MATERIALS
   a. ENGINEERED SOIL MEDIA: 65% SAND, 20% SANDY LOAM, 15% COMPOST (OR PER SPECIFICATIONS).
   b. CHOKER LAYER: 2"–4" WASHED SAND OVER 2" CHOKING STONE.
4. OVERFLOW:
   a. ALLOW FOR 2"OF FREEBOARD, MINIMUM.
   b. PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
5. BOTTOM OF SWALE SHALL BE AT LEAST 10' ABOVE THE SEASONAL HIGH WATER TABLE OR 2' ABOVE BEDROCK, AS DETERMINED BY GEOTECHNICAL INVESTIGATION.
6. 18" MINIMUM CONCRETE STEP OUT ZONE REQUIRED WHEN PARKING IS ADJACENT TO CURB.

NUTMEG
DMA EXHIBIT SHEET

EXCEL ENGINEERING
LAND PLANNING • ENGINEERING • SURVEYING
440 STATE PLACE, ESCONDIDO, CA 92029
PH (760)745-8118 FX (760)745-1890

ATTACHMENT 1E



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SCALE 1:60

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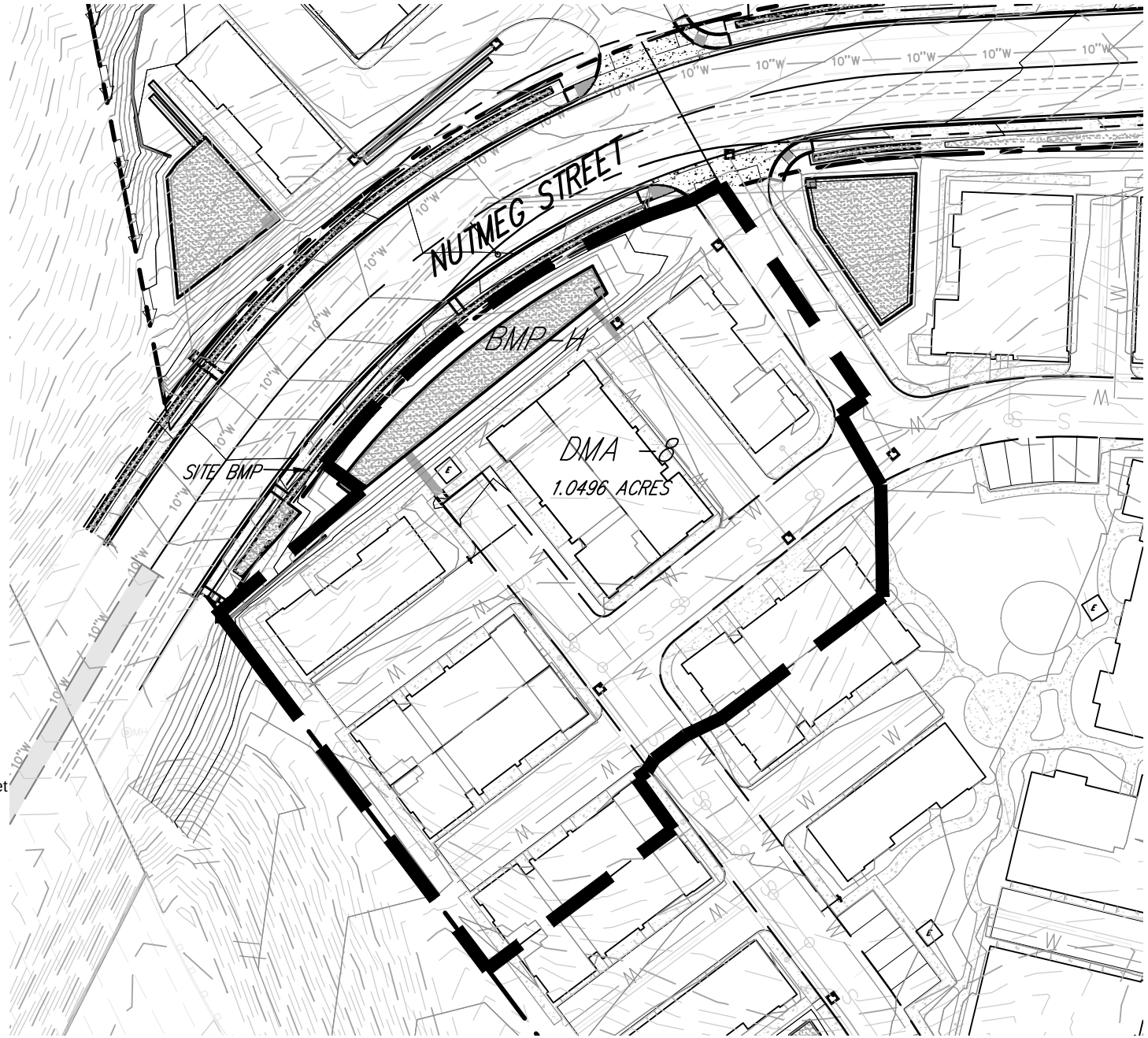

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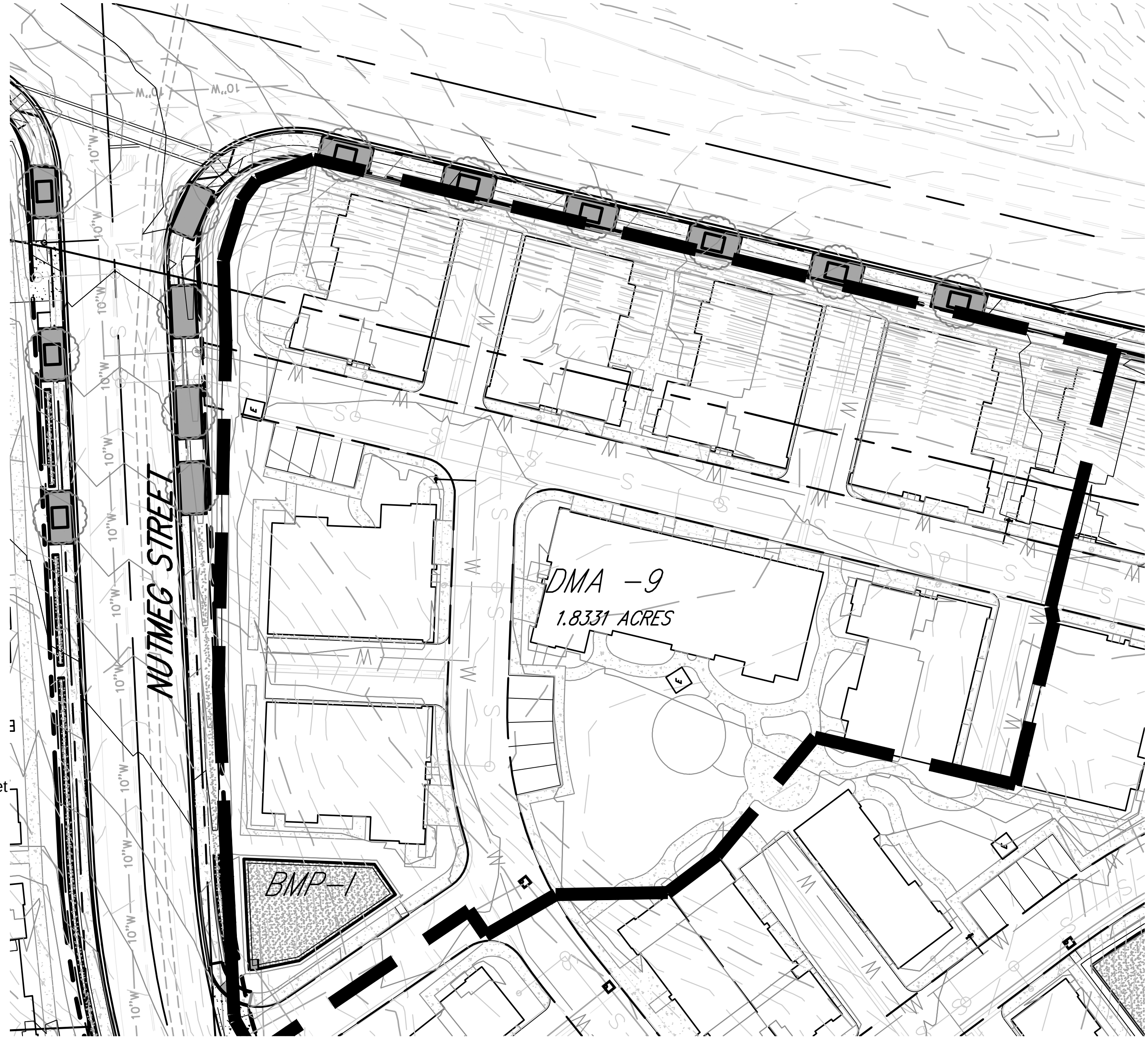

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Feet

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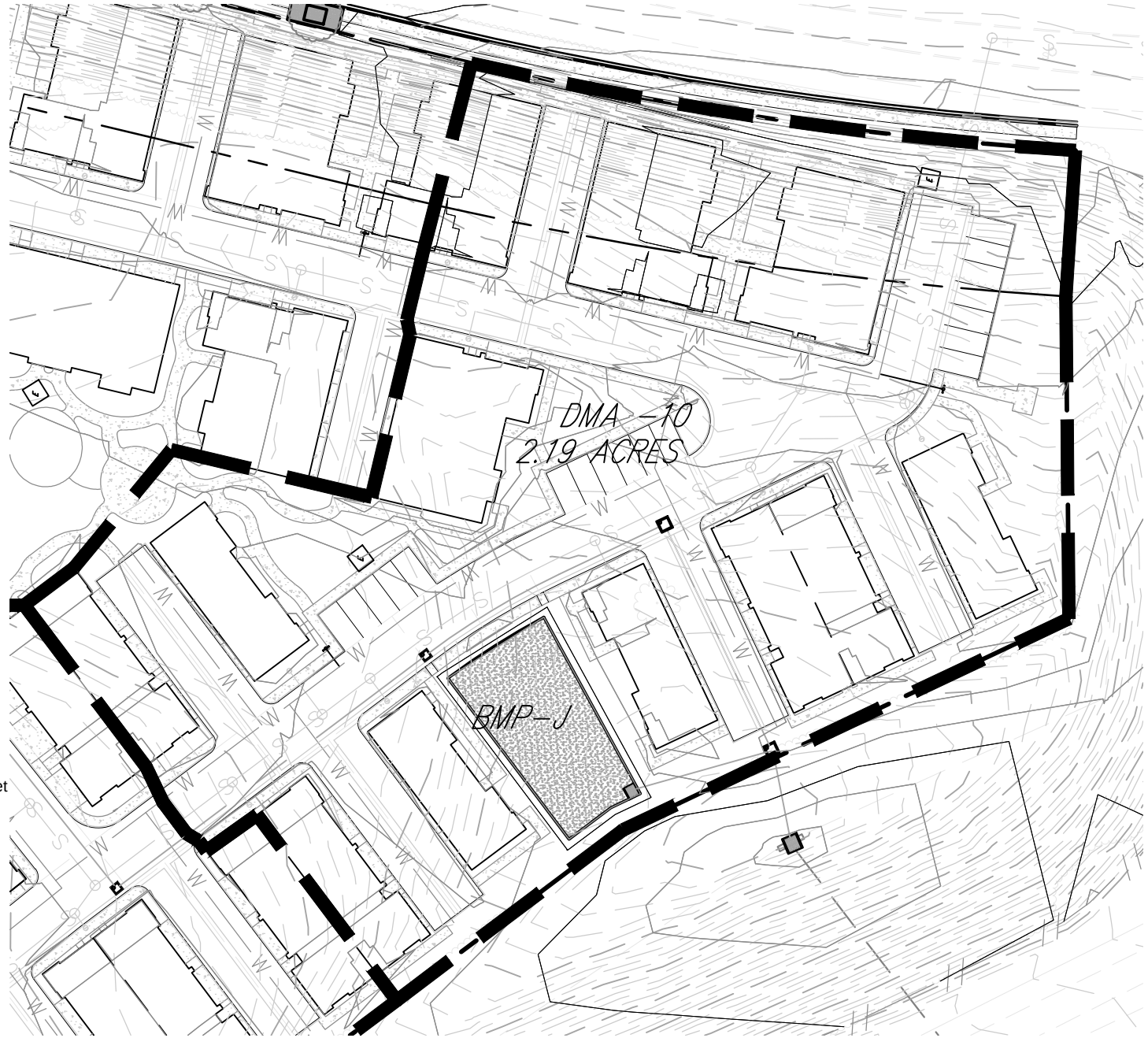

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ATTACHMENT 1F

ATTACHMENT 2

BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

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

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 2a	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the Storm Water Design Manual	☐Included ☒Submitted as separate stand-alone document
Attachment 2b	Hydromodification Management Exhibit (Required)	☒Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2c	Management of Critical Coarse Sediment Yield Areas See Section 6.2 and Appendix H of the Storm Water Design Manual.	☒Exhibit depicting onsite and/or upstream sources of critical coarse sediment as mapped by Regional or Jurisdictional approaches outlined in Appendix H.1 AND, ☒Demonstration that the project effectively avoids and bypasses sources of mapped critical coarse sediment per approaches outlined in Appendix H.2 and H.3. OR, ☐Demonstration that project does not generate a net impact on the receiving water per approaches outlined in Appendix H.4.
Attachment 2d	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the Storm Water Design Manual.	☒Not performed ☐Included ☐Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐Included ☒Not required because BMPs will drain in less than 96 hours

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ATTACHMENT 2A

SWMM MODELING TO DETERMINE LID SIZES FOR HYDROMODIFICATION COMPLIANCE

Nutmeg **Homes**
Escondido

DATE: June 14, 2018

Prepared For:

ADJ Holdings, LLC

Prepared By:

EXCEL ENGINEERING
440 STATE PLACE
ESCONDIDO, CA 92029
TEL: (760)745-8118

Hydromodification Analysis

INTRODUCTION

This report provides Hydromodification and Water Quality design based on LID (Low Impact Development) principles for a proposed Residential site development located adjacent to Center City Parkway, Escondido, 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 7.45 acres, with the developed tributary area is approximately 10.03 acres. There are three points of compliance (POC) for the project in the analysis one at the Southwest of I-15 at a natural channel (POC-1) the at the Northeast corner of the site as it enters a natural channel (POC-2), and the Northwest corner at Nutmeg where there is (POC-3).

The Hydromodification and Water Quality system proposed for this project consists of 6 biofiltration basins with one point of compliance located at the southwest corner of the project. This system detains storm water in the basin surface and also in the underdrain reservoir. 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 an empty lot that sits lower than existing street level all storm runoff sheet flows to either the north or south, this site was mass graded in part to accommodate Caltrans for the I-15 and Development of Centre City Parkway. The ground cover consists of grass and some shrubs with trees. All material will be removed for the post development construction purposes. For the purpose of this study, the site is assumed to have 0% of impervious surface in the existing condition.

The site is currently an undeveloped area adjacent to the I-15 freeway and Center City Parkway; on the North end of Escondido. It is served by utilities (water, sewer, and storm drain (on the south westerly portion of the site connecting to an existing cal trans line).

Existing residential developments exist on the East side of Center City Parkway, and West of the I-15. This site has two POCs; the first draining a quarter of Nutmeg street and a portion of Center City Parkway to an open pervious area that flows southwesterly to an existing Caltrans pipeline. A second area north of Nutmeg Street drains south westerly along Nutmeg Street with a Half the flow of Nutmeg Street around to a natural channel to meet with the Caltrans pipeline. The second POC is the north eastern corner of the site that drains along with the remaining of Nutmeg Street and Center City Street North to enter the Escondido sub area.

After drainage leaves the site, it flows in two directions to the north where the water circles back on itself and travels through the Escondido sub Hydrologic area southward to Escondido Creek. Once in Escondido creek flows continue until they reach the Pacific Ocean at San Elijo Lagoon. The second flow travels South westerly to travel to San Marcos Creek which flows to the Pacific Ocean and discharges at Batiquitos Lagoon.

Post-Development Model Setup

For POC-1 Figure 2 illustrates each The Nutmeg Street Development project layout proposes to place multiple residential housing units in place to cover most of the site. Fill soil will be brought in to level the site and bring the current surface up to allow a gentler slope. The finish floor elevations of the building pads are relatively flat plane through the site to drain in the direction of the existing flows away from the buildings towards water quality treatment basins. Once within the water quality treatment systems, the stormwater infiltrates through the treatment medium into underdrains that route the flows to the private on site storm drainage system. The public portions of POC-1 include a portion of the Westerly side of Centre City Parkway and Portions of Nutmeg Street. This water will be treated through “Green Streets” and in the case Rain Gardens will be used. Water will be allowed to flow through the median and gravel layer before infiltrating into the native soil. Flood storms will be calculated through the separate hydrology/ hydraulics report in final engineering and will confluence with the private water as it travels to the Caltrans Pipe. This system uses new piping to direct the flows to the existing Caltrans pipe that travels under the I-15 Freeway. Once on the other side of the Freeway the water is discharged into a natural channel.

The flows for Poc-2 are as follows: The north flow sheet flows to the basin B.1 and mitigates through a water quality treatment basin then travels to an infiltration basin B.2 (rock garden) before being released back the natural channel going offsite. The higher flows will naturally top the infiltration basin and flow downstream just as in the pre-development conditions and the low flow will be allowed to infiltrate into the soil. A small portion of Nutmeg street and Centre City Parkway will be treated in Rain Gardens along the road side before infiltrating into the natural soil and the overflow will travel to the Rock garden and confluence with the private water for additional opportunity to infiltrate before discharging downstream.

The final Poc-3 will allow surface flow to travel to a curb inlet where flows will be directed by a weir to a storage pipe before discharging through an orifice in the weir thus increasing the travel time and reducing the velocity of the low flows into the basin before treatment. Higher storms will fill the pipe and in addition of going through the two orifices in the weir plate; will also convey the q100 storm event over the top of the weir as will be calculated in the final hydrology/ hydraulics engineering report. The storm water will mitigate

Table of Contents

The final Poc-3 will allow surface flow to travel to a curb inlet where flows will be directed by a weir to a storage pipe before discharging through an orifice in the weir thus increasing the travel time and reducing the velocity of the low flows into the basin before treatment. Higher storms will fill the pipe and in addition of going through the two orifices in the weir plate; will also convey the q100 storm event over the top of the weir as will be calculated in the final hydrology/ hydraulics engineering report. The storm water will mitigate through the soil and discharge downstream out of a d-25 that will have the velocity low enough to travel down the gutter before reaching the natural channel. The last portion of the sidewalk and areas north of Nutmeg street will be treated in another Rain garden where storm water will be given the opportunity to infiltrate through the media and gravel. Overflow water will confluence with water from the basin (bmp-A) before reaching the natural channel downstream.

Figure-1. Typical
Bio-filtration Section

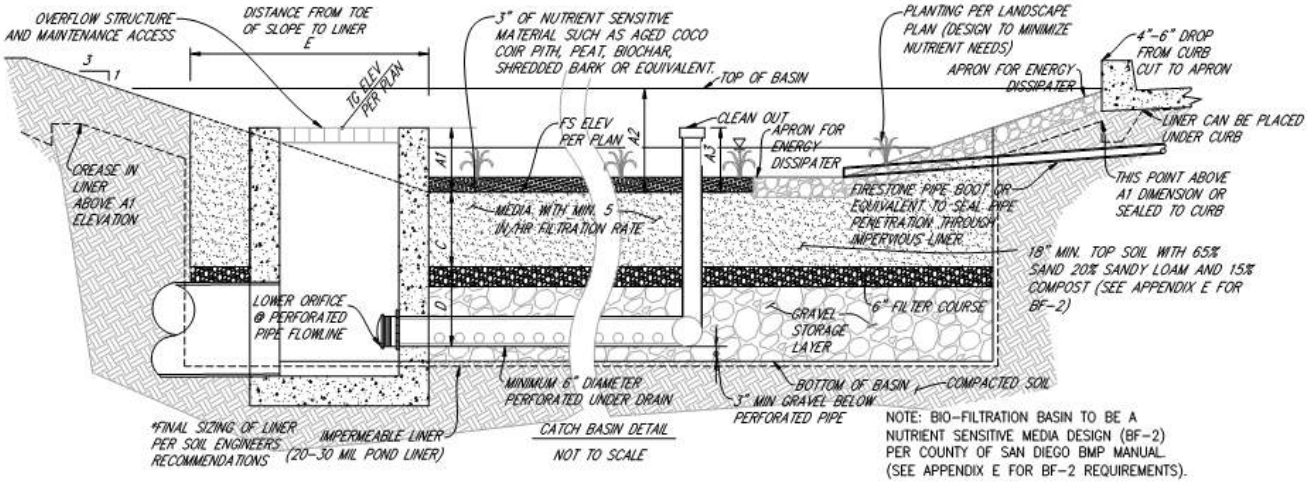


Figure-1.1. Typical
Bio-filtration Sections for site

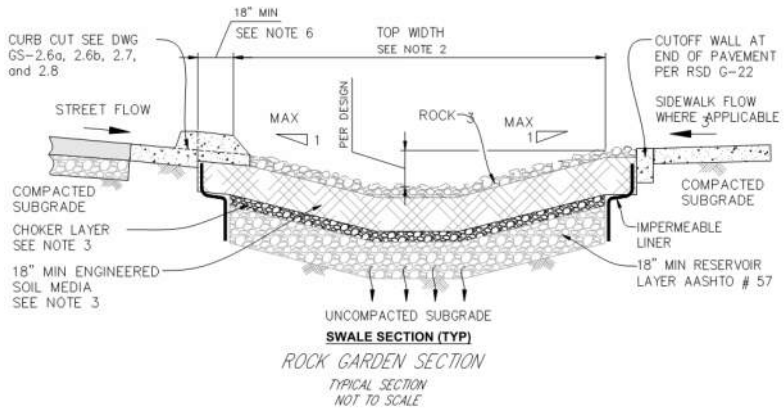


Figure-1.2. Typical
Rock Garden Sections for site

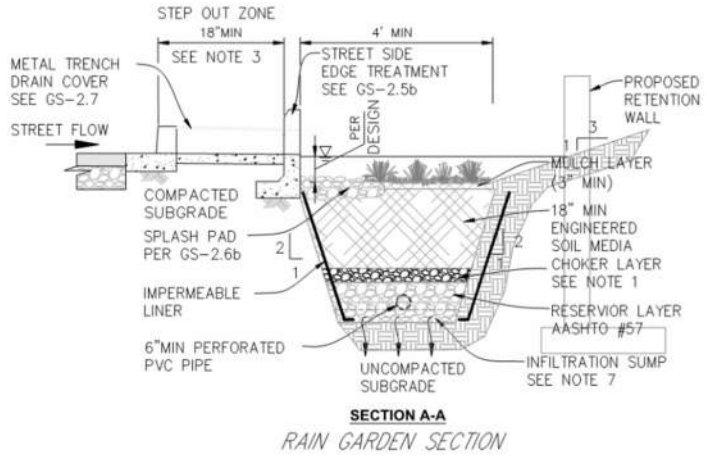


Figure-1.3. Typical

Rain Garden Section for the site

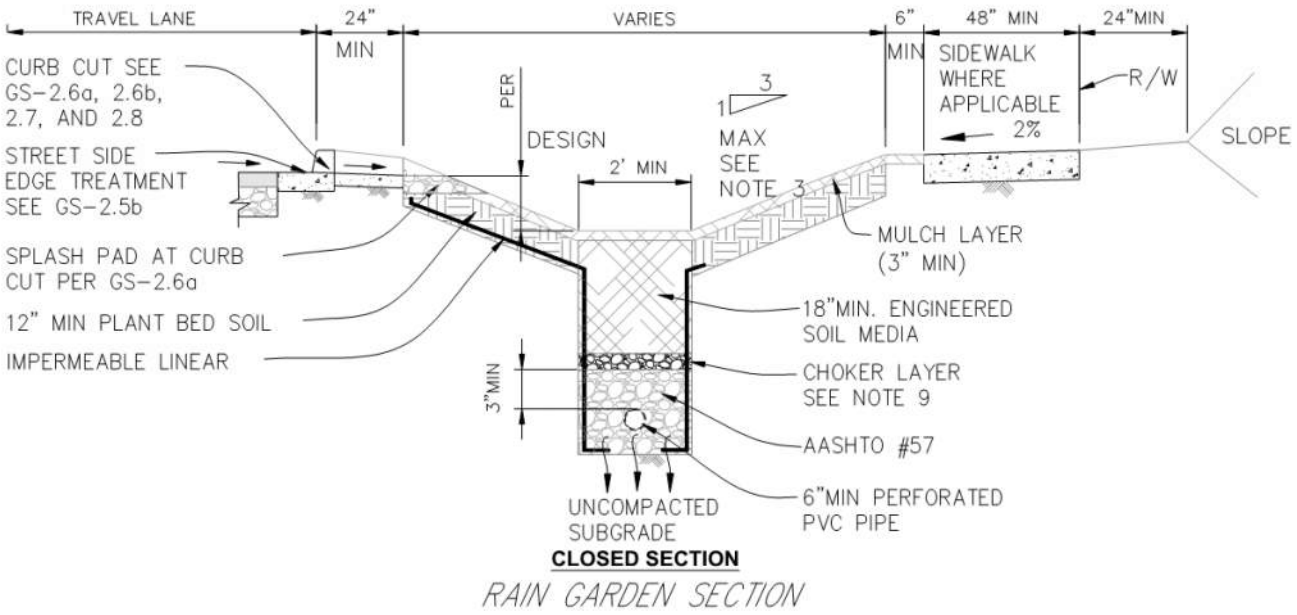
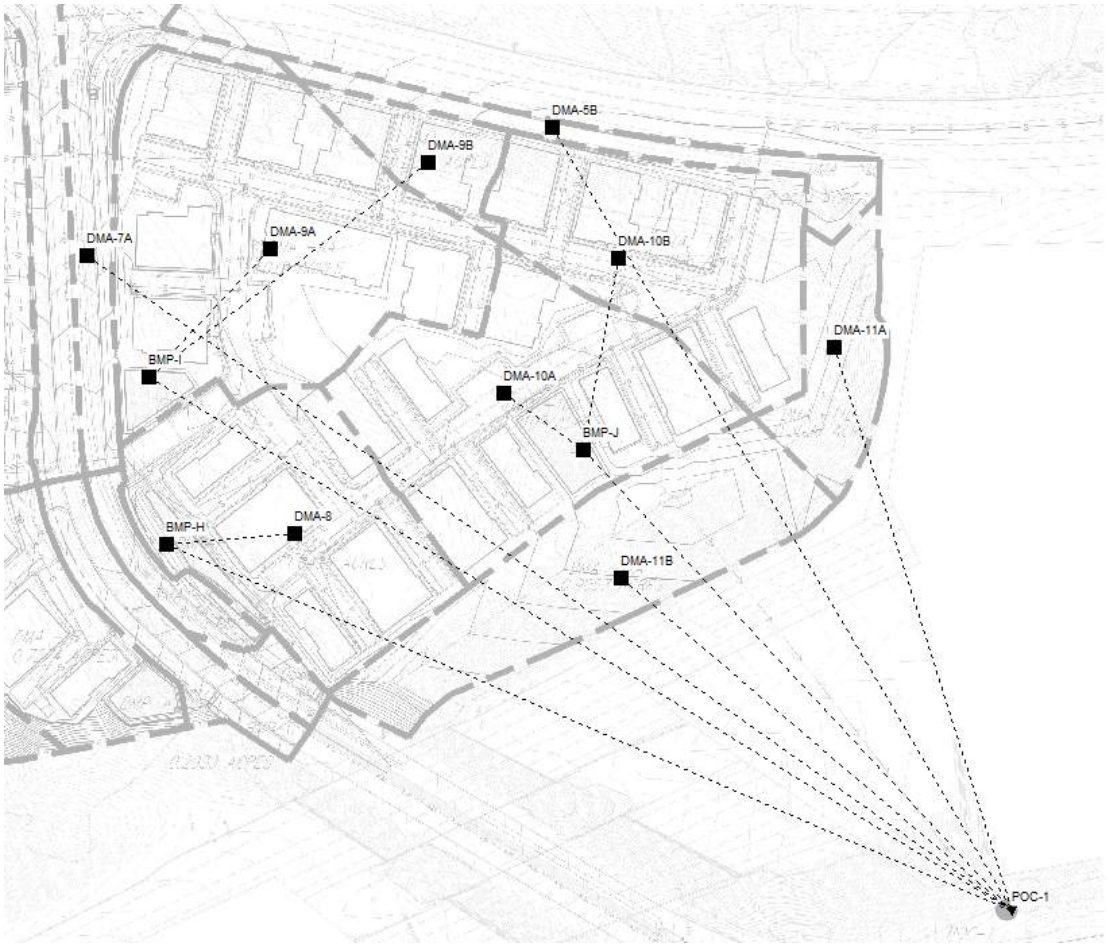


Figure-1.4. Typical

Rain Garden Section for the site



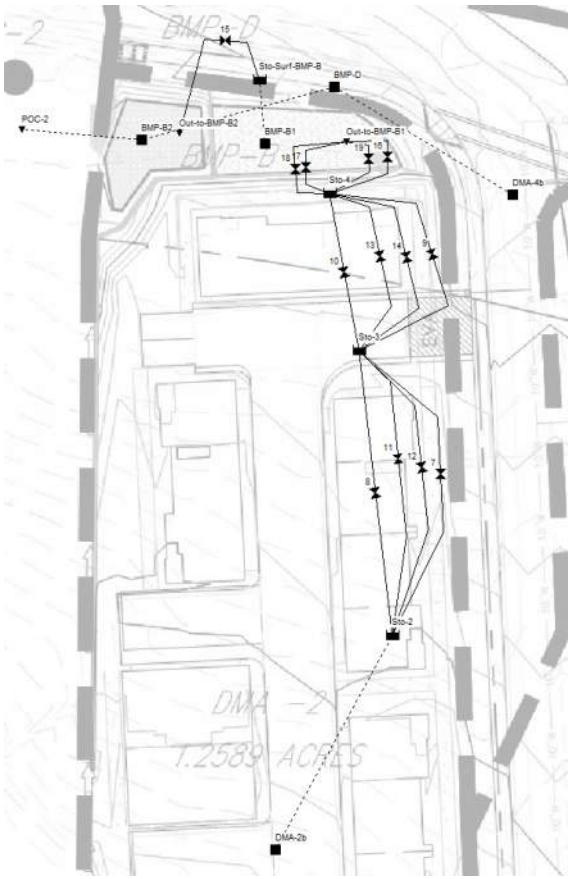


Fig.2 – SWMM Post-Development with Mitigation Model Poc1 and Poc2

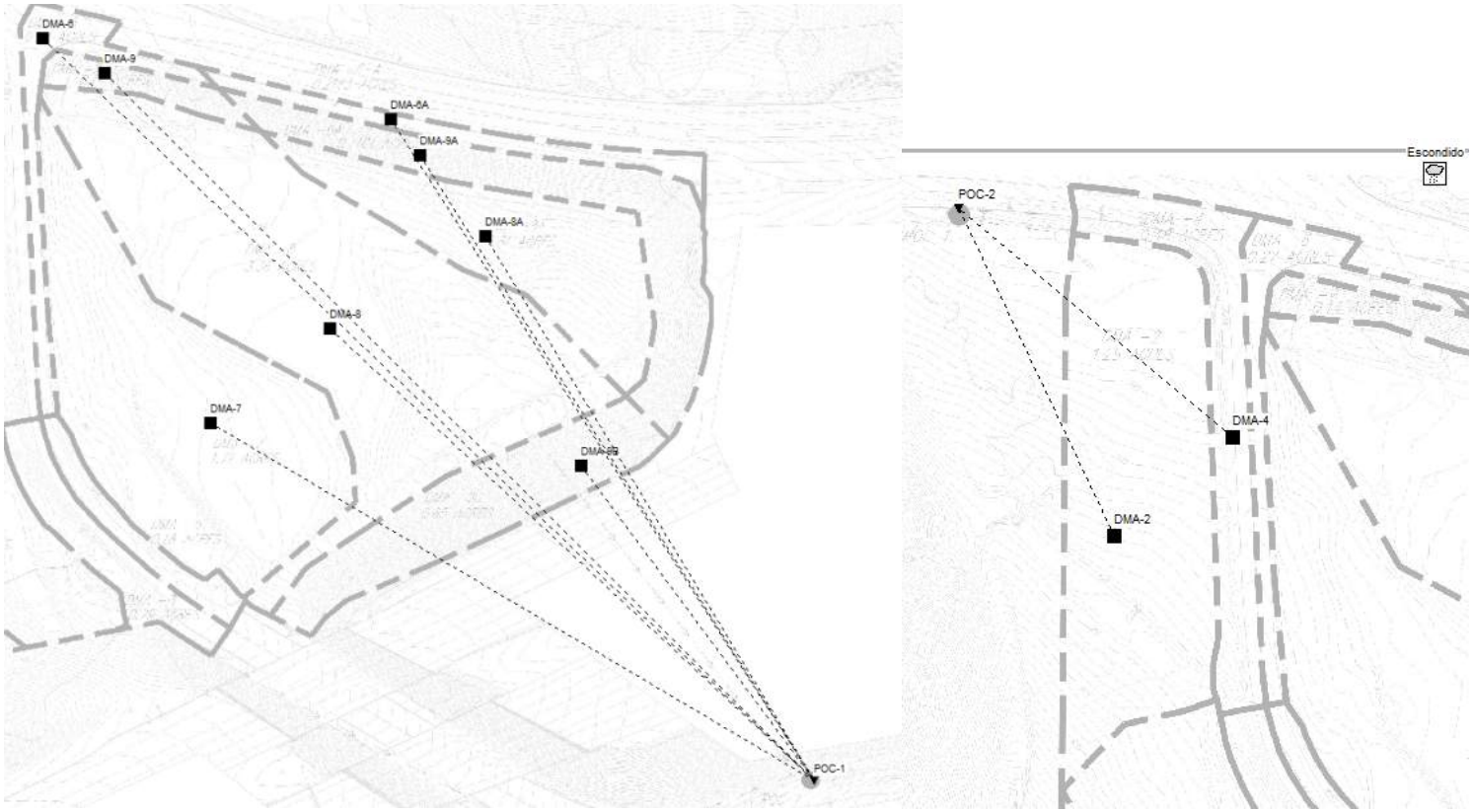


Fig.3 – SWMM Pre-Development Model POC1 and POC2

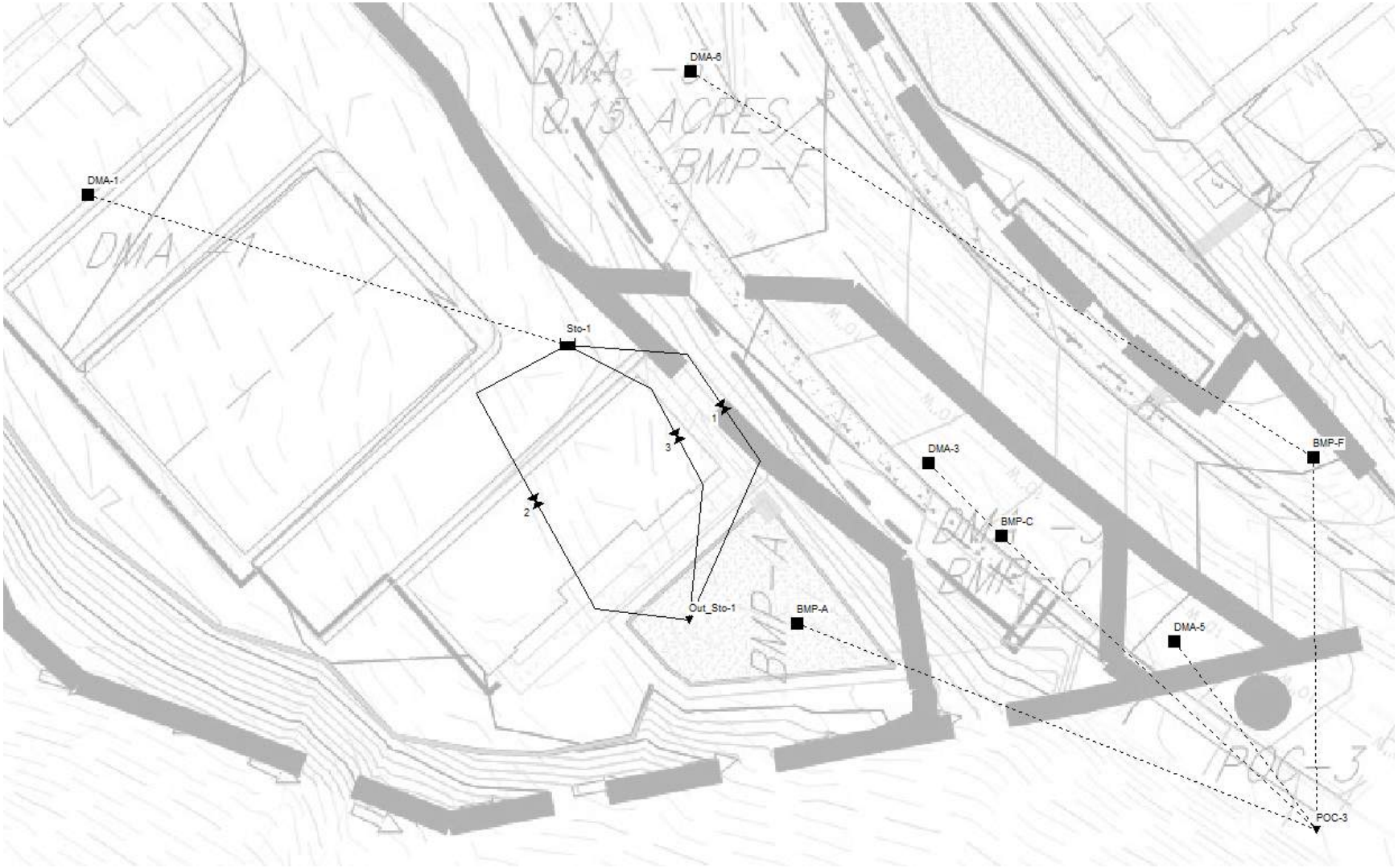


Fig.3 – SWMM Post-Development Model POC3

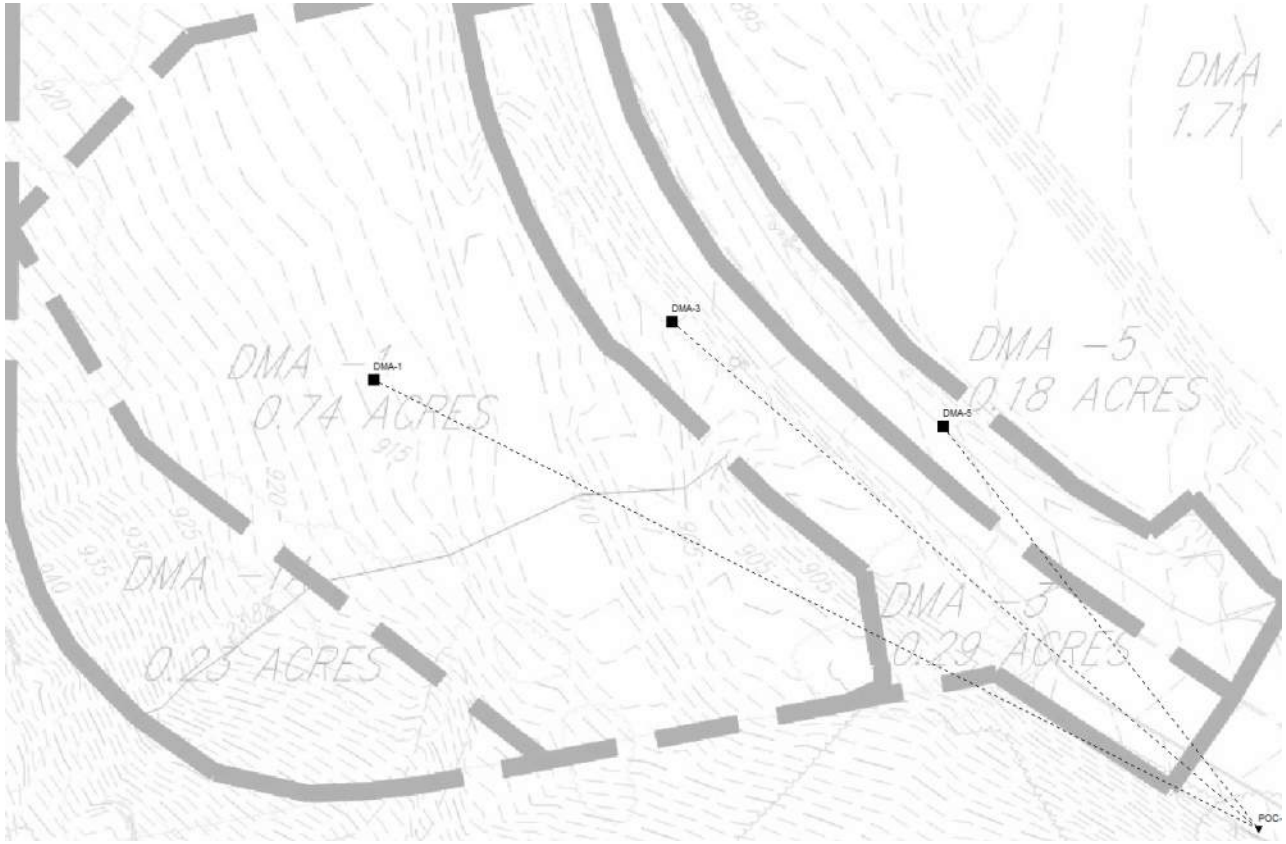


Fig.3 – SWMM Post-Development Model POC3

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 Nutmeg Homes DMAs drain to BMPs A-I. The de-minimus was minimized as much areas are bypassed to the POC designated for the project site (see hydromodification exhibit) to keep pre development flows.

DMA Table for Post-Development of POC-1

Post Development						
[SUBCATCHMENTS]						
Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope
DMA-7A	Escondido	POC-1	0.4894	48	45.10181	3.4
DMA-5B	Escondido	POC-1	0.2193	48	25.40226	0.2
DMA-8	Escondido	BMP-H	0.999843	70	300.0813	0.5
DMA-9A	Escondido	BMP-I	1.6139	67	239.1536	0.5
DMA-9B	Escondido	BMP-I	0.2571	67	8749.118	0.1
DMA-10A	Escondido	BMP-J	1.156	69	258.8174	1.4
DMA-10B	Escondido	BMP-J	0.876	69	246.2917	4
DMA-11A	Escondido	Poc-1	0.4372	0	284.1803	4
DMA-11B	Escondido	Poc-1	0.8487	0	207.7634	4.1
BMP-H	Escondido	POC-1	0.045757	0	19	0
BMP-I	Escondido	POC-1	0.0413	0	36	0
BMP-J	Escondido	POC-1	0.0719	0	40	0
DMA-2b	Escondido	Sto-2	1.142027	67	105.9345	1.9
BMP-B2	Escondido	POC-2	0.0188	0	24	0
BMP-B1	Escondido	Sto-Surf-BMP-B	0.031267	0	24	0
DMA-4b	Escondido	BMP-D	0.381315	87	46.46938	2.6
BMP-D	Escondido	Bmp-B2	0.00769	0	6	0
DMA-1	Escondido	Sto-1	0.809239	55	109.3409	1.5
DMA-3	Escondido	BMP-C	0.110394	50	44.63249	4.8
DMA-5	Escondido	POC-3	0.0165	100	15	5.1
DMA-6	Escondido	BMP-F	0.39596	78	35	2.5
BMP-A	Escondido	POC-3	0.038761	0	50	0
BMP-F	Escondido	POC-3	0.014233	0	7	0
BMP-C	Escondido	POC-3	0.003006	0	10	0
		Total Area	10.03			

DMA Table for Pre-Development of POC-1

Pre Development						
[SUBCATCHMENTS]						
Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope
DMA-1	Escondido	POC-3	0.8358	0	145.2608	23.8
DMA-5	Escondido	POC-3	0.1649	0	35.24834	3.4
DMA-3	Escondido	POC-3	0.2564	0	48.25916	5.4
DMA-2	Escondido	POC-2	1.2514	0	121.2805	15.5
DMA-4	Escondido	POC-2	0.4678	0	42.34932	3.5
DMA-9B	Escondido	POC-1	0.645891	0	294.5029	50
DMA-6	Escondido	POC-1	0.265565	0	33.17599	3.1
DMA-7	Escondido	POC-1	1.707346	0	260.7497	3.1
DMA-8	Escondido	POC-1	2.5455	0	207.8225	4
DMA-6A	Escondido	POC-1	0.218274	0	21.87082	1.4
DMA-9A	Escondido	Poc-1	0.71607	0	283.3705	40.6
DMA-9	Escondido	POC-1	0.144766	0	94.81678	40.6
DMA-8A	Escondido	POC-1	0.813453	0	229.2475	12.1
			10.03			

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.

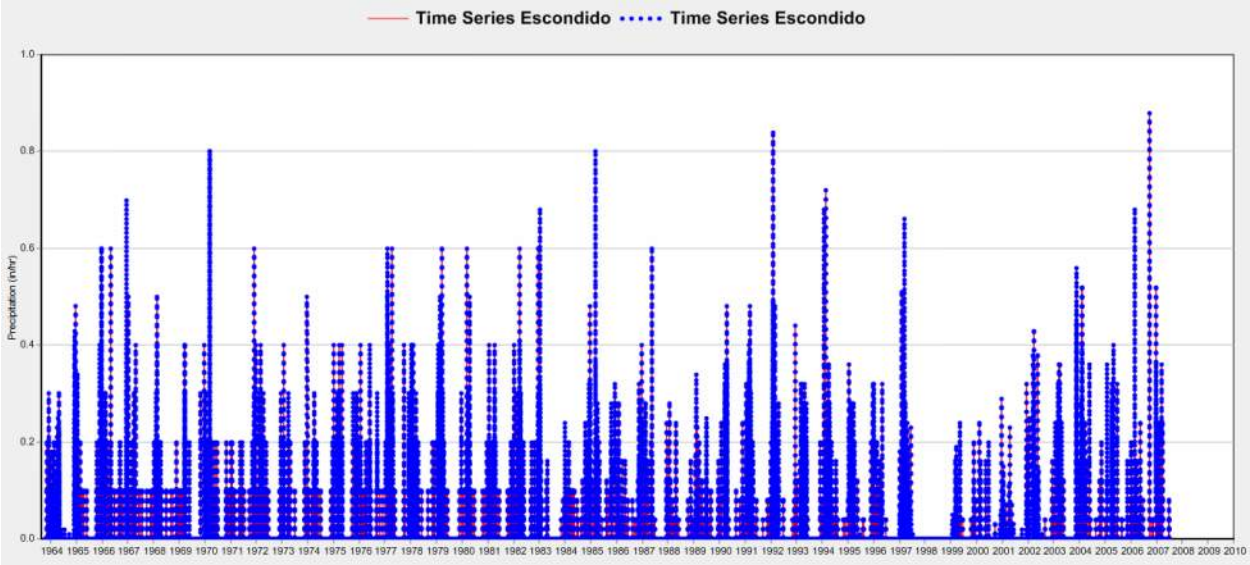


Fig. 2.1 – Time series rain data, which corresponds to runoff estimates for each of the 385,440 time steps (each date and hour) of the 44-year simulation period. (Inches/hour vs. elapsed time)

Rain Gauge

The properties of a rain gauge 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 gauge station. The Escondido rain station was chosen due to its data quality and its location to the project site.

The rain gauge 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 8/28/1951 to 5/23/2008 and generates 44 years of hourly runoff estimates, which corresponds to runoff estimates for each of the 508,080 time steps (each date and hour) of the 44 year simulation period. See figure 2.1 for hourly precipitation intensity graph for 44 years in inches.

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.

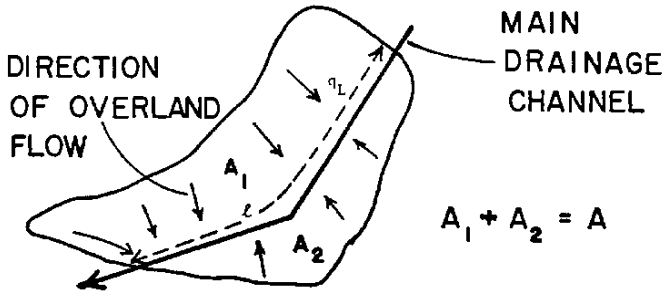


Figure-2-2 Irregular subcatchment shape for width calculations (DiGiano et al., 1977, p.165).

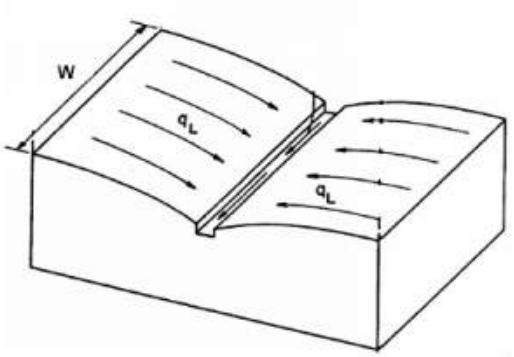


Figure-2-3 Idealized representation of a subcatchment.

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:

$$Y = 2X(1.5 - Z)(2K - X)/(2K - 1) \qquad (3\text{-}12)$$

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 on both the pre and post development is an average grass (0.05) as shown in Table 3-5 below. The ground is developed but small vegetation is of average size. For this project the source provided by Yen (2001) was used. A picture of the vegetation on site is in figure 2-4

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.

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

Figure 2 -4

Infiltration Model

The pre-development condition is primarily empty land with moderate vegetation cover. 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 C and, 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 HHSA 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 4 (in/day).

January	February	March	April	May	June
0.07	0.1	0.13	0.17	0.19	0.22
July	August	September	October	November	December
0.07	0.1	0.13	0.17	0.19	0.22

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

Storage Depth
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.

Vegetation Volume Fraction
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.

Surface Roughness
Manning's n value for overland flow over a vegetative surface.

Surface Slope
Slope of porous pavement surface or vegetative swale (percent).

2. Soil

Thickness
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).

Field Capacity
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. A factor of 3 inches is accounted for dead space and is removed from measurement on grading plans. With the 3 inches subtracted the flow line out of the gavel is Total Gravel depth – 3”

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):

$q = C(h\text{-}Hd)^n$

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

LID_CONTROLS		
Name	Type/Layer	Parameters
BMP-A	BC	
BMP-A	SURFACE	6
BMP-A	SOIL	18
BMP-A	STORAGE	12
BMP-A	DRAIN	0.080863226

BMP-J	BC	
BMP-J	SURFACE	6
BMP-J	SOIL	18
BMP-J	STORAGE	60
BMP-J	DRAIN	0.053537

BMP-F	BC	
BMP-F	SURFACE	6
BMP-F	SOIL	18
BMP-F	STORAGE	12
BMP-F	DRAIN	0.114781676

BMP-B1	BC	
BMP-B1	SURFACE	6
BMP-B1	SOIL	18
BMP-B1	STORAGE	12
BMP-B1	DRAIN	0.108261

BMP-H	BC	
BMP-H	SURFACE	6

BMP-B2	BC	
BMP-B2	SURFACE	24

BMP-H	SOIL	18
BMP-H	STORAGE	60
BMP-H	DRAIN	0.059324788

BMP-B2	SOIL	12
BMP-B2	STORAGE	72
BMP-B2	DRAIN	0.246638

BMP-I	BC	
BMP-I	SURFACE	6
BMP-I	SOIL	18
BMP-I	STORAGE	60
BMP-I	DRAIN	0.059777169

BMP-D	BC	
BMP-D	SURFACE	6
BMP-D	SOIL	18
BMP-D	STORAGE	36
BMP-D	DRAIN	0

BMP-A	BC	
BMP-A	SURFACE	6
BMP-A	SOIL	18
BMP-A	STORAGE	48
BMP-A	DRAIN	0.04849246

BMP-F	BC	
BMP-F	SURFACE	6
BMP-F	SOIL	18
BMP-F	STORAGE	48
BMP-F	DRAIN	0

BMP-C	BC	
BMP-C	SURFACE	6
BMP-C	SOIL	18
BMP-C	STORAGE	48
BMP-C	DRAIN	0

Note:

$q = C(h\text{-}Hd)^n$

C= $C_o A_o \frac{\sqrt{2g}}{A} \times 12^{0.5} \times 3600$

SECTION V. MODELING BIO-FILTRATIONSURFACE PONDING

The main elements used to design surface ponding in SWMM are storage units (labeled as IMP_Pond) with orifice and weir outlets.

1. Storage Units

Storage units are drainage system nodes that provide storage volume. Physically they could represent storage facilities as small as a catch basin or as large as a lake. The volumetric properties of a storage unit are described by a function or table of surface area versus height. Storage volume is described by a storage curve, an evaporation factor and a maximum depth of storage.

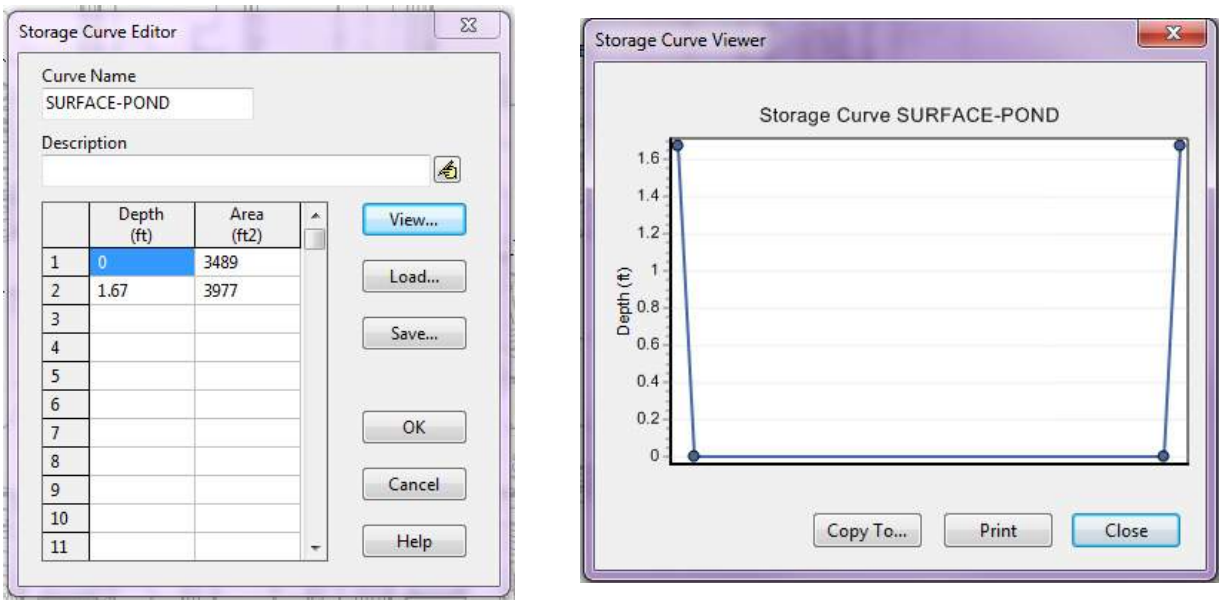


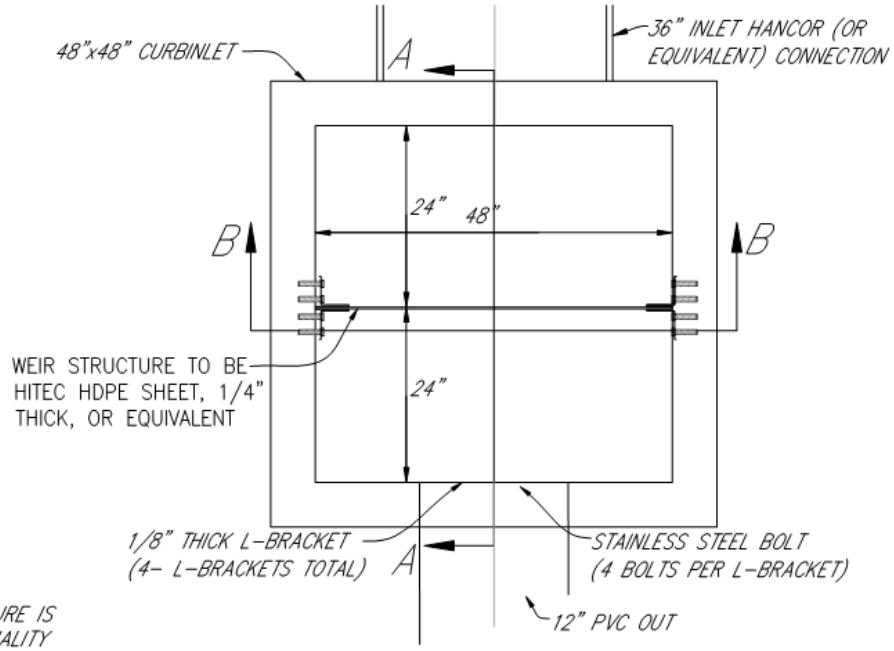
Figure 5 – Example Storage Curve for Storage Unit

2. Orifices

SWMM's orifice-type link can be used to represent the opening along the side or bottom of the storage unit that serves as an outlet. The upstream node of the orifice is the storage unit while its downstream node would be a junction that connects it to a downstream conduit. A circular shaped orifice was selected to drain the ponding water.

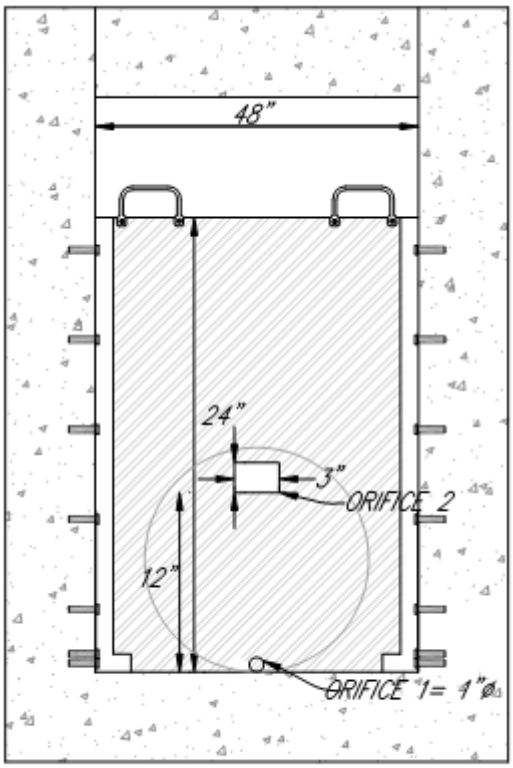
3. Weirs

A Rectangular-shaped weir was used to represent the weir at the stand box riser. See Details of weir below.

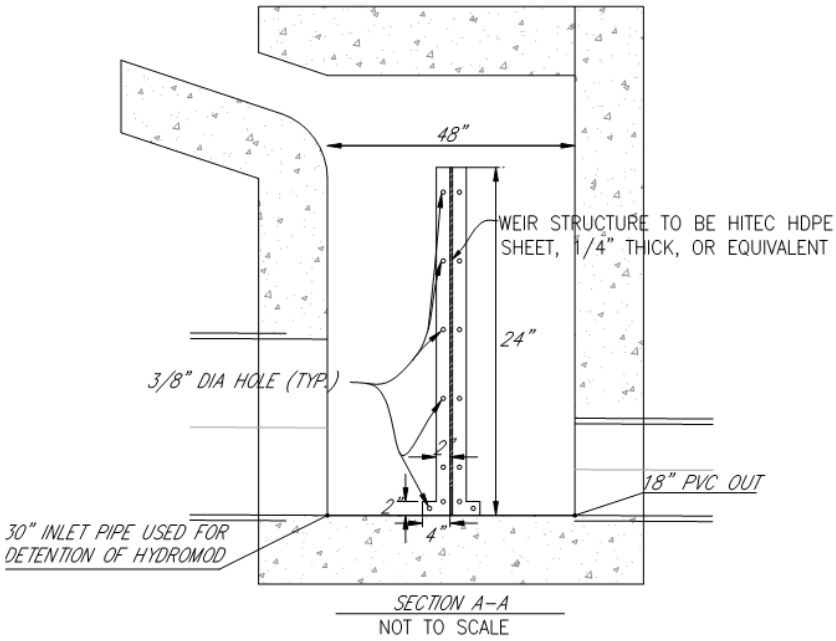


WEIR CONTROL STRUCTURE 1
PLAN VIEW
NOT TO SCALE

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



SECTION B-B
NOT TO SCALE



SECTION A-A
NOT TO SCALE

WEIR CONTROL STRUCTURE 1
DETAIL

Adding a Storage Unit, orifice and weirs to the Model

The following steps are taken to define the storage unit.

1. A new Storage Curve object labeled as Sto-BMP# is created to represent the shape of the storage unit. A new Storage Curve object labeled Sto-1 is created to represent the water detained behind the weir in a detention pipe.
2. This storage unit was a part of bio-filtration model connected from a flow divider from Subcatchment which is assigned as LID. This conduit represents runoff that is not percolating into the soil and collected in the surface storage creating pond.
3. The two previously determined depth-area points are entered into the Curve Editor dialog for the curve SURFACE_PONDING.
4. The following properties are assigned to a storage unit labeled as "Surface_Pond". Storage Curve = Tabular; Curve Name =Sto-1; Invert Elevation 0 ft (assumption); Maximum Depth=2.5 ft and Initial Depth = 0 ft (the simulation starts when the pond empty).
5. Add weir represents the plate in the curb inlet that will allow water to back up into the detention pipe and ; Type=transverse; Height=1.5'; Crest Length=3'; inlet offset=24"; Discharge coefficient=3.33. For the weir in a detention system the height is from the flowline of the pipe to the top of the plate in the box 2'
6. Add 2 orifices as the multi-stage surface pond system connecting the storage to outfall; type=sideflow; Diameter =0.0833" (1"); a second orifice at an offset of =1' with a height of 0.16667' and a length of 0.25'

Sizing Orifice and Weir

Similar to sizing the bio-filtration area, Orifices and Weir are sized based on the comparison between peak flow duration and the peak flow frequency for pre-and mitigated post-development conditions. Therefore, the entire model should be set up completely with assumed parameters. This calculation is an iterative process until those two comparisons meet the Hydromodification criteria**.**

The Storage Nodes used in this project are as follows:

A storage Node is used in POC 3 to represent the detention that that will be withheld and released at a slower rate to meet hydromodification compliance yet allow high flows and Q100 to continue through the system.

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 44-yr simulation. The runoff continuity error is -6.51 % 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.

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

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.

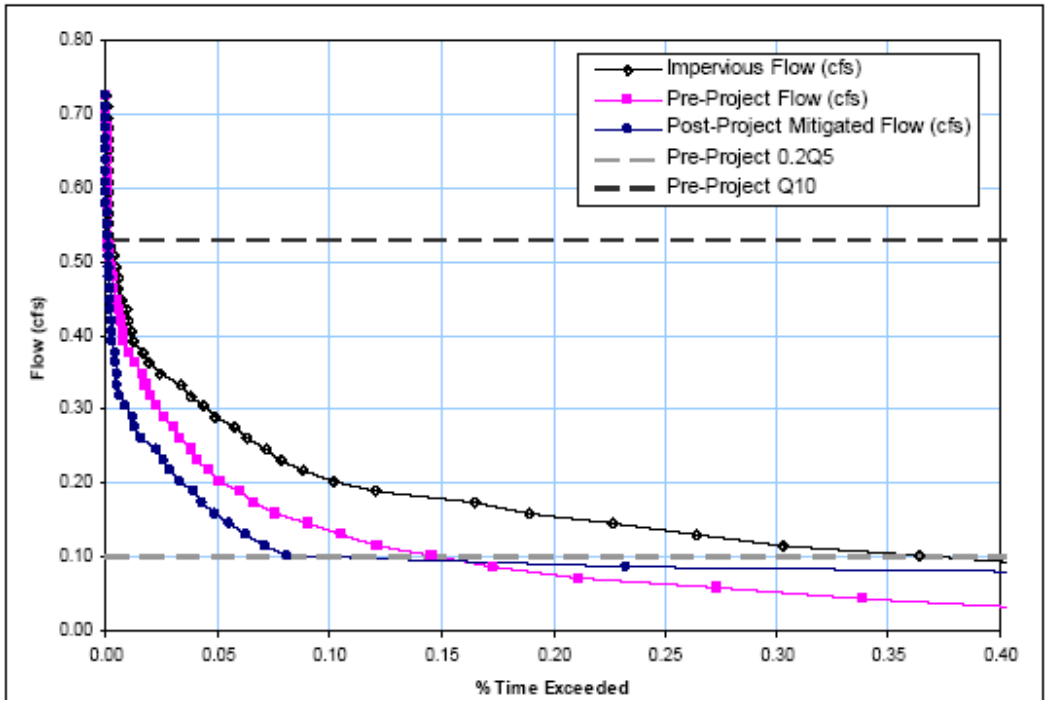


Figure 6-1. Flow Duration Series Statistics for a Hypothetical Development Scenario

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 $Q_{10\,a}$nd 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 4^{th}, 5^{th}, and 6^{th} 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 5.1 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 6 biofiltration basins (labeled as BMP-# (Best Management Practices) with a total tributary area of approximately 10.03 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.

Nutmeg Homes

On POC-1 through POC-3, The flow duration curve on the following page shows the existing condition is as follows
POC-1 = (365(daysx24(hr/day)x0.143(%)=12.5(hours/year)
POC-2 = (365(daysx24(hr/day)x0.082(%)=7.2(hours/year)
POC-3 = (365(daysx24(hr/day)x0.083(%)=7.3(hours/year)

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 as follows
POC-1 = (365(daysx24(hr/day)x0.143(%)=12.5(hours/year)
POC-2 = (365(daysx24(hr/day)x0.077(%)=6.7(hours/year)
POC-3 = (365(daysx24(hr/day)x0.091(%)=8.0(hours/year)

POC-1 and POC-2 as lower than the predevelopment and POC-3 although higher than the predevelopment is within the 10% allowable; therefore all POCs area within compliance

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).

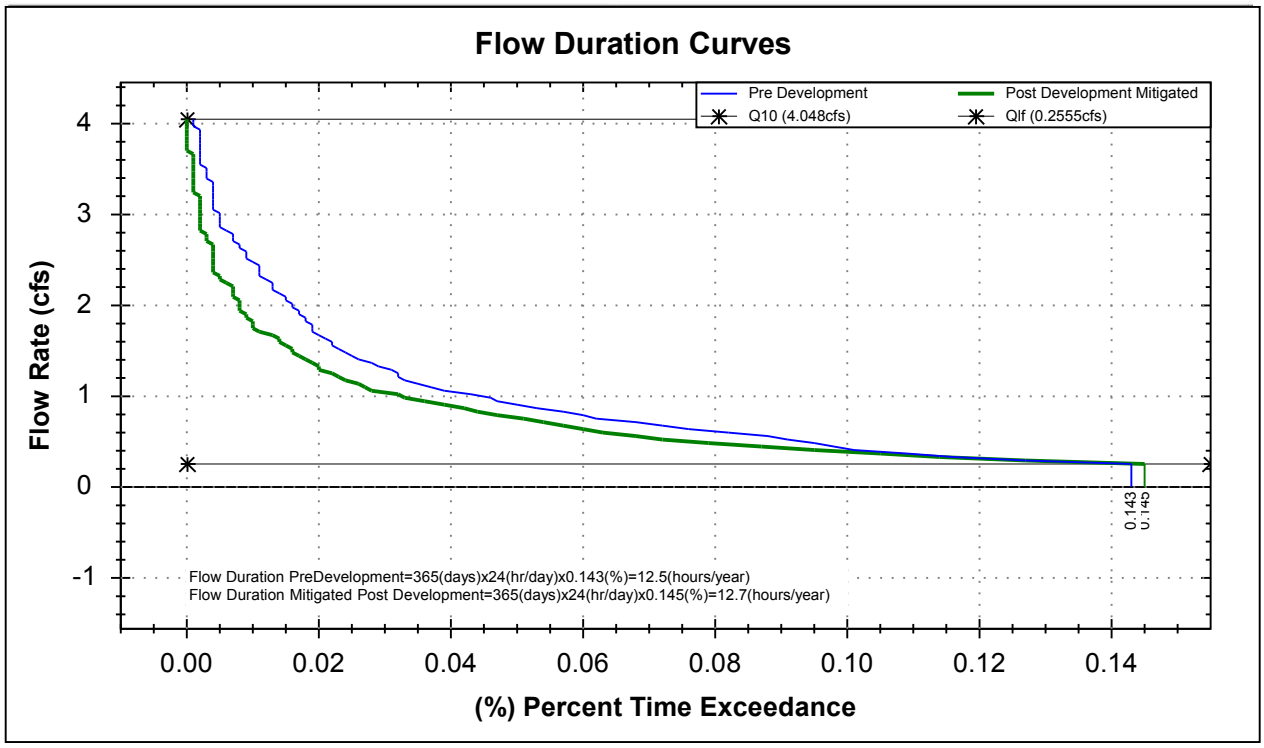


Table 7-1 POC-1

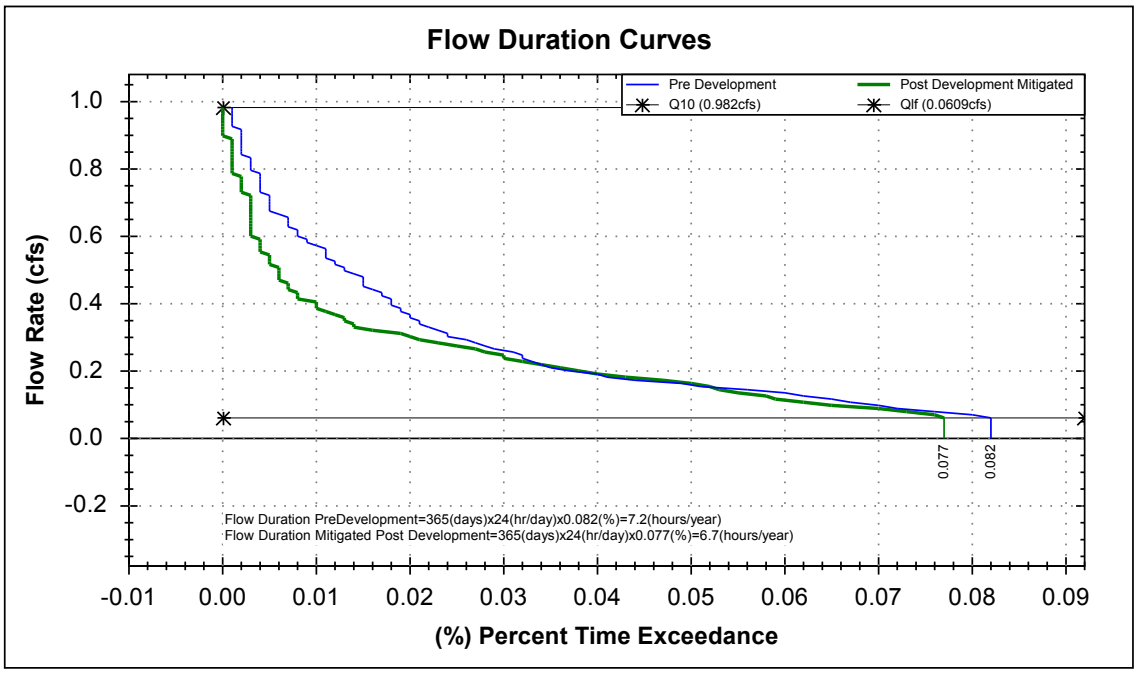


Table 7-1 POC-2

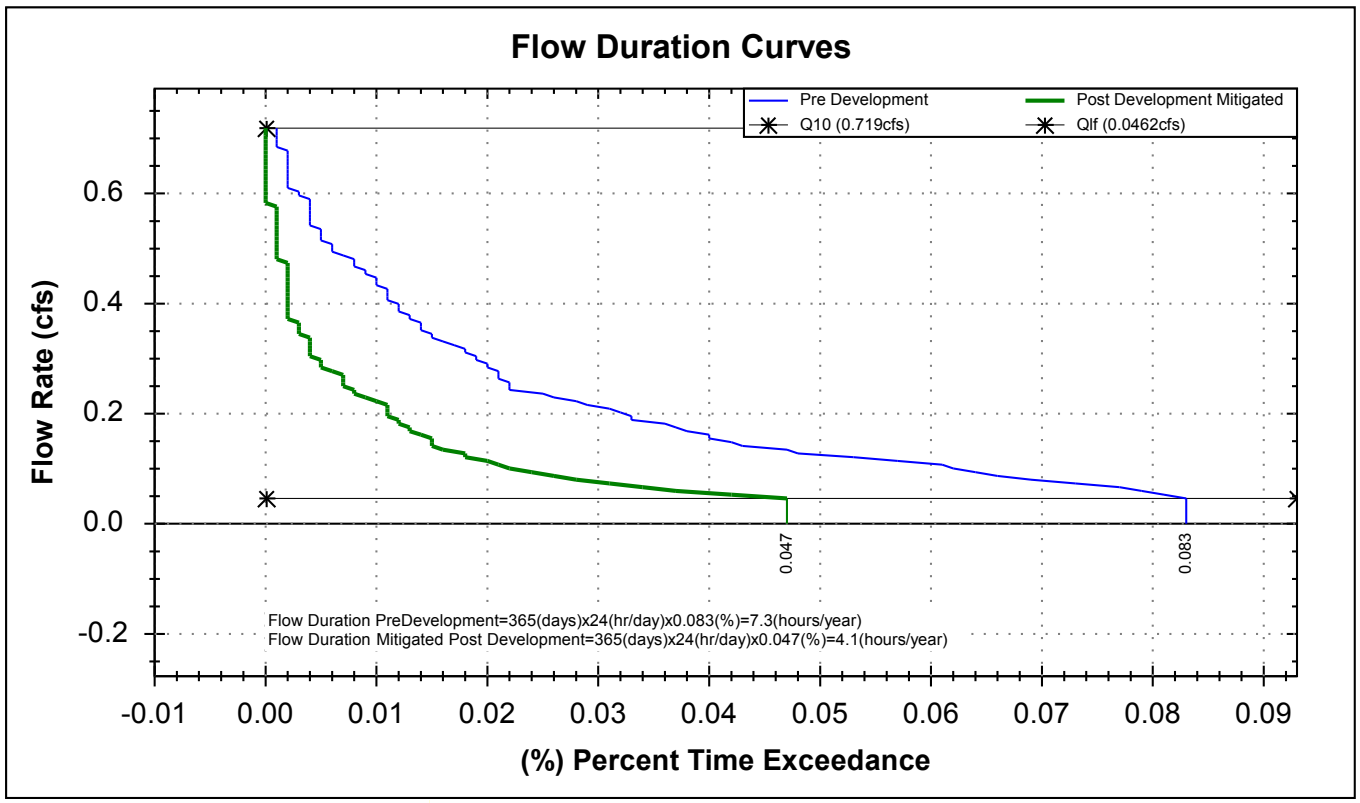


Table 7-1 POC-3

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: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\POC-1\17046-Pre-Development-poc1.out
SWMM file time stamp: 9/20/2018 3:25:02 PM
Selected Node to Analyze: POC-1

POST-DEVELOPMENT MITIGATED SWMM FILE

SWMM file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\POC-1\17046-Post-Development-poc1.out
SWMM file time stamp: 1/31/2019 3:36:25 PM
Selected Node to Analyze: POC-1

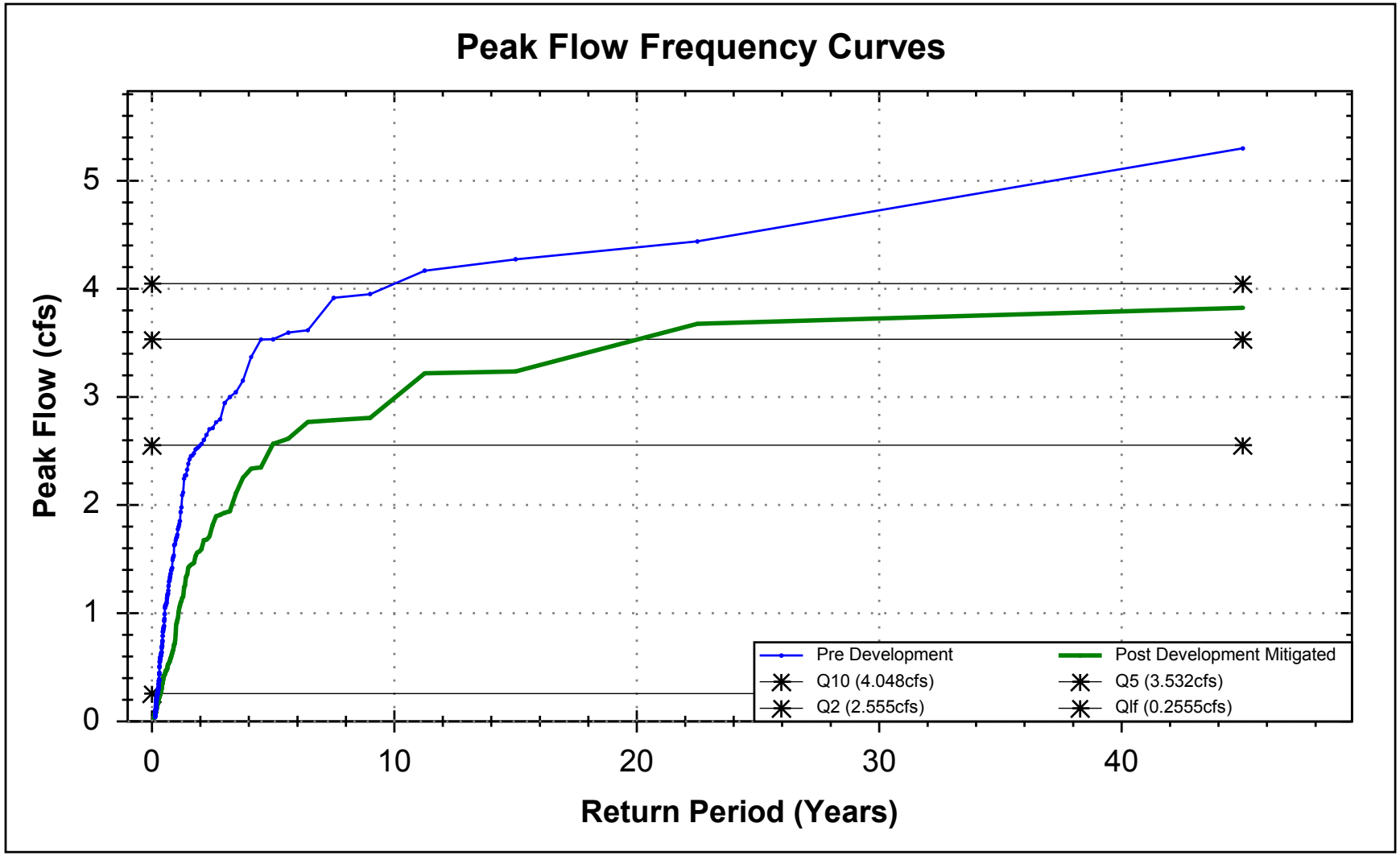
MITIGATED CONDITIONS RESULTS

For the Mitigated Conditions:

Peak Flow Conditions PASS
Flow Duration Conditions PASS

The Mitigated Conditions peak flow frequency curve is composed of 462 points. Of the points, 0 point(s) are above the flow control upper limit (Q10), 330 point(s) are below the low flow threshold value (Qlf). Of the points within the flow control range (Qlf to Q10), 132 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, 98 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)
0
1
2
3
4
5
0
10
20
30
40
Return Period (Years)
Pre Development
Post Development Mitigated
Q10 (4.048cfs)
Q5 (3.532cfs)
Q2 (2.555cfs)
Qlf (0.2555cfs)

Compare Post-Development Curve to Pre-Development Curve

post-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\POC-1\17046-Post-Development-poc1.out
post-development time stamp: 1/31/2019 3:36:25 PM
Compared to:
pre-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\POC-1\17046-Pre-Development-poc1.out
pre-development time stamp: 9/20/2018 3:25:02 PM

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
0	45.00	3.82	5.30	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
1	22.50	3.68	4.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
2	15.00	3.24	4.27	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
3	11.25	3.22	4.17	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
4	9.00	2.81	3.95	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
5	7.50	2.79	3.92	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
6	6.43	2.77	3.62	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
7	5.63	2.61	3.59	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
8	5.00	2.57	3.53	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
9	4.50	2.35	3.53	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
10	4.09	2.34	3.37	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
11	3.75	2.25	3.15	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
12	3.46	2.11	3.04	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
13	3.21	1.94	3.00	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
14	3.00	1.93	2.94	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
15	2.81	1.91	2.79	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
16	2.65	1.90	2.77	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
17	2.50	1.81	2.71	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
18	2.37	1.71	2.70	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
19	2.25	1.68	2.65	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
20	2.14	1.68	2.60	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
21	2.05	1.59	2.56	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
22	1.96	1.57	2.55	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
23	1.88	1.56	2.53	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
24	1.80	1.53	2.52	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
25	1.73	1.46	2.48	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
26	1.67	1.46	2.46	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
27	1.61	1.45	2.45	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
28	1.55	1.43	2.42	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
29	1.50	1.42	2.38	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
30	1.45	1.36	2.33	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
31	1.41	1.34	2.28	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
32	1.36	1.26	2.27	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
33	1.32	1.24	2.24	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	1.15	2.12	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
35	1.25	1.14	2.09	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
36	1.22	1.11	1.98	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
37	1.18	1.10	1.93	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
38	1.15	1.07	1.85	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
39	1.13	1.05	1.82	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
40	1.10	1.01	1.80	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
41	1.07	0.95	1.78	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
42	1.05	0.94	1.73	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
43	1.02	0.91	1.70	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
44	1.00	0.90	1.69	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
45	0.98	0.80	1.67	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
46	0.96	0.75	1.64	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
47	0.94	0.72	1.64	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
48	0.92	0.71	1.63	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
49	0.90	0.69	1.53	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
50	0.88	0.66	1.52	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
51	0.87	0.66	1.51	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
52	0.85	0.65	1.49	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
53	0.83	0.63	1.42	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
54	0.82	0.62	1.41	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
55	0.80	0.61	1.40	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
56	0.79	0.59	1.40	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
57	0.78	0.59	1.37	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
58	0.76	0.58	1.36	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
59	0.75	0.57	1.34	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
60	0.74	0.56	1.32	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
61	0.73	0.55	1.30	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
62	0.71	0.54	1.30	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
63	0.70	0.54	1.29	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
64	0.69	0.54	1.26	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
65	0.68	0.53	1.25	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
66	0.67	0.53	1.21	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
67	0.66	0.53	1.18	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
68	0.65	0.52	1.18	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
69	0.64	0.50	1.17	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
70	0.63	0.49	1.16	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
71	0.63	0.48	1.14	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
72	0.62	0.48	1.12	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
73	0.61	0.48	1.10	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
74	0.60	0.47	1.10	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
75	0.59	0.47	1.09	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	0.47	1.08	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
77	0.58	0.47	1.08	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
78	0.57	0.47	1.08	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
79	0.56	0.46	1.07	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
80	0.56	0.45	1.07	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
81	0.55	0.45	1.07	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
82	0.54	0.44	1.06	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
83	0.54	0.44	1.05	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
84	0.53	0.44	0.99	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
85	0.52	0.43	0.99	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
86	0.52	0.43	0.95	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
87	0.51	0.43	0.94	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
88	0.51	0.42	0.93	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
89	0.50	0.42	0.88	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
90	0.50	0.42	0.88	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
91	0.49	0.42	0.87	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
92	0.48	0.42	0.87	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
93	0.48	0.41	0.86	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
94	0.47	0.40	0.86	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
95	0.47	0.39	0.85	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
96	0.46	0.38	0.84	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
97	0.46	0.38	0.84	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
98	0.46	0.38	0.83	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
99	0.45	0.38	0.83	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
100	0.45	0.37	0.79	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
101	0.44	0.37	0.79	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
102	0.44	0.35	0.74	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
103	0.43	0.35	0.74	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
104	0.43	0.35	0.74	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
105	0.43	0.35	0.72	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
106	0.42	0.35	0.70	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
107	0.42	0.33	0.69	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
108	0.41	0.33	0.69	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
109	0.41	0.33	0.69	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
110	0.41	0.31	0.69	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
111	0.40	0.31	0.67	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
112	0.40	0.31	0.64	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
113	0.40	0.30	0.64	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
114	0.39	0.30	0.64	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
115	0.39	0.29	0.63	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
116	0.39	0.29	0.62	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
117	0.38	0.29	0.62	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
118	0.38	0.28	0.62	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
119	0.38	0.28	0.62	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
120	0.37	0.28	0.61	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
121	0.37	0.28	0.61	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
122	0.37	0.27	0.61	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
123	0.36	0.27	0.60	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
124	0.36	0.26	0.60	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
125	0.36	0.26	0.60	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
126	0.35	0.26	0.60	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
127	0.35	0.26	0.59	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
128	0.35	0.26	0.59	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
129	0.35	0.26	0.59	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
130	0.34	0.26	0.59	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
131	0.34	0.26	0.58	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
132	0.34	0.25	0.58	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
133	0.34	0.25	0.57	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
134	0.33	0.25	0.57	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
135	0.33	0.25	0.57	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
136	0.33	0.24	0.56	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
137	0.33	0.24	0.55	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
138	0.32	0.24	0.55	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
139	0.32	0.24	0.54	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
140	0.32	0.23	0.51	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
141	0.32	0.23	0.51	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
142	0.32	0.23	0.51	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
143	0.31	0.23	0.50	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
144	0.31	0.23	0.50	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
145	0.31	0.23	0.45	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
146	0.31	0.23	0.45	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
147	0.30	0.23	0.44	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
148	0.30	0.23	0.43	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
149	0.30	0.23	0.39	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
150	0.30	0.23	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
151	0.30	0.22	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
152	0.29	0.22	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
153	0.29	0.22	0.38	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
154	0.29	0.22	0.37	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
155	0.29	0.22	0.37	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
156	0.29	0.21	0.37	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
157	0.29	0.21	0.36	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
158	0.28	0.21	0.35	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
159	0.28	0.21	0.34	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	0.20	0.34	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
161	0.28	0.20	0.34	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
162	0.28	0.20	0.34	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
163	0.27	0.20	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
164	0.27	0.20	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
165	0.27	0.20	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
166	0.27	0.19	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
167	0.27	0.19	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
168	0.27	0.19	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
169	0.27	0.19	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
170	0.26	0.19	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
171	0.26	0.19	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
172	0.26	0.19	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
173	0.26	0.18	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
174	0.26	0.18	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
175	0.26	0.18	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
176	0.25	0.18	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
177	0.25	0.18	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
178	0.25	0.18	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
179	0.25	0.18	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
180	0.25	0.18	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
181	0.25	0.18	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
182	0.25	0.18	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
183	0.25	0.18	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
184	0.24	0.18	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
185	0.24	0.18	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
186	0.24	0.18	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
187	0.24	0.17	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
188	0.24	0.17	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
189	0.24	0.17	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
190	0.24	0.17	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
191	0.23	0.17	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
192	0.23	0.17	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
193	0.23	0.16	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
194	0.23	0.16	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
195	0.23	0.16	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
196	0.23	0.16	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
197	0.23	0.16	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
198	0.23	0.16	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
199	0.23	0.16	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
200	0.22	0.16	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
201	0.22	0.16	0.25	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	0.16	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
203	0.22	0.16	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
204	0.22	0.15	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
205	0.22	0.15	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
206	0.22	0.15	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
207	0.22	0.15	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
208	0.22	0.15	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
209	0.21	0.15	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
210	0.21	0.15	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
211	0.21	0.15	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
212	0.21	0.15	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
213	0.21	0.15	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
214	0.21	0.15	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
215	0.21	0.15	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
216	0.21	0.15	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
217	0.21	0.15	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
218	0.21	0.15	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
219	0.21	0.15	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
220	0.20	0.14	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
221	0.20	0.14	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
222	0.20	0.14	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
223	0.20	0.14	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
224	0.20	0.14	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
225	0.20	0.14	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
226	0.20	0.14	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
227	0.20	0.14	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
228	0.20	0.14	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
229	0.20	0.14	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
230	0.20	0.13	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
231	0.19	0.13	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
232	0.19	0.13	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
233	0.19	0.13	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
234	0.19	0.12	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
235	0.19	0.12	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
236	0.19	0.12	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
237	0.19	0.12	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
238	0.19	0.12	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
239	0.19	0.12	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
240	0.19	0.12	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
241	0.19	0.12	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
242	0.19	0.12	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
243	0.18	0.12	0.20	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	0.11	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
245	0.18	0.11	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
246	0.18	0.11	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
247	0.18	0.11	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
248	0.18	0.11	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
249	0.18	0.11	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
250	0.18	0.11	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
251	0.18	0.11	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
252	0.18	0.11	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
253	0.18	0.10	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
254	0.18	0.10	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
255	0.18	0.10	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
256	0.18	0.10	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
257	0.17	0.10	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
258	0.17	0.10	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
259	0.17	0.10	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
260	0.17	0.10	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
261	0.17	0.10	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
262	0.17	0.10	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
263	0.17	0.10	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
264	0.17	0.10	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
265	0.17	0.10	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
266	0.17	0.09	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
267	0.17	0.09	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
268	0.17	0.09	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
269	0.17	0.09	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
270	0.17	0.09	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
271	0.17	0.09	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
272	0.17	0.09	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
273	0.16	0.09	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
274	0.16	0.09	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
275	0.16	0.09	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
276	0.16	0.09	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
277	0.16	0.09	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
278	0.16	0.09	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
279	0.16	0.09	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
280	0.16	0.09	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
281	0.16	0.09	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
282	0.16	0.08	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
283	0.16	0.08	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
284	0.16	0.08	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
285	0.16	0.08	0.11	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	0.08	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
287	0.16	0.08	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
288	0.16	0.08	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
289	0.16	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
290	0.16	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
291	0.15	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
292	0.15	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
293	0.15	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
294	0.15	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
295	0.15	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
296	0.15	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
297	0.15	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
298	0.15	0.08	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
299	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
300	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
301	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
302	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
303	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
304	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
305	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
306	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
307	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
308	0.15	0.08	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
309	0.15	0.08	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
310	0.15	0.08	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
311	0.14	0.08	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
312	0.14	0.07	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
313	0.14	0.07	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
314	0.14	0.07	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
315	0.14	0.07	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
316	0.14	0.07	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
317	0.14	0.07	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
318	0.14	0.07	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
319	0.14	0.07	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
320	0.14	0.07	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
321	0.14	0.07	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
322	0.14	0.07	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
323	0.14	0.07	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
324	0.14	0.07	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
325	0.14	0.07	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
326	0.14	0.07	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
327	0.13	0.07	0.03	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	0.13	0.07	0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
329	0.13	0.07	0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
330	0.13	0.07	0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
331	0.13	0.07	0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
332	0.13	0.07	0.00	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
333	0.13	0.07	0.00	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
334	0.13	0.07	0.00	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
335	0.13	0.07	-0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
336	0.13	0.07	-0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
337	0.13	0.07	-0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
338	0.13	0.07	-0.01	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
339	0.13	0.07	-0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
340	0.13	0.07	-0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
341	0.13	0.07	-0.02	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
342	0.13	0.07	-0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
343	0.13	0.07	-0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
344	0.13	0.07	-0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
345	0.13	0.07	-0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
346	0.13	0.07	-0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
347	0.13	0.07	-0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
348	0.12	0.07	-0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
349	0.12	0.07	-0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
350	0.12	0.07	-0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
351	0.12	0.07	-0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
352	0.12	0.06	-0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
353	0.12	0.06	-0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
354	0.12	0.06	-0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
355	0.12	0.06	-0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
356	0.12	0.06	-0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
357	0.12	0.06	-0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
358	0.12	0.06	-0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
359	0.12	0.06	-0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
360	0.12	0.06	-0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
361	0.12	0.06	-0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
362	0.12	0.06	-0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
363	0.12	0.06	-0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
364	0.12	0.06	-0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
365	0.12	0.06	-0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
366	0.12	0.06	-0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
367	0.12	0.06	-0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
368	0.12	0.06	-0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
369	0.12	0.06	-0.08	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	0.06	-0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
371	0.12	0.06	-0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
372	0.12	0.06	-0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
373	0.11	0.06	-0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
374	0.11	0.06	-0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
375	0.11	0.06	-0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
376	0.11	0.06	-0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
377	0.11	0.06	-0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
378	0.11	0.06	-0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
379	0.11	0.05	-0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
380	0.11	0.05	-0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
381	0.11	0.05	-0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
382	0.11	0.05	-0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
383	0.11	0.05	-0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
384	0.11	0.05	-0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
385	0.11	0.05	-0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
386	0.11	0.05	-0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
387	0.11	0.05	-0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
388	0.11	0.05	-0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
389	0.11	0.05	-0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
390	0.11	0.05	-0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
391	0.11	0.05	-0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
392	0.11	0.05	-0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
393	0.11	0.05	-0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
394	0.11	0.05	-0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
395	0.11	0.05	-0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
396	0.11	0.05	-0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
397	0.11	0.05	-0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
398	0.11	0.05	-0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
399	0.11	0.05	-0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
400	0.11	0.04	-0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
401	0.11	0.04	-0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
402	0.11	0.04	-0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
403	0.11	0.04	-0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
404	0.11	0.04	-0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
405	0.11	0.04	-0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
406	0.11	0.04	-0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
407	0.11	0.04	-0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
408	0.11	0.04	-0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
409	0.10	0.04	-0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
410	0.10	0.04	-0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
411	0.10	0.04	-0.17	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	0.10	0.04	-0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
413	0.10	0.04	-0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
414	0.10	0.04	-0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
415	0.10	0.04	-0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
416	0.10	0.04	-0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
417	0.10	0.04	-0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
418	0.10	0.04	-0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
419	0.10	0.04	-0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
420	0.10	0.04	-0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
421	0.10	0.04	-0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
422	0.10	0.04	-0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
423	0.10	0.04	-0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
424	0.10	0.04	-0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
425	0.10	0.04	-0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
426	0.10	0.04	-0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
427	0.10	0.04	-0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
428	0.10	0.04	-0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
429	0.10	0.04	-0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
430	0.10	0.04	-0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
431	0.10	0.04	-0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
432	0.10	0.04	-0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
433	0.10	0.04	-0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
434	0.10	0.04	-0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
435	0.10	0.04	-0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
436	0.10	0.04	-0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
437	0.10	0.04	-0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
438	0.10	0.04	-0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
439	0.10	0.04	-0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
440	0.10	0.04	-0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
441	0.10	0.04	-0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
442	0.10	0.04	-0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
443	0.10	0.04	-0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
444	0.10	0.04	-0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
445	0.10	0.04	-0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
446	0.09	0.04	-0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
447	0.09	0.04	-0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
448	0.09	0.04	-0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
449	0.09	0.04	-0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
450	0.09	0.04	-0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
451	0.09	0.04	-0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
452	0.09	0.04	-0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
453	0.09	0.04	-0.24	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	0.09	0.04	-0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
455	0.09	0.04	-0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
456	0.09	0.04	-0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
457	0.09	0.04	-0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
458	0.09	0.04	-0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
459	0.09	0.04	-0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
460	0.09	0.04	-0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
461	0.09	0.04	-0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

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SWMM.out time stamp: 9/20/2018 3:25:02 PM

Q10: 4.048
Q5: 3.532
Q2: 2.555

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	5.299	0.30%	45
2	1971/02/23 05:00:00	1971/02/23 12:00:00	8	4.439	0.60%	22.5
3	1995/01/04 15:00:00	1995/01/05 02:00:00	12	4.273	0.91%	15
4	1995/01/25 08:00:00	1995/01/25 22:00:00	15	4.168	1.21%	11.25
5	1998/02/14 13:00:00	1998/02/14 22:00:00	10	3.951	1.51%	9
6	1986/02/15 01:00:00	1986/02/15 08:00:00	8	3.916	1.81%	7.5
7	1966/12/05 01:00:00	1966/12/06 23:00:00	47	3.616	2.11%	6.43
8	1978/03/16 22:00:00	1978/03/18 14:00:00	41	3.595	2.42%	5.63
9	1983/03/01 14:00:00	1983/03/03 08:00:00	43	3.532	2.72%	5
10	1978/01/16 06:00:00	1978/01/16 13:00:00	8	3.531	3.02%	4.5
11	1967/11/19 06:00:00	1967/11/20 03:00:00	22	3.369	3.32%	4.09
12	1988/04/20 07:00:00	1988/04/21 22:00:00	40	3.151	3.63%	3.75
13	1983/12/25 06:00:00	1983/12/25 19:00:00	14	3.044	3.93%	3.46
14	2004/10/18 09:00:00	2004/10/18 11:00:00	3	2.999	4.23%	3.21
15	1969/01/24 07:00:00	1969/01/25 17:00:00	35	2.944	4.53%	3
16	1998/01/09 15:00:00	1998/01/10 17:00:00	27	2.793	4.83%	2.81
17	1980/01/28 07:00:00	1980/01/30 19:00:00	61	2.766	5.14%	2.65
18	1981/02/08 23:00:00	1981/02/09 08:00:00	10	2.711	5.44%	2.5
19	2005/01/09 04:00:00	2005/01/09 22:00:00	19	2.702	5.74%	2.37
20	1972/11/14 13:00:00	1972/11/14 15:00:00	3	2.649	6.04%	2.25
21	1983/11/25 00:00:00	1983/11/25 03:00:00	4	2.603	6.34%	2.14
22	1992/02/15 13:00:00	1992/02/15 18:00:00	6	2.564	6.65%	2.05
23	2007/01/31 00:00:00	2007/01/31 01:00:00	2	2.546	6.95%	1.96
24	2007/08/26 07:00:00	2007/08/26 09:00:00	3	2.527	7.25%	1.88
25	1980/02/16 18:00:00	1980/02/21 00:00:00	103	2.515	7.55%	1.8
26	1965/11/22 04:00:00	1965/11/23 05:00:00	26	2.478	7.85%	1.73
27	1998/02/03 16:00:00	1998/02/03 19:00:00	4	2.459	8.16%	1.67
28	2005/01/11 02:00:00	2005/01/11 08:00:00	7	2.452	8.46%	1.61
29	1991/03/20 07:00:00	1991/03/21 02:00:00	20	2.423	8.76%	1.55
30	1993/01/12 22:00:00	1993/01/14 05:00:00	32	2.382	9.06%	1.5
31	2004/10/19 16:00:00	2004/10/20 16:00:00	25	2.327	9.37%	1.45
32	1967/04/11 09:00:00	1967/04/12 05:00:00	21	2.276	9.67%	1.41
33	1967/12/18 15:00:00	1967/12/19 15:00:00	25	2.273	9.97%	1.36
34	2007/11/30 10:00:00	2007/11/30 23:00:00	14	2.244	10.27%	1.32
35	2003/02/25 17:00:00	2003/02/25 19:00:00	3	2.116	10.57%	1.29
36	1993/02/08 01:00:00	1993/02/08 11:00:00	11	2.092	10.88%	1.25
37	2004/02/26 06:00:00	2004/02/26 09:00:00	4	1.978	11.18%	1.22
38	1979/01/05 07:00:00	1979/01/06 07:00:00	25	1.935	11.48%	1.18
39	1982/01/01 09:00:00	1982/01/01 12:00:00	4	1.853	11.78%	1.15

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
40	1995/03/05 08:00:00	1995/03/06 01:00:00	18	1.823	12.08%	1.13
41	1980/01/10 23:00:00	1980/01/12 08:00:00	34	1.8	12.39%	1.1
42	1970/03/04 22:00:00	1970/03/05 01:00:00	4	1.777	12.69%	1.07
43	2004/10/27 04:00:00	2004/10/27 09:00:00	6	1.725	12.99%	1.05
44	2003/02/12 17:00:00	2003/02/13 17:00:00	25	1.704	13.29%	1.02
45	1982/03/18 02:00:00	1982/03/19 17:00:00	40	1.693	13.60%	1
46	1969/02/06 08:00:00	1969/02/06 11:00:00	4	1.672	13.90%	0.98
47	1985/11/25 00:00:00	1985/11/25 06:00:00	7	1.642	14.20%	0.96
48	1983/02/27 17:00:00	1983/02/27 21:00:00	5	1.635	14.50%	0.94
49	2003/04/14 17:00:00	2003/04/14 18:00:00	2	1.628	14.80%	0.92
50	1985/11/29 08:00:00	1985/11/29 17:00:00	10	1.534	15.11%	0.9
51	2006/01/02 14:00:00	2006/01/02 15:00:00	2	1.52	15.41%	0.88
52	1978/02/05 20:00:00	1978/02/06 22:00:00	27	1.513	15.71%	0.87
53	1978/01/14 16:00:00	1978/01/15 05:00:00	14	1.492	16.01%	0.85
54	1965/04/08 14:00:00	1965/04/10 00:00:00	35	1.419	16.31%	0.83
55	1979/01/17 12:00:00	1979/01/18 16:00:00	29	1.414	16.62%	0.82
56	1980/03/02 21:00:00	1980/03/03 03:00:00	7	1.399	16.92%	0.8
57	1974/12/04 09:00:00	1974/12/04 10:00:00	2	1.395	17.22%	0.79
58	1976/02/08 15:00:00	1976/02/09 03:00:00	13	1.369	17.52%	0.78
59	1974/03/07 18:00:00	1974/03/08 14:00:00	21	1.359	17.82%	0.76
60	1978/12/17 19:00:00	1978/12/18 13:00:00	19	1.339	18.13%	0.75
61	1967/01/24 18:00:00	1967/01/25 00:00:00	7	1.325	18.43%	0.74
62	1970/11/29 14:00:00	1970/11/29 23:00:00	10	1.303	18.73%	0.73
63	2006/04/04 23:00:00	2006/04/05 09:00:00	11	1.3	19.03%	0.71
64	1991/02/27 18:00:00	1991/03/01 12:00:00	43	1.288	19.34%	0.7
65	1991/03/19 00:00:00	1991/03/19 04:00:00	5	1.256	19.64%	0.69
66	2004/02/22 14:00:00	2004/02/23 03:00:00	14	1.248	19.94%	0.68
67	1965/11/16 17:00:00	1965/11/16 23:00:00	7	1.21	20.24%	0.67
68	1991/03/25 07:00:00	1991/03/27 10:00:00	52	1.183	20.54%	0.66
69	1998/02/08 16:00:00	1998/02/08 18:00:00	3	1.178	20.85%	0.65
70	2003/03/15 17:00:00	2003/03/16 17:00:00	25	1.168	21.15%	0.64
71	1994/02/07 15:00:00	1994/02/07 21:00:00	7	1.164	21.45%	0.63
72	1992/02/06 11:00:00	1992/02/07 00:00:00	14	1.141	21.75%	0.63
73	1976/03/03 00:00:00	1976/03/03 02:00:00	3	1.121	22.05%	0.62
74	2002/11/08 17:00:00	2002/11/09 17:00:00	25	1.099	22.36%	0.61
75	1966/12/03 13:00:00	1966/12/03 20:00:00	8	1.096	22.66%	0.6
76	1970/12/21 03:00:00	1970/12/21 10:00:00	8	1.088	22.96%	0.59
77	1965/12/13 01:00:00	1965/12/13 01:00:00	1	1.081	23.26%	0.58
78	1970/02/28 16:00:00	1970/03/02 07:00:00	40	1.079	23.56%	0.58
79	1992/01/05 15:00:00	1992/01/06 03:00:00	13	1.078	23.87%	0.57
80	1993/11/14 17:00:00	1993/11/14 17:00:00	1	1.072	24.17%	0.56
81	2005/02/21 03:00:00	2005/02/21 14:00:00	12	1.07	24.47%	0.56
82	1987/01/07 00:00:00	1987/01/07 08:00:00	9	1.07	24.77%	0.55
83	1967/11/21 13:00:00	1967/11/21 14:00:00	2	1.055	25.08%	0.54
84	1965/12/29 20:00:00	1965/12/29 21:00:00	2	1.049	25.38%	0.54
85	1981/03/01 05:00:00	1981/03/01 16:00:00	12	0.993	25.68%	0.53
86	1983/03/23 18:00:00	1983/03/23 22:00:00	5	0.99	25.98%	0.52

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
87	1973/02/11 05:00:00	1973/02/13 01:00:00	45	0.95	26.28%	0.52
88	1976/04/14 11:00:00	1976/04/14 11:00:00	1	0.935	26.59%	0.51
89	1998/02/22 17:00:00	1998/02/24 17:00:00	49	0.927	26.89%	0.51
90	1977/05/08 18:00:00	1977/05/08 22:00:00	5	0.883	27.19%	0.5
91	1993/01/15 13:00:00	1993/01/18 16:00:00	76	0.88	27.49%	0.5
92	2001/11/24 17:00:00	2001/11/24 18:00:00	2	0.87	27.79%	0.49
93	1986/03/10 16:00:00	1986/03/10 20:00:00	5	0.868	28.10%	0.48
94	1994/03/24 23:00:00	1994/03/25 15:00:00	17	0.864	28.40%	0.48
95	1998/02/17 16:00:00	1998/02/17 18:00:00	3	0.857	28.70%	0.47
96	1986/09/25 03:00:00	1986/09/25 07:00:00	5	0.851	29.00%	0.47
97	1987/11/04 17:00:00	1987/11/04 23:00:00	7	0.84	29.31%	0.46
98	1969/02/23 23:00:00	1969/02/25 23:00:00	49	0.835	29.61%	0.46
99	1988/12/24 23:00:00	1988/12/25 01:00:00	3	0.827	29.91%	0.46
100	1990/01/17 03:00:00	1990/01/17 04:00:00	2	0.826	30.21%	0.45
101	1991/12/29 16:00:00	1991/12/29 17:00:00	2	0.79	30.51%	0.45
102	1974/01/04 19:00:00	1974/01/05 03:00:00	9	0.789	30.82%	0.44
103	2005/01/03 08:00:00	2005/01/04 10:00:00	27	0.744	31.12%	0.44
104	1996/11/21 20:00:00	1996/11/22 03:00:00	8	0.743	31.42%	0.43
105	1974/01/06 13:00:00	1974/01/08 04:00:00	40	0.742	31.72%	0.43
106	1996/01/31 18:00:00	1996/02/01 04:00:00	11	0.725	32.02%	0.43
107	1971/12/24 22:00:00	1971/12/25 23:00:00	26	0.7	32.33%	0.42
108	2002/12/20 17:00:00	2002/12/20 18:00:00	2	0.693	32.63%	0.42
109	2003/12/25 18:00:00	2003/12/25 20:00:00	3	0.688	32.93%	0.41
110	1976/12/31 09:00:00	1976/12/31 12:00:00	4	0.688	33.23%	0.41
111	1995/02/14 01:00:00	1995/02/14 10:00:00	10	0.686	33.53%	0.41
112	1969/01/20 09:00:00	1969/01/21 16:00:00	32	0.674	33.84%	0.4
113	1983/02/08 04:00:00	1983/02/08 06:00:00	3	0.641	34.14%	0.4
114	1998/03/28 17:00:00	1998/03/29 17:00:00	25	0.637	34.44%	0.4
115	1998/02/06 17:00:00	1998/02/06 18:00:00	2	0.636	34.74%	0.39
116	2003/02/11 17:00:00	2003/02/11 17:00:00	1	0.632	35.05%	0.39
117	1981/03/19 21:00:00	1981/03/19 22:00:00	2	0.621	35.35%	0.39
118	1980/03/06 01:00:00	1980/03/06 14:00:00	14	0.621	35.65%	0.38
119	1982/12/22 23:00:00	1982/12/23 00:00:00	2	0.619	35.95%	0.38
120	1978/03/11 21:00:00	1978/03/15 08:00:00	84	0.616	36.25%	0.38
121	1995/04/18 10:00:00	1995/04/18 11:00:00	2	0.615	36.56%	0.37
122	2005/02/22 18:00:00	2005/02/23 11:00:00	18	0.613	36.86%	0.37
123	1996/12/09 18:00:00	1996/12/09 20:00:00	3	0.607	37.16%	0.37
124	1978/11/13 23:00:00	1978/11/13 23:00:00	1	0.604	37.46%	0.36
125	1992/02/12 18:00:00	1992/02/13 06:00:00	13	0.603	37.76%	0.36
126	1992/12/29 14:00:00	1992/12/29 20:00:00	7	0.602	38.07%	0.36
127	1975/03/08 09:00:00	1975/03/08 13:00:00	5	0.597	38.37%	0.35
128	1995/01/07 19:00:00	1995/01/08 02:00:00	8	0.594	38.67%	0.35
129	1976/02/05 06:00:00	1976/02/06 07:00:00	26	0.592	38.97%	0.35
130	1967/01/22 19:00:00	1967/01/23 01:00:00	7	0.589	39.27%	0.35
131	1994/02/20 16:00:00	1994/02/20 16:00:00	1	0.585	39.58%	0.34
132	2008/02/22 04:00:00	2008/02/22 09:00:00	6	0.585	39.88%	0.34
133	1983/01/27 08:00:00	1983/01/27 14:00:00	7	0.577	40.18%	0.34

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
134	1979/03/01 13:00:00	1979/03/01 20:00:00	8	0.574	40.48%	0.34
135	1986/03/15 22:00:00	1986/03/16 18:00:00	21	0.568	40.79%	0.33
136	1970/03/08 12:00:00	1970/03/08 19:00:00	8	0.567	41.09%	0.33
137	1973/03/08 13:00:00	1973/03/08 20:00:00	8	0.564	41.39%	0.33
138	2001/01/11 04:00:00	2001/01/12 09:00:00	30	0.551	41.69%	0.33
139	2004/03/02 03:00:00	2004/03/02 04:00:00	2	0.549	41.99%	0.32
140	1980/01/09 05:00:00	1980/01/09 19:00:00	15	0.545	42.30%	0.32
141	2006/03/10 17:00:00	2006/03/11 03:00:00	11	0.514	42.60%	0.32
142	1995/03/11 02:00:00	1995/03/12 01:00:00	24	0.509	42.90%	0.32
143	1995/03/23 12:00:00	1995/03/23 13:00:00	2	0.507	43.20%	0.32
144	1973/01/16 20:00:00	1973/01/16 22:00:00	3	0.501	43.50%	0.31
145	1998/05/12 17:00:00	1998/05/12 17:00:00	1	0.5	43.81%	0.31
146	1986/11/17 22:00:00	1986/11/18 02:00:00	5	0.45	44.11%	0.31
147	1969/01/14 07:00:00	1969/01/14 12:00:00	6	0.446	44.41%	0.31
148	1965/12/09 06:00:00	1965/12/10 09:00:00	28	0.435	44.71%	0.3
149	1972/12/04 15:00:00	1972/12/04 19:00:00	5	0.434	45.02%	0.3
150	1972/11/16 13:00:00	1972/11/17 11:00:00	23	0.395	45.32%	0.3
151	1994/02/17 12:00:00	1994/02/17 13:00:00	2	0.382	45.62%	0.3
152	1980/02/14 01:00:00	1980/02/15 11:00:00	35	0.381	45.92%	0.3
153	1982/03/15 13:00:00	1982/03/16 00:00:00	12	0.38	46.22%	0.29
154	1994/04/28 00:00:00	1994/04/28 01:00:00	2	0.377	46.53%	0.29
155	2002/12/16 17:00:00	2002/12/16 17:00:00	1	0.375	46.83%	0.29
156	1983/11/20 12:00:00	1983/11/21 10:00:00	23	0.372	47.13%	0.29
157	2004/02/03 00:00:00	2004/02/03 01:00:00	2	0.372	47.43%	0.29
158	1966/11/07 16:00:00	1966/11/07 18:00:00	3	0.365	47.73%	0.29
159	1964/11/17 18:00:00	1964/11/17 23:00:00	6	0.353	48.04%	0.28
160	1973/03/11 13:00:00	1973/03/11 17:00:00	5	0.344	48.34%	0.28
161	1986/03/12 14:00:00	1986/03/12 14:00:00	1	0.343	48.64%	0.28
162	1988/01/17 11:00:00	1988/01/17 21:00:00	11	0.343	48.94%	0.28
163	1965/03/31 18:00:00	1965/04/02 02:00:00	33	0.34	49.24%	0.28
164	1985/11/11 10:00:00	1985/11/11 16:00:00	7	0.317	49.55%	0.27
165	1992/01/07 20:00:00	1992/01/07 21:00:00	2	0.315	49.85%	0.27
166	1990/01/14 04:00:00	1990/01/14 05:00:00	2	0.315	50.15%	0.27
167	2004/12/29 02:00:00	2004/12/29 04:00:00	3	0.313	50.45%	0.27
168	1972/11/11 08:00:00	1972/11/11 09:00:00	2	0.31	50.76%	0.27
169	2000/02/21 17:00:00	2000/02/21 17:00:00	1	0.306	51.06%	0.27
170	1975/04/08 03:00:00	1975/04/09 01:00:00	23	0.304	51.36%	0.27
171	1968/03/08 10:00:00	1968/03/08 13:00:00	4	0.303	51.66%	0.26
172	1997/01/12 16:00:00	1997/01/13 12:00:00	21	0.303	51.96%	0.26
173	1987/01/04 17:00:00	1987/01/04 23:00:00	7	0.301	52.27%	0.26
174	1998/04/11 17:00:00	1998/04/11 17:00:00	1	0.3	52.57%	0.26
175	1983/03/18 04:00:00	1983/03/18 19:00:00	16	0.299	52.87%	0.26
176	1985/12/02 23:00:00	1985/12/03 02:00:00	4	0.296	53.17%	0.26
177	1973/11/22 23:00:00	1973/11/23 02:00:00	4	0.295	53.47%	0.25
178	1976/09/10 06:00:00	1976/09/10 21:00:00	16	0.294	53.78%	0.25
179	1986/02/08 05:00:00	1986/02/08 18:00:00	14	0.292	54.08%	0.25
180	1993/03/28 03:00:00	1993/03/28 03:00:00	1	0.291	54.38%	0.25

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
181	1968/04/01 20:00:00	1968/04/01 20:00:00	1	0.289	54.68%	0.25
182	2008/02/03 11:00:00	2008/02/03 15:00:00	5	0.285	54.98%	0.25
183	1977/08/17 01:00:00	1977/08/17 10:00:00	10	0.284	55.29%	0.25
184	1976/03/01 17:00:00	1976/03/01 19:00:00	3	0.284	55.59%	0.25
185	1992/03/02 11:00:00	1992/03/02 11:00:00	1	0.284	55.89%	0.24
186	2005/01/07 15:00:00	2005/01/07 16:00:00	2	0.283	56.19%	0.24
187	1987/12/16 17:00:00	1987/12/16 22:00:00	6	0.282	56.50%	0.24
188	1976/11/12 01:00:00	1976/11/12 09:00:00	9	0.279	56.80%	0.24
189	1983/03/20 20:00:00	1983/03/21 03:00:00	8	0.275	57.10%	0.24
190	1996/02/25 10:00:00	1996/02/26 00:00:00	15	0.269	57.40%	0.24
191	1971/12/27 14:00:00	1971/12/28 15:00:00	26	0.267	57.70%	0.24
192	1988/12/21 06:00:00	1988/12/21 07:00:00	2	0.267	58.01%	0.23
193	1993/02/19 18:00:00	1993/02/19 23:00:00	6	0.265	58.31%	0.23
194	2008/01/05 04:00:00	2008/01/07 05:00:00	50	0.263	58.61%	0.23
195	1996/01/21 19:00:00	1996/01/21 19:00:00	1	0.261	58.91%	0.23
196	1975/03/10 11:00:00	1975/03/11 14:00:00	28	0.259	59.21%	0.23
197	1988/11/25 10:00:00	1988/11/25 14:00:00	5	0.259	59.52%	0.23
198	1982/02/10 10:00:00	1982/02/10 21:00:00	12	0.256	59.82%	0.23
199	2006/02/28 00:00:00	2006/02/28 07:00:00	8	0.255	60.12%	0.23
200	1992/12/07 10:00:00	1992/12/07 16:00:00	7	0.255	60.42%	0.23
201	1967/03/13 15:00:00	1967/03/13 22:00:00	8	0.255	60.73%	0.22
202	1983/01/29 02:00:00	1983/01/29 04:00:00	3	0.253	61.03%	0.22
203	1965/12/14 15:00:00	1965/12/14 16:00:00	2	0.251	61.33%	0.22
204	1970/12/19 02:00:00	1970/12/19 06:00:00	5	0.249	61.63%	0.22
205	1980/01/18 18:00:00	1980/01/19 00:00:00	7	0.247	61.93%	0.22
206	1983/10/01 04:00:00	1983/10/01 18:00:00	15	0.245	62.24%	0.22
207	1975/04/05 21:00:00	1975/04/06 16:00:00	20	0.245	62.54%	0.22
208	1969/02/22 03:00:00	1969/02/22 07:00:00	5	0.244	62.84%	0.22
209	1997/01/25 23:00:00	1997/01/26 05:00:00	7	0.244	63.14%	0.22
210	1979/01/31 07:00:00	1979/02/01 11:00:00	29	0.244	63.44%	0.21
211	1979/03/27 10:00:00	1979/03/28 03:00:00	18	0.244	63.75%	0.21
212	1980/03/26 00:00:00	1980/03/26 01:00:00	2	0.238	64.05%	0.21
213	1971/05/07 20:00:00	1971/05/07 21:00:00	2	0.238	64.35%	0.21
214	1980/03/10 18:00:00	1980/03/10 20:00:00	3	0.237	64.65%	0.21
215	1982/03/28 18:00:00	1982/03/28 18:00:00	1	0.236	64.95%	0.21
216	1969/02/18 15:00:00	1969/02/18 19:00:00	5	0.236	65.26%	0.21
217	1995/12/20 17:00:00	1995/12/20 17:00:00	1	0.234	65.56%	0.21
218	1973/01/18 21:00:00	1973/01/19 02:00:00	6	0.234	65.86%	0.21
219	1979/03/17 05:00:00	1979/03/17 08:00:00	4	0.231	66.16%	0.21
220	1982/11/30 12:00:00	1982/11/30 19:00:00	8	0.23	66.47%	0.21
221	1983/04/30 04:00:00	1983/04/30 05:00:00	2	0.229	66.77%	0.2
222	1993/01/31 02:00:00	1993/01/31 02:00:00	1	0.228	67.07%	0.2
223	1994/04/25 18:00:00	1994/04/26 21:00:00	28	0.228	67.37%	0.2
224	1982/11/10 04:00:00	1982/11/11 01:00:00	22	0.227	67.67%	0.2
225	1978/11/21 19:00:00	1978/11/21 19:00:00	1	0.226	67.98%	0.2
226	1983/11/12 02:00:00	1983/11/12 21:00:00	20	0.224	68.28%	0.2
227	1973/03/22 00:00:00	1973/03/22 02:00:00	3	0.223	68.58%	0.2

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
228	1969/03/13 14:00:00	1969/03/13 18:00:00	5	0.222	68.88%	0.2
229	1976/04/12 22:00:00	1976/04/13 04:00:00	7	0.222	69.18%	0.2
230	1993/02/23 20:00:00	1993/02/24 05:00:00	10	0.221	69.49%	0.2
231	2000/10/29 23:00:00	2000/10/30 00:00:00	2	0.219	69.79%	0.2
232	2002/03/17 23:00:00	2002/03/17 23:00:00	1	0.219	70.09%	0.19
233	1981/03/05 08:00:00	1981/03/05 15:00:00	8	0.218	70.39%	0.19
234	1990/06/10 04:00:00	1990/06/10 05:00:00	2	0.218	70.69%	0.19
235	1967/04/22 03:00:00	1967/04/22 05:00:00	3	0.216	71.00%	0.19
236	1978/01/30 12:00:00	1978/01/30 13:00:00	2	0.206	71.30%	0.19
237	1982/01/20 23:00:00	1982/01/21 01:00:00	3	0.206	71.60%	0.19
238	1965/12/16 06:00:00	1965/12/16 08:00:00	3	0.206	71.90%	0.19
239	1979/02/21 05:00:00	1979/02/21 22:00:00	18	0.206	72.21%	0.19
240	1977/12/26 04:00:00	1977/12/26 18:00:00	15	0.204	72.51%	0.19
241	1995/01/12 09:00:00	1995/01/12 14:00:00	6	0.202	72.81%	0.19
242	1969/03/21 19:00:00	1969/03/21 20:00:00	2	0.2	73.11%	0.19
243	2008/02/14 12:00:00	2008/02/14 13:00:00	2	0.2	73.41%	0.19
244	1995/03/21 11:00:00	1995/03/21 15:00:00	5	0.195	73.72%	0.18
245	1983/05/01 07:00:00	1983/05/01 08:00:00	2	0.195	74.02%	0.18
246	1978/03/31 03:00:00	1978/03/31 03:00:00	1	0.185	74.32%	0.18
247	2005/04/28 09:00:00	2005/04/28 09:00:00	1	0.183	74.62%	0.18
248	1978/04/07 01:00:00	1978/04/07 02:00:00	2	0.182	74.92%	0.18
249	1973/02/28 05:00:00	1973/02/28 06:00:00	2	0.182	75.23%	0.18
250	2006/03/28 22:00:00	2006/03/29 01:00:00	4	0.179	75.53%	0.18
251	2000/02/13 17:00:00	2000/02/13 17:00:00	1	0.179	75.83%	0.18
252	2005/02/11 12:00:00	2005/02/12 12:00:00	25	0.178	76.13%	0.18
253	1989/03/25 17:00:00	1989/03/25 17:00:00	1	0.177	76.44%	0.18
254	1983/02/25 00:00:00	1983/02/25 00:00:00	1	0.175	76.74%	0.18
255	2006/03/21 02:00:00	2006/03/21 02:00:00	1	0.174	77.04%	0.18
256	1981/11/28 09:00:00	1981/11/28 23:00:00	15	0.174	77.34%	0.18
257	1970/03/11 12:00:00	1970/03/11 16:00:00	5	0.173	77.64%	0.18
258	1979/10/20 14:00:00	1979/10/20 15:00:00	2	0.172	77.95%	0.17
259	1965/02/06 18:00:00	1965/02/06 18:00:00	1	0.17	78.25%	0.17
260	2005/03/22 22:00:00	2005/03/22 23:00:00	2	0.168	78.55%	0.17
261	1975/12/11 23:00:00	1975/12/12 07:00:00	9	0.168	78.85%	0.17
262	1986/12/06 17:00:00	1986/12/06 18:00:00	2	0.167	79.15%	0.17
263	2001/12/21 17:00:00	2001/12/21 17:00:00	1	0.163	79.46%	0.17
264	1981/02/25 21:00:00	1981/02/25 22:00:00	2	0.161	79.76%	0.17
265	1973/03/20 08:00:00	1973/03/20 11:00:00	4	0.161	80.06%	0.17
266	1974/04/02 05:00:00	1974/04/02 07:00:00	3	0.157	80.36%	0.17
267	1965/11/25 11:00:00	1965/11/25 12:00:00	2	0.157	80.66%	0.17
268	1983/12/03 17:00:00	1983/12/03 17:00:00	1	0.157	80.97%	0.17
269	1992/03/23 04:00:00	1992/03/23 04:00:00	1	0.149	81.27%	0.17
270	1986/03/08 19:00:00	1986/03/08 19:00:00	1	0.143	81.57%	0.17
271	1978/09/05 18:00:00	1978/09/05 18:00:00	1	0.141	81.87%	0.17
272	1987/12/04 21:00:00	1987/12/04 21:00:00	1	0.14	82.18%	0.17
273	2007/12/08 07:00:00	2007/12/08 07:00:00	1	0.14	82.48%	0.17
274	1996/12/11 10:00:00	1996/12/11 16:00:00	7	0.138	82.78%	0.16

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
275	1983/10/07 08:00:00	1983/10/07 10:00:00	3	0.133	83.08%	0.16
276	1996/02/27 21:00:00	1996/02/27 22:00:00	2	0.132	83.38%	0.16
277	1974/10/29 05:00:00	1974/10/29 08:00:00	4	0.129	83.69%	0.16
278	1998/03/25 17:00:00	1998/03/25 17:00:00	1	0.12	83.99%	0.16
279	1995/01/10 22:00:00	1995/01/10 22:00:00	1	0.12	84.29%	0.16
280	2003/05/03 17:00:00	2003/05/03 17:00:00	1	0.117	84.59%	0.16
281	1987/11/02 03:00:00	1987/11/02 03:00:00	1	0.116	84.89%	0.16
282	1969/01/26 19:00:00	1969/01/26 20:00:00	2	0.114	85.20%	0.16
283	1998/01/29 17:00:00	1998/01/29 17:00:00	1	0.114	85.50%	0.16
284	1982/03/27 01:00:00	1982/03/27 06:00:00	6	0.113	85.80%	0.16
285	1969/01/28 20:00:00	1969/01/28 20:00:00	1	0.111	86.10%	0.16
286	1991/01/09 14:00:00	1991/01/09 14:00:00	1	0.109	86.40%	0.16
287	2000/02/17 17:00:00	2000/02/17 17:00:00	1	0.108	86.71%	0.16
288	2008/01/23 21:00:00	2008/01/23 22:00:00	2	0.107	87.01%	0.16
289	1972/12/08 13:00:00	1972/12/08 14:00:00	2	0.105	87.31%	0.16
290	1979/03/19 01:00:00	1979/03/20 03:00:00	27	0.103	87.61%	0.16
291	1971/03/13 06:00:00	1971/03/13 07:00:00	2	0.102	87.92%	0.16
292	1979/02/02 16:00:00	1979/02/02 16:00:00	1	0.101	88.22%	0.15
293	1973/03/06 23:00:00	1973/03/07 01:00:00	3	0.099	88.52%	0.15
294	1983/03/22 13:00:00	1983/03/22 15:00:00	3	0.098	88.82%	0.15
295	2005/02/18 05:00:00	2005/02/19 00:00:00	20	0.097	89.12%	0.15
296	1982/12/09 19:00:00	1982/12/09 19:00:00	1	0.097	89.43%	0.15
297	1977/01/03 23:00:00	1977/01/04 00:00:00	2	0.097	89.73%	0.15
298	2004/12/31 16:00:00	2004/12/31 17:00:00	2	0.096	90.03%	0.15
299	1994/03/19 03:00:00	1994/03/19 08:00:00	6	0.096	90.33%	0.15
300	1965/04/03 08:00:00	1965/04/03 09:00:00	2	0.095	90.63%	0.15
301	1982/04/02 12:00:00	1982/04/02 16:00:00	5	0.094	90.94%	0.15
302	1977/03/25 02:00:00	1977/03/25 03:00:00	2	0.094	91.24%	0.15
303	1975/02/10 02:00:00	1975/02/10 03:00:00	2	0.093	91.54%	0.15
304	1998/03/26 17:00:00	1998/03/26 17:00:00	1	0.092	91.84%	0.15
305	1976/04/15 16:00:00	1976/04/15 17:00:00	2	0.09	92.15%	0.15
306	1971/02/16 22:00:00	1971/02/16 22:00:00	1	0.086	92.45%	0.15
307	1992/03/26 19:00:00	1992/03/26 19:00:00	1	0.086	92.75%	0.15
308	1983/04/21 01:00:00	1983/04/21 03:00:00	3	0.085	93.05%	0.15
309	1970/03/06 23:00:00	1970/03/07 01:00:00	3	0.084	93.35%	0.15
310	1971/12/31 06:00:00	1971/12/31 06:00:00	1	0.082	93.66%	0.15
311	1976/02/07 07:00:00	1976/02/07 09:00:00	3	0.08	93.96%	0.15
312	1987/02/25 02:00:00	1987/02/25 02:00:00	1	0.079	94.26%	0.14
313	1964/12/27 15:00:00	1964/12/27 16:00:00	2	0.075	94.56%	0.14
314	1978/03/22 05:00:00	1978/03/22 05:00:00	1	0.073	94.86%	0.14
315	1994/12/25 03:00:00	1994/12/25 03:00:00	1	0.072	95.17%	0.14
316	1975/11/28 16:00:00	1975/11/28 17:00:00	2	0.072	95.47%	0.14
317	1996/03/13 07:00:00	1996/03/13 09:00:00	3	0.071	95.77%	0.14
318	1975/02/03 14:00:00	1975/02/03 14:00:00	1	0.071	96.07%	0.14
319	1986/03/13 17:00:00	1986/03/13 19:00:00	3	0.069	96.37%	0.14
320	1990/02/17 19:00:00	1990/02/17 19:00:00	1	0.067	96.68%	0.14
321	1978/11/23 13:00:00	1978/11/23 13:00:00	1	0.067	96.98%	0.14

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
322	1968/02/13 22:00:00	1968/02/13 23:00:00	2	0.066	97.28%	0.14
323	1995/12/23 10:00:00	1995/12/23 10:00:00	1	0.064	97.58%	0.14
324	1966/10/04 14:00:00	1966/10/04 14:00:00	1	0.058	97.89%	0.14
325	1995/04/16 09:00:00	1995/04/16 09:00:00	1	0.053	98.19%	0.14
326	1983/02/02 16:00:00	1983/02/02 16:00:00	1	0.049	98.49%	0.14
327	1979/11/07 20:00:00	1979/11/07 22:00:00	3	0.049	98.79%	0.14
328	1995/01/03 14:00:00	1995/01/03 14:00:00	1	0.047	99.09%	0.14
329	1983/02/26 14:00:00	1983/02/26 14:00:00	1	0.045	99.40%	0.14
330	2007/02/19 11:00:00	2007/02/19 16:00:00	6	0.039	99.70%	0.14
--End of Data----------						

SWMM.out file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\POC-1\17046-Post-Development-poc1.out
SWMM.out time stamp: 1/31/2019 3:36:25 PM

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 16:00:00	1993/01/11 14:00:00	119	3.824	0.20%	45
2	1966/12/03 07:00:00	1966/12/08 06:00:00	120	3.676	0.40%	22.5
3	1986/02/14 23:00:00	1986/02/16 17:00:00	43	3.235	0.60%	15
4	1995/01/04 14:00:00	1995/01/06 07:00:00	42	3.219	0.80%	11.25
5	1978/01/14 15:00:00	1978/01/17 20:00:00	78	2.806	1.00%	9
6	1980/01/28 06:00:00	1980/01/31 19:00:00	86	2.785	1.20%	7.5
7	2007/08/26 07:00:00	2007/08/26 18:00:00	12	2.769	1.41%	6.43
8	1978/03/12 01:00:00	1978/03/18 23:00:00	167	2.614	1.61%	5.63
9	1983/03/01 14:00:00	1983/03/04 18:00:00	77	2.567	1.81%	5
10	1965/11/22 03:00:00	1965/11/25 12:00:00	82	2.348	2.01%	4.5
11	1971/02/23 04:00:00	1971/02/24 06:00:00	27	2.337	2.21%	4.09
12	1969/01/24 07:00:00	1969/01/27 06:00:00	72	2.252	2.41%	3.75
13	1998/02/14 10:00:00	1998/02/16 01:00:00	40	2.109	2.61%	3.46
14	1995/01/24 18:00:00	1995/01/26 13:00:00	44	1.942	2.81%	3.21
15	1979/01/05 07:00:00	1979/01/07 14:00:00	56	1.928	3.01%	3
16	1995/03/05 06:00:00	1995/03/07 11:00:00	54	1.91	3.21%	2.81
17	1980/02/13 13:00:00	1980/02/22 11:00:00	215	1.897	3.41%	2.65
18	2004/10/17 08:00:00	2004/10/21 12:00:00	101	1.812	3.61%	2.5
19	1967/11/19 06:00:00	1967/11/22 15:00:00	82	1.709	3.82%	2.37
20	2007/11/30 07:00:00	2007/12/02 08:00:00	50	1.68	4.02%	2.25
21	2005/01/07 14:00:00	2005/01/12 17:00:00	124	1.677	4.22%	2.14
22	1983/12/24 19:00:00	1983/12/27 10:00:00	64	1.592	4.42%	2.05
23	2004/10/27 03:00:00	2004/10/28 18:00:00	40	1.57	4.62%	1.96
24	1980/03/02 21:00:00	1980/03/04 06:00:00	34	1.562	4.82%	1.88
25	1993/02/08 00:00:00	1993/02/09 22:00:00	47	1.53	5.02%	1.8
26	1980/01/09 03:00:00	1980/01/13 07:00:00	101	1.463	5.22%	1.73
27	1972/11/14 13:00:00	1972/11/15 04:00:00	16	1.455	5.42%	1.67
28	1981/02/08 21:00:00	1981/02/10 11:00:00	39	1.448	5.62%	1.61
29	2007/01/30 15:00:00	2007/01/31 13:00:00	23	1.435	5.82%	1.55
30	1967/04/11 08:00:00	1967/04/12 16:00:00	33	1.423	6.02%	1.5
31	1983/11/25 00:00:00	1983/11/25 15:00:00	16	1.356	6.22%	1.45
32	1988/04/20 04:00:00	1988/04/22 14:00:00	59	1.337	6.43%	1.41
33	1991/02/27 15:00:00	1991/03/02 20:00:00	78	1.257	6.63%	1.36
34	1967/12/18 15:00:00	1967/12/20 17:00:00	51	1.241	6.83%	1.32
35	2004/02/26 05:00:00	2004/02/27 14:00:00	34	1.151	7.03%	1.29
36	1993/01/12 22:00:00	1993/01/19 16:00:00	163	1.143	7.23%	1.25
37	1991/03/19 00:00:00	1991/03/22 00:00:00	73	1.112	7.43%	1.22
38	1985/11/24 15:00:00	1985/11/26 15:00:00	49	1.095	7.63%	1.18
39	1974/12/04 05:00:00	1974/12/05 07:00:00	27	1.071	7.83%	1.15

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
40	1998/01/09 13:00:00	1998/01/11 10:00:00	46	1.049	8.03%	1.13
41	1970/02/28 15:00:00	1970/03/03 12:00:00	70	1.01	8.23%	1.1
42	1970/03/04 21:00:00	1970/03/05 17:00:00	21	0.955	8.43%	1.07
43	1992/02/15 13:00:00	1992/02/16 11:00:00	23	0.935	8.63%	1.05
44	1969/02/06 08:00:00	1969/02/07 09:00:00	26	0.909	8.84%	1.02
45	1985/11/29 07:00:00	1985/11/30 21:00:00	39	0.899	9.04%	1
46	1998/02/03 15:00:00	1998/02/04 20:00:00	30	0.802	9.24%	0.98
47	1977/05/08 13:00:00	1977/05/10 09:00:00	45	0.746	9.44%	0.96
48	1974/03/07 17:00:00	1974/03/09 18:00:00	50	0.716	9.64%	0.94
49	1978/12/16 23:00:00	1978/12/19 18:00:00	68	0.713	9.84%	0.92
50	2003/02/25 15:00:00	2003/02/26 17:00:00	27	0.695	10.04%	0.9
51	1976/02/04 09:00:00	1976/02/10 15:00:00	151	0.663	10.24%	0.88
52	1982/03/18 02:00:00	1982/03/20 17:00:00	64	0.655	10.44%	0.87
53	1981/12/30 08:00:00	1982/01/02 09:00:00	74	0.646	10.64%	0.85
54	2005/02/21 03:00:00	2005/02/24 07:00:00	77	0.629	10.84%	0.83
55	1966/11/07 15:00:00	1966/11/08 12:00:00	22	0.615	11.04%	0.82
56	2003/02/11 17:00:00	2003/02/14 18:00:00	74	0.608	11.24%	0.8
57	1978/02/05 01:00:00	1978/02/07 12:00:00	60	0.595	11.45%	0.79
58	1991/03/25 07:00:00	1991/03/28 14:00:00	80	0.588	11.65%	0.78
59	1983/02/26 13:00:00	1983/02/28 13:00:00	49	0.581	11.85%	0.76
60	1981/03/19 20:00:00	1981/03/20 13:00:00	18	0.567	12.05%	0.75
61	2003/04/14 16:00:00	2003/04/15 17:00:00	26	0.557	12.25%	0.74
62	2006/04/04 18:00:00	2006/04/06 02:00:00	33	0.553	12.45%	0.73
63	1965/12/09 06:00:00	1965/12/11 06:00:00	49	0.542	12.65%	0.71
64	1996/11/21 16:00:00	1996/11/23 11:00:00	44	0.541	12.85%	0.7
65	1979/01/17 10:00:00	1979/01/18 16:00:00	31	0.537	13.05%	0.69
66	1969/02/22 02:00:00	1969/02/27 02:00:00	121	0.53	13.25%	0.68
67	1970/11/28 23:00:00	1970/12/01 00:00:00	50	0.53	13.45%	0.67
68	1973/01/16 18:00:00	1973/01/17 13:00:00	20	0.527	13.65%	0.66
69	2006/01/02 13:00:00	2006/01/03 04:00:00	16	0.516	13.86%	0.65
70	1996/01/31 17:00:00	1996/02/02 07:00:00	39	0.498	14.06%	0.64
71	1967/01/22 16:00:00	1967/01/26 02:00:00	83	0.494	14.26%	0.63
72	1981/02/28 16:00:00	1981/03/03 00:00:00	57	0.482	14.46%	0.63
73	1965/04/08 14:00:00	1965/04/10 17:00:00	52	0.48	14.66%	0.62
74	2004/02/22 14:00:00	2004/02/24 04:00:00	39	0.475	14.86%	0.61
75	1976/03/01 15:00:00	1976/03/03 20:00:00	54	0.472	15.06%	0.6
76	1992/02/06 11:00:00	1992/02/07 21:00:00	35	0.471	15.26%	0.59
77	1993/11/14 17:00:00	1993/11/14 22:00:00	6	0.469	15.46%	0.58
78	1994/02/17 11:00:00	1994/02/18 02:00:00	16	0.468	15.66%	0.58
79	1965/11/14 19:00:00	1965/11/17 20:00:00	74	0.468	15.86%	0.57
80	1986/11/17 19:00:00	1986/11/19 00:00:00	30	0.459	16.06%	0.56
81	1986/09/25 01:00:00	1986/09/25 23:00:00	23	0.452	16.27%	0.56
82	1998/02/06 17:00:00	1998/02/09 07:00:00	63	0.452	16.47%	0.55
83	1994/02/07 15:00:00	1994/02/08 17:00:00	27	0.44	16.67%	0.54
84	1974/01/04 19:00:00	1974/01/09 16:00:00	118	0.439	16.87%	0.54
85	2003/03/15 16:00:00	2003/03/16 23:00:00	32	0.435	17.07%	0.53
86	1965/12/13 01:00:00	1965/12/13 08:00:00	8	0.43	17.27%	0.52

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
87	1970/12/19 02:00:00	1970/12/22 08:00:00	79	0.427	17.47%	0.52
88	1976/04/12 21:00:00	1976/04/14 16:00:00	44	0.425	17.67%	0.51
89	1982/12/22 19:00:00	1982/12/23 17:00:00	23	0.424	17.87%	0.51
90	1973/02/11 05:00:00	1973/02/13 04:00:00	48	0.423	18.07%	0.5
91	1992/01/05 11:00:00	1992/01/08 04:00:00	66	0.421	18.27%	0.5
92	1965/12/29 19:00:00	1965/12/30 08:00:00	14	0.418	18.47%	0.49
93	1987/01/04 13:00:00	1987/01/07 18:00:00	78	0.417	18.67%	0.48
94	2002/11/08 16:00:00	2002/11/10 01:00:00	34	0.411	18.88%	0.48
95	1995/03/11 02:00:00	1995/03/12 19:00:00	42	0.403	19.08%	0.47
96	1983/03/23 18:00:00	1983/03/24 17:00:00	24	0.395	19.28%	0.47
97	1986/03/10 08:00:00	1986/03/12 14:00:00	55	0.384	19.48%	0.46
98	1972/12/04 13:00:00	1972/12/05 13:00:00	25	0.383	19.68%	0.46
99	1998/02/22 17:00:00	1998/02/25 00:00:00	56	0.381	19.88%	0.46
100	1994/03/24 22:00:00	1994/03/25 22:00:00	25	0.376	20.08%	0.45
101	1983/01/27 08:00:00	1983/01/29 09:00:00	50	0.369	20.28%	0.45
102	1988/12/24 22:00:00	1988/12/26 00:00:00	27	0.365	20.48%	0.44
103	1998/02/17 16:00:00	1998/02/18 04:00:00	13	0.352	20.68%	0.44
104	1976/12/30 15:00:00	1977/01/01 01:00:00	35	0.351	20.88%	0.43
105	1991/12/29 15:00:00	1991/12/30 07:00:00	17	0.35	21.08%	0.43
106	1995/02/13 23:00:00	1995/02/15 06:00:00	32	0.349	21.29%	0.43
107	2001/11/24 17:00:00	2001/11/25 05:00:00	13	0.346	21.49%	0.42
108	1987/11/04 17:00:00	1987/11/05 16:00:00	24	0.333	21.69%	0.42
109	1990/01/17 03:00:00	1990/01/17 09:00:00	7	0.332	21.89%	0.41
110	2005/01/03 07:00:00	2005/01/04 19:00:00	37	0.33	22.09%	0.41
111	1979/03/01 12:00:00	1979/03/02 12:00:00	25	0.312	22.29%	0.41
112	1992/02/12 18:00:00	1992/02/14 01:00:00	32	0.309	22.49%	0.4
113	1976/11/11 22:00:00	1976/11/13 04:00:00	31	0.306	22.69%	0.4
114	1968/03/08 04:00:00	1968/03/09 07:00:00	28	0.297	22.89%	0.4
115	1969/01/14 02:00:00	1969/01/15 08:00:00	31	0.296	23.09%	0.39
116	1980/03/06 00:00:00	1980/03/07 01:00:00	26	0.292	23.29%	0.39
117	2002/12/20 17:00:00	2002/12/21 01:00:00	9	0.292	23.49%	0.39
118	1971/12/24 16:00:00	1971/12/26 11:00:00	44	0.291	23.69%	0.38
119	1975/03/08 08:00:00	1975/03/09 07:00:00	24	0.284	23.90%	0.38
120	1978/11/13 22:00:00	1978/11/14 12:00:00	15	0.283	24.10%	0.38
121	1992/12/29 13:00:00	1992/12/30 06:00:00	18	0.283	24.30%	0.37
122	1996/12/09 18:00:00	1996/12/10 09:00:00	16	0.283	24.50%	0.37
123	1998/03/28 17:00:00	1998/03/29 17:00:00	25	0.269	24.70%	0.37
124	2006/03/10 17:00:00	2006/03/11 18:00:00	26	0.268	24.90%	0.36
125	2008/02/22 03:00:00	2008/02/23 03:00:00	25	0.265	25.10%	0.36
126	1973/11/22 23:00:00	1973/11/23 13:00:00	15	0.265	25.30%	0.36
127	1988/01/17 11:00:00	1988/01/18 15:00:00	29	0.262	25.50%	0.35
128	2008/01/05 02:00:00	2008/01/07 20:00:00	67	0.261	25.70%	0.35
129	1969/01/20 04:00:00	1969/01/22 03:00:00	48	0.261	25.90%	0.35
130	1982/03/15 13:00:00	1982/03/16 13:00:00	25	0.257	26.10%	0.35
131	1997/01/12 14:00:00	1997/01/14 13:00:00	48	0.257	26.31%	0.34
132	1983/02/07 05:00:00	1983/02/08 16:00:00	36	0.256	26.51%	0.34
133	1994/02/20 16:00:00	1994/02/20 21:00:00	6	0.255	26.71%	0.34

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
134	1995/01/07 19:00:00	1995/01/08 22:00:00	28	0.252	26.91%	0.34
135	2003/12/25 18:00:00	2003/12/26 02:00:00	9	0.248	27.11%	0.33
136	2001/01/11 04:00:00	2001/01/12 17:00:00	38	0.247	27.31%	0.33
137	1985/11/11 05:00:00	1985/11/12 18:00:00	38	0.241	27.51%	0.33
138	1995/04/18 10:00:00	1995/04/19 00:00:00	15	0.237	27.71%	0.33
139	1970/03/08 12:00:00	1970/03/09 06:00:00	19	0.237	27.91%	0.32
140	1973/03/08 13:00:00	1973/03/09 07:00:00	19	0.236	28.11%	0.32
141	1992/03/02 09:00:00	1992/03/03 06:00:00	22	0.233	28.31%	0.32
142	2004/02/02 23:00:00	2004/02/03 07:00:00	9	0.232	28.51%	0.32
143	1986/03/15 22:00:00	1986/03/17 05:00:00	32	0.232	28.71%	0.32
144	1968/04/01 20:00:00	1968/04/02 11:00:00	16	0.231	28.92%	0.31
145	1973/03/11 13:00:00	1973/03/12 05:00:00	17	0.231	29.12%	0.31
146	2004/12/28 08:00:00	2004/12/30 12:00:00	53	0.23	29.32%	0.31
147	1983/11/20 12:00:00	1983/11/21 10:00:00	23	0.23	29.52%	0.31
148	1964/11/17 16:00:00	1964/11/18 13:00:00	22	0.229	29.72%	0.3
149	1995/03/23 10:00:00	1995/03/23 18:00:00	9	0.228	29.92%	0.3
150	1987/12/16 13:00:00	1987/12/17 22:00:00	34	0.227	30.12%	0.3
151	2004/03/02 02:00:00	2004/03/02 11:00:00	10	0.226	30.32%	0.3
152	1976/09/10 02:00:00	1976/09/11 17:00:00	40	0.223	30.52%	0.3
153	1990/01/14 04:00:00	1990/01/15 06:00:00	27	0.219	30.72%	0.29
154	1994/04/28 00:00:00	1994/04/28 01:00:00	2	0.219	30.92%	0.29
155	1998/05/12 17:00:00	1998/05/12 23:00:00	7	0.217	31.12%	0.29
156	1986/02/07 20:00:00	1986/02/09 04:00:00	33	0.215	31.33%	0.29
157	1975/04/08 03:00:00	1975/04/09 22:00:00	44	0.213	31.53%	0.29
158	1972/11/16 11:00:00	1972/11/17 11:00:00	25	0.212	31.73%	0.29
159	1972/11/11 08:00:00	1972/11/11 16:00:00	9	0.209	31.93%	0.28
160	1992/12/07 08:00:00	1992/12/08 13:00:00	30	0.208	32.13%	0.28
161	1995/12/20 17:00:00	1995/12/20 18:00:00	2	0.2	32.33%	0.28
162	1982/11/29 20:00:00	1982/12/01 13:00:00	42	0.199	32.53%	0.28
163	1983/03/20 20:00:00	1983/03/21 06:00:00	11	0.198	32.73%	0.28
164	1967/03/13 14:00:00	1967/03/14 13:00:00	24	0.198	32.93%	0.27
165	1979/03/27 10:00:00	1979/03/29 09:00:00	48	0.197	33.13%	0.27
166	1977/08/17 00:00:00	1977/08/18 10:00:00	35	0.197	33.33%	0.27
167	1983/03/17 06:00:00	1983/03/19 08:00:00	51	0.194	33.53%	0.27
168	1975/12/11 23:00:00	1975/12/12 19:00:00	21	0.193	33.73%	0.27
169	1982/02/10 10:00:00	1982/02/11 12:00:00	27	0.192	33.94%	0.27
170	1975/03/10 11:00:00	1975/03/11 21:00:00	35	0.191	34.14%	0.27
171	1979/03/17 05:00:00	1979/03/17 17:00:00	13	0.189	34.34%	0.26
172	2008/02/14 12:00:00	2008/02/14 23:00:00	12	0.187	34.54%	0.26
173	1965/03/31 15:00:00	1965/04/03 20:00:00	78	0.187	34.74%	0.26
174	1988/11/25 09:00:00	1988/11/26 01:00:00	17	0.185	34.94%	0.26
175	1980/03/10 17:00:00	1980/03/11 08:00:00	16	0.184	35.14%	0.26
176	1987/12/04 21:00:00	1987/12/05 04:00:00	8	0.184	35.34%	0.26
177	1993/03/28 03:00:00	1993/03/28 03:00:00	1	0.183	35.54%	0.25
178	2008/02/03 09:00:00	2008/02/04 10:00:00	26	0.182	35.74%	0.25
179	1978/09/05 18:00:00	1978/09/06 03:00:00	10	0.182	35.94%	0.25
180	1996/02/25 10:00:00	1996/02/26 03:00:00	18	0.182	36.14%	0.25

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
181	2005/04/28 08:00:00	2005/04/29 01:00:00	18	0.182	36.35%	0.25
182	1996/01/21 18:00:00	1996/01/22 11:00:00	18	0.18	36.55%	0.25
183	2002/12/16 17:00:00	2002/12/17 00:00:00	8	0.178	36.75%	0.25
184	2006/02/28 00:00:00	2006/03/01 01:00:00	26	0.177	36.95%	0.25
185	1988/12/21 03:00:00	1988/12/21 12:00:00	10	0.176	37.15%	0.24
186	1979/01/31 05:00:00	1979/02/02 16:00:00	60	0.176	37.35%	0.24
187	1969/02/18 10:00:00	1969/02/20 04:00:00	43	0.176	37.55%	0.24
188	1978/11/21 19:00:00	1978/11/22 01:00:00	7	0.175	37.75%	0.24
189	1993/01/31 01:00:00	1993/01/31 08:00:00	8	0.173	37.95%	0.24
190	1982/11/09 17:00:00	1982/11/11 08:00:00	40	0.172	38.15%	0.24
191	1993/02/18 15:00:00	1993/02/20 20:00:00	54	0.17	38.35%	0.24
192	1971/12/27 14:00:00	1971/12/28 18:00:00	29	0.168	38.55%	0.23
193	1989/03/25 11:00:00	1989/03/26 11:00:00	25	0.165	38.76%	0.23
194	1993/02/23 19:00:00	1993/02/24 05:00:00	11	0.164	38.96%	0.23
195	2005/02/11 03:00:00	2005/02/13 03:00:00	49	0.164	39.16%	0.23
196	1979/02/21 02:00:00	1979/02/22 04:00:00	27	0.163	39.36%	0.23
197	1969/03/13 14:00:00	1969/03/13 18:00:00	5	0.163	39.56%	0.23
198	1974/04/02 02:00:00	1974/04/02 16:00:00	15	0.158	39.76%	0.23
199	1980/01/18 04:00:00	1980/01/19 00:00:00	21	0.157	39.96%	0.23
200	1979/10/20 02:00:00	1979/10/21 11:00:00	34	0.156	40.16%	0.23
201	1971/05/07 20:00:00	1971/05/08 07:00:00	12	0.156	40.36%	0.22
202	1965/02/06 03:00:00	1965/02/07 05:00:00	27	0.156	40.56%	0.22
203	1997/01/25 23:00:00	1997/01/26 20:00:00	22	0.156	40.76%	0.22
204	1965/12/14 15:00:00	1965/12/14 20:00:00	6	0.155	40.96%	0.22
205	2000/02/21 17:00:00	2000/02/21 17:00:00	1	0.155	41.16%	0.22
206	1990/06/09 10:00:00	1990/06/10 09:00:00	24	0.154	41.37%	0.22
207	1978/04/07 01:00:00	1978/04/07 07:00:00	7	0.154	41.57%	0.22
208	1983/10/01 04:00:00	1983/10/01 18:00:00	15	0.154	41.77%	0.22
209	1981/03/05 07:00:00	1981/03/05 15:00:00	9	0.154	41.97%	0.22
210	1981/02/25 21:00:00	1981/02/26 08:00:00	12	0.153	42.17%	0.21
211	1983/04/29 09:00:00	1983/05/01 08:00:00	48	0.153	42.37%	0.21
212	1986/03/08 15:00:00	1986/03/08 19:00:00	5	0.152	42.57%	0.21
213	1975/04/05 21:00:00	1975/04/06 21:00:00	25	0.152	42.77%	0.21
214	1998/04/11 17:00:00	1998/04/11 17:00:00	1	0.151	42.97%	0.21
215	1967/04/21 15:00:00	1967/04/22 05:00:00	15	0.151	43.17%	0.21
216	1973/01/18 21:00:00	1973/01/19 12:00:00	16	0.151	43.37%	0.21
217	1980/03/25 23:00:00	1980/03/26 05:00:00	7	0.148	43.57%	0.21
218	1973/02/27 23:00:00	1973/02/28 12:00:00	14	0.146	43.78%	0.21
219	2002/03/17 23:00:00	2002/03/18 03:00:00	5	0.146	43.98%	0.21
220	1995/01/10 19:00:00	1995/01/13 00:00:00	54	0.145	44.18%	0.21
221	2000/10/29 23:00:00	2000/10/30 05:00:00	7	0.144	44.38%	0.2
222	1982/01/20 07:00:00	1982/01/21 21:00:00	39	0.144	44.58%	0.2
223	1983/02/24 09:00:00	1983/02/25 06:00:00	22	0.142	44.78%	0.2
224	1982/03/28 18:00:00	1982/03/28 18:00:00	1	0.142	44.98%	0.2
225	1994/04/25 18:00:00	1994/04/26 21:00:00	28	0.141	45.18%	0.2
226	1981/11/28 06:00:00	1981/11/29 10:00:00	29	0.141	45.38%	0.2
227	1973/03/20 08:00:00	1973/03/22 06:00:00	47	0.141	45.58%	0.2

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
228	1965/12/16 06:00:00	1965/12/16 11:00:00	6	0.139	45.78%	0.2
229	1986/12/06 03:00:00	1986/12/07 12:00:00	34	0.138	45.98%	0.2
230	1978/01/30 10:00:00	1978/01/31 03:00:00	18	0.136	46.18%	0.2
231	1974/10/28 12:00:00	1974/10/29 23:00:00	36	0.133	46.39%	0.2
232	1985/12/02 23:00:00	1985/12/03 13:00:00	15	0.132	46.59%	0.19
233	1978/03/31 02:00:00	1978/03/31 23:00:00	22	0.131	46.79%	0.19
234	1977/12/25 17:00:00	1977/12/27 06:00:00	38	0.131	46.99%	0.19
235	1983/12/03 15:00:00	1983/12/04 02:00:00	12	0.121	47.19%	0.19
236	2006/03/21 02:00:00	2006/03/21 06:00:00	5	0.121	47.39%	0.19
237	1969/03/21 19:00:00	1969/03/21 20:00:00	2	0.119	47.59%	0.19
238	1987/10/22 16:00:00	1987/10/23 04:00:00	13	0.117	47.79%	0.19
239	1996/12/11 10:00:00	1996/12/11 23:00:00	14	0.117	47.99%	0.19
240	1995/03/21 11:00:00	1995/03/21 18:00:00	8	0.117	48.19%	0.19
241	1997/04/04 10:00:00	1997/04/04 10:00:00	1	0.116	48.39%	0.19
242	2006/05/22 04:00:00	2006/05/22 12:00:00	9	0.116	48.59%	0.19
243	2006/03/28 22:00:00	2006/03/29 08:00:00	11	0.116	48.80%	0.19
244	1991/01/09 14:00:00	1991/01/09 14:00:00	1	0.115	49.00%	0.18
245	2005/03/22 21:00:00	2005/03/23 04:00:00	8	0.114	49.20%	0.18
246	1994/03/19 02:00:00	1994/03/20 09:00:00	32	0.112	49.40%	0.18
247	1964/12/27 11:00:00	1964/12/28 09:00:00	23	0.111	49.60%	0.18
248	1975/11/27 18:00:00	1975/11/28 22:00:00	29	0.11	49.80%	0.18
249	2000/02/13 17:00:00	2000/02/13 17:00:00	1	0.11	50.00%	0.18
250	1976/10/22 20:00:00	1976/10/22 20:00:00	1	0.109	50.20%	0.18
251	1980/12/04 13:00:00	1980/12/05 04:00:00	16	0.109	50.40%	0.18
252	1970/10/03 14:00:00	1970/10/03 15:00:00	2	0.108	50.60%	0.18
253	1970/03/11 12:00:00	1970/03/12 04:00:00	17	0.105	50.80%	0.18
254	1992/03/23 03:00:00	1992/03/23 04:00:00	2	0.105	51.00%	0.18
255	1995/12/23 10:00:00	1995/12/23 10:00:00	1	0.103	51.20%	0.18
256	1978/11/11 03:00:00	1978/11/12 09:00:00	31	0.103	51.41%	0.18
257	1982/03/27 01:00:00	1982/03/27 10:00:00	10	0.102	51.61%	0.18
258	2001/12/21 17:00:00	2001/12/21 17:00:00	1	0.102	51.81%	0.17
259	2000/04/17 18:00:00	2000/04/18 09:00:00	16	0.1	52.01%	0.17
260	1986/09/24 00:00:00	1986/09/24 00:00:00	1	0.099	52.21%	0.17
261	2007/12/07 04:00:00	2007/12/08 07:00:00	28	0.098	52.41%	0.17
262	2005/02/18 04:00:00	2005/02/19 16:00:00	37	0.098	52.61%	0.17
263	1982/12/09 19:00:00	1982/12/09 21:00:00	3	0.097	52.81%	0.17
264	1985/09/18 09:00:00	1985/09/18 12:00:00	4	0.096	53.01%	0.17
265	1977/03/25 02:00:00	1977/03/25 15:00:00	14	0.096	53.21%	0.17
266	1998/03/25 17:00:00	1998/03/25 17:00:00	1	0.096	53.41%	0.17
267	1985/02/02 05:00:00	1985/02/02 16:00:00	12	0.094	53.61%	0.17
268	1971/02/16 22:00:00	1971/02/17 10:00:00	13	0.093	53.82%	0.17
269	1990/02/17 11:00:00	1990/02/18 09:00:00	23	0.093	54.02%	0.17
270	1982/04/02 12:00:00	1982/04/03 09:00:00	22	0.09	54.22%	0.17
271	1978/03/22 05:00:00	1978/03/22 13:00:00	9	0.089	54.42%	0.17
272	1988/04/14 21:00:00	1988/04/15 07:00:00	11	0.089	54.62%	0.17
273	1979/03/19 01:00:00	1979/03/20 03:00:00	27	0.088	54.82%	0.17
274	1987/11/02 03:00:00	1987/11/02 03:00:00	1	0.088	55.02%	0.16

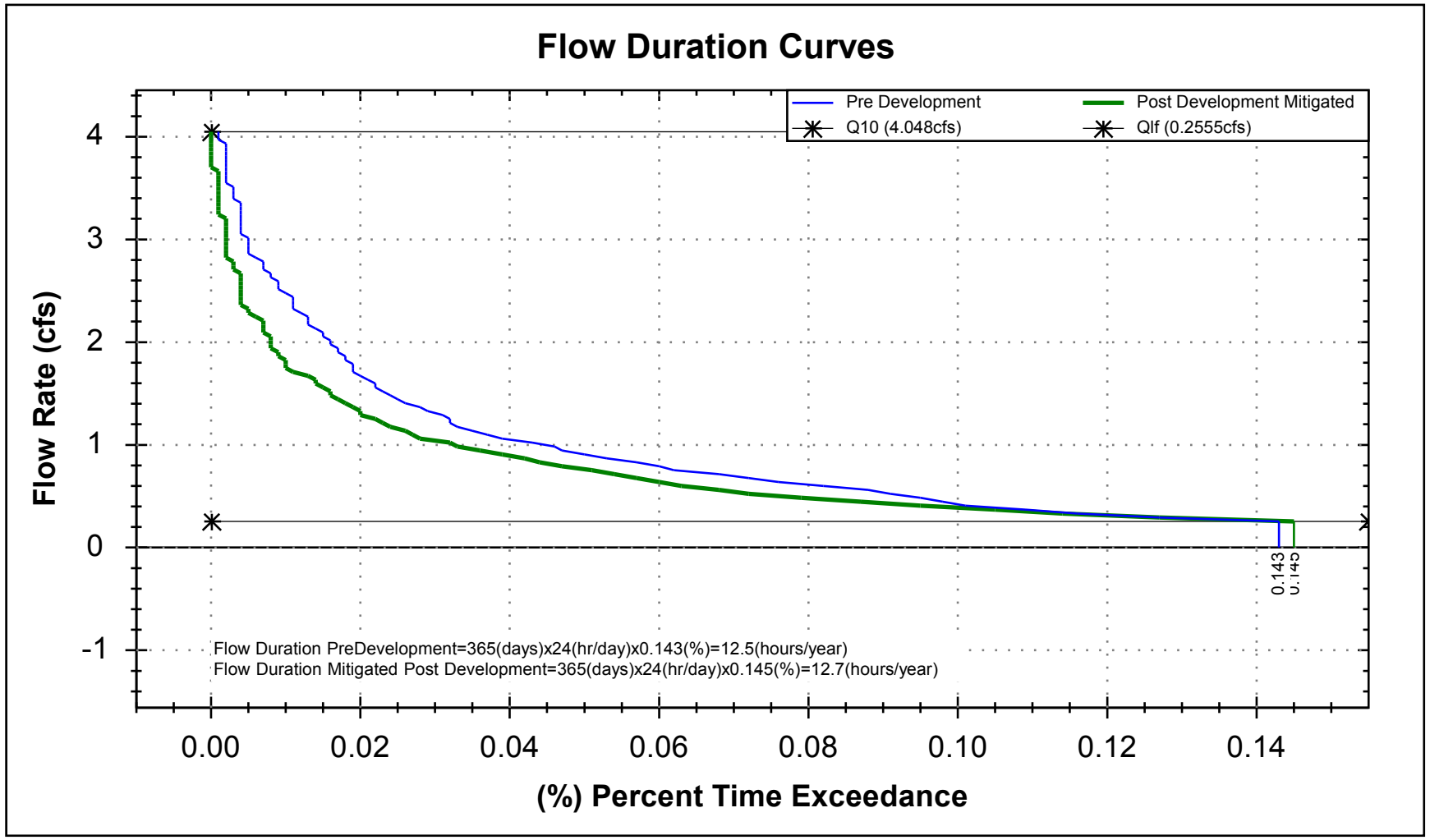
Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
275	1968/02/13 22:00:00	1968/02/13 23:00:00	2	0.087	55.22%	0.16
276	2004/04/01 22:00:00	2004/04/01 22:00:00	1	0.087	55.42%	0.16
277	1984/12/08 01:00:00	1984/12/08 01:00:00	1	0.086	55.62%	0.16
278	1966/10/04 14:00:00	1966/10/04 14:00:00	1	0.086	55.82%	0.16
279	2004/02/18 17:00:00	2004/02/18 17:00:00	1	0.086	56.02%	0.16
280	1996/02/27 21:00:00	1996/02/27 22:00:00	2	0.086	56.22%	0.16
281	1991/10/26 22:00:00	1991/10/26 23:00:00	2	0.086	56.43%	0.16
282	2007/04/20 15:00:00	2007/04/20 16:00:00	2	0.086	56.63%	0.16
283	2008/01/23 20:00:00	2008/01/23 22:00:00	3	0.085	56.83%	0.16
284	1970/03/06 22:00:00	1970/03/07 01:00:00	4	0.085	57.03%	0.16
285	1971/12/22 06:00:00	1971/12/23 11:00:00	30	0.085	57.23%	0.16
286	1995/04/16 07:00:00	1995/04/16 23:00:00	17	0.084	57.43%	0.16
287	1982/01/28 20:00:00	1982/01/28 23:00:00	4	0.084	57.63%	0.16
288	1973/03/06 06:00:00	1973/03/07 01:00:00	20	0.083	57.83%	0.16
289	1996/03/12 17:00:00	1996/03/13 15:00:00	23	0.083	58.03%	0.16
290	1990/01/31 01:00:00	1990/01/31 01:00:00	1	0.082	58.23%	0.16
291	1965/03/11 14:00:00	1965/03/11 14:00:00	1	0.082	58.43%	0.16
292	1977/01/03 13:00:00	1977/01/04 00:00:00	12	0.082	58.63%	0.15
293	1988/02/02 08:00:00	1988/02/03 02:00:00	19	0.082	58.84%	0.15
294	1986/04/06 07:00:00	1986/04/06 20:00:00	14	0.081	59.04%	0.15
295	1975/02/09 20:00:00	1975/02/10 06:00:00	11	0.081	59.24%	0.15
296	2003/05/03 17:00:00	2003/05/03 17:00:00	1	0.081	59.44%	0.15
297	1978/11/23 08:00:00	1978/11/23 13:00:00	6	0.079	59.64%	0.15
298	2001/01/26 12:00:00	2001/01/27 02:00:00	15	0.079	59.84%	0.15
299	1994/12/25 02:00:00	1994/12/25 07:00:00	6	0.079	60.04%	0.15
300	1969/11/06 19:00:00	1969/11/07 02:00:00	8	0.078	60.24%	0.15
301	1972/12/08 10:00:00	1972/12/09 02:00:00	17	0.078	60.44%	0.15
302	1998/01/29 17:00:00	1998/01/29 17:00:00	1	0.078	60.64%	0.15
303	1977/03/16 13:00:00	1977/03/17 03:00:00	15	0.078	60.84%	0.15
304	1987/02/25 02:00:00	1987/02/25 02:00:00	1	0.078	61.04%	0.15
305	1967/08/31 02:00:00	1967/08/31 07:00:00	6	0.078	61.24%	0.15
306	1986/01/30 04:00:00	1986/01/30 15:00:00	12	0.077	61.45%	0.15
307	1983/11/12 03:00:00	1983/11/13 04:00:00	26	0.077	61.65%	0.15
308	1998/03/26 17:00:00	1998/03/26 17:00:00	1	0.077	61.85%	0.15
309	1966/02/06 11:00:00	1966/02/08 00:00:00	38	0.077	62.05%	0.15
310	1971/05/28 12:00:00	1971/05/29 02:00:00	15	0.076	62.25%	0.15
311	1975/03/06 06:00:00	1975/03/06 15:00:00	10	0.076	62.45%	0.15
312	2000/02/17 17:00:00	2000/02/17 17:00:00	1	0.076	62.65%	0.14
313	1986/03/13 17:00:00	1986/03/14 02:00:00	10	0.074	62.85%	0.14
314	1969/01/28 19:00:00	1969/01/28 20:00:00	2	0.074	63.05%	0.14
315	1977/12/18 05:00:00	1977/12/18 12:00:00	8	0.073	63.25%	0.14
316	1972/05/20 04:00:00	1972/05/20 13:00:00	10	0.072	63.45%	0.14
317	1968/12/25 19:00:00	1968/12/26 10:00:00	16	0.072	63.65%	0.14
318	1974/01/01 05:00:00	1974/01/01 21:00:00	17	0.072	63.86%	0.14
319	2004/12/31 15:00:00	2004/12/31 17:00:00	3	0.072	64.06%	0.14
320	1971/01/02 05:00:00	1971/01/02 18:00:00	14	0.072	64.26%	0.14
321	1981/01/28 07:00:00	1981/01/28 14:00:00	8	0.072	64.46%	0.14

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
322	1981/01/29 18:00:00	1981/01/30 09:00:00	16	0.072	64.66%	0.14
323	1992/02/10 00:00:00	1992/02/10 00:00:00	1	0.072	64.86%	0.14
324	1964/09/24 14:00:00	1964/09/24 14:00:00	1	0.072	65.06%	0.14
325	1966/10/10 12:00:00	1966/10/10 13:00:00	2	0.072	65.26%	0.14
326	1970/04/30 09:00:00	1970/04/30 09:00:00	1	0.072	65.46%	0.14
327	1971/03/13 06:00:00	1971/03/13 07:00:00	2	0.072	65.66%	0.14
328	1972/04/30 04:00:00	1972/04/30 10:00:00	7	0.072	65.86%	0.14
329	1972/10/19 03:00:00	1972/10/19 03:00:00	1	0.072	66.06%	0.14
330	1973/03/04 00:00:00	1973/03/04 00:00:00	1	0.072	66.27%	0.14
331	1973/04/30 05:00:00	1973/04/30 11:00:00	7	0.072	66.47%	0.14
332	1973/12/01 15:00:00	1973/12/01 15:00:00	1	0.072	66.67%	0.14
333	1976/04/11 19:00:00	1976/04/11 19:00:00	1	0.072	66.87%	0.14
334	1976/11/27 04:00:00	1976/11/27 06:00:00	3	0.072	67.07%	0.14
335	1979/02/14 03:00:00	1979/02/14 05:00:00	3	0.072	67.27%	0.13
336	1979/11/07 19:00:00	1979/11/09 01:00:00	31	0.072	67.47%	0.13
337	1980/03/21 19:00:00	1980/03/22 00:00:00	6	0.072	67.67%	0.13
338	1983/08/16 15:00:00	1983/08/16 15:00:00	1	0.072	67.87%	0.13
339	1985/10/07 14:00:00	1985/10/07 14:00:00	1	0.072	68.07%	0.13
340	1985/10/09 12:00:00	1985/10/09 12:00:00	1	0.072	68.27%	0.13
341	1992/03/20 16:00:00	1992/03/21 08:00:00	17	0.072	68.47%	0.13
342	2001/05/29 15:00:00	2001/05/29 15:00:00	1	0.072	68.67%	0.13
343	1981/11/27 01:00:00	1981/11/27 02:00:00	2	0.072	68.88%	0.13
344	1964/11/09 13:00:00	1964/11/09 16:00:00	4	0.072	69.08%	0.13
345	1964/11/10 17:00:00	1964/11/10 18:00:00	2	0.072	69.28%	0.13
346	1995/01/03 13:00:00	1995/01/03 14:00:00	2	0.072	69.48%	0.13
347	2006/12/10 00:00:00	2006/12/10 06:00:00	7	0.072	69.68%	0.13
348	1968/12/20 09:00:00	1968/12/20 10:00:00	2	0.071	69.88%	0.13
349	1996/10/30 14:00:00	1996/10/30 21:00:00	8	0.071	70.08%	0.13
350	1964/10/15 10:00:00	1964/10/15 14:00:00	5	0.071	70.28%	0.13
351	1971/10/16 05:00:00	1971/10/17 11:00:00	31	0.071	70.48%	0.13
352	1981/03/26 23:00:00	1981/03/26 23:00:00	1	0.071	70.68%	0.13
353	1983/10/07 08:00:00	1983/10/07 13:00:00	6	0.071	70.88%	0.13
354	1983/04/21 00:00:00	1983/04/21 09:00:00	10	0.071	71.08%	0.13
355	1994/11/10 12:00:00	1994/11/10 12:00:00	1	0.071	71.29%	0.13
356	1969/03/10 05:00:00	1969/03/10 11:00:00	7	0.071	71.49%	0.13
357	1971/04/14 12:00:00	1971/04/14 15:00:00	4	0.071	71.69%	0.13
358	2005/10/16 17:00:00	2005/10/16 17:00:00	1	0.071	71.89%	0.13
359	2007/02/19 08:00:00	2007/02/19 16:00:00	9	0.07	72.09%	0.13
360	1983/03/22 13:00:00	1983/03/22 15:00:00	3	0.07	72.29%	0.13
361	1975/02/03 10:00:00	1975/02/04 15:00:00	30	0.069	72.49%	0.13
362	1992/03/26 18:00:00	1992/03/26 19:00:00	2	0.069	72.69%	0.12
363	1994/02/03 20:00:00	1994/02/04 11:00:00	16	0.068	72.89%	0.12
364	2002/11/29 17:00:00	2002/11/29 17:00:00	1	0.068	73.09%	0.12
365	1973/11/18 01:00:00	1973/11/18 15:00:00	15	0.067	73.29%	0.12
366	1997/12/06 17:00:00	1997/12/06 17:00:00	1	0.065	73.49%	0.12
367	2004/12/05 12:00:00	2004/12/05 17:00:00	6	0.064	73.69%	0.12
368	2005/03/05 00:00:00	2005/03/05 04:00:00	5	0.063	73.90%	0.12

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
369	1976/04/15 16:00:00	1976/04/15 21:00:00	6	0.063	74.10%	0.12
370	1986/10/09 18:00:00	1986/10/10 11:00:00	18	0.062	74.30%	0.12
371	1990/01/02 03:00:00	1990/01/02 07:00:00	5	0.062	74.50%	0.12
372	1979/01/15 15:00:00	1979/01/15 22:00:00	8	0.061	74.70%	0.12
373	2007/02/12 22:00:00	2007/02/13 02:00:00	5	0.061	74.90%	0.12
374	1994/03/06 23:00:00	1994/03/07 10:00:00	12	0.061	75.10%	0.12
375	1988/01/05 17:00:00	1988/01/05 17:00:00	1	0.061	75.30%	0.12
376	1982/11/19 03:00:00	1982/11/19 13:00:00	11	0.061	75.50%	0.12
377	1974/03/27 10:00:00	1974/03/27 10:00:00	1	0.06	75.70%	0.12
378	2001/04/21 04:00:00	2001/04/21 13:00:00	10	0.058	75.90%	0.12
379	2003/11/12 06:00:00	2003/11/12 12:00:00	7	0.057	76.10%	0.12
380	2005/10/18 01:00:00	2005/10/18 10:00:00	10	0.057	76.31%	0.12
381	1991/12/28 01:00:00	1991/12/28 01:00:00	1	0.057	76.51%	0.12
382	1992/12/17 23:00:00	1992/12/18 05:00:00	7	0.057	76.71%	0.12
383	2006/12/16 21:00:00	2006/12/16 21:00:00	1	0.057	76.91%	0.12
384	1983/12/09 18:00:00	1983/12/09 19:00:00	2	0.057	77.11%	0.12
385	1984/04/06 06:00:00	1984/04/06 06:00:00	1	0.057	77.31%	0.12
386	1984/12/14 14:00:00	1984/12/14 14:00:00	1	0.057	77.51%	0.12
387	1988/02/29 22:00:00	1988/02/29 22:00:00	1	0.057	77.71%	0.12
388	1990/02/04 11:00:00	1990/02/04 11:00:00	1	0.057	77.91%	0.12
389	1995/06/17 00:00:00	1995/06/17 00:00:00	1	0.057	78.11%	0.12
390	2004/11/29 12:00:00	2004/11/29 12:00:00	1	0.057	78.31%	0.12
391	2006/03/17 20:00:00	2006/03/17 20:00:00	1	0.057	78.51%	0.12
392	2007/02/28 05:00:00	2007/02/28 05:00:00	1	0.057	78.71%	0.12
393	1994/01/25 01:00:00	1994/01/25 08:00:00	8	0.057	78.92%	0.12
394	2004/01/28 06:00:00	2004/01/28 06:00:00	1	0.057	79.12%	0.11
395	2005/01/28 16:00:00	2005/01/28 16:00:00	1	0.057	79.32%	0.11
396	1997/02/27 21:00:00	1997/02/27 21:00:00	1	0.057	79.52%	0.11
397	1990/11/26 03:00:00	1990/11/26 03:00:00	1	0.057	79.72%	0.11
398	2006/10/14 12:00:00	2006/10/14 12:00:00	1	0.056	79.92%	0.11
399	1989/10/22 00:00:00	1989/10/22 00:00:00	1	0.056	80.12%	0.11
400	1987/04/03 23:00:00	1987/04/04 00:00:00	2	0.056	80.32%	0.11
401	1985/12/11 03:00:00	1985/12/11 07:00:00	5	0.055	80.52%	0.11
402	1970/11/26 02:00:00	1970/11/26 11:00:00	10	0.054	80.72%	0.11
403	1967/04/18 20:00:00	1967/04/19 20:00:00	25	0.053	80.92%	0.11
404	1996/04/18 01:00:00	1996/04/18 07:00:00	7	0.052	81.12%	0.11
405	1992/12/27 21:00:00	1992/12/28 04:00:00	8	0.051	81.33%	0.11
406	1983/02/02 20:00:00	1983/02/02 20:00:00	1	0.049	81.53%	0.11
407	1968/11/15 12:00:00	1968/11/15 19:00:00	8	0.049	81.73%	0.11
408	1965/04/07 04:00:00	1965/04/07 06:00:00	3	0.049	81.93%	0.11
409	1982/09/26 09:00:00	1982/09/26 17:00:00	9	0.049	82.13%	0.11
410	2001/12/09 17:00:00	2001/12/09 17:00:00	1	0.048	82.33%	0.11
411	1970/02/10 02:00:00	1970/02/11 06:00:00	29	0.048	82.53%	0.11
412	1985/03/27 14:00:00	1985/03/28 09:00:00	20	0.048	82.73%	0.11
413	1979/01/09 10:00:00	1979/01/09 13:00:00	4	0.048	82.93%	0.11
414	1971/01/12 20:00:00	1971/01/12 23:00:00	4	0.048	83.13%	0.11
415	1967/11/30 17:00:00	1967/11/30 21:00:00	5	0.048	83.33%	0.11

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
416	1973/03/13 21:00:00	1973/03/13 21:00:00	1	0.047	83.53%	0.11
417	1985/02/09 12:00:00	1985/02/09 15:00:00	4	0.047	83.73%	0.11
418	1967/12/16 20:00:00	1967/12/17 02:00:00	7	0.047	83.94%	0.11
419	1965/01/24 08:00:00	1965/01/24 08:00:00	1	0.047	84.14%	0.11
420	2007/12/20 22:00:00	2007/12/21 03:00:00	6	0.046	84.34%	0.11
421	2008/01/27 09:00:00	2008/01/27 09:00:00	1	0.046	84.54%	0.11
422	1998/03/31 17:00:00	1998/03/31 17:00:00	1	0.045	84.74%	0.11
423	1970/01/16 18:00:00	1970/01/16 19:00:00	2	0.044	84.94%	0.11
424	2004/11/21 06:00:00	2004/11/21 08:00:00	3	0.043	85.14%	0.11
425	1997/01/23 07:00:00	1997/01/23 07:00:00	1	0.043	85.34%	0.11
426	1986/01/31 18:00:00	1986/01/31 18:00:00	1	0.043	85.54%	0.11
427	1987/10/31 04:00:00	1987/10/31 22:00:00	19	0.043	85.74%	0.11
428	1997/01/05 11:00:00	1997/01/05 15:00:00	5	0.043	85.94%	0.11
429	1988/11/14 07:00:00	1988/11/14 09:00:00	3	0.043	86.14%	0.11
430	1997/01/15 20:00:00	1997/01/15 20:00:00	1	0.043	86.35%	0.11
431	2005/12/31 19:00:00	2005/12/31 19:00:00	1	0.043	86.55%	0.1
432	1994/01/27 12:00:00	1994/01/27 12:00:00	1	0.042	86.75%	0.1
433	1989/01/06 00:00:00	1989/01/06 00:00:00	1	0.042	86.95%	0.1
434	1993/11/23 03:00:00	1993/11/23 03:00:00	1	0.042	87.15%	0.1
435	1993/12/11 17:00:00	1993/12/11 17:00:00	1	0.042	87.35%	0.1
436	1993/12/14 18:00:00	1993/12/14 18:00:00	1	0.042	87.55%	0.1
437	1990/11/19 22:00:00	1990/11/20 05:00:00	8	0.042	87.75%	0.1
438	1992/01/03 16:00:00	1992/01/03 16:00:00	1	0.042	87.95%	0.1
439	1990/04/04 09:00:00	1990/04/04 10:00:00	2	0.042	88.15%	0.1
440	1991/03/13 22:00:00	1991/03/14 01:00:00	4	0.042	88.35%	0.1
441	1990/03/11 03:00:00	1990/03/11 03:00:00	1	0.042	88.55%	0.1
442	1993/03/26 18:00:00	1993/03/26 18:00:00	1	0.042	88.76%	0.1
443	1996/03/04 23:00:00	1996/03/04 23:00:00	1	0.042	88.96%	0.1
444	1994/04/09 14:00:00	1994/04/09 14:00:00	1	0.041	89.16%	0.1
445	1984/03/24 13:00:00	1984/03/24 13:00:00	1	0.041	89.36%	0.1
446	1984/12/16 04:00:00	1984/12/16 04:00:00	1	0.041	89.56%	0.1
447	1985/08/10 14:00:00	1985/08/10 14:00:00	1	0.041	89.76%	0.1
448	1986/01/02 15:00:00	1986/01/02 15:00:00	1	0.041	89.96%	0.1
449	1986/09/18 11:00:00	1986/09/18 11:00:00	1	0.041	90.16%	0.1
450	1986/12/20 06:00:00	1986/12/20 06:00:00	1	0.041	90.36%	0.1
451	1992/03/31 16:00:00	1992/03/31 16:00:00	1	0.041	90.56%	0.1
452	2000/10/21 18:00:00	2000/10/21 18:00:00	1	0.041	90.76%	0.1
453	2006/03/12 21:00:00	2006/03/12 21:00:00	1	0.041	90.96%	0.1
454	2007/02/22 21:00:00	2007/02/22 21:00:00	1	0.041	91.16%	0.1
455	1987/10/12 19:00:00	1987/10/12 19:00:00	1	0.041	91.37%	0.1
456	2004/04/17 15:00:00	2004/04/17 15:00:00	1	0.041	91.57%	0.1
457	2006/04/14 22:00:00	2006/04/14 22:00:00	1	0.041	91.77%	0.1
458	1974/12/28 07:00:00	1974/12/29 10:00:00	28	0.041	91.97%	0.1
459	1986/07/19 14:00:00	1986/07/19 14:00:00	1	0.04	92.17%	0.1
460	1990/05/28 05:00:00	1990/05/28 05:00:00	1	0.04	92.37%	0.1
461	2005/09/20 03:00:00	2005/09/20 03:00:00	1	0.04	92.57%	0.1
462	1977/01/06 21:00:00	1977/01/07 07:00:00	11	0.04	92.77%	0.1

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
463	1995/06/15 22:00:00	1995/06/15 22:00:00	1	0.04	92.97%	0.1
464	1985/02/20 21:00:00	1985/02/20 21:00:00	1	0.039	93.17%	0.1
465	1982/01/05 14:00:00	1982/01/05 14:00:00	1	0.039	93.37%	0.1
466	1972/01/09 12:00:00	1972/01/10 00:00:00	13	0.039	93.57%	0.1
467	1973/01/09 13:00:00	1973/01/10 01:00:00	13	0.039	93.78%	0.1
468	1972/12/07 07:00:00	1972/12/07 09:00:00	3	0.039	93.98%	0.1
469	1977/12/23 06:00:00	1977/12/23 06:00:00	1	0.039	94.18%	0.1
470	1982/01/10 19:00:00	1982/01/10 21:00:00	3	0.039	94.38%	0.1
471	1967/12/13 13:00:00	1967/12/13 13:00:00	1	0.039	94.58%	0.1
472	1970/12/17 02:00:00	1970/12/17 19:00:00	18	0.038	94.78%	0.1
473	1975/04/01 05:00:00	1975/04/01 05:00:00	1	0.038	94.98%	0.1
474	2002/03/07 15:00:00	2002/03/07 15:00:00	1	0.038	95.18%	0.1
475	1975/03/14 11:00:00	1975/03/14 11:00:00	1	0.037	95.38%	0.1
476	1967/04/04 19:00:00	1967/04/04 19:00:00	1	0.037	95.58%	0.1
477	1971/12/04 01:00:00	1971/12/04 01:00:00	1	0.036	95.78%	0.09
478	1971/12/07 02:00:00	1971/12/07 02:00:00	1	0.036	95.98%	0.09
479	1980/12/07 12:00:00	1980/12/07 12:00:00	1	0.036	96.18%	0.09
480	1982/12/08 00:00:00	1982/12/08 00:00:00	1	0.036	96.39%	0.09
481	1978/01/10 18:00:00	1978/01/10 20:00:00	3	0.036	96.59%	0.09
482	1983/01/19 06:00:00	1983/01/19 07:00:00	2	0.036	96.79%	0.09
483	1975/01/30 19:00:00	1975/01/30 21:00:00	3	0.036	96.99%	0.09
484	1983/01/24 19:00:00	1983/01/24 19:00:00	1	0.036	97.19%	0.09
485	1969/11/10 01:00:00	1969/11/10 02:00:00	2	0.036	97.39%	0.09
486	1973/02/03 21:00:00	1973/02/03 21:00:00	1	0.035	97.59%	0.09
487	1977/02/22 02:00:00	1977/02/22 02:00:00	1	0.035	97.79%	0.09
488	1971/12/31 06:00:00	1971/12/31 06:00:00	1	0.035	97.99%	0.09
489	1969/12/09 00:00:00	1969/12/09 00:00:00	1	0.035	98.19%	0.09
490	1970/01/11 18:00:00	1970/01/11 18:00:00	1	0.035	98.39%	0.09
491	1983/01/23 04:00:00	1983/01/23 04:00:00	1	0.035	98.59%	0.09
492	1970/12/09 11:00:00	1970/12/09 11:00:00	1	0.035	98.80%	0.09
493	1973/01/04 04:00:00	1973/01/04 17:00:00	14	0.035	99.00%	0.09
494	1968/01/27 23:00:00	1968/01/27 23:00:00	1	0.035	99.20%	0.09
495	1969/01/19 00:00:00	1969/01/19 00:00:00	1	0.035	99.40%	0.09
496	1977/01/28 19:00:00	1977/01/28 19:00:00	1	0.035	99.60%	0.09
497	1974/01/20 22:00:00	1974/01/20 22:00:00	1	0.035	99.80%	0.09
--End of Data----------						


Flow Duration Curves
Pre Development
Post Development Mitigated
Q10 (4.048cfs)
Qlf (0.2555cfs)
Flow Rate (cfs)
4
3
2
1
0
-1
0.143
0.145
Flow Duration PreDevelopment=365(days)x24(hr/day)x0.143(%)=12.5(hours/year)
Flow Duration Mitigated Post Development=365(days)x24(hr/day)x0.145(%)=12.7(hours/year)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
(%) Percent Time Exceedance

Compare Post-Development Curve to Pre-Development Curve

post-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\POC-1\17046-Post-Development-poc1.out
post-development time stamp: 1/31/2019 3:36:25 PM
Compared to:
pre-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\POC-1\17046-Pre-Development-poc1.out
pre-development time stamp: 9/20/2018 3:25:02 PM

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	0.26	0.15	0.14	FALSE	TRUE	FALSE	Pass- Qpost Below Flow Control Threshold
1	0.29	0.13	0.13	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
2	0.33	0.11	0.12	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
3	0.37	0.11	0.11	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
4	0.41	0.10	0.10	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
5	0.45	0.09	0.10	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
6	0.49	0.08	0.10	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
7	0.52	0.07	0.09	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
8	0.56	0.07	0.09	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
9	0.60	0.06	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
10	0.64	0.06	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
11	0.68	0.06	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
12	0.72	0.05	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
13	0.75	0.05	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
14	0.79	0.05	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
15	0.83	0.04	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
16	0.87	0.04	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
17	0.91	0.04	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
18	0.95	0.04	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
19	0.98	0.03	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
20	1.02	0.03	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
21	1.06	0.03	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
22	1.10	0.03	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
23	1.14	0.03	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
24	1.18	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
25	1.21	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
26	1.25	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
27	1.29	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
28	1.33	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
29	1.37	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
30	1.41	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
31	1.44	0.02	0.03	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	1.48	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
33	1.52	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
34	1.56	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
35	1.60	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
36	1.63	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
37	1.67	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
38	1.71	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
39	1.75	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
40	1.79	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
41	1.83	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
42	1.86	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
43	1.90	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
44	1.94	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
45	1.98	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
46	2.02	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
47	2.06	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
48	2.09	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
49	2.13	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
50	2.17	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
51	2.21	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
52	2.25	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
53	2.29	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
54	2.32	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
55	2.36	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
56	2.40	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
57	2.44	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
58	2.48	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
59	2.52	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
60	2.55	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
61	2.59	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
62	2.63	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
63	2.67	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
64	2.71	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
65	2.75	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
66	2.78	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
67	2.82	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
68	2.86	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
69	2.90	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
70	2.94	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
71	2.98	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	3.01	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
73	3.05	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
74	3.09	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
75	3.13	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
76	3.17	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
77	3.21	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
78	3.24	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
79	3.28	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
80	3.32	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
81	3.36	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
82	3.40	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
83	3.44	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
84	3.47	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
85	3.51	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
86	3.55	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
87	3.59	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
88	3.63	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
89	3.67	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
90	3.70	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
91	3.74	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
92	3.78	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
93	3.82	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
94	3.86	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
95	3.89	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
96	3.93	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
97	3.97	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
98	4.01	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
99	4.05	0.00	0.00	TRUE	FALSE	FALSE	Pass- Qpost Above Flow Control Upper Limit

Duration Table Summary at Project Discharge Point

file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\POC-1\17046-Pre-Development-poc1.out
time stamp: 9/20/2018 3:25:02 PM

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	0.26	61	546	0.143
2	0.29	40	485	0.127
3	0.33	29	445	0.116
4	0.37	29	416	0.109
5	0.41	12	387	0.101
6	0.45	11	375	0.098
7	0.49	16	364	0.095
8	0.52	13	348	0.091
9	0.56	21	335	0.088
10	0.60	25	314	0.082
11	0.64	13	289	0.076
12	0.68	17	276	0.072
13	0.72	20	259	0.068
14	0.75	10	239	0.062
15	0.79	10	229	0.060
16	0.83	18	219	0.057
17	0.87	11	201	0.053
18	0.91	10	190	0.050
19	0.94	5	180	0.047
20	0.98	11	175	0.046
21	1.02	13	164	0.043
22	1.06	11	151	0.039
23	1.10	6	140	0.037
24	1.14	6	134	0.035
25	1.17	4	128	0.033
26	1.21	2	124	0.032
27	1.25	5	122	0.032
28	1.29	5	117	0.031
29	1.33	6	112	0.029
30	1.37	5	106	0.028
31	1.40	6	101	0.026
32	1.44	4	95	0.025
33	1.48	4	91	0.024
34	1.52	4	87	0.023
35	1.56	0	83	0.022
36	1.60	1	83	0.022
37	1.63	5	82	0.021
38	1.67	3	77	0.020
39	1.71	1	74	0.019
40	1.75	1	73	0.019
41	1.79	3	72	0.019
42	1.83	2	69	0.018
43	1.86	1	67	0.018
44	1.90	1	66	0.017
45	1.94	4	65	0.017
46	1.98	1	61	0.016
47	2.02	1	60	0.016
48	2.06	3	59	0.015
49	2.09	1	56	0.015
50	2.13	4	55	0.014
51	2.17	0	51	0.013

Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
52	2.21	3	51	0.013
53	2.25	3	48	0.013
54	2.29	1	45	0.012
55	2.32	1	44	0.011
56	2.36	1	43	0.011
57	2.40	1	42	0.011
58	2.44	2	41	0.011
59	2.48	3	39	0.010
60	2.52	2	36	0.009
61	2.55	1	34	0.009
62	2.59	2	33	0.009
63	2.63	1	31	0.008
64	2.67	3	30	0.008
65	2.71	1	27	0.007
66	2.75	1	26	0.007
67	2.78	2	25	0.007
68	2.82	2	23	0.006
69	2.86	0	21	0.005
70	2.90	0	21	0.005
71	2.94	1	21	0.005
72	2.98	2	20	0.005
73	3.01	1	18	0.005
74	3.05	0	17	0.004
75	3.09	0	17	0.004
76	3.13	2	17	0.004
77	3.17	0	15	0.004
78	3.20	0	15	0.004
79	3.24	1	15	0.004
80	3.28	0	14	0.004
81	3.32	0	14	0.004
82	3.36	1	14	0.004
83	3.40	1	13	0.003
84	3.43	0	12	0.003
85	3.47	0	12	0.003
86	3.51	3	12	0.003
87	3.55	0	9	0.002
88	3.59	2	9	0.002
89	3.63	0	7	0.002
90	3.66	0	7	0.002
91	3.70	0	7	0.002
92	3.74	0	7	0.002
93	3.78	0	7	0.002
94	3.82	0	7	0.002
95	3.86	0	7	0.002
96	3.89	1	7	0.002
97	3.93	1	6	0.002
98	3.97	1	5	0.001
99	4.01	0	4	0.001
100	4.05	0	4	0.001
---------End of Data----------				

Duration Table Summary at Project Discharge Point

file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\POC-1\17046-Post-Development-poc1.out
time stamp: 1/31/2019 3:36:25 PM

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	0.26	68	554	0.145
2	0.29	48	486	0.127
3	0.33	35	438	0.114
4	0.37	39	403	0.105
5	0.41	31	364	0.095
6	0.45	30	333	0.087
7	0.49	26	303	0.079
8	0.52	17	277	0.072
9	0.56	20	260	0.068
10	0.60	9	240	0.063
11	0.64	13	231	0.060
12	0.68	11	218	0.057
13	0.72	13	207	0.054
14	0.75	14	194	0.051
15	0.79	11	180	0.047
16	0.83	9	169	0.044
17	0.87	11	160	0.042
18	0.91	12	149	0.039
19	0.94	9	137	0.036
20	0.98	7	128	0.033
21	1.02	14	121	0.032
22	1.06	4	107	0.028
23	1.10	5	103	0.027
24	1.14	5	98	0.026
25	1.17	6	93	0.024
26	1.21	4	87	0.023
27	1.25	6	83	0.022
28	1.29	2	77	0.020
29	1.33	3	75	0.020
30	1.37	4	72	0.019
31	1.40	3	68	0.018
32	1.44	4	65	0.017
33	1.48	0	61	0.016
34	1.52	5	61	0.016
35	1.56	3	56	0.015
36	1.60	1	53	0.014
37	1.63	2	52	0.014
38	1.67	7	50	0.013
39	1.71	3	43	0.011
40	1.75	2	40	0.010
41	1.79	1	38	0.010
42	1.83	1	37	0.010
43	1.86	1	36	0.009
44	1.90	4	35	0.009
45	1.94	1	31	0.008
46	1.98	0	30	0.008
47	2.02	0	30	0.008
48	2.06	2	30	0.008
49	2.09	1	28	0.007
50	2.13	1	27	0.007
51	2.17	1	26	0.007

Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
52	2.21	1	25	0.007
53	2.25	3	24	0.006
54	2.29	1	21	0.005
55	2.32	3	20	0.005
56	2.36	1	17	0.004
57	2.40	0	16	0.004
58	2.44	0	16	0.004
59	2.48	0	16	0.004
60	2.52	0	16	0.004
61	2.55	1	16	0.004
62	2.59	1	15	0.004
63	2.63	0	14	0.004
64	2.67	1	14	0.004
65	2.71	1	13	0.003
66	2.75	1	12	0.003
67	2.78	2	11	0.003
68	2.82	0	9	0.002
69	2.86	0	9	0.002
70	2.90	1	9	0.002
71	2.94	0	8	0.002
72	2.98	0	8	0.002
73	3.01	0	8	0.002
74	3.05	1	8	0.002
75	3.09	0	7	0.002
76	3.13	1	7	0.002
77	3.17	0	6	0.002
78	3.20	2	6	0.002
79	3.24	0	4	0.001
80	3.28	0	4	0.001
81	3.32	1	4	0.001
82	3.36	0	3	0.001
83	3.40	0	3	0.001
84	3.43	0	3	0.001
85	3.47	0	3	0.001
86	3.51	0	3	0.001
87	3.55	0	3	0.001
88	3.59	1	3	0.001
89	3.63	0	2	0.001
90	3.66	1	2	0.001
91	3.70	0	1	0.000
92	3.74	0	1	0.000
93	3.78	0	1	0.000
94	3.82	1	1	0.000
95	3.86	0	0	0.000
96	3.89	0	0	0.000
97	3.93	0	0	0.000
98	3.97	0	0	0.000
99	4.01	0	0	0.000
100	4.05	0	0	0.000
---------End of Data----------				

END OF STATISTICS ANALYSIS

STATISTICS ANALYSIS OF THE SWMM FILES FOR:

DISCHARGE NODE: POC-2

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: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Pre-Development-poc2.out
SWMM file time stamp: 9/19/2018 3:42:17 PM
Selected Node to Analyze: POC-2

POST-DEVELOPMENT MITIGATED SWMM FILE

SWMM file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Post-Development-poc2.out
SWMM file time stamp: 9/19/2018 3:39:32 PM
Selected Node to Analyze: POC-2

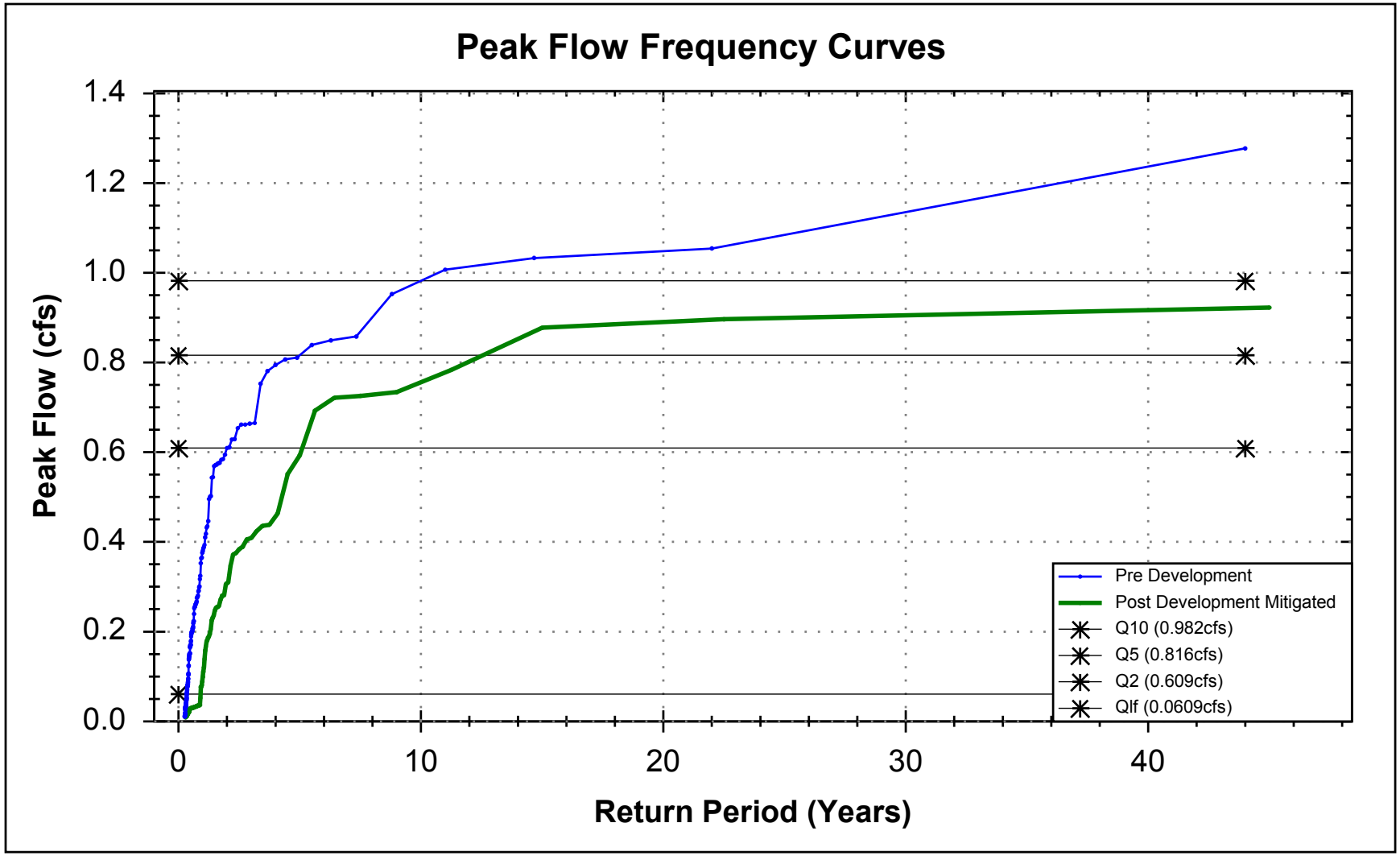
MITIGATED CONDITIONS RESULTS

For the Mitigated Conditions:

Peak Flow Conditions PASS
Flow Duration Conditions PASS

The Mitigated Conditions peak flow frequency curve is composed of 156 points. Of the points, 0 point(s) are above the flow control upper limit (Q10), 107 point(s) are below the low flow threshold value (Qlf). Of the points within the flow control range (Qlf to Q10), 49 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, 94 point(s) have a lower duration than pre-development conditions, and 6 point(s) have a duration that exceeds the pre-development by less than 10%, and for less than 10% of the curve length. 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)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
10
20
30
40
Return Period (Years)
Pre Development
Post Development Mitigated
Q10 (0.982cfs)
Q5 (0.816cfs)
Q2 (0.609cfs)
Qlf (0.0609cfs)

Compare Post-Development Curve to Pre-Development Curve

post-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Post-Development-poc2.out
post-development time stamp: 9/19/2018 3:39:32 PM
Compared to:
pre-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Pre-Development-poc2.out
pre-development time stamp: 12/31/1600 4:00:00 PM

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
0	45.00	0.92	1.29	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
1	22.50	0.90	1.06	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
2	15.00	0.88	1.03	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
3	11.25	0.78	1.01	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
4	9.00	0.73	0.96	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
5	7.50	0.73	0.87	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
6	6.43	0.72	0.85	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
7	5.63	0.69	0.84	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
8	5.00	0.59	0.82	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
9	4.50	0.55	0.81	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
10	4.09	0.46	0.80	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
11	3.75	0.44	0.78	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
12	3.46	0.44	0.76	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
13	3.21	0.42	0.69	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
14	3.00	0.41	0.66	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
15	2.81	0.41	0.66	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
16	2.65	0.39	0.66	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
17	2.50	0.38	0.66	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
18	2.37	0.38	0.64	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
19	2.25	0.37	0.63	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
20	2.14	0.35	0.62	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
21	2.05	0.31	0.61	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
22	1.96	0.31	0.60	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
23	1.88	0.28	0.59	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
24	1.80	0.28	0.58	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
25	1.73	0.27	0.58	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
26	1.67	0.26	0.58	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
27	1.61	0.25	0.57	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
28	1.55	0.25	0.57	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
29	1.50	0.25	0.57	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
30	1.45	0.24	0.56	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
31	1.41	0.23	0.54	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
32	1.36	0.23	0.53	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
33	1.32	0.20	0.50	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	0.19	0.50	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
35	1.25	0.19	0.49	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
36	1.22	0.19	0.44	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
37	1.18	0.18	0.43	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
38	1.15	0.18	0.43	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
39	1.13	0.17	0.42	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
40	1.10	0.16	0.41	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
41	1.07	0.14	0.39	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
42	1.05	0.12	0.39	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
43	1.02	0.11	0.39	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
44	1.00	0.10	0.38	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
45	0.98	0.09	0.38	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
46	0.96	0.08	0.37	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
47	0.94	0.08	0.36	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
48	0.92	0.08	0.35	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
49	0.90	0.05	0.33	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
50	0.88	0.04	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
51	0.87	0.04	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
52	0.85	0.04	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
53	0.83	0.04	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
54	0.82	0.04	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
55	0.80	0.04	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
56	0.79	0.03	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
57	0.78	0.03	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
58	0.76	0.03	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
59	0.75	0.03	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
60	0.74	0.03	0.27	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
61	0.73	0.03	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
62	0.71	0.03	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
63	0.70	0.03	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
64	0.69	0.03	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
65	0.68	0.03	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
66	0.67	0.03	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
67	0.66	0.03	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
68	0.65	0.03	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
69	0.64	0.03	0.25	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
70	0.63	0.03	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
71	0.63	0.03	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
72	0.62	0.03	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
73	0.61	0.03	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
74	0.60	0.03	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
75	0.59	0.03	0.21	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
76	0.58	0.03	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
77	0.58	0.03	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
78	0.57	0.03	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
79	0.56	0.03	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
80	0.56	0.03	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
81	0.55	0.03	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
82	0.54	0.03	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
83	0.54	0.03	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
84	0.53	0.03	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
85	0.52	0.03	0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
86	0.52	0.03	0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
87	0.51	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
88	0.51	0.03	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
89	0.50	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
90	0.50	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
91	0.49	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
92	0.48	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
93	0.48	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
94	0.47	0.03	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
95	0.47	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
96	0.46	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
97	0.46	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
98	0.46	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
99	0.45	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
100	0.45	0.03	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
101	0.44	0.02	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
102	0.44	0.02	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
103	0.43	0.02	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
104	0.43	0.02	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
105	0.43	0.02	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
106	0.42	0.02	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
107	0.42	0.02	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
108	0.41	0.02	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
109	0.41	0.02	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
110	0.41	0.02	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
111	0.40	0.02	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
112	0.40	0.02	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
113	0.40	0.02	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
114	0.39	0.02	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
115	0.39	0.02	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
116	0.39	0.02	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
117	0.38	0.02	0.08	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	0.02	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
119	0.38	0.02	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
120	0.37	0.02	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
121	0.37	0.02	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
122	0.37	0.02	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
123	0.36	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
124	0.36	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
125	0.36	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
126	0.35	0.01	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
127	0.35	0.01	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
128	0.35	0.01	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
129	0.35	0.01	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
130	0.34	0.01	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
131	0.34	0.01	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
132	0.34	0.01	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
133	0.34	0.01	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
134	0.33	0.01	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
135	0.33	0.01	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
136	0.33	0.01	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
137	0.33	0.01	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
138	0.32	0.01	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
139	0.32	0.01	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
140	0.32	0.01	0.05	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
141	0.32	0.01	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
142	0.32	0.01	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
143	0.31	0.01	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
144	0.31	0.01	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
145	0.31	0.01	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
146	0.31	0.01	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
147	0.30	0.01	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
148	0.30	0.01	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
149	0.30	0.01	0.04	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
150	0.30	0.01	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
151	0.30	0.01	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
152	0.29	0.01	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
153	0.29	0.01	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
154	0.29	0.01	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
155	0.29	0.01	0.03	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

SWMM.out file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Pre-Development-poc2.out
SWMM.out time stamp: 12/31/1600 4:00:00 PM

Q10: 0.982
Q5: 0.816
Q2: 0.609

Peak Flow Statistics Table Values

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
1	1993/01/06 17:00:00	1993/01/08 17:00:00	49	1.277	0.58%	44
2	1971/02/23 05:00:00	1971/02/23 11:00:00	7	1.054	1.16%	22
3	1995/01/25 20:00:00	1995/01/25 22:00:00	3	1.033	1.74%	14.67
4	1995/01/04 17:00:00	1995/01/04 22:00:00	6	1.007	2.33%	11
5	1998/02/14 16:00:00	1998/02/14 19:00:00	4	0.953	2.91%	8.8
6	1966/12/05 03:00:00	1966/12/06 23:00:00	45	0.858	3.49%	7.33
7	1986/02/15 02:00:00	1986/02/15 08:00:00	7	0.849	4.07%	6.29
8	1978/01/16 06:00:00	1978/01/16 11:00:00	6	0.839	4.65%	5.5
9	1978/03/17 04:00:00	1978/03/17 10:00:00	7	0.811	5.23%	4.89
10	1983/03/01 15:00:00	1983/03/01 17:00:00	3	0.807	5.81%	4.4
11	1988/04/21 21:00:00	1988/04/21 21:00:00	1	0.795	6.40%	4
12	1967/11/19 08:00:00	1967/11/19 12:00:00	5	0.781	6.98%	3.67
13	2004/10/18 09:00:00	2004/10/18 11:00:00	3	0.753	7.56%	3.39
14	1998/01/09 17:00:00	1998/01/10 17:00:00	25	0.665	8.14%	3.14
15	1969/01/25 10:00:00	1969/01/25 14:00:00	5	0.664	8.72%	2.93
16	2005/01/09 04:00:00	2005/01/09 22:00:00	19	0.662	9.30%	2.75
17	2005/01/11 02:00:00	2005/01/11 07:00:00	6	0.662	9.88%	2.59
18	1983/12/25 10:00:00	1983/12/25 10:00:00	1	0.654	10.47%	2.44
19	2007/01/31 00:00:00	2007/01/31 00:00:00	1	0.629	11.05%	2.32
20	1993/01/09 17:00:00	1993/01/09 18:00:00	2	0.628	11.63%	2.2
21	1980/02/18 04:00:00	1980/02/20 23:00:00	68	0.611	12.21%	2.1
22	1993/02/08 01:00:00	1993/02/08 03:00:00	3	0.609	12.79%	2
23	1980/01/29 02:00:00	1980/01/30 19:00:00	42	0.594	13.37%	1.91
24	1993/01/12 23:00:00	1993/01/14 05:00:00	31	0.585	13.95%	1.83
25	1998/02/03 17:00:00	1998/02/03 18:00:00	2	0.583	14.53%	1.76
26	2004/10/20 11:00:00	2004/10/20 16:00:00	6	0.576	15.12%	1.69
27	1991/03/20 07:00:00	1991/03/20 09:00:00	3	0.575	15.70%	1.63
28	1972/11/14 14:00:00	1972/11/14 14:00:00	1	0.572	16.28%	1.57
29	1992/02/15 14:00:00	1992/02/15 16:00:00	3	0.571	16.86%	1.52
30	1981/02/09 06:00:00	1981/02/09 06:00:00	1	0.569	17.44%	1.47
31	1983/11/25 01:00:00	1983/11/25 01:00:00	1	0.544	18.02%	1.42
32	1965/11/22 15:00:00	1965/11/23 05:00:00	15	0.543	18.60%	1.38
33	2007/11/30 15:00:00	2007/11/30 22:00:00	8	0.502	19.19%	1.33
34	2003/02/25 17:00:00	2003/02/25 18:00:00	2	0.501	19.77%	1.29
35	1967/12/18 16:00:00	1967/12/18 19:00:00	4	0.496	20.35%	1.26
36	2004/02/26 07:00:00	2004/02/26 09:00:00	3	0.446	20.93%	1.22
37	2007/08/26 07:00:00	2007/08/26 08:00:00	2	0.435	21.51%	1.19
38	1995/03/05 09:00:00	1995/03/06 00:00:00	16	0.432	22.09%	1.16
39	1967/04/11 10:00:00	1967/04/11 10:00:00	1	0.418	22.67%	1.13

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
40	1970/03/04 23:00:00	1970/03/05 00:00:00	2	0.41	23.26%	1.1
41	2003/02/12 17:00:00	2003/02/12 17:00:00	1	0.393	23.84%	1.07
42	1979/01/06 00:00:00	1979/01/06 05:00:00	6	0.389	24.42%	1.05
43	2003/04/14 17:00:00	2003/04/14 17:00:00	1	0.386	25.00%	1.02
44	1982/01/01 11:00:00	1982/01/01 11:00:00	1	0.38	25.58%	1
45	1982/03/18 12:00:00	1982/03/18 20:00:00	9	0.376	26.16%	0.98
46	2006/01/02 14:00:00	2006/01/02 15:00:00	2	0.365	26.74%	0.96
47	1980/01/11 00:00:00	1980/01/11 12:00:00	13	0.364	27.33%	0.94
48	1983/02/27 17:00:00	1983/02/27 18:00:00	2	0.353	27.91%	0.92
49	1980/02/16 18:00:00	1980/02/16 20:00:00	3	0.324	28.49%	0.9
50	1983/03/02 17:00:00	1983/03/02 20:00:00	4	0.317	29.07%	0.88
51	1978/01/14 23:00:00	1978/01/15 05:00:00	7	0.301	29.65%	0.86
52	1965/04/09 20:00:00	1965/04/09 23:00:00	4	0.299	30.23%	0.85
53	1978/02/05 20:00:00	1978/02/06 10:00:00	15	0.291	30.81%	0.83
54	1985/11/25 04:00:00	1985/11/25 05:00:00	2	0.29	31.40%	0.82
55	2004/10/27 04:00:00	2004/10/27 08:00:00	5	0.28	31.98%	0.8
56	1970/12/21 08:00:00	1970/12/21 08:00:00	1	0.278	32.56%	0.79
57	1985/11/29 10:00:00	1985/11/29 14:00:00	5	0.277	33.14%	0.77
58	1991/03/27 03:00:00	1991/03/27 06:00:00	4	0.275	33.72%	0.76
59	1991/02/28 16:00:00	1991/03/01 12:00:00	21	0.267	34.30%	0.75
60	1965/11/16 18:00:00	1965/11/16 22:00:00	5	0.264	34.88%	0.73
61	2004/02/22 14:00:00	2004/02/23 00:00:00	11	0.262	35.47%	0.72
62	2002/11/08 17:00:00	2002/11/08 17:00:00	1	0.261	36.05%	0.71
63	1979/01/17 12:00:00	1979/01/17 12:00:00	1	0.261	36.63%	0.7
64	2003/03/15 17:00:00	2003/03/15 17:00:00	1	0.259	37.21%	0.69
65	2005/01/03 09:00:00	2005/01/03 10:00:00	2	0.255	37.79%	0.68
66	1994/02/07 15:00:00	1994/02/07 16:00:00	2	0.255	38.37%	0.67
67	1967/01/24 19:00:00	1967/01/25 00:00:00	6	0.254	38.95%	0.66
68	1976/03/03 00:00:00	1976/03/03 02:00:00	3	0.252	39.53%	0.65
69	1998/02/08 17:00:00	1998/02/08 17:00:00	1	0.239	40.12%	0.64
70	1988/12/24 23:00:00	1988/12/25 01:00:00	3	0.223	40.70%	0.63
71	1976/02/08 15:00:00	1976/02/08 20:00:00	6	0.223	41.28%	0.62
72	1980/03/02 21:00:00	1980/03/03 03:00:00	7	0.219	41.86%	0.61
73	1969/02/06 08:00:00	1969/02/06 09:00:00	2	0.212	42.44%	0.6
74	2005/02/21 08:00:00	2005/02/21 14:00:00	7	0.209	43.02%	0.6
75	1978/12/17 20:00:00	1978/12/18 12:00:00	17	0.207	43.60%	0.59
76	1987/01/07 08:00:00	1987/01/07 08:00:00	1	0.206	44.19%	0.58
77	1995/02/14 09:00:00	1995/02/14 10:00:00	2	0.202	44.77%	0.57
78	1996/01/31 20:00:00	1996/02/01 04:00:00	9	0.201	45.35%	0.56
79	1965/12/13 01:00:00	1965/12/13 01:00:00	1	0.2	45.93%	0.56
80	1992/01/05 16:00:00	1992/01/06 03:00:00	12	0.199	46.51%	0.55
81	1970/11/29 14:00:00	1970/11/29 17:00:00	4	0.199	47.09%	0.54
82	1974/12/04 09:00:00	1974/12/04 09:00:00	1	0.197	47.67%	0.54
83	1974/03/08 03:00:00	1974/03/08 14:00:00	12	0.196	48.26%	0.53
84	2001/11/24 17:00:00	2001/11/24 17:00:00	1	0.194	48.84%	0.52
85	2006/04/05 06:00:00	2006/04/05 06:00:00	1	0.189	49.42%	0.52
86	1991/03/19 01:00:00	1991/03/19 03:00:00	3	0.18	50.00%	0.51

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
87	1966/12/03 16:00:00	1966/12/03 18:00:00	3	0.177	50.58%	0.51
88	1998/02/23 17:00:00	1998/02/23 17:00:00	1	0.171	51.16%	0.5
89	1986/09/25 03:00:00	1986/09/25 06:00:00	4	0.17	51.74%	0.49
90	1986/03/10 16:00:00	1986/03/10 20:00:00	5	0.169	52.33%	0.49
91	1967/11/21 14:00:00	1967/11/21 14:00:00	1	0.169	52.91%	0.48
92	1993/01/15 14:00:00	1993/01/16 14:00:00	25	0.166	53.49%	0.48
93	1970/03/01 00:00:00	1970/03/01 02:00:00	3	0.165	54.07%	0.47
94	1965/04/08 15:00:00	1965/04/08 18:00:00	4	0.152	54.65%	0.47
95	1981/03/01 12:00:00	1981/03/01 16:00:00	5	0.151	55.23%	0.46
96	1990/01/17 03:00:00	1990/01/17 03:00:00	1	0.151	55.81%	0.46
97	1998/02/17 17:00:00	1998/02/17 17:00:00	1	0.149	56.40%	0.45
98	2003/02/11 17:00:00	2003/02/11 17:00:00	1	0.149	56.98%	0.45
99	2001/01/11 05:00:00	2001/01/11 08:00:00	4	0.149	57.56%	0.44
100	1983/03/23 18:00:00	1983/03/23 20:00:00	3	0.145	58.14%	0.44
101	1969/02/24 01:00:00	1969/02/24 04:00:00	4	0.143	58.72%	0.44
102	1986/03/15 22:00:00	1986/03/16 18:00:00	21	0.14	59.30%	0.43
103	1970/03/02 05:00:00	1970/03/02 07:00:00	3	0.139	59.88%	0.43
104	2003/12/25 18:00:00	2003/12/25 19:00:00	2	0.137	60.47%	0.42
105	1969/02/25 17:00:00	1969/02/25 21:00:00	5	0.125	61.05%	0.42
106	1992/02/06 23:00:00	1992/02/06 23:00:00	1	0.123	61.63%	0.42
107	2002/12/20 17:00:00	2002/12/20 17:00:00	1	0.106	62.21%	0.41
108	1974/01/07 14:00:00	1974/01/08 02:00:00	13	0.106	62.79%	0.41
109	1995/01/07 19:00:00	1995/01/07 23:00:00	5	0.103	63.37%	0.4
110	1971/12/25 21:00:00	1971/12/25 21:00:00	1	0.095	63.95%	0.4
111	1993/03/28 03:00:00	1993/03/28 03:00:00	1	0.095	64.53%	0.4
112	1965/12/29 20:00:00	1965/12/29 20:00:00	1	0.089	65.12%	0.39
113	1969/01/21 09:00:00	1969/01/21 09:00:00	1	0.087	65.70%	0.39
114	1993/11/14 17:00:00	1993/11/14 17:00:00	1	0.086	66.28%	0.39
115	1998/02/06 17:00:00	1998/02/06 17:00:00	1	0.083	66.86%	0.38
116	1994/04/28 00:00:00	1994/04/28 00:00:00	1	0.081	67.44%	0.38
117	1998/03/28 17:00:00	1998/03/28 17:00:00	1	0.081	68.02%	0.38
118	1976/04/14 11:00:00	1976/04/14 11:00:00	1	0.08	68.60%	0.37
119	1994/03/25 15:00:00	1994/03/25 15:00:00	1	0.08	69.19%	0.37
120	1993/01/18 05:00:00	1993/01/18 11:00:00	7	0.079	69.77%	0.37
121	2005/02/23 00:00:00	2005/02/23 00:00:00	1	0.078	70.35%	0.36
122	1987/11/04 17:00:00	1987/11/04 20:00:00	4	0.077	70.93%	0.36
123	1994/02/20 16:00:00	1994/02/20 16:00:00	1	0.077	71.51%	0.36
124	1983/02/08 05:00:00	1983/02/08 05:00:00	1	0.076	72.09%	0.36
125	1973/02/11 05:00:00	1973/02/11 05:00:00	1	0.07	72.67%	0.35
126	2008/02/22 04:00:00	2008/02/22 09:00:00	6	0.067	73.26%	0.35
127	1992/12/29 14:00:00	1992/12/29 20:00:00	7	0.064	73.84%	0.35
128	1977/05/08 19:00:00	1977/05/08 20:00:00	2	0.062	74.42%	0.34
129	2003/02/13 17:00:00	2003/02/13 17:00:00	1	0.062	75.00%	0.34
130	1991/12/29 16:00:00	1991/12/29 16:00:00	1	0.06	75.58%	0.34
131	1998/05/12 17:00:00	1998/05/12 17:00:00	1	0.058	76.16%	0.34
132	1996/11/22 02:00:00	1996/11/22 02:00:00	1	0.053	76.74%	0.33
133	1970/03/08 13:00:00	1970/03/08 14:00:00	2	0.051	77.33%	0.33

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
134	1973/03/08 14:00:00	1973/03/08 15:00:00	2	0.051	77.91%	0.33
135	1995/04/18 11:00:00	1995/04/18 11:00:00	1	0.05	78.49%	0.33
136	1974/01/04 19:00:00	1974/01/04 22:00:00	4	0.048	79.07%	0.32
137	1970/12/19 04:00:00	1970/12/19 04:00:00	1	0.048	79.65%	0.32
138	1993/02/19 19:00:00	1993/02/19 21:00:00	3	0.046	80.23%	0.32
139	2004/03/02 04:00:00	2004/03/02 04:00:00	1	0.042	80.81%	0.32
140	1965/12/14 16:00:00	1965/12/14 16:00:00	1	0.041	81.40%	0.31
141	2002/12/16 17:00:00	2002/12/16 17:00:00	1	0.041	81.98%	0.31
142	1996/12/09 18:00:00	1996/12/09 20:00:00	3	0.041	82.56%	0.31
143	2008/01/06 07:00:00	2008/01/06 07:00:00	1	0.039	83.14%	0.31
144	1972/11/16 15:00:00	1972/11/16 15:00:00	1	0.037	83.72%	0.31
145	1992/02/12 21:00:00	1992/02/13 06:00:00	10	0.037	84.30%	0.3
146	1967/01/23 01:00:00	1967/01/23 01:00:00	1	0.036	84.88%	0.3
147	1980/03/06 02:00:00	1980/03/06 02:00:00	1	0.035	85.47%	0.3
148	1976/12/31 09:00:00	1976/12/31 09:00:00	1	0.034	86.05%	0.3
149	1975/03/08 09:00:00	1975/03/08 12:00:00	4	0.033	86.63%	0.3
150	1978/11/13 23:00:00	1978/11/13 23:00:00	1	0.033	87.21%	0.29
151	1971/12/27 16:00:00	1971/12/27 16:00:00	1	0.032	87.79%	0.29
152	1978/03/13 14:00:00	1978/03/13 17:00:00	4	0.032	88.37%	0.29
153	1976/02/06 05:00:00	1976/02/06 05:00:00	1	0.032	88.95%	0.29
154	1980/01/09 12:00:00	1980/01/09 12:00:00	1	0.031	89.53%	0.29
155	1983/01/27 09:00:00	1983/01/27 10:00:00	2	0.031	90.12%	0.28
156	1995/03/23 12:00:00	1995/03/23 12:00:00	1	0.03	90.70%	0.28
157	2006/03/11 03:00:00	2006/03/11 03:00:00	1	0.03	91.28%	0.28
158	1973/01/18 22:00:00	1973/01/18 22:00:00	1	0.026	91.86%	0.28
159	1979/03/01 18:00:00	1979/03/01 18:00:00	1	0.026	92.44%	0.28
160	1985/12/03 00:00:00	1985/12/03 01:00:00	2	0.019	93.02%	0.28
161	1973/01/16 21:00:00	1973/01/16 22:00:00	2	0.019	93.60%	0.27
162	1995/03/11 06:00:00	1995/03/11 06:00:00	1	0.019	94.19%	0.27
163	1982/12/22 23:00:00	1982/12/22 23:00:00	1	0.017	94.77%	0.27
164	1992/01/07 21:00:00	1992/01/07 21:00:00	1	0.016	95.35%	0.27
165	1997/01/26 03:00:00	1997/01/26 03:00:00	1	0.016	95.93%	0.27
166	1986/03/12 14:00:00	1986/03/12 14:00:00	1	0.013	96.51%	0.27
167	2005/01/07 15:00:00	2005/01/07 15:00:00	1	0.012	97.09%	0.26
168	1980/03/10 20:00:00	1980/03/10 20:00:00	1	0.012	97.67%	0.26
169	1965/04/01 22:00:00	1965/04/01 22:00:00	1	0.012	98.26%	0.26
170	1986/11/18 01:00:00	1986/11/18 01:00:00	1	0.012	98.84%	0.26
171	1969/01/14 12:00:00	1969/01/14 12:00:00	1	0.01	99.42%	0.26
-End of Data----------						

SWMM.out file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Post-Development-poc2.out
SWMM.out time stamp: 9/19/2018 3:39:32 PM

Q10: 0.000
Q5: 0.000
Q2: 0.000

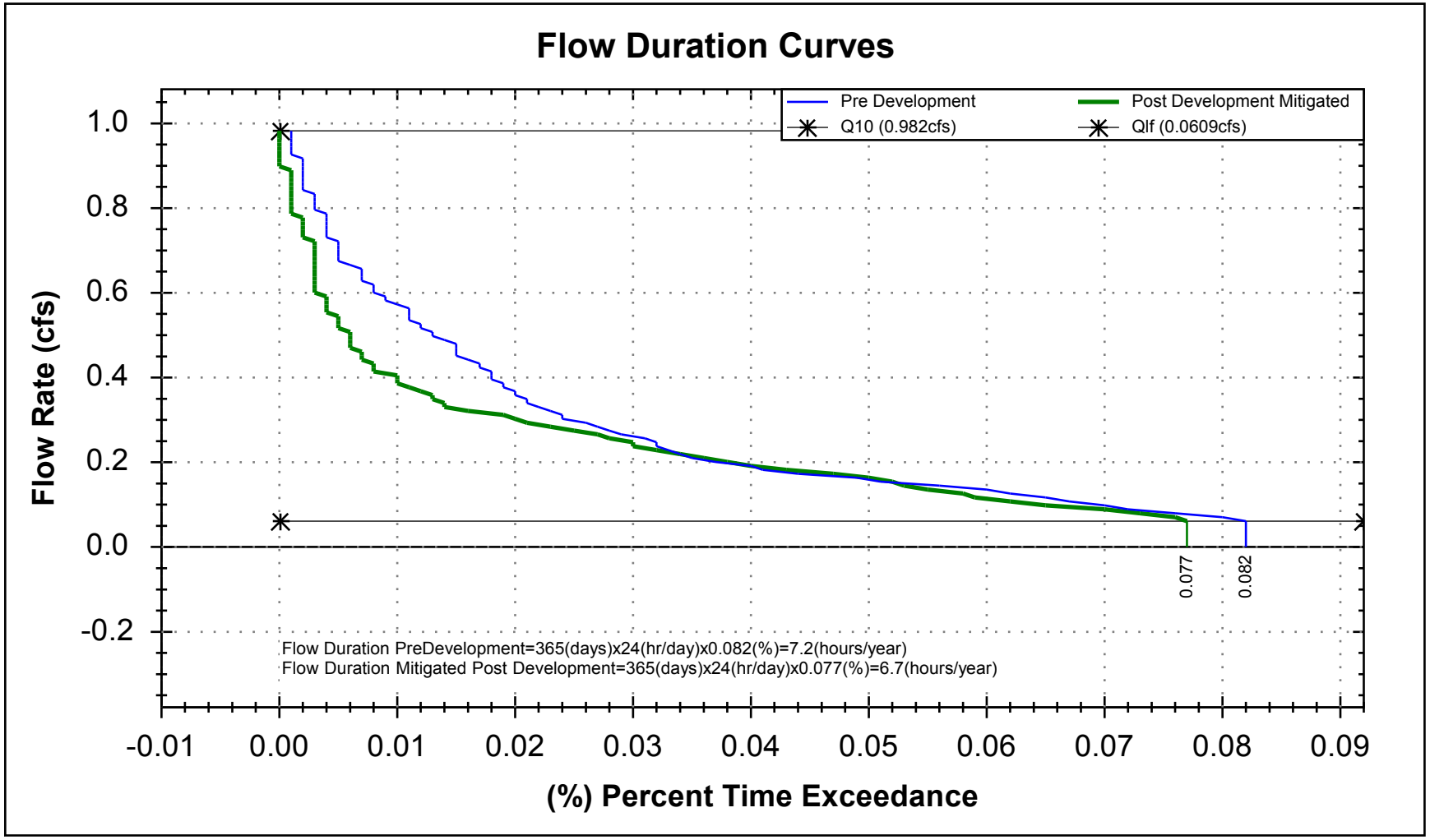
Peak Flow Statistics Table Values

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
1	1993/01/06 23:00:00	1993/01/11 12:00:00	110	0.922	0.64%	45
2	1966/12/03 17:00:00	1966/12/08 05:00:00	109	0.896	1.27%	22.5
3	1995/01/04 20:00:00	1995/01/06 09:00:00	38	0.878	1.91%	15
4	1978/03/12 20:00:00	1978/03/19 04:00:00	153	0.784	2.55%	11.25
5	1986/02/15 04:00:00	1986/02/16 19:00:00	40	0.734	3.18%	9
6	1978/01/15 01:00:00	1978/01/17 19:00:00	67	0.726	3.82%	7.5
7	1980/01/29 02:00:00	1980/01/31 20:00:00	67	0.721	4.46%	6.43
8	1969/01/24 23:00:00	1969/01/27 04:00:00	54	0.693	5.10%	5.63
9	1965/11/22 18:00:00	1965/11/24 11:00:00	42	0.593	5.73%	5
10	1979/01/05 23:00:00	1979/01/07 13:00:00	39	0.551	6.37%	4.5
11	1967/11/19 10:00:00	1967/11/22 21:00:00	84	0.464	7.01%	4.09
12	1971/02/23 07:00:00	1971/02/24 20:00:00	38	0.438	7.64%	3.75
13	2005/01/09 07:00:00	2005/01/12 17:00:00	83	0.436	8.28%	3.46
14	1980/02/14 08:00:00	1980/02/22 10:00:00	195	0.424	8.92%	3.21
15	1993/01/13 18:00:00	1993/01/19 21:00:00	148	0.409	9.55%	3
16	1980/01/09 16:00:00	1980/01/13 02:00:00	83	0.406	10.19%	2.81
17	1995/03/05 15:00:00	1995/03/07 09:00:00	43	0.389	10.83%	2.65
18	2007/11/30 16:00:00	2007/12/02 07:00:00	40	0.384	11.46%	2.5
19	1970/02/28 23:00:00	1970/03/03 13:00:00	63	0.375	12.10%	2.37
20	1983/02/27 21:00:00	1983/03/04 20:00:00	120	0.372	12.74%	2.25
21	1998/02/14 18:00:00	1998/02/16 06:00:00	37	0.347	13.38%	2.14
22	1985/11/25 06:00:00	1985/11/26 17:00:00	36	0.31	14.01%	2.05
23	1991/02/28 00:00:00	1991/03/02 19:00:00	68	0.306	14.65%	1.96
24	1983/12/25 12:00:00	1983/12/27 02:00:00	39	0.281	15.29%	1.88
25	2007/08/26 09:00:00	2007/08/27 11:00:00	27	0.28	15.92%	1.8
26	1991/03/27 03:00:00	1991/03/28 20:00:00	42	0.271	16.56%	1.73
27	1993/02/08 04:00:00	1993/02/09 19:00:00	40	0.257	17.20%	1.67
28	1991/03/19 08:00:00	1991/03/22 10:00:00	75	0.255	17.83%	1.61
29	1981/02/09 08:00:00	1981/02/10 15:00:00	32	0.254	18.47%	1.55
30	1996/11/22 02:00:00	1996/11/23 13:00:00	36	0.247	19.11%	1.5
31	2005/02/21 11:00:00	2005/02/24 11:00:00	73	0.236	19.75%	1.45
32	1982/03/18 15:00:00	1982/03/20 18:00:00	52	0.231	20.38%	1.41
33	2004/10/27 08:00:00	2004/10/28 22:00:00	39	0.225	21.02%	1.36
34	1985/11/29 15:00:00	1985/12/01 00:00:00	34	0.205	21.66%	1.32
35	1995/01/25 22:00:00	1995/01/27 03:00:00	30	0.195	22.29%	1.29
36	1969/02/24 04:00:00	1969/02/27 07:00:00	76	0.189	22.93%	1.25
37	1967/01/23 02:00:00	1967/01/26 07:00:00	78	0.187	23.57%	1.22
38	1980/03/03 00:00:00	1980/03/04 15:00:00	40	0.181	24.20%	1.18
39	1974/03/08 09:00:00	1974/03/09 20:00:00	36	0.178	24.84%	1.15

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
40	1977/05/08 22:00:00	1977/05/10 11:00:00	38	0.167	25.48%	1.13
41	1988/04/20 16:00:00	1988/04/23 04:00:00	61	0.158	26.11%	1.1
42	1967/12/18 21:00:00	1967/12/20 21:00:00	49	0.138	26.75%	1.07
43	1974/01/05 04:00:00	1974/01/09 12:00:00	105	0.12	27.39%	1.05
44	1978/12/17 16:00:00	1978/12/20 02:00:00	59	0.11	28.03%	1.02
45	1976/02/06 04:00:00	1976/02/10 17:00:00	110	0.099	28.66%	1
46	1998/01/09 19:00:00	1998/01/11 19:00:00	49	0.089	29.30%	0.98
47	1974/12/04 12:00:00	1974/12/05 15:00:00	28	0.08	29.94%	0.96
48	2004/10/18 13:00:00	2004/10/21 23:00:00	83	0.077	30.57%	0.94
49	2004/02/26 11:00:00	2004/02/27 15:00:00	29	0.077	31.21%	0.92
50	1965/11/16 21:00:00	1965/11/18 07:00:00	35	0.052	31.85%	0.9
51	2003/02/12 18:00:00	2003/02/15 04:00:00	59	0.036	32.48%	0.88
52	1996/02/01 03:00:00	1996/02/02 13:00:00	35	0.036	33.12%	0.87
53	1970/11/29 21:00:00	1970/12/01 07:00:00	35	0.036	33.76%	0.85
54	1981/03/01 16:00:00	1981/03/03 05:00:00	38	0.036	34.39%	0.83
55	1997/01/13 01:00:00	1997/01/14 21:00:00	45	0.035	35.03%	0.82
56	1976/09/10 16:00:00	1976/09/12 02:00:00	35	0.035	35.67%	0.8
57	1965/12/09 13:00:00	1965/12/11 12:00:00	48	0.035	36.31%	0.79
58	2004/02/23 01:00:00	2004/02/24 10:00:00	34	0.034	36.94%	0.78
59	1965/04/09 06:00:00	1965/04/11 03:00:00	46	0.034	37.58%	0.76
60	1992/02/07 02:00:00	1992/02/08 05:00:00	28	0.034	38.22%	0.75
61	1995/03/11 10:00:00	1995/03/13 01:00:00	40	0.034	38.85%	0.74
62	1986/11/18 05:00:00	1986/11/19 07:00:00	27	0.033	39.49%	0.73
63	1992/01/05 23:00:00	1992/01/08 10:00:00	60	0.033	40.13%	0.71
64	1998/02/03 22:00:00	1998/02/05 04:00:00	31	0.033	40.76%	0.7
65	1977/08/17 10:00:00	1977/08/18 15:00:00	30	0.032	41.40%	0.69
66	1969/01/14 14:00:00	1969/01/15 15:00:00	26	0.032	42.04%	0.68
67	2004/12/29 06:00:00	2004/12/30 15:00:00	34	0.032	42.68%	0.67
68	2008/01/05 12:00:00	2008/01/08 05:00:00	66	0.032	43.31%	0.66
69	1970/03/05 04:00:00	1970/03/06 03:00:00	24	0.032	43.95%	0.65
70	1987/01/05 00:00:00	1987/01/06 08:00:00	33	0.031	44.59%	0.64
71	1971/12/25 09:00:00	1971/12/27 00:00:00	40	0.031	45.22%	0.63
72	1988/01/17 23:00:00	1988/01/18 22:00:00	24	0.031	45.86%	0.63
73	1992/02/15 18:00:00	1992/02/16 20:00:00	27	0.031	46.50%	0.62
74	1985/11/11 17:00:00	1985/11/13 00:00:00	32	0.031	47.13%	0.61
75	1976/03/01 23:00:00	1976/03/04 06:00:00	56	0.031	47.77%	0.6
76	1975/04/08 20:00:00	1975/04/10 04:00:00	33	0.03	48.41%	0.59
77	1982/11/30 20:00:00	1982/12/01 19:00:00	24	0.03	49.04%	0.58
78	2006/04/05 11:00:00	2006/04/06 09:00:00	23	0.03	49.68%	0.58
79	1968/03/08 16:00:00	1968/03/09 13:00:00	22	0.03	50.32%	0.57
80	1987/12/17 00:00:00	1987/12/18 04:00:00	29	0.03	50.96%	0.56
81	1992/02/13 03:00:00	1992/02/14 06:00:00	28	0.03	51.59%	0.56
82	2003/02/25 23:00:00	2003/02/27 01:00:00	27	0.03	52.23%	0.55
83	1967/04/11 16:00:00	1967/04/13 00:00:00	33	0.03	52.87%	0.54
84	1995/02/14 14:00:00	1995/02/15 13:00:00	24	0.03	53.50%	0.54
85	1995/01/08 02:00:00	1995/01/09 05:00:00	28	0.029	54.14%	0.53
86	1978/02/06 02:00:00	1978/02/07 20:00:00	43	0.029	54.78%	0.52

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
87	1976/11/12 08:00:00	1976/11/13 09:00:00	26	0.029	55.41%	0.52
88	1970/12/21 10:00:00	1970/12/22 15:00:00	30	0.029	56.05%	0.51
89	2005/02/12 08:00:00	2005/02/13 14:00:00	31	0.029	56.69%	0.51
90	1972/12/04 22:00:00	1972/12/05 17:00:00	20	0.029	57.32%	0.5
91	2007/01/31 06:00:00	2007/02/01 04:00:00	23	0.029	57.96%	0.5
92	1966/11/07 23:00:00	1966/11/08 18:00:00	20	0.029	58.60%	0.49
93	1972/11/14 20:00:00	1972/11/15 14:00:00	19	0.028	59.24%	0.48
94	1982/12/23 05:00:00	1982/12/23 23:00:00	19	0.028	59.87%	0.48
95	1982/01/01 15:00:00	1982/01/02 10:00:00	20	0.028	60.51%	0.47
96	1983/11/25 07:00:00	1983/11/26 01:00:00	19	0.028	61.15%	0.47
97	1969/02/06 15:00:00	1969/02/07 15:00:00	25	0.028	61.78%	0.46
98	1992/12/07 20:00:00	1992/12/08 17:00:00	22	0.027	62.42%	0.46
99	1998/02/08 19:00:00	1998/02/09 19:00:00	25	0.027	63.06%	0.46
100	1979/03/01 23:00:00	1979/03/02 18:00:00	20	0.026	63.69%	0.45
101	1986/09/25 11:00:00	1986/09/26 04:00:00	18	0.026	64.33%	0.45
102	1979/03/28 05:00:00	1979/03/29 05:00:00	25	0.025	64.97%	0.44
103	2001/01/11 12:00:00	2001/01/12 22:00:00	35	0.022	65.61%	0.44
104	1982/02/10 21:00:00	1982/02/11 17:00:00	21	0.021	66.24%	0.43
105	2006/02/28 09:00:00	2006/03/01 06:00:00	22	0.021	66.88%	0.43
106	1987/01/07 10:00:00	1987/01/08 04:00:00	19	0.02	67.52%	0.43
107	1976/12/31 15:00:00	1977/01/01 08:00:00	18	0.02	68.15%	0.42
108	1973/01/17 03:00:00	1973/01/17 18:00:00	16	0.02	68.79%	0.42
109	1993/02/20 01:00:00	1993/02/20 23:00:00	23	0.02	69.43%	0.41
110	1986/03/16 10:00:00	1986/03/17 15:00:00	30	0.019	70.06%	0.41
111	1982/01/21 14:00:00	1982/01/22 09:00:00	20	0.019	70.70%	0.41
112	1980/03/06 12:00:00	1980/03/07 09:00:00	22	0.019	71.34%	0.4
113	1970/03/08 19:00:00	1970/03/09 14:00:00	20	0.018	71.97%	0.4
114	1967/03/14 02:00:00	1967/03/14 17:00:00	16	0.018	72.61%	0.4
115	1995/01/12 16:00:00	1995/01/13 10:00:00	19	0.017	73.25%	0.39
116	1974/10/29 10:00:00	1974/10/30 08:00:00	23	0.017	73.89%	0.39
117	1975/03/11 00:00:00	1975/03/12 08:00:00	33	0.017	74.52%	0.39
118	1983/03/24 00:00:00	1983/03/24 16:00:00	17	0.017	75.16%	0.38
119	2005/01/04 02:00:00	2005/01/05 06:00:00	29	0.017	75.80%	0.38
120	2008/02/22 13:00:00	2008/02/23 06:00:00	18	0.017	76.43%	0.38
121	1965/04/02 03:00:00	1965/04/02 20:00:00	18	0.017	77.07%	0.37
122	1971/12/22 23:00:00	1971/12/23 19:00:00	21	0.016	77.71%	0.37
123	1994/02/08 00:00:00	1994/02/09 01:00:00	26	0.016	78.34%	0.37
124	1982/11/10 17:00:00	1982/11/11 19:00:00	27	0.015	78.98%	0.36
125	1972/11/16 19:00:00	1972/11/17 20:00:00	26	0.015	79.62%	0.36
126	1979/10/20 19:00:00	1979/10/21 09:00:00	15	0.014	80.25%	0.36
127	1982/03/16 02:00:00	1982/03/16 17:00:00	16	0.014	80.89%	0.35
128	1986/02/08 12:00:00	1986/02/09 11:00:00	24	0.013	81.53%	0.35
129	1975/03/08 17:00:00	1975/03/09 06:00:00	14	0.013	82.17%	0.35
130	1998/02/24 06:00:00	1998/02/25 13:00:00	32	0.012	82.80%	0.35
131	2003/04/14 23:00:00	2003/04/16 03:00:00	29	0.012	83.44%	0.34
132	2002/11/09 17:00:00	2002/11/10 14:00:00	22	0.012	84.08%	0.34
133	1964/11/18 03:00:00	1964/11/18 16:00:00	14	0.012	84.71%	0.34

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
134	1978/11/12 02:00:00	1978/11/12 19:00:00	18	0.012	85.35%	0.34
135	1988/12/25 06:00:00	1988/12/25 18:00:00	13	0.011	85.99%	0.33
136	2003/03/16 18:00:00	2003/03/17 12:00:00	19	0.011	86.62%	0.33
137	1986/03/11 05:00:00	1986/03/11 20:00:00	16	0.011	87.26%	0.33
138	2008/02/03 23:00:00	2008/02/04 15:00:00	17	0.011	87.90%	0.33
139	1973/02/12 08:00:00	1973/02/13 12:00:00	29	0.011	88.54%	0.32
140	1986/12/07 09:00:00	1986/12/07 23:00:00	15	0.011	89.17%	0.32
141	1994/03/19 14:00:00	1994/03/20 04:00:00	15	0.011	89.81%	0.32
142	1983/03/19 02:00:00	1983/03/19 14:00:00	13	0.011	90.45%	0.32
143	1998/02/18 03:00:00	1998/02/18 15:00:00	13	0.011	91.08%	0.32
144	1983/01/27 19:00:00	1983/01/28 06:00:00	12	0.01	91.72%	0.31
145	1997/01/26 15:00:00	1997/01/27 01:00:00	11	0.01	92.36%	0.31
146	1996/12/12 01:00:00	1996/12/12 10:00:00	10	0.01	92.99%	0.31
147	1964/12/28 09:00:00	1964/12/28 18:00:00	10	0.01	93.63%	0.31
148	1965/02/07 04:00:00	1965/02/07 13:00:00	10	0.01	94.27%	0.3
149	1969/01/22 04:00:00	1969/01/22 11:00:00	8	0.01	94.90%	0.3
150	2006/01/03 03:00:00	2006/01/03 10:00:00	8	0.01	95.54%	0.3
151	1994/02/17 23:00:00	1994/02/18 05:00:00	7	0.01	96.18%	0.3
152	1971/12/28 06:00:00	1971/12/29 02:00:00	21	0.01	96.82%	0.3
153	1973/01/19 12:00:00	1973/01/19 17:00:00	6	0.01	97.45%	0.29
154	1976/04/13 15:00:00	1976/04/13 19:00:00	5	0.009	98.09%	0.29
155	1979/01/19 00:00:00	1979/01/19 03:00:00	4	0.009	98.73%	0.29
156	1976/04/14 20:00:00	1976/04/14 21:00:00	2	0.009	99.36%	0.29
--End of Data----------						


Flow Duration Curves
Pre Development
Post Development Mitigated
Q10 (0.982cfs)
Qlf (0.0609cfs)
Flow Rate (cfs)
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
0.077
0.082
Flow Duration PreDevelopment=365(days)x24(hr/day)x0.082(%)=7.2(hours/year)
Flow Duration Mitigated Post Development=365(days)x24(hr/day)x0.077(%)=6.7(hours/year)
-0.01
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
(%) Percent Time Exceedance

Compare Post-Development Curve to Pre-Development Curve

post-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Post-Development-poc2.out
post-development time stamp: 9/19/2018 3:39:32 PM
Compared to:
pre-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Pre-Development-poc2.out
pre-development time stamp: 12/31/1600 4:00:00 PM

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	0.06	0.08	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
1	0.07	0.08	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
2	0.08	0.07	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
3	0.09	0.07	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
4	0.10	0.07	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
5	0.11	0.06	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
6	0.12	0.06	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
7	0.13	0.06	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
8	0.14	0.06	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
9	0.15	0.05	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
10	0.15	0.05	0.05	FALSE	TRUE	FALSE	Pass: Post Duration <10% Over Pre Duration
11	0.16	0.05	0.05	FALSE	TRUE	FALSE	Pass: Post Duration <10% Over Pre Duration
12	0.17	0.05	0.04	FALSE	TRUE	FALSE	Pass: Post Duration <10% Over Pre Duration
13	0.18	0.04	0.04	FALSE	TRUE	FALSE	Pass: Post Duration <10% Over Pre Duration
14	0.19	0.04	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
15	0.20	0.04	0.04	FALSE	TRUE	FALSE	Pass: Post Duration <10% Over Pre Duration
16	0.21	0.04	0.04	FALSE	TRUE	FALSE	Pass: Post Duration <10% Over Pre Duration
17	0.22	0.03	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
18	0.23	0.03	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
19	0.24	0.03	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
20	0.25	0.03	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
21	0.26	0.03	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
22	0.27	0.03	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
23	0.28	0.03	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
24	0.28	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
25	0.29	0.02	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
26	0.30	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
27	0.31	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
28	0.32	0.02	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
29	0.33	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
30	0.34	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
31	0.35	0.01	0.02	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	0.36	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
33	0.37	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
34	0.38	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
35	0.39	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
36	0.40	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
37	0.41	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
38	0.42	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
39	0.42	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
40	0.43	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
41	0.44	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
42	0.45	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
43	0.46	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
44	0.47	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
45	0.48	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
46	0.49	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
47	0.50	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
48	0.51	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
49	0.52	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
50	0.53	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
51	0.54	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
52	0.55	0.01	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
53	0.55	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
54	0.56	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
55	0.57	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
56	0.58	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
57	0.59	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
58	0.60	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
59	0.61	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
60	0.62	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
61	0.63	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
62	0.64	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
63	0.65	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
64	0.66	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
65	0.67	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
66	0.68	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
67	0.68	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
68	0.69	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
69	0.70	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
70	0.71	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
71	0.72	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	0.73	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
73	0.74	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
74	0.75	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
75	0.76	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
76	0.77	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
77	0.78	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
78	0.79	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
79	0.80	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
80	0.81	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
81	0.82	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
82	0.82	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
83	0.83	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
84	0.84	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
85	0.85	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
86	0.86	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
87	0.87	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
88	0.88	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
89	0.89	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
90	0.90	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
91	0.91	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
92	0.92	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
93	0.93	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
94	0.94	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
95	0.95	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
96	0.95	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
97	0.96	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
98	0.97	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
99	0.98	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration

Duration Table Summary at Project Discharge Point

file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Pre-Development-poc2.out
time stamp: 12/31/1600 4:00:00 PM

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	0.06	9	315	0.082
2	0.07	15	306	0.080
3	0.08	14	291	0.076
4	0.09	8	277	0.072
5	0.10	12	269	0.070
6	0.11	10	257	0.067
7	0.12	9	247	0.065
8	0.13	10	238	0.062
9	0.14	14	228	0.060
10	0.14	18	214	0.056
11	0.15	9	196	0.051
12	0.16	20	187	0.049
13	0.17	10	167	0.044
14	0.18	3	157	0.041
15	0.19	11	154	0.040
16	0.20	9	143	0.037
17	0.21	4	134	0.035
18	0.22	2	130	0.034
19	0.23	4	128	0.033
20	0.24	2	124	0.032
21	0.25	5	122	0.032
22	0.26	6	117	0.031
23	0.27	4	111	0.029
24	0.27	4	107	0.028
25	0.28	5	103	0.027
26	0.29	5	98	0.026
27	0.30	2	93	0.024
28	0.31	3	91	0.024
29	0.32	4	88	0.023
30	0.33	2	84	0.022
31	0.34	2	82	0.021
32	0.35	2	80	0.021
33	0.36	3	78	0.020
34	0.37	2	75	0.020
35	0.38	2	73	0.019
36	0.39	2	71	0.019
37	0.40	0	69	0.018
38	0.41	2	69	0.018
39	0.41	2	67	0.018
40	0.42	1	65	0.017
41	0.43	3	64	0.017
42	0.44	2	61	0.016
43	0.45	1	59	0.015
44	0.46	1	58	0.015
45	0.47	1	57	0.015
46	0.48	2	56	0.015
47	0.49	3	54	0.014
48	0.50	3	51	0.013
49	0.51	1	48	0.013
50	0.52	1	47	0.012
51	0.53	2	46	0.012

Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
52	0.54	2	44	0.011
53	0.54	0	42	0.011
54	0.55	0	42	0.011
55	0.56	4	42	0.011
56	0.57	2	38	0.010
57	0.58	3	36	0.009
58	0.59	1	33	0.009
59	0.60	2	32	0.008
60	0.61	1	30	0.008
61	0.62	1	29	0.008
62	0.63	1	28	0.007
63	0.64	0	27	0.007
64	0.65	1	27	0.007
65	0.66	4	26	0.007
66	0.67	3	22	0.006
67	0.68	0	19	0.005
68	0.68	0	19	0.005
69	0.69	0	19	0.005
70	0.70	0	19	0.005
71	0.71	1	19	0.005
72	0.72	1	18	0.005
73	0.73	0	17	0.004
74	0.74	0	17	0.004
75	0.75	2	17	0.004
76	0.76	0	15	0.004
77	0.77	0	15	0.004
78	0.78	1	15	0.004
79	0.79	1	14	0.004
80	0.80	0	13	0.003
81	0.81	2	13	0.003
82	0.81	0	11	0.003
83	0.82	1	11	0.003
84	0.83	2	10	0.003
85	0.84	1	8	0.002
86	0.85	1	7	0.002
87	0.86	0	6	0.002
88	0.87	0	6	0.002
89	0.88	0	6	0.002
90	0.89	0	6	0.002
91	0.90	0	6	0.002
92	0.91	0	6	0.002
93	0.92	1	6	0.002
94	0.93	0	5	0.001
95	0.94	0	5	0.001
96	0.95	1	5	0.001
97	0.95	0	4	0.001
98	0.96	0	4	0.001
99	0.97	0	4	0.001
100	0.98	0	4	0.001
---------End of Data----------				

Duration Table Summary at Project Discharge Point

file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\17046-Post-Development-poc2.out
time stamp: 9/19/2018 3:39:32 PM

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	0.06	7	296	0.077
2	0.07	9	289	0.076
3	0.08	13	280	0.073
4	0.09	17	267	0.070
5	0.10	14	250	0.065
6	0.11	9	236	0.062
7	0.12	6	227	0.059
8	0.13	10	221	0.058
9	0.14	7	211	0.055
10	0.14	4	204	0.053
11	0.15	8	200	0.052
12	0.16	14	192	0.050
13	0.17	13	178	0.047
14	0.18	12	165	0.043
15	0.19	8	153	0.040
16	0.20	9	145	0.038
17	0.21	5	136	0.036
18	0.22	9	131	0.034
19	0.23	6	122	0.032
20	0.24	1	116	0.030
21	0.25	7	115	0.030
22	0.26	4	108	0.028
23	0.27	10	104	0.027
24	0.27	6	94	0.025
25	0.28	6	88	0.023
26	0.29	7	82	0.021
27	0.30	3	75	0.020
28	0.31	9	72	0.019
29	0.32	8	63	0.016
30	0.33	2	55	0.014
31	0.34	4	53	0.014
32	0.35	1	49	0.013
33	0.36	3	48	0.013
34	0.37	4	45	0.012
35	0.38	3	41	0.011
36	0.39	1	38	0.010
37	0.40	0	37	0.010
38	0.41	5	37	0.010
39	0.41	3	32	0.008
40	0.42	0	29	0.008
41	0.43	2	29	0.008
42	0.44	1	27	0.007
43	0.45	0	26	0.007
44	0.46	2	26	0.007
45	0.47	0	24	0.006
46	0.48	0	24	0.006
47	0.49	1	24	0.006
48	0.50	1	23	0.006
49	0.51	1	22	0.006
50	0.52	1	21	0.005
51	0.53	0	20	0.005

Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
52	0.54	0	20	0.005
53	0.54	3	20	0.005
54	0.55	0	17	0.004
55	0.56	1	17	0.004
56	0.57	0	16	0.004
57	0.58	1	16	0.004
58	0.59	2	15	0.004
59	0.60	0	13	0.003
60	0.61	0	13	0.003
61	0.62	0	13	0.003
62	0.63	0	13	0.003
63	0.64	0	13	0.003
64	0.65	0	13	0.003
65	0.66	1	13	0.003
66	0.67	0	12	0.003
67	0.68	0	12	0.003
68	0.68	1	12	0.003
69	0.69	0	11	0.003
70	0.70	0	11	0.003
71	0.71	1	11	0.003
72	0.72	1	10	0.003
73	0.73	2	9	0.002
74	0.74	0	7	0.002
75	0.75	0	7	0.002
76	0.76	0	7	0.002
77	0.77	0	7	0.002
78	0.78	2	7	0.002
79	0.79	0	5	0.001
80	0.80	0	5	0.001
81	0.81	1	5	0.001
82	0.81	0	4	0.001
83	0.82	0	4	0.001
84	0.83	0	4	0.001
85	0.84	1	4	0.001
86	0.85	0	3	0.001
87	0.86	0	3	0.001
88	0.87	1	3	0.001
89	0.88	0	2	0.001
90	0.89	1	2	0.001
91	0.90	0	1	0.000
92	0.91	0	1	0.000
93	0.92	1	1	0.000
94	0.93	0	0	0.000
95	0.94	0	0	0.000
96	0.95	0	0	0.000
97	0.95	0	0	0.000
98	0.96	0	0	0.000
99	0.97	0	0	0.000
100	0.98	0	0	0.000
---------End of Data----------				

END OF STATISTICS ANALYSIS

STATISTICS ANALYSIS OF THE SWMM FILES FOR:

DISCHARGE NODE: POC-3

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: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Pre-Development-poc3.out
SWMM file time stamp: 1/31/2019 6:13:00 PM
Selected Node to Analyze: POC-3

POST-DEVELOPMENT MITIGATED SWMM FILE

SWMM file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Post-Development-poc3-1224.out
SWMM file time stamp: 1/31/2019 6:39:03 PM
Selected Node to Analyze: POC-3

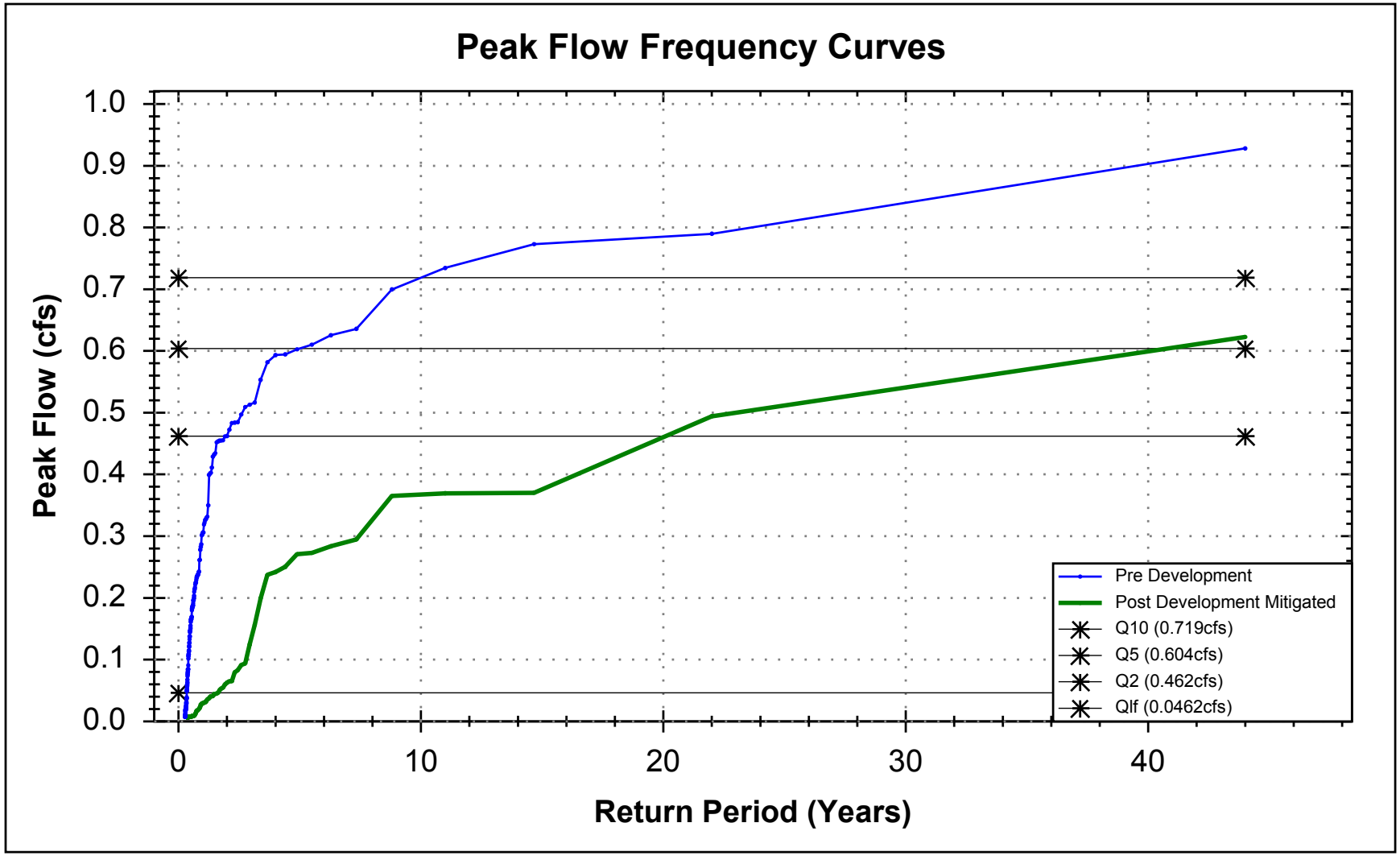
MITIGATED CONDITIONS RESULTS

For the Mitigated Conditions:

Peak Flow Conditions PASS
Flow Duration Conditions PASS

The Mitigated Conditions peak flow frequency curve is composed of 122 points. Of the points, 0 point(s) are above the flow control upper limit (Q10), 96 point(s) are below the low flow threshold value (Qlf). Of the points within the flow control range (Qlf to Q10), 26 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, 98 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)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
10
20
30
40
Return Period (Years)
Pre Development
Post Development Mitigated
Q10 (0.719cfs)
Q5 (0.604cfs)
Q2 (0.462cfs)
Qlf (0.0462cfs)

Compare Post-Development Curve to Pre-Development Curve

post-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Post-Development-poc3-1224.out
post-development time stamp: 1/31/2019 6:39:03 PM
Compared to:
pre-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Pre-Development-poc3.out
pre-development time stamp: 1/31/2019 6:13:00 PM

Post PT #	Rtn Prd (yrs)	Post Dev Q	Pre Dev Q	Qpost < Qpre	Qpost > Qpre	Qpost > 110% Qpre	Pass/Fail
0	44.00	0.62	0.93	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
1	22.00	0.49	0.79	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
2	14.67	0.37	0.77	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
3	11.00	0.37	0.73	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
4	8.80	0.36	0.70	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
5	7.33	0.29	0.64	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
6	6.29	0.28	0.63	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
7	5.50	0.27	0.61	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
8	4.89	0.27	0.60	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
9	4.40	0.25	0.59	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
10	4.00	0.24	0.59	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
11	3.67	0.24	0.58	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
12	3.39	0.20	0.55	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
13	3.14	0.16	0.52	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
14	2.93	0.12	0.51	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
15	2.75	0.09	0.51	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
16	2.59	0.09	0.50	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
17	2.44	0.08	0.48	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
18	2.32	0.08	0.48	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
19	2.20	0.07	0.48	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
20	2.10	0.06	0.47	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
21	2.00	0.06	0.46	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
22	1.91	0.06	0.46	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
23	1.83	0.05	0.46	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
24	1.76	0.05	0.45	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
25	1.69	0.05	0.45	TRUE	FALSE	FALSE	Pass- Qpost < Qpre
26	1.63	0.05	0.45	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
27	1.57	0.04	0.45	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
28	1.52	0.04	0.43	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
29	1.47	0.04	0.43	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
30	1.42	0.04	0.43	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
31	1.38	0.04	0.41	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
32	1.33	0.04	0.40	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
33	1.29	0.04	0.40	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
34	1.26	0.04	0.40	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
35	1.22	0.04	0.35	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
36	1.19	0.04	0.33	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
37	1.16	0.03	0.33	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
38	1.13	0.03	0.33	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
39	1.10	0.03	0.33	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
40	1.07	0.03	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
41	1.05	0.03	0.32	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
42	1.02	0.03	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
43	1.00	0.03	0.31	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
44	0.98	0.03	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
45	0.96	0.03	0.30	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
46	0.94	0.03	0.29	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
47	0.92	0.03	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
48	0.90	0.02	0.28	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
49	0.88	0.02	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
50	0.86	0.02	0.26	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
51	0.85	0.02	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
52	0.83	0.02	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
53	0.82	0.02	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
54	0.80	0.02	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
55	0.79	0.02	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
56	0.77	0.02	0.24	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
57	0.76	0.02	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
58	0.75	0.02	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
59	0.73	0.02	0.23	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
60	0.72	0.01	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
61	0.71	0.01	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
62	0.70	0.01	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
63	0.69	0.01	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
64	0.68	0.01	0.22	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
65	0.67	0.01	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
66	0.66	0.01	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
67	0.65	0.01	0.21	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
68	0.64	0.01	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
69	0.63	0.01	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
70	0.62	0.01	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
71	0.61	0.01	0.20	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
72	0.60	0.01	0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
73	0.60	0.01	0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
74	0.59	0.01	0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
75	0.58	0.01	0.19	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
76	0.57	0.01	0.19	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
77	0.56	0.01	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
78	0.56	0.01	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
79	0.55	0.01	0.18	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
80	0.54	0.01	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
81	0.54	0.01	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
82	0.53	0.01	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
83	0.52	0.01	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
84	0.52	0.01	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
85	0.51	0.01	0.17	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
86	0.51	0.01	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
87	0.50	0.01	0.16	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
88	0.49	0.01	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
89	0.49	0.01	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
90	0.48	0.01	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
91	0.48	0.01	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
92	0.47	0.01	0.15	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
93	0.47	0.01	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
94	0.46	0.01	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
95	0.46	0.01	0.14	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
96	0.45	0.01	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
97	0.45	0.01	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
98	0.44	0.01	0.13	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
99	0.44	0.01	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
100	0.44	0.01	0.12	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
101	0.43	0.01	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
102	0.43	0.01	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
103	0.42	0.01	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
104	0.42	0.01	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
105	0.42	0.01	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
106	0.41	0.01	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
107	0.41	0.01	0.11	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
108	0.40	0.01	0.10	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
109	0.40	0.01	0.09	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
110	0.40	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
111	0.39	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
112	0.39	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
113	0.39	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
114	0.38	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
115	0.38	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
116	0.38	0.01	0.08	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
117	0.37	0.01	0.08	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	0.37	0.01	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
119	0.37	0.01	0.07	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
120	0.36	0.01	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
121	0.36	0.01	0.06	FALSE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold

SWMM.out file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Pre-Development-poc3.out
SWMM.out time stamp: 1/31/2019 6:13:00 PM

Q10: 0.719
Q5: 0.604
Q2: 0.462

Peak Flow Statistics Table Values

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
1	1993/01/06 17:00:00	1993/01/08 17:00:00	49	0.928	0.60%	44
2	1971/02/23 05:00:00	1971/02/23 12:00:00	8	0.79	1.20%	22
3	1995/01/25 20:00:00	1995/01/25 22:00:00	3	0.773	1.81%	14.67
4	1995/01/04 17:00:00	1995/01/04 22:00:00	6	0.734	2.41%	11
5	1998/02/14 16:00:00	1998/02/14 19:00:00	4	0.7	3.01%	8.8
6	1986/02/15 02:00:00	1986/02/15 08:00:00	7	0.636	3.61%	7.33
7	1966/12/05 03:00:00	1966/12/06 23:00:00	45	0.625	4.22%	6.29
8	1988/04/21 21:00:00	1988/04/21 22:00:00	2	0.61	4.82%	5.5
9	1967/11/19 08:00:00	1967/11/19 15:00:00	8	0.603	5.42%	4.89
10	1978/01/16 06:00:00	1978/01/16 11:00:00	6	0.594	6.02%	4.4
11	1978/03/17 04:00:00	1978/03/17 10:00:00	7	0.593	6.63%	4
12	1983/03/01 15:00:00	1983/03/01 17:00:00	3	0.582	7.23%	3.67
13	2004/10/18 09:00:00	2004/10/18 11:00:00	3	0.553	7.83%	3.39
14	2005/01/09 04:00:00	2005/01/09 22:00:00	19	0.517	8.43%	3.14
15	1983/12/25 10:00:00	1983/12/25 11:00:00	2	0.513	9.04%	2.93
16	1998/01/09 17:00:00	1998/01/10 17:00:00	25	0.509	9.64%	2.75
17	2005/01/11 02:00:00	2005/01/11 07:00:00	6	0.497	10.24%	2.59
18	1969/01/25 10:00:00	1969/01/25 14:00:00	5	0.485	10.84%	2.44
19	1993/01/09 17:00:00	1993/01/09 18:00:00	2	0.484	11.45%	2.32
20	1980/02/18 04:00:00	1980/02/21 00:00:00	69	0.483	12.05%	2.2
21	2007/01/31 00:00:00	2007/01/31 01:00:00	2	0.472	12.65%	2.1
22	1993/01/13 21:00:00	1993/01/14 05:00:00	9	0.462	13.25%	2
23	2004/10/20 11:00:00	2004/10/20 16:00:00	6	0.462	13.86%	1.91
24	1981/02/09 06:00:00	1981/02/09 07:00:00	2	0.455	14.46%	1.83
25	1998/02/03 17:00:00	1998/02/03 18:00:00	2	0.455	15.06%	1.76
26	1991/03/20 07:00:00	1991/03/20 09:00:00	3	0.455	15.66%	1.69
27	1992/02/15 14:00:00	1992/02/15 16:00:00	3	0.454	16.27%	1.63
28	1972/11/14 14:00:00	1972/11/14 15:00:00	2	0.452	16.87%	1.57
29	1993/02/08 01:00:00	1993/02/08 03:00:00	3	0.434	17.47%	1.52
30	1983/11/25 01:00:00	1983/11/25 02:00:00	2	0.432	18.07%	1.47
31	1980/01/29 03:00:00	1980/01/30 19:00:00	41	0.429	18.67%	1.42
32	2007/11/30 15:00:00	2007/11/30 22:00:00	8	0.411	19.28%	1.38
33	1967/12/18 16:00:00	1967/12/18 19:00:00	4	0.403	19.88%	1.33
34	2003/02/25 17:00:00	2003/02/25 18:00:00	2	0.401	20.48%	1.29
35	1965/11/22 15:00:00	1965/11/23 05:00:00	15	0.399	21.08%	1.26
36	1967/04/11 10:00:00	1967/04/11 10:00:00	1	0.35	21.69%	1.22
37	2004/02/26 07:00:00	2004/02/26 09:00:00	3	0.332	22.29%	1.19
38	2003/02/12 17:00:00	2003/02/13 17:00:00	25	0.33	22.89%	1.16
39	1982/01/01 11:00:00	1982/01/01 11:00:00	1	0.328	23.49%	1.13

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
40	2003/04/14 17:00:00	2003/04/14 18:00:00	2	0.326	24.10%	1.1
41	1982/03/18 12:00:00	1982/03/18 20:00:00	9	0.322	24.70%	1.07
42	1995/03/05 08:00:00	1995/03/06 00:00:00	17	0.319	25.30%	1.05
43	2006/01/02 14:00:00	2006/01/02 15:00:00	2	0.306	25.90%	1.02
44	1983/02/27 17:00:00	1983/02/27 18:00:00	2	0.306	26.51%	1
45	1980/01/11 00:00:00	1980/01/11 13:00:00	14	0.303	27.11%	0.98
46	2007/08/26 07:00:00	2007/08/26 08:00:00	2	0.301	27.71%	0.96
47	1979/01/06 00:00:00	1979/01/06 05:00:00	6	0.287	28.31%	0.94
48	1980/02/16 18:00:00	1980/02/16 20:00:00	3	0.283	28.92%	0.92
49	1970/03/04 23:00:00	1970/03/05 01:00:00	3	0.278	29.52%	0.9
50	1985/11/25 04:00:00	1985/11/25 05:00:00	2	0.262	30.12%	0.88
51	1978/02/05 20:00:00	1978/02/06 10:00:00	15	0.261	30.72%	0.86
52	1965/04/09 20:00:00	1965/04/09 23:00:00	4	0.243	31.33%	0.85
53	2004/10/27 04:00:00	2004/10/27 09:00:00	6	0.242	31.93%	0.83
54	2002/11/08 17:00:00	2002/11/08 18:00:00	2	0.238	32.53%	0.82
55	1991/02/28 16:00:00	1991/03/01 12:00:00	21	0.238	33.13%	0.8
56	2003/03/15 17:00:00	2003/03/15 18:00:00	2	0.237	33.73%	0.79
57	1985/11/29 10:00:00	1985/11/29 15:00:00	6	0.236	34.34%	0.77
58	1979/01/17 12:00:00	1979/01/17 12:00:00	1	0.235	34.94%	0.76
59	1994/02/07 15:00:00	1994/02/07 16:00:00	2	0.232	35.54%	0.75
60	2004/02/22 14:00:00	2004/02/23 02:00:00	13	0.229	36.14%	0.73
61	1983/03/02 17:00:00	1983/03/02 20:00:00	4	0.225	36.75%	0.72
62	1978/01/14 23:00:00	1978/01/15 05:00:00	7	0.225	37.35%	0.71
63	1976/03/03 00:00:00	1976/03/03 02:00:00	3	0.224	37.95%	0.7
64	1998/02/08 17:00:00	1998/02/08 17:00:00	1	0.222	38.55%	0.69
65	1970/12/21 08:00:00	1970/12/21 08:00:00	1	0.217	39.16%	0.68
66	1967/01/24 19:00:00	1967/01/25 00:00:00	6	0.214	39.76%	0.67
67	1991/03/27 03:00:00	1991/03/27 06:00:00	4	0.214	40.36%	0.66
68	1976/02/08 15:00:00	1976/02/08 22:00:00	8	0.21	40.96%	0.65
69	1965/11/16 18:00:00	1965/11/16 22:00:00	5	0.203	41.57%	0.64
70	1978/12/17 20:00:00	1978/12/18 12:00:00	17	0.199	42.17%	0.63
71	1969/02/06 09:00:00	1969/02/06 10:00:00	2	0.196	42.77%	0.62
72	1974/03/08 03:00:00	1974/03/08 14:00:00	12	0.196	43.37%	0.61
73	1987/01/07 08:00:00	1987/01/07 08:00:00	1	0.191	43.98%	0.6
74	1992/01/05 16:00:00	1992/01/06 03:00:00	12	0.188	44.58%	0.6
75	1970/11/29 14:00:00	1970/11/29 17:00:00	4	0.187	45.18%	0.59
76	2006/04/05 06:00:00	2006/04/05 06:00:00	1	0.186	45.78%	0.58
77	1974/12/04 09:00:00	1974/12/04 10:00:00	2	0.185	46.39%	0.57
78	2001/11/24 17:00:00	2001/11/24 17:00:00	1	0.184	46.99%	0.56
79	2005/01/03 08:00:00	2005/01/03 10:00:00	3	0.183	47.59%	0.56
80	1965/12/13 01:00:00	1965/12/13 01:00:00	1	0.18	48.19%	0.55
81	1980/03/02 21:00:00	1980/03/03 03:00:00	7	0.169	48.80%	0.54
82	1991/03/19 01:00:00	1991/03/19 03:00:00	3	0.169	49.40%	0.54
83	1986/03/10 16:00:00	1986/03/10 20:00:00	5	0.166	50.00%	0.53
84	1998/02/23 17:00:00	1998/02/23 17:00:00	1	0.166	50.60%	0.52
85	1996/01/31 20:00:00	1996/02/01 04:00:00	9	0.166	51.20%	0.52
86	1995/02/14 09:00:00	1995/02/14 10:00:00	2	0.165	51.81%	0.51

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
87	2005/02/21 08:00:00	2005/02/21 14:00:00	7	0.164	52.41%	0.51
88	1988/12/24 23:00:00	1988/12/25 01:00:00	3	0.161	53.01%	0.5
89	1967/11/21 14:00:00	1967/11/21 14:00:00	1	0.155	53.61%	0.49
90	1981/03/01 12:00:00	1981/03/01 16:00:00	5	0.151	54.22%	0.49
91	1990/01/17 03:00:00	1990/01/17 03:00:00	1	0.147	54.82%	0.48
92	1998/02/17 17:00:00	1998/02/17 17:00:00	1	0.147	55.42%	0.48
93	2003/02/11 17:00:00	2003/02/11 17:00:00	1	0.147	56.02%	0.47
94	1965/04/08 15:00:00	1965/04/08 19:00:00	5	0.144	56.63%	0.47
95	1966/12/03 16:00:00	1966/12/03 18:00:00	3	0.138	57.23%	0.46
96	1970/03/02 05:00:00	1970/03/02 07:00:00	3	0.137	57.83%	0.46
97	1970/03/01 00:00:00	1970/03/01 02:00:00	3	0.133	58.43%	0.45
98	1993/01/15 14:00:00	1993/01/16 14:00:00	25	0.128	59.04%	0.45
99	1986/09/25 03:00:00	1986/09/25 06:00:00	4	0.127	59.64%	0.44
100	1992/02/06 23:00:00	1992/02/06 23:00:00	1	0.122	60.24%	0.44
101	1983/03/23 19:00:00	1983/03/23 20:00:00	2	0.12	60.84%	0.44
102	2003/12/25 18:00:00	2003/12/25 19:00:00	2	0.115	61.45%	0.43
103	1993/03/28 03:00:00	1993/03/28 03:00:00	1	0.113	62.05%	0.43
104	1969/02/25 17:00:00	1969/02/25 21:00:00	5	0.113	62.65%	0.42
105	1969/02/24 01:00:00	1969/02/24 04:00:00	4	0.109	63.25%	0.42
106	2001/01/11 05:00:00	2001/01/11 08:00:00	4	0.108	63.86%	0.42
107	1986/03/15 23:00:00	1986/03/15 23:00:00	1	0.106	64.46%	0.41
108	2002/12/20 17:00:00	2002/12/20 17:00:00	1	0.106	65.06%	0.41
109	1974/01/07 14:00:00	1974/01/08 04:00:00	15	0.102	65.66%	0.4
110	1971/12/25 21:00:00	1971/12/25 21:00:00	1	0.091	66.27%	0.4
111	1995/01/07 19:00:00	1995/01/07 23:00:00	5	0.085	66.87%	0.4
112	1969/01/21 09:00:00	1969/01/21 10:00:00	2	0.084	67.47%	0.39
113	1998/02/06 17:00:00	1998/02/06 17:00:00	1	0.084	68.07%	0.39
114	1998/03/28 17:00:00	1998/03/28 17:00:00	1	0.084	68.67%	0.39
115	2005/02/23 00:00:00	2005/02/23 02:00:00	3	0.08	69.28%	0.38
116	1994/02/20 16:00:00	1994/02/20 16:00:00	1	0.08	69.88%	0.38
117	1993/01/18 05:00:00	1993/01/18 11:00:00	7	0.077	70.48%	0.38
118	1983/02/08 05:00:00	1983/02/08 06:00:00	2	0.075	71.08%	0.37
119	1994/03/25 15:00:00	1994/03/25 15:00:00	1	0.073	71.69%	0.37
120	1976/04/14 11:00:00	1976/04/14 11:00:00	1	0.067	72.29%	0.37
121	1965/12/29 20:00:00	1965/12/29 21:00:00	2	0.063	72.89%	0.36
122	1998/05/12 17:00:00	1998/05/12 17:00:00	1	0.062	73.49%	0.36
123	1977/05/08 19:00:00	1977/05/08 20:00:00	2	0.06	74.10%	0.36
124	2008/02/22 04:00:00	2008/02/22 09:00:00	6	0.059	74.70%	0.36
125	1992/12/29 14:00:00	1992/12/29 20:00:00	7	0.057	75.30%	0.35
126	1987/11/04 17:00:00	1987/11/04 20:00:00	4	0.054	75.90%	0.35
127	1965/12/14 16:00:00	1965/12/14 16:00:00	1	0.051	76.51%	0.35
128	1993/11/14 17:00:00	1993/11/14 17:00:00	1	0.05	77.11%	0.34
129	1973/02/11 05:00:00	1973/02/11 05:00:00	1	0.049	77.71%	0.34
130	1970/12/19 04:00:00	1970/12/19 04:00:00	1	0.049	78.31%	0.34
131	1995/04/18 11:00:00	1995/04/18 11:00:00	1	0.039	78.92%	0.34
132	1996/11/22 02:00:00	1996/11/22 03:00:00	2	0.038	79.52%	0.33
133	1991/12/29 16:00:00	1991/12/29 16:00:00	1	0.037	80.12%	0.33

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
134	1993/02/19 19:00:00	1993/02/19 21:00:00	3	0.037	80.72%	0.33
135	2008/01/06 07:00:00	2008/01/06 07:00:00	1	0.036	81.33%	0.33
136	2004/03/02 04:00:00	2004/03/02 04:00:00	1	0.031	81.93%	0.32
137	1970/03/08 14:00:00	1970/03/08 14:00:00	1	0.029	82.53%	0.32
138	1973/03/08 15:00:00	1973/03/08 15:00:00	1	0.029	83.13%	0.32
139	1974/01/04 19:00:00	1974/01/04 22:00:00	4	0.027	83.73%	0.32
140	1983/01/27 09:00:00	1983/01/27 10:00:00	2	0.025	84.34%	0.31
141	2002/12/16 17:00:00	2002/12/16 17:00:00	1	0.025	84.94%	0.31
142	1992/02/12 21:00:00	1992/02/13 06:00:00	10	0.023	85.54%	0.31
143	1975/03/08 09:00:00	1975/03/08 12:00:00	4	0.023	86.14%	0.31
144	1996/12/09 18:00:00	1996/12/09 20:00:00	3	0.022	86.75%	0.31
145	1967/01/23 01:00:00	1967/01/23 01:00:00	1	0.022	87.35%	0.3
146	1980/03/06 02:00:00	1980/03/06 02:00:00	1	0.022	87.95%	0.3
147	1978/03/13 14:00:00	1978/03/13 17:00:00	4	0.02	88.55%	0.3
148	1976/12/31 09:00:00	1976/12/31 09:00:00	1	0.02	89.16%	0.3
149	1978/11/13 23:00:00	1978/11/13 23:00:00	1	0.019	89.76%	0.3
150	1976/02/06 05:00:00	1976/02/06 05:00:00	1	0.019	90.36%	0.29
151	2005/01/07 15:00:00	2005/01/07 15:00:00	1	0.018	90.96%	0.29
152	1995/03/23 12:00:00	1995/03/23 12:00:00	1	0.018	91.57%	0.29
153	1980/01/09 12:00:00	1980/01/09 12:00:00	1	0.018	92.17%	0.29
154	2006/03/11 03:00:00	2006/03/11 03:00:00	1	0.018	92.77%	0.29
155	1985/12/03 00:00:00	1985/12/03 01:00:00	2	0.016	93.37%	0.28
156	1979/03/01 18:00:00	1979/03/01 18:00:00	1	0.016	93.98%	0.28
157	1995/03/11 06:00:00	1995/03/11 06:00:00	1	0.012	94.58%	0.28
158	1972/11/16 15:00:00	1972/11/16 15:00:00	1	0.011	95.18%	0.28
159	1973/01/16 21:00:00	1973/01/16 22:00:00	2	0.011	95.78%	0.28
160	1997/01/26 03:00:00	1997/01/26 03:00:00	1	0.011	96.39%	0.28
161	1982/12/22 23:00:00	1982/12/22 23:00:00	1	0.01	96.99%	0.27
162	1992/01/07 21:00:00	1992/01/07 21:00:00	1	0.009	97.59%	0.27
163	1986/03/12 14:00:00	1986/03/12 14:00:00	1	0.008	98.19%	0.27
164	1965/04/01 22:00:00	1965/04/01 22:00:00	1	0.007	98.80%	0.27
165	1986/11/18 01:00:00	1986/11/18 01:00:00	1	0.007	99.40%	0.27
--End of Data----------						

SWMM.out file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Post-Development-poc3-1224.out
SWMM.out time stamp: 1/31/2019 6:39:03 PM

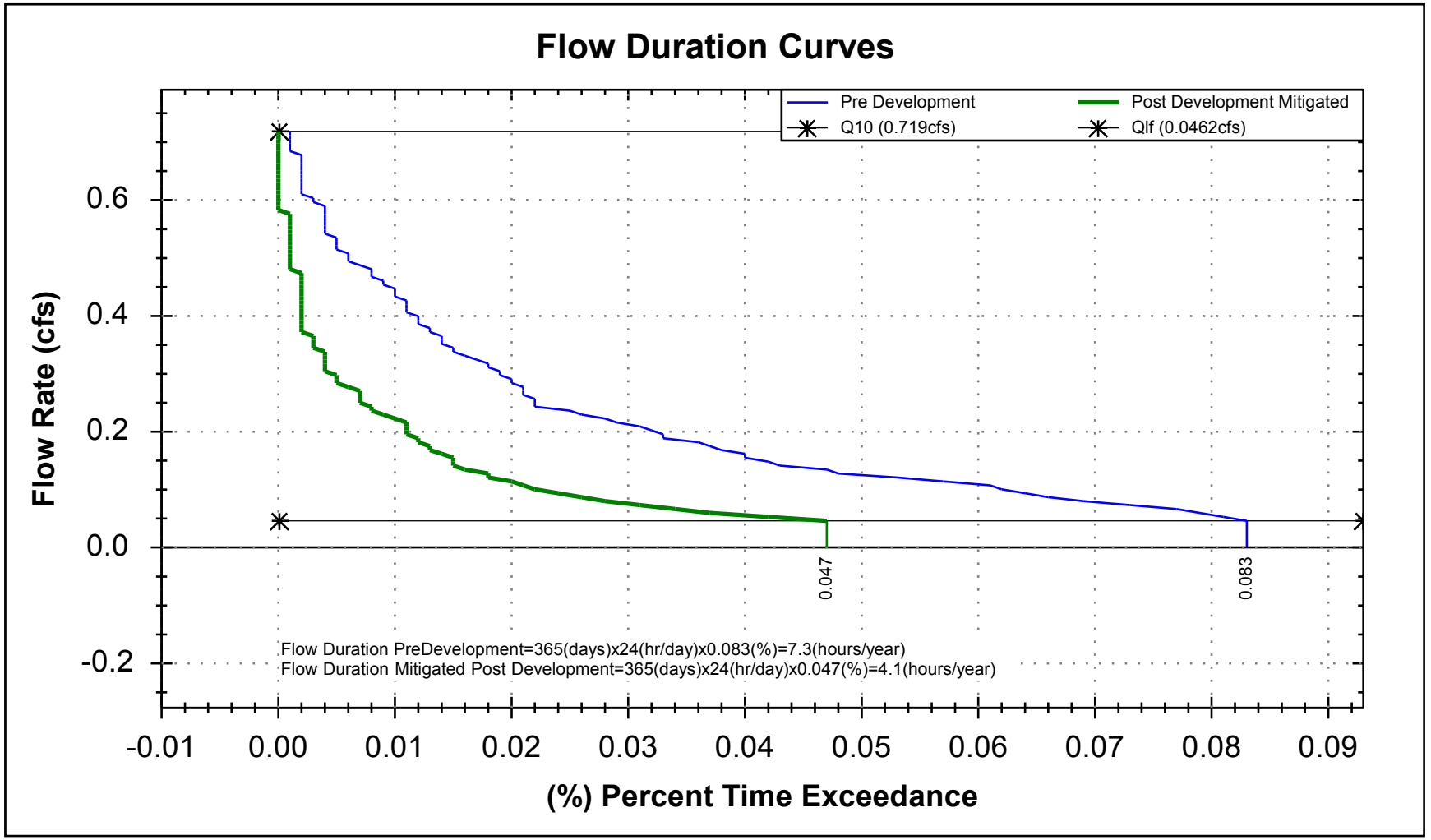
Q10: 0.000
Q5: 0.000
Q2: 0.000

Peak Flow Statistics Table Values

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
1	1966/12/03 17:00:00	1966/12/08 10:00:00	114	0.623	0.81%	44
2	1995/01/04 19:00:00	1995/01/06 10:00:00	40	0.494	1.63%	22
3	1993/01/06 22:00:00	1993/01/11 11:00:00	110	0.37	2.44%	14.67
4	1978/01/15 00:00:00	1978/01/17 23:00:00	72	0.369	3.25%	11
5	1965/11/22 19:00:00	1965/11/24 16:00:00	46	0.365	4.07%	8.8
6	1978/03/17 05:00:00	1978/03/18 21:00:00	41	0.295	4.88%	7.33
7	1980/01/29 04:00:00	1980/01/31 20:00:00	65	0.284	5.69%	6.29
8	1986/02/15 03:00:00	1986/02/16 20:00:00	42	0.273	6.50%	5.5
9	1995/03/05 14:00:00	1995/03/07 13:00:00	48	0.271	7.32%	4.89
10	1969/01/25 12:00:00	1969/01/27 03:00:00	40	0.25	8.13%	4.4
11	1980/02/16 20:00:00	1980/02/22 13:00:00	138	0.242	8.94%	4
12	1983/03/01 16:00:00	1983/03/04 10:00:00	67	0.237	9.76%	3.67
13	2007/08/26 08:00:00	2007/08/27 04:00:00	21	0.199	10.57%	3.39
14	1979/01/05 14:00:00	1979/01/07 16:00:00	51	0.156	11.38%	3.14
15	2005/01/09 19:00:00	2005/01/12 20:00:00	74	0.124	12.20%	2.93
16	2007/11/30 14:00:00	2007/12/02 09:00:00	44	0.094	13.01%	2.75
17	1980/01/09 17:00:00	1980/01/13 06:00:00	86	0.091	13.82%	2.59
18	1993/01/13 23:00:00	1993/01/19 02:00:00	124	0.083	14.63%	2.44
19	1991/02/27 23:00:00	1991/03/02 23:00:00	73	0.079	15.45%	2.32
20	1980/03/02 22:00:00	1980/03/04 07:00:00	34	0.065	16.26%	2.2
21	1976/02/08 19:00:00	1976/02/09 23:00:00	29	0.065	17.07%	2.1
22	1970/02/28 18:00:00	1970/03/03 05:00:00	60	0.063	17.89%	2
23	1971/02/23 06:00:00	1971/02/24 20:00:00	39	0.06	18.70%	1.91
24	1998/02/14 18:00:00	1998/02/16 00:00:00	31	0.054	19.51%	1.83
25	1967/11/19 08:00:00	1967/11/21 21:00:00	62	0.053	20.33%	1.76
26	1991/03/19 03:00:00	1991/03/21 20:00:00	66	0.05	21.14%	1.69
27	1969/02/24 06:00:00	1969/02/26 15:00:00	58	0.046	21.95%	1.63
28	2005/02/21 12:00:00	2005/02/23 16:00:00	53	0.045	22.76%	1.57
29	2004/10/27 06:00:00	2004/10/28 18:00:00	37	0.044	23.58%	1.52
30	1967/01/24 22:00:00	1967/01/25 18:00:00	21	0.044	24.39%	1.47
31	1991/03/27 06:00:00	1991/03/28 06:00:00	25	0.041	25.20%	1.42
32	1988/04/21 22:00:00	1988/04/22 11:00:00	14	0.041	26.02%	1.38
33	1995/01/25 21:00:00	1995/01/26 16:00:00	20	0.04	26.83%	1.33
34	1982/03/18 19:00:00	1982/03/20 05:00:00	35	0.04	27.64%	1.29
35	1974/03/08 11:00:00	1974/03/09 11:00:00	25	0.037	28.46%	1.26
36	1974/01/07 19:00:00	1974/01/08 19:00:00	25	0.036	29.27%	1.22
37	1981/02/09 07:00:00	1981/02/10 03:00:00	21	0.036	30.08%	1.19
38	2004/10/20 13:00:00	2004/10/21 08:00:00	20	0.034	30.89%	1.16
39	2004/10/18 11:00:00	2004/10/19 09:00:00	23	0.031	31.71%	1.13

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
40	1978/12/17 21:00:00	1978/12/19 02:00:00	30	0.031	32.52%	1.1
41	1993/02/08 03:00:00	1993/02/09 06:00:00	28	0.031	33.33%	1.07
42	1967/04/11 11:00:00	1967/04/12 12:00:00	26	0.03	34.15%	1.05
43	1972/11/14 15:00:00	1972/11/15 06:00:00	16	0.029	34.96%	1.02
44	1996/11/22 00:00:00	1996/11/23 01:00:00	26	0.029	35.77%	1
45	1983/11/25 02:00:00	1983/11/25 17:00:00	16	0.029	36.59%	0.98
46	1985/11/29 15:00:00	1985/11/30 16:00:00	26	0.029	37.40%	0.96
47	1978/03/13 19:00:00	1978/03/15 12:00:00	42	0.027	38.21%	0.94
48	1985/11/25 05:00:00	1985/11/26 08:00:00	28	0.027	39.02%	0.92
49	1983/12/25 11:00:00	1983/12/26 12:00:00	26	0.024	39.84%	0.9
50	2007/01/31 01:00:00	2007/01/31 15:00:00	15	0.022	40.65%	0.88
51	2008/01/07 02:00:00	2008/01/07 03:00:00	2	0.021	41.46%	0.86
52	2003/02/12 22:00:00	2003/02/13 20:00:00	23	0.02	42.28%	0.85
53	1967/12/18 17:00:00	1967/12/20 06:00:00	38	0.02	43.09%	0.83
54	1986/11/18 02:00:00	1986/11/18 17:00:00	16	0.019	43.90%	0.82
55	1969/02/06 10:00:00	1969/02/07 04:00:00	19	0.018	44.72%	0.8
56	1994/02/17 14:00:00	1994/02/17 22:00:00	9	0.018	45.53%	0.79
57	2004/02/26 09:00:00	2004/02/27 03:00:00	19	0.017	46.34%	0.77
58	1965/12/09 08:00:00	1965/12/10 18:00:00	35	0.017	47.15%	0.76
59	1970/03/05 01:00:00	1970/03/05 15:00:00	15	0.017	47.97%	0.75
60	1967/01/23 01:00:00	1967/01/23 20:00:00	20	0.016	48.78%	0.73
61	1998/01/09 18:00:00	1998/01/11 01:00:00	32	0.015	49.59%	0.72
62	1974/12/04 10:00:00	1974/12/05 03:00:00	18	0.013	50.41%	0.71
63	1973/01/16 23:00:00	1973/01/17 08:00:00	10	0.013	51.22%	0.7
64	1977/05/08 21:00:00	1977/05/09 22:00:00	26	0.012	52.03%	0.69
65	1966/11/07 18:00:00	1966/11/08 07:00:00	14	0.011	52.85%	0.68
66	1970/11/29 16:00:00	1970/11/30 17:00:00	26	0.01	53.66%	0.67
67	1982/12/23 00:00:00	1982/12/23 11:00:00	12	0.01	54.47%	0.66
68	1996/02/01 04:00:00	1996/02/01 21:00:00	18	0.009	55.28%	0.65
69	1992/02/15 15:00:00	1992/02/16 09:00:00	19	0.009	56.10%	0.64
70	1981/03/01 16:00:00	1981/03/02 12:00:00	21	0.009	56.91%	0.63
71	2004/02/22 20:00:00	2004/02/23 19:00:00	24	0.009	57.72%	0.62
72	1995/03/11 05:00:00	1995/03/12 09:00:00	29	0.009	58.54%	0.61
73	1965/11/16 23:00:00	1965/11/17 14:00:00	16	0.009	59.35%	0.6
74	1998/02/03 21:00:00	1998/02/04 11:00:00	15	0.009	60.16%	0.6
75	1992/02/07 00:00:00	1992/02/07 13:00:00	14	0.009	60.98%	0.59
76	1980/02/14 08:00:00	1980/02/14 23:00:00	16	0.008	61.79%	0.58
77	1992/01/05 22:00:00	1992/01/06 16:00:00	19	0.008	62.60%	0.57
78	1986/09/25 09:00:00	1986/09/25 19:00:00	11	0.008	63.41%	0.56
79	2008/01/05 10:00:00	2008/01/06 00:00:00	15	0.008	64.23%	0.56
80	1987/01/04 23:00:00	1987/01/05 15:00:00	17	0.008	65.04%	0.55
81	2003/02/25 22:00:00	2003/02/26 09:00:00	12	0.008	65.85%	0.54
82	1997/01/13 01:00:00	1997/01/14 01:00:00	25	0.008	66.67%	0.54
83	1977/08/17 10:00:00	1977/08/17 23:00:00	14	0.008	67.48%	0.53
84	1969/01/14 14:00:00	1969/01/14 23:00:00	10	0.008	68.29%	0.52
85	1972/12/04 20:00:00	1972/12/05 06:00:00	11	0.008	69.11%	0.52
86	1995/01/08 02:00:00	1995/01/08 15:00:00	14	0.008	69.92%	0.51

Rank	Start Date	End Date	Duration	Peak	Frequency	Return Period
87	1965/04/10 02:00:00	1965/04/10 10:00:00	9	0.008	70.73%	0.51
88	1987/12/17 00:00:00	1987/12/17 12:00:00	13	0.008	71.54%	0.5
89	1982/01/01 15:00:00	1982/01/01 22:00:00	8	0.008	72.36%	0.49
90	1976/09/10 22:00:00	1976/09/11 07:00:00	10	0.008	73.17%	0.49
91	1985/11/11 16:00:00	1985/11/12 06:00:00	15	0.007	73.98%	0.48
92	2006/04/05 10:00:00	2006/04/05 19:00:00	10	0.007	74.80%	0.48
93	1988/01/17 23:00:00	1988/01/18 07:00:00	9	0.007	75.61%	0.47
94	2008/02/22 10:00:00	2008/02/22 20:00:00	11	0.007	76.42%	0.47
95	1992/12/07 19:00:00	1992/12/08 04:00:00	10	0.007	77.24%	0.46
96	1976/03/03 05:00:00	1976/03/03 15:00:00	11	0.007	78.05%	0.46
97	1988/12/25 04:00:00	1988/12/25 11:00:00	8	0.007	78.86%	0.45
98	1992/02/13 01:00:00	1992/02/13 16:00:00	16	0.007	79.67%	0.45
99	1976/11/12 07:00:00	1976/11/12 19:00:00	13	0.007	80.49%	0.44
100	1982/11/30 21:00:00	1982/12/01 04:00:00	8	0.007	81.30%	0.44
101	1968/03/08 15:00:00	1968/03/08 22:00:00	8	0.007	82.11%	0.44
102	1974/01/05 02:00:00	1974/01/05 12:00:00	11	0.007	82.93%	0.43
103	1975/03/08 16:00:00	1975/03/08 22:00:00	7	0.007	83.74%	0.43
104	1976/03/01 22:00:00	1976/03/02 04:00:00	7	0.007	84.55%	0.42
105	1995/02/14 14:00:00	1995/02/14 19:00:00	6	0.007	85.37%	0.42
106	2001/01/11 11:00:00	2001/01/11 20:00:00	10	0.007	86.18%	0.42
107	2003/04/14 22:00:00	2003/04/15 06:00:00	9	0.007	86.99%	0.41
108	1983/02/27 22:00:00	1983/02/28 06:00:00	9	0.007	87.80%	0.41
109	1983/01/27 14:00:00	1983/01/27 21:00:00	8	0.007	88.62%	0.4
110	1994/02/07 20:00:00	1994/02/08 07:00:00	12	0.007	89.43%	0.4
111	1983/03/24 00:00:00	1983/03/24 06:00:00	7	0.007	90.24%	0.4
112	1978/02/06 02:00:00	1978/02/07 00:00:00	23	0.007	91.06%	0.39
113	1979/03/02 00:00:00	1979/03/02 04:00:00	5	0.007	91.87%	0.39
114	1981/03/19 22:00:00	1981/03/19 22:00:00	1	0.006	92.68%	0.39
115	2006/02/28 11:00:00	2006/02/28 17:00:00	7	0.006	93.50%	0.38
116	1982/02/10 22:00:00	1982/02/11 03:00:00	6	0.006	94.31%	0.38
117	2006/01/02 19:00:00	2006/01/03 00:00:00	6	0.006	95.12%	0.38
118	1975/04/09 02:00:00	1975/04/09 07:00:00	6	0.006	95.93%	0.37
119	1965/04/08 23:00:00	1965/04/09 02:00:00	4	0.006	96.75%	0.37
120	1967/03/14 02:00:00	1967/03/14 05:00:00	4	0.006	97.56%	0.37
121	2005/01/03 14:00:00	2005/01/03 17:00:00	4	0.006	98.37%	0.36
122	2008/02/03 20:00:00	2008/02/03 21:00:00	2	0.006	99.19%	0.36
--End of Data----------						


Flow Duration Curves
Pre Development
Post Development Mitigated
Q10 (0.719cfs)
Qlf (0.0462cfs)
Flow Rate (cfs)
0.6
0.4
0.2
0.0
-0.2
0.047
0.083
Flow Duration PreDevelopment=365(days)x24(hr/day)x0.083(%)=7.3(hours/year)
Flow Duration Mitigated Post Development=365(days)x24(hr/day)x0.047(%)=4.1(hours/year)
-0.01
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
(%) Percent Time Exceedance

Compare Post-Development Curve to Pre-Development Curve

post-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Post-Development-poc3-1224.out
post-development time stamp: 1/31/2019 6:39:03 PM
Compared to:
pre-development SWMM file: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Pre-Development-poc3.out
pre-development time stamp: 1/31/2019 6:13:00 PM

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	0.05	0.05	0.08	TRUE	FALSE	FALSE	Pass- Qpost Below Flow Control Threshold
1	0.05	0.04	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
2	0.06	0.04	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
3	0.07	0.03	0.08	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
4	0.07	0.03	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
5	0.08	0.03	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
6	0.09	0.03	0.07	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
7	0.09	0.02	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
8	0.10	0.02	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
9	0.11	0.02	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
10	0.11	0.02	0.06	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
11	0.12	0.02	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
12	0.13	0.02	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
13	0.14	0.02	0.05	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
14	0.14	0.02	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
15	0.15	0.02	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
16	0.16	0.02	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
17	0.16	0.01	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
18	0.17	0.01	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
19	0.18	0.01	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
20	0.18	0.01	0.04	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
21	0.19	0.01	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
22	0.20	0.01	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
23	0.20	0.01	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
24	0.21	0.01	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
25	0.22	0.01	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
26	0.22	0.01	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
27	0.23	0.01	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
28	0.24	0.01	0.03	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
29	0.24	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
30	0.25	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
31	0.26	0.01	0.02	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	0.26	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
33	0.27	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
34	0.28	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
35	0.28	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
36	0.29	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
37	0.30	0.01	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
38	0.30	0.00	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
39	0.31	0.00	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
40	0.32	0.00	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
41	0.33	0.00	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
42	0.33	0.00	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
43	0.34	0.00	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
44	0.35	0.00	0.02	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
45	0.35	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
46	0.36	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
47	0.37	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
48	0.37	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
49	0.38	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
50	0.39	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
51	0.39	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
52	0.40	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
53	0.41	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
54	0.41	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
55	0.42	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
56	0.43	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
57	0.43	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
58	0.44	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
59	0.45	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
60	0.45	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
61	0.46	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
62	0.47	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
63	0.47	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
64	0.48	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
65	0.49	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
66	0.50	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
67	0.50	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
68	0.51	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
69	0.52	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
70	0.52	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
71	0.53	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	0.54	0.00	0.01	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
73	0.54	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
74	0.55	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
75	0.56	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
76	0.56	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
77	0.57	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
78	0.58	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
79	0.58	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
80	0.59	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
81	0.60	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
82	0.60	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
83	0.61	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
84	0.62	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
85	0.62	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
86	0.63	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
87	0.64	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
88	0.64	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
89	0.65	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
90	0.66	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
91	0.66	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
92	0.67	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
93	0.68	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
94	0.69	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
95	0.69	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
96	0.70	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
97	0.71	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
98	0.71	0.00	0.00	TRUE	FALSE	FALSE	Pass: Post Duration < Pre Duration
99	0.72	0.00	0.00	TRUE	FALSE	FALSE	Pass- Qpost Above Flow Control Upper Limit

Duration Table Summary at Project Discharge Point

file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Pre-Development-poc3.out
time stamp: 1/31/2019 6:13:00 PM

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	0.05	7	316	0.083
2	0.05	5	309	0.081
3	0.06	8	304	0.079
4	0.07	17	296	0.077
5	0.07	15	279	0.073
6	0.08	12	264	0.069
7	0.09	6	252	0.066
8	0.09	7	246	0.064
9	0.10	5	239	0.062
10	0.11	16	234	0.061
11	0.11	15	218	0.057
12	0.12	21	203	0.053
13	0.13	4	182	0.048
14	0.13	13	178	0.047
15	0.14	6	165	0.043
16	0.15	4	159	0.042
17	0.15	1	155	0.040
18	0.16	9	154	0.040
19	0.17	5	145	0.038
20	0.18	3	140	0.037
21	0.18	9	137	0.036
22	0.19	2	128	0.033
23	0.20	4	126	0.033
24	0.20	5	122	0.032
25	0.21	5	117	0.031
26	0.22	5	112	0.029
27	0.22	6	107	0.028
28	0.23	6	101	0.026
29	0.24	10	95	0.025
30	0.24	1	85	0.022
31	0.25	0	84	0.022
32	0.26	3	84	0.022
33	0.26	0	81	0.021
34	0.27	1	81	0.021
35	0.28	2	80	0.021
36	0.28	3	78	0.020
37	0.29	1	75	0.020
38	0.30	2	74	0.019
39	0.30	3	72	0.019
40	0.31	2	69	0.018
41	0.32	3	67	0.018
42	0.32	4	64	0.017
43	0.33	1	60	0.016
44	0.34	2	59	0.015
45	0.35	3	57	0.015
46	0.35	2	54	0.014
47	0.36	0	52	0.014
48	0.37	2	52	0.014
49	0.37	2	50	0.013
50	0.38	2	48	0.013
51	0.39	0	46	0.012

Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
52	0.39	1	46	0.012
53	0.40	2	45	0.012
54	0.41	1	43	0.011
55	0.41	1	42	0.011
56	0.42	0	41	0.011
57	0.43	2	41	0.011
58	0.43	1	39	0.010
59	0.44	0	38	0.010
60	0.45	2	38	0.010
61	0.45	3	36	0.009
62	0.46	2	33	0.009
63	0.47	1	31	0.008
64	0.47	1	30	0.008
65	0.48	4	29	0.008
66	0.49	2	25	0.007
67	0.49	1	23	0.006
68	0.50	0	22	0.006
69	0.51	2	22	0.006
70	0.51	1	20	0.005
71	0.52	0	19	0.005
72	0.53	1	19	0.005
73	0.54	1	18	0.005
74	0.54	0	17	0.004
75	0.55	1	17	0.004
76	0.56	0	16	0.004
77	0.56	0	16	0.004
78	0.57	1	16	0.004
79	0.58	1	15	0.004
80	0.58	0	14	0.004
81	0.59	2	14	0.004
82	0.60	2	12	0.003
83	0.60	1	10	0.003
84	0.61	1	9	0.002
85	0.62	0	8	0.002
86	0.62	1	8	0.002
87	0.63	1	7	0.002
88	0.64	0	6	0.002
89	0.64	0	6	0.002
90	0.65	0	6	0.002
91	0.66	0	6	0.002
92	0.66	0	6	0.002
93	0.67	0	6	0.002
94	0.68	1	6	0.002
95	0.68	0	5	0.001
96	0.69	0	5	0.001
97	0.70	1	5	0.001
98	0.71	0	4	0.001
99	0.71	0	4	0.001
100	0.72	0	4	0.001
---------End of Data----------				

Duration Table Summary at Project Discharge Point

file name: V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current Itteration\Poc-3\17046-Post-Development-poc3-1224.out
time stamp: 1/31/2019 6:39:03 PM

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	0.05	17	179	0.047
2	0.05	22	162	0.042
3	0.06	11	140	0.037
4	0.07	9	129	0.034
5	0.07	13	120	0.031
6	0.08	9	107	0.028
7	0.09	5	98	0.026
8	0.09	9	93	0.024
9	0.10	5	84	0.022
10	0.11	2	79	0.021
11	0.11	7	77	0.020
12	0.12	3	70	0.018
13	0.13	5	67	0.018
14	0.13	3	62	0.016
15	0.14	0	59	0.015
16	0.15	2	59	0.015
17	0.15	4	57	0.015
18	0.16	2	53	0.014
19	0.17	1	51	0.013
20	0.18	3	50	0.013
21	0.18	2	47	0.012
22	0.19	1	45	0.012
23	0.20	2	44	0.011
24	0.20	0	42	0.011
25	0.21	1	42	0.011
26	0.22	4	41	0.011
27	0.22	3	37	0.010
28	0.23	2	34	0.009
29	0.24	2	32	0.008
30	0.24	2	30	0.008
31	0.25	1	28	0.007
32	0.26	2	27	0.007
33	0.26	0	25	0.007
34	0.27	3	25	0.007
35	0.28	1	22	0.006
36	0.28	1	21	0.005
37	0.29	2	20	0.005
38	0.30	1	18	0.005
39	0.30	1	17	0.004
40	0.31	1	16	0.004
41	0.32	0	15	0.004
42	0.32	0	15	0.004
43	0.33	1	15	0.004
44	0.34	1	14	0.004
45	0.35	0	13	0.003
46	0.35	1	13	0.003
47	0.36	1	12	0.003
48	0.37	3	11	0.003
49	0.37	0	8	0.002
50	0.38	0	8	0.002
51	0.39	0	8	0.002

Bin Number	Discharge Rate	Number of Periods	Total Periods Exceeding	Percent Time Exceeded
52	0.39	0	8	0.002
53	0.40	0	8	0.002
54	0.41	0	8	0.002
55	0.41	0	8	0.002
56	0.42	0	8	0.002
57	0.43	1	8	0.002
58	0.43	0	7	0.002
59	0.44	0	7	0.002
60	0.45	0	7	0.002
61	0.45	0	7	0.002
62	0.46	1	7	0.002
63	0.47	0	6	0.002
64	0.47	1	6	0.002
65	0.48	0	5	0.001
66	0.49	1	5	0.001
67	0.49	0	4	0.001
68	0.50	0	4	0.001
69	0.51	0	4	0.001
70	0.51	0	4	0.001
71	0.52	0	4	0.001
72	0.53	0	4	0.001
73	0.54	0	4	0.001
74	0.54	1	4	0.001
75	0.55	0	3	0.001
76	0.56	0	3	0.001
77	0.56	0	3	0.001
78	0.57	0	3	0.001
79	0.58	2	3	0.001
80	0.58	0	1	0.000
81	0.59	0	1	0.000
82	0.60	0	1	0.000
83	0.60	0	1	0.000
84	0.61	0	1	0.000
85	0.62	1	1	0.000
86	0.62	0	0	0.000
87	0.63	0	0	0.000
88	0.64	0	0	0.000
89	0.64	0	0	0.000
90	0.65	0	0	0.000
91	0.66	0	0	0.000
92	0.66	0	0	0.000
93	0.67	0	0	0.000
94	0.68	0	0	0.000
95	0.68	0	0	0.000
96	0.69	0	0	0.000
97	0.70	0	0	0.000
98	0.71	0	0	0.000
99	0.71	0	0	0.000
100	0.72	0	0	0.000
---------End of Data----------				

END OF STATISTICS ANALYSIS

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-H	BMP-H	1993.16	10	0.625	0.0593247883218596	6	18	60	0.4	0.67	11.5	15.0	102.1	128.6
BMP-A	BMP-A	1688.42	8	0.5	0.0484924601857531	6	18	48	0.4	0.67	15.2	20.3	111.0	146.5
BMP-B1	BMP-B1	1362	11	0.6875	0.108261220456644	6	18	12	0.4	0.67	10.1	16.2	22.2	48.5
BMP-B2	BMP-B2	818.93	13	0.8125	0.246638443787257	24	12	72	0.4	0.67	14	N/A	N/A	N/A
BMP-C	BMP-C	144.01	0	0	0	6	18	48	0.4	0.67	21	N/A	N/A	N/A
BMP-D	BMP-D	334.98	0	0	0	6	18	36	0.4	0.67	21	N/A	N/A	N/A
BMP-F	BMP-F	620	0	0	0	6	18	48	0.4	0.67	21	N/A	N/A	N/A
BMP-I	BMP-I	1799.03	9	0.5625	0.059777168819766	6	18	60	0.4	0.67	11.4	14.9	101.3	127.6
BMP-J	BMP-J	3131.96	11	0.6875	0.0535369598639641	6	18	60	0.4	0.67	12.7	16.6	113.2	142.5

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)

$$q = C_o A_o \sqrt{2g}\sqrt{h}\ (cfs)$$

and

(SWMM Underdrain Equation (per unit area))

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

or

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

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

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

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

$$Or$$

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

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

Solving for T:

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

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.

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

****
Rainfall File Summary
****

Station ID	First Date	Last Date	Recording Frequency	Periods w/Precip	Periods Missing	Periods 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 13:00:00
Ending Date 05/23/2008 22:00:00
Antecedent Dry Days 0.0
Report Time Step 01:00:00
Wet Time Step 01:00:00
Dry Time Step 01:00:00

********** Runoff Quantity Continuity **********	Volume acre-feet	Depth inches
Total Precipitation	359.383	611.120
Evaporation Loss	6.237	10.605
Infiltration Loss	310.275	527.615
Surface Runoff	54.145	92.072
Final Storage	0.000	0.000
Continuity Error (%)	-3.137	

********** Flow Routing Continuity **********	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	54.145	17.644
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	54.145	17.644
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	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-9B	611.12	0.00	6.23	549.48	76.08	1.33	0.50	0.125
DMA-6	611.12	0.00	6.66	557.56	59.50	0.43	0.20	0.097
DMA-7	611.12	0.00	6.61	556.67	61.45	2.85	1.29	0.101
DMA-8	611.12	0.00	6.75	558.94	56.39	3.90	1.86	0.092
DMA-6A	611.12	0.00	8.01	553.98	59.65	0.35	0.15	0.098
DMA-9A	611.12	0.00	24.52	421.38	208.68	4.06	0.61	0.341
DMA-9	611.12	0.00	6.23	549.11	76.73	0.30	0.11	0.126
DMA-8A	611.12	0.00	25.05	424.09	200.10	4.42	0.69	0.327

Analysis begun on: Thu Sep 20 15:24:49 2018
Analysis ended on: Thu Sep 20 15:25:02 2018
Total elapsed time: 00:00:13

```
[TITLE]
;;Project Title/Notes

[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            13:00:00
REPORT_START_DATE     09/24/1964
REPORT_START_TIME     13:00:00
END_DATE              05/23/2008
END_TIME              22:00:00
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

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             0.07    0.1     0.13    0.17    0.19    0.22    0.24    0.22
0.19    0.13    0.09    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-7A              Escondido           POC-1               0.4151      63
45.10181306 3.4         0
DMA-5B              Escondido           POC-1               0.2193      48
25.40225944 0.2         0
DMA-8               Escondido           BMP-H               0.999843    70
300.0812733 0.5         0
DMA-9A              Escondido           BMP-I               1.6139      67
239.1535544 0.5         0
DMA-9B              Escondido           BMP-I               0.2571      67
8749.11781  0.1         0
DMA-10A             Escondido           BMP-J               1.156       69
```

```
    258.8174468 1.4         0
61  DMA-10B             Escondido           BMP-J               0.876       69
    246.2917284 4           0
62  DMA-11A             Escondido           Poc-1               0.4372      0
    284.1802622 4           0
63  DMA-11B             Escondido           Poc-1               0.8487      0
    207.7634342 4.1         0
64  BMP-H               Escondido           POC-1               0.045756657 0
    19          0           0
65  BMP-I               Escondido           POC-1               0.0413      0
    36          0           0
66  BMP-J               Escondido           POC-1               0.0719      0
    40          0           0
67
68  [SUBAREAS]
69  ;;Subcatchment      N-Imperv    N-Perv      S-Imperv    S-Perv      PctZero
    RouteTo     PctRouted
70  ;;--------------    ----------  ----------  ----------  ----------  ----------
    ----------  ----------
71  DMA-7A              0.012       0.1         0.05        0.1         25
    OUTLET
72  DMA-5B              0.012       0.1         0.05        0.1         25
    OUTLET
73  DMA-8               0.012       0.1         0.05        0.1         25
    OUTLET
74  DMA-9A              0.012       0.1         0.05        0.1         25
    OUTLET
75  DMA-9B              0.012       0.1         0.05        0.1         25
    OUTLET
76  DMA-10A             0.012       0.1         0.05        0.1         25
    OUTLET
77  DMA-10B             0.012       0.1         0.05        0.1         25
    OUTLET
78  DMA-11A             0.012       0.1         0.05        0.1         25
    OUTLET
79  DMA-11B             0.012       0.1         0.05        0.1         25
    OUTLET
80  BMP-H               0.012       0.1         0.05        0.1         25
    OUTLET
81  BMP-I               0.012       0.1         0.05        0.1         25
    OUTLET
82  BMP-J               0.012       0.1         0.05        0.1         25
    OUTLET
83
84  [INFILTRATION]
85  ;;Subcatchment      Suction     Ksat        IMD
86  ;;--------------    ----------  ----------  ----------
87  DMA-7A              6           0.075       0.32
88  DMA-5B              9           0.01875     0.33
89  DMA-8               6           0.075       0.32
90  DMA-9A              6           0.075       0.32
91  DMA-9B              9           0.01875     0.33
92  DMA-10A             6           0.075       0.32
93  DMA-10B             9           0.01875     0.33
94  DMA-11A             9           0.01875     0.33
95  DMA-11B             6           0.075       0.32
96  BMP-H               6           0.1         0.32
97  BMP-I               6           0.1         0.32
98  BMP-J               6           0.1         0.32
99
100 [LID_CONTROLS]
101 ;;Name              Type/Layer  Parameters
102 ;;--------------    ----------  ----------
103 BMP-A               BC
104 BMP-A               SURFACE     6           0.01        0           0
    5
105 BMP-A               SOIL        18          0.4         0.2         0.1
    5           5           1.5
106 BMP-A               STORAGE     12          0.67        0.5         0
```

```
BMP-A               DRAIN       0.0808632258168262  0.5         3           6

BMP-F               BC
BMP-F               SURFACE     6           0.01        0           0
5
BMP-F               SOIL        18          0.4         0.2         0.1
5           5           1.5
BMP-F               STORAGE     12          0.67        0.5         0
BMP-F               DRAIN       0.114781675985446   0.5         3           6

BMP-H               BC
BMP-H               SURFACE     6           0.01        0           0
5
BMP-H               SOIL        18          0.4         0.2         0.1
5           5           1.5
BMP-H               STORAGE     60          0.67        0.5         0
BMP-H               DRAIN       0.0593247883218596  0.5         3           6

BMP-I               BC
BMP-I               SURFACE     6           0.01        0           0
5
BMP-I               SOIL        18          0.4         0.2         0.1
5           5           1.5
BMP-I               STORAGE     60          0.67        0.5         0
BMP-I               DRAIN       0.059777168819766   0.5         3           6

BMP-J               BC
BMP-J               SURFACE     6           0.01        0           0
5
BMP-J               SOIL        18          0.4         0.2         0.1
5           5           1.5
BMP-J               STORAGE     60          0.67        0.5         0
BMP-J               DRAIN       0.0535369598639641  0.5         3           6

[LID_USAGE]
;;Subcatchment      LID Process         Number  Area        Width       InitSat
FromImp     ToPerv      RptFile                         DrainTo
;;--------------    ----------------    ------- ----------  ----------  ----------
----------  ----------  ------------------------    ----------------
BMP-H               BMP-H               1       1993.16     0           0
0           0           "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\BMP-H.txt"
BMP-I               BMP-I               1       1799.03     0           0
0           0           "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\BMP-I.txt"
BMP-J               BMP-J               1       3131.96     0           0
0           0           "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\BMP-J.txt"

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

[CURVES]
;;Name              Type        X-Value     Y-Value
;;--------------    ----------  ----------  ----------
Sto-BMP-C           Storage     0           147
Sto-BMP-C                       1.5         147
Sto-BMP-C                       3           147
;
STO-BMP-E           Storage     0           272
STO-BMP-E                       1.5         272
STO-BMP-E                       272         3
;
Sto-BMP-G           Storage     0           356
Sto-BMP-G                       1.5         356
Sto-BMP-G                       3           356
```

```
[REPORT]
;;Reporting Options
INPUT       NO
CONTROLS    NO
SUBCATCHMENTS   ALL
NODES   ALL
LINKS   ALL

[TAGS]

[MAP]
DIMENSIONS  -2500.000   0.000   12500.000   10000.000
Units       None

[COORDINATES]
;;Node              X-Coord             Y-Coord
;;--------------    ------------------  ------------------
POC-1               9268.891            2463.199

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

[Polygons]
;;Subcatchment      X-Coord             Y-Coord
;;--------------    ------------------  ------------------
DMA-7A              2674.190            7144.259
DMA-5B              5991.168            8056.919
DMA-5B              5991.168            8056.919
DMA-5B              5991.168            8056.919
DMA-5B              5991.168            8056.919
DMA-8               4156.035            5161.923
DMA-9A              3989.205            7193.327
DMA-9A              3969.578            7193.327
DMA-9B              5107.949            7801.766
DMA-10A             5647.694            6162.905
DMA-10B             6462.218            7124.632
DMA-11A             8002.944            6486.752
DMA-11B             6481.845            4838.077
BMP-H               3243.376            5083.415
BMP-I               3115.800            6270.854
BMP-J               6216.879            5750.736

[SYMBOLS]
;;Gage              X-Coord             Y-Coord
;;--------------    ------------------  ------------------
Escondido           3901.291            9418.665


[BACKDROP]
FILE        "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\17046-SWMM-POST-EXCEL.jpg"
DIMENSIONS  -2500.000   0.000   12500.000   10000.000

```

```
[POC-2 Pre-Development]
;;Project Title/Notes

[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           13:00:00
REPORT_START_DATE    09/24/1964
REPORT_START_TIME    13:00:00
END_DATE             05/23/2008
END_TIME             22:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:30:00
DRY_STEP             24:00:00
ROUTING_STEP         0:00:30

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          0.07   0.1    0.13   0.17   0.19   0.22   0.24   0.22   0.19   0.13
0.09   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-2            Escondido        POC-2            1.2514   0        121.2805182
15.5     0
DMA-4            Escondido        POC-2            0.4678   0        42.34931602
3.5      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
DMA-2            0.012      0.12       0.05       0.1        25         OUTLET
```

```
DMA-4            0.012      0.021      0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-2            6          0.1        0.32
DMA-4            6          0.075      0.32

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC-2            0          FREE                        NO

[REPORT]
;;Reporting Options
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -2500.000 0.000 12500.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-2            436.703            9175.662

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-2            1565.260           6800.785
DMA-4            2419.038           7517.174

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Escondido        3901.291           9418.665


[BACKDROP]
FILE       "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\17046-SWMM-Pre-EXCEL.jpg"
DIMENSIONS -2500.000 0.000 12500.000 10000.000
```

```
[TITLE]
;;Project Title/Notes

[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            13:00:00
REPORT_START_DATE     09/24/1964
REPORT_START_TIME     13:00:00
END_DATE              05/23/2008
END_TIME              22:00:00
SWEEP_START           01/01
SWEEP_END             12/31
DRY_DAYS              0
REPORT_STEP           01:00:00
WET_STEP              00:30:00
DRY_STEP              24:00:00
ROUTING_STEP          0:00:30

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             0.07    0.1     0.13    0.17    0.19    0.22    0.24    0.22
0.19    0.13    0.09    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-2b              Escondido           Sto-2               1.173027365 67
105.9345399 1.9         0
BMP-B2              Escondido           POC-2               0.0188      0
24          0           0
BMP-B1              Escondido           Sto-Surf-BMP-B      0.031267218 0
24          0           0
DMA-4b              Escondido           BMP-D               0.3345      75
46.46938481 2.6         0
BMP-D               Escondido           Bmp-B2              0.00769     0
6           0           0

```

```
[SUBAREAS]
;;Subcatchment      N-Imperv    N-Perv      S-Imperv    S-Perv      PctZero
RouteTo     PctRouted
;;--------------    ----------  ----------  ----------  ----------  ----------
----------  ----------
DMA-2b              0.017       0.04        0.05        0.1         25
OUTLET
BMP-B2              0.012       0.09        0.05        0.1         25
OUTLET
BMP-B1              0.012       0.09        0.05        0.1         25
OUTLET
DMA-4b              0.012       0.1         0.05        0.1         25
OUTLET
BMP-D               0.01        0.09        0.1         0.05        25
OUTLET

[INFILTRATION]
;;Subcatchment      Suction     Ksat        IMD
;;--------------    ----------  ----------  ----------
DMA-2b              6           0.075       0.32
BMP-B2              6           0.1         0.32
BMP-B1              6           0.1         0.32
DMA-4b              6           0.075       0.32
BMP-D               6           0.1         0.32

[LID_CONTROLS]
;;Name              Type/Layer  Parameters
;;--------------    ----------  ----------
BMP-B1              BC
BMP-B1              SURFACE     6           0.01        0           0
5
BMP-B1              SOIL        18          0.4         0.2         0.1
5           5           1.5
BMP-B1              STORAGE     12          0.67        0.0         0
BMP-B1              DRAIN       0.108261220456644   0.5         3           6

BMP-B2              BC
BMP-B2              SURFACE     24          0.01        0           0
5
BMP-B2              SOIL        12          0.4         0.2         0.1
5           5           1.5
BMP-B2              STORAGE     72          0.67        0.373       0
BMP-B2              DRAIN       0.246638443787257   0.5         48          6

BMP-D               BC
BMP-D               SURFACE     6           0.01        0           0
5
BMP-D               SOIL        18          0.4         0.2         0.1
5           5           1.5
BMP-D               STORAGE     36          0.67        0.98        0
BMP-D               DRAIN       0           0.5         0           6

[LID_USAGE]
;;Subcatchment      LID Process         Number  Area        Width       InitSat
FromImp     ToPerv      RptFile                         DrainTo
;;--------------    ----------------    ------- ----------  ----------  ----------
----------  ----------  ------------------------    ----------------
BMP-B2              BMP-B2              1       818.93      0           0
0           1           "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\BMP-B2.txt"
BMP-B1              BMP-B1              1       1362.00     0           0
0           0           "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\BMP-B1.txt"
BMP-B2
BMP-D               BMP-D               1       334.98      0           0
0           0

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

```
---------------
POC-2               0           FREE
NO
Out-to-BMP-B1       0           NORMAL                          NO
BMP-B1
Out-to-BMP-B2       0           NORMAL                          NO
BMP-B2

[STORAGE]
;;Name             Elev.       MaxDepth    InitDepth   Shape       Curve
Name/Params              N/A         Fevap       Psi         Ksat        IMD
;;---------------  --------    ----------  ----------- ----------
----------------------------    --------    --------                --------    --------
Sto-2               0           2.5         0           TABULAR
Sto-2                           0           0
Sto-3               0           2.5         0           TABULAR
Sto-3                           0           0
Sto-Surf-BMP-B      0           0.5         0           TABULAR
Storage-B                       0           1
Sto-4               0           2.5         0           TABULAR
Sto-4                           0           0

[ORIFICES]
;;Name             From Node           To Node             Type            Offset
Qcoeff      Gated       CloseTime
;;---------------  ----------------    ----------------    ------------    ----------
----------  --------    ----------
10                  Sto-3               Sto-4               SIDE            0
0.61        NO          0
8                   Sto-2               Sto-3               SIDE            0
0.61        NO          0
11                  Sto-2               Sto-3               SIDE            0.5
0.61        NO          0
13                  Sto-3               Sto-4               SIDE            1.5
0.61        NO          0
17                  Sto-4               Out-to-BMP-B1       SIDE            0
0.61        NO          0
18                  Sto-4               Out-to-BMP-B1       SIDE            1.75
0.61        NO          0

[WEIRS]
;;Name             From Node           To Node             Type            CrestHt
Qcoeff      Gated       EndCon      EndCoeff    Surcharge   RoadWidth   RoadSurf
;;---------------  ----------------    ----------------    ------------    ----------
----------  --------    --------    ----------  ----------  ----------  ----------
7                   Sto-2               Sto-3               SIDEFLOW        2
3.33        NO          0           0           YES
9                   Sto-3               Sto-4               SIDEFLOW        2.25
3.33        NO          0           0           YES
12                  Sto-2               Sto-3               SIDEFLOW        1.5
3.33        NO          0           0           YES
14                  Sto-3               Sto-4               SIDEFLOW        2.236111
3.33        NO          0           0           YES
15                  Sto-Surf-BMP-B      Out-to-BMP-B2       TRANSVERSE      0
3.33        NO          0           0           YES
16                  Sto-4               Out-to-BMP-B1       SIDEFLOW        2.25
3.33        NO          0           0           YES
19                  Sto-4               Out-to-BMP-B1       SIDEFLOW        2.236111
3.33        NO          0           0           YES

[XSECTIONS]
;;Link             Shape           Geom1               Geom2       Geom3
Geom4       Barrels     Culvert
;;---------------  ------------    ----------------    ----------  ----------
----------  ----------  ----------
10                  RECT_CLOSED     0.16667             0.25        0           0
8                   RECT_CLOSED     0.083333            0.25        0           0
11                  RECT_CLOSED     0.16667             0.25        0           0
13                  RECT_CLOSED     0.16667             1.5         0           0
```

```
17                RECT_CLOSED     0.5               0.5         0           0
18                RECT_CLOSED     0.0833333         1.5         0           0
7                 RECT_OPEN       1                 1.75        0
0
9                 RECT_OPEN       1                 3           0
0
12                RECT_OPEN       0.25              0.25        0
0
14                RECT_OPEN       0.166667          1           0
0
15                RECT_OPEN       0.5               12          0
0
16                RECT_OPEN       1                 3           0
0
19                RECT_OPEN       0.16667           2           0
0

[CURVES]
;;Name             Type        X-Value     Y-Value
;;---------------  ----------  ----------  ----------
rate-1            Rating      0           0
rate-1                        0.749       0
rate-1                        0.75        0
rate-1                        0.792       0.237
rate-1                        0.833       0.671
rate-1                        0.875       1.233
rate-1                        0.917       1.898
rate-1                        0.958       2.653
rate-1                        1           3.48
;
MWS-BMP-D         Storage     0           272
MWS-BMP-D                     1           272
MWS-BMP-D                     2           272
;
Storage-B         Storage     0           1362.22
Storage-B                     0.5         1483.98
;
Sto-1             Storage     0           0
Sto-1                         0.18        8.5
Sto-1                         0.37        23.13513514
Sto-1                         0.55        25.63636364
Sto-1                         0.73        23.15068493
Sto-1                         0.92        19.67391304
Sto-1                         1.1         16.45454545
Sto-1                         1.28        13.203125
Sto-1                         1.47        9.591836735
Sto-1                         1.65        5.181818182
Sto-1                         1.84        0.826086957
;
;2.5' dia 35.52' L
Sto-2             Storage     0           0
Sto-2                         0.25        46.48
Sto-2                         0.5         34.32
Sto-2                         0.75        64.08
Sto-2                         1           43.92
Sto-2                         1.25        68.88
Sto-2                         1.5         43.92
Sto-2                         1.75        64.08
Sto-2                         2           34.32
Sto-2                         2.25        46.48
Sto-2                         2.5         0.08
;
;2.5dia-160L
Sto-3             Storage     0           0
Sto-3                         0.25        210.4
Sto-3                         0.5         155.2
Sto-3                         0.75        288.8
Sto-3                         1           200.8
Sto-3                         1.25        310.4
```

```
Sto-3                           1.5         200.8
Sto-3                           1.75        288
Sto-3                           2           156
Sto-3                           2.25        208.8
Sto-3                           2.5         0.8
;
Sto-4               Storage     0           0
Sto-4                           0.25        100.8
Sto-4                           0.5         74.4
Sto-4                           0.75        138.4
Sto-4                           1           96
Sto-4                           1.25        148.8
Sto-4                           1.5         96
Sto-4                           1.75        138.4
Sto-4                           2           74.4
Sto-4                           2.25        100.8
Sto-4                           2.5         1.42109E-14
;
Sto-5               Storage     0           0
Sto-5                           0.2         11.7
Sto-5                           0.4         25.25
Sto-5                           0.6         33.83333333
Sto-5                           0.8         33.25
Sto-5                           1           29
Sto-5                           1.2         24.25
Sto-5                           1.4         19
Sto-5                           1.6         12.6875
Sto-5                           1.8         5.611111111
Sto-5                           2           1.165
;
Sto-6               Storage     0           0
Sto-6                           0.22        18.90909091
Sto-6                           0.45        22.88888889
Sto-6                           0.68        44.11764706
Sto-6                           0.9         45.22222222
Sto-6                           1.13        41.94690265
Sto-6                           1.35        35.18518519
Sto-6                           1.58        25.69620253
Sto-6                           1.8         16.66666667
Sto-6                           2.03        5.073891626
Sto-6                           2.25        1.844444444

[REPORT]
;;Reporting Options
INPUT       NO
CONTROLS    NO
SUBCATCHMENTS   ALL
NODES   ALL
LINKS   ALL

[TAGS]

[MAP]
DIMENSIONS  -2500.000   0.000   12500.000   10000.000
Units       None

[COORDINATES]
;;Node              X-Coord             Y-Coord
;;--------------    ------------------  ------------------
POC-2               -1517.557           8581.445
Out-to-BMP-B1       -593.166            8546.318
Out-to-BMP-B2       -1067.354           8571.846
Sto-2               -461.256            7134.877
Sto-3               -556.891            7949.424
Sto-Surf-BMP-B      -839.677            8721.963
Sto-4               -639.334            8397.919

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

```
;;--------------    ------------------  ------------------
11                  -421.850            7418.444
11                  -466.885            7861.290
13                  -464.383            8076.458
13                  -526.932            8359.179
17                  -709.575            8424.230
17                  -709.575            8521.806
18                  -732.092            8399.211
18                  -744.602            8531.814
7                   -316.768            7430.954
7                   -331.780            7758.710
9                   -301.756            8078.960
9                   -394.328            8369.187
12                  -359.301            7435.958
12                  -396.830            7791.235
14                  -386.823            8071.454
14                  -456.877            8359.179
15                  -874.704            8829.547
15                  -997.300            8837.053
16                  -474.391            8454.254
16                  -476.893            8549.328
19                  -526.932            8459.258
19                  -529.434            8534.316

[Polygons]
;;Subcatchment      X-Coord             Y-Coord
;;--------------    ------------------  ------------------
DMA-2b              -795.459            6524.218
BMP-B2              -1175.313           8551.358
BMP-B1              -824.665            8541.822
DMA-4b              -119.113            8394.207
BMP-D               -627.010            8701.947

[SYMBOLS]
;;Gage              X-Coord             Y-Coord
;;--------------    ------------------  ------------------
Escondido           3901.291            9418.665


[BACKDROP]
FILE        "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current
Itteration\17046-DMA-Exhibit-EXCEL.jpg"
DIMENSIONS  -2500.000   0.000   12500.000   10000.000

```

```
[TITLE]
;;Project Title/Notes

[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            13:00:00
REPORT_START_DATE     09/24/1964
REPORT_START_TIME     13:00:00
END_DATE              05/23/2008
END_TIME              22:00:00
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

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             0.07    0.1     0.13    0.17    0.19    0.22    0.24    0.22
0.19    0.13    0.09    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-1               Escondido           POC-3               0.8321      0
145.2608057 23.8        0
DMA-5               Escondido           POC-3               0.1649      0
35.24834194 3.4         0
DMA-3               Escondido           POC-3               0.2564      0
48.25915779 5.4         0

[SUBAREAS]
;;Subcatchment      N-Imperv    N-Perv      S-Imperv    S-Perv      PctZero
RouteTo     PctRouted
;;--------------    ----------  ----------  ----------  ----------  ----------
```

```
----------  ----------
DMA-1               0.012       0.1         0.05        0.1         25
OUTLET
DMA-5               0.012       0.1         0.05        0.1         25
OUTLET
DMA-3               0.012       0.1         0.05        0.1         25
OUTLET

[INFILTRATION]
;;Subcatchment      Suction     Ksat        IMD
;;--------------    ----------  ----------  ----------
DMA-1               6           0.1         0.32
DMA-5               6           0.075       0.32
DMA-3               6           0.075       0.32

[OUTFALLS]
;;Name              Elevation   Type        Stage Data          Gated       Route
To
;;--------------    ----------  ----------  ----------------    --------
----------------
POC-3               0           FREE
NO

[REPORT]
;;Reporting Options
INPUT       NO
CONTROLS    NO
SUBCATCHMENTS   ALL
NODES   ALL
LINKS   ALL

[TAGS]

[MAP]
DIMENSIONS  -2500.000   0.000   12500.000   10000.000
Units       None

[COORDINATES]
;;Node              X-Coord             Y-Coord
;;--------------    ------------------  ------------------
POC-3               4345.525            3426.372

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

[Polygons]
;;Subcatchment      X-Coord             Y-Coord
;;--------------    ------------------  ------------------
DMA-1               2105.005            4563.297
DMA-5               3547.596            4445.535
DMA-3               2860.648            4710.500

[SYMBOLS]
;;Gage              X-Coord             Y-Coord
;;--------------    ------------------  ------------------
Escondido           3901.291            9418.665


[BACKDROP]
FILE        "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\17046-SWMM-Pre-EXCEL.jpg"
DIMENSIONS  -2500.000   0.000   12500.000   10000.000

```

```
[TITLE]
;;Project Title/Notes

[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            13:00:00
REPORT_START_DATE     09/24/1964
REPORT_START_TIME     13:00:00
END_DATE              05/23/2008
END_TIME              22:00:00
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

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             0.07    0.1     0.13    0.17    0.19    0.22    0.24    0.22
0.19    0.13    0.09    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-1               Escondido           Sto-1               0.809239    55
109.3408544 1.5         0
DMA-3               Escondido           BMP-C               0.0690942   0.20
44.63248732 4.8         0
DMA-12              Escondido           BMP-K               0.05097     8
40          5.1         0
DMA-6               Escondido           BMP-F               0.289267    89
35          5.7         0
BMP-A               Escondido           POC-3               0.03876079  0
50          0           0
BMP-F               Escondido           1                   0.014233242 0
```

```
    7           5.7         0
61  BMP-C               Escondido           POC-3               0.003306    0
    10          0           0
62  BMP-K               Escondido           POC-3               0.005028    0
    2           0           0
63  BMP-F.2             Escondido           poc-3               0.004820937 0
    20          0           0
64  3                   Escondido           BMP-F.2             0.104179    89
    30          5.7         0
65
66  [SUBAREAS]
67  ;;Subcatchment      N-Imperv    N-Perv      S-Imperv    S-Perv      PctZero
    RouteTo     PctRouted
68  ;;--------------    ----------  ----------  ----------  ----------  ----------
    ----------  ----------
69  DMA-1               0.012       0.1         0.05        0.1         25
    OUTLET
70  DMA-3               0.012       0.1         0.05        0.1         25
    OUTLET
71  DMA-12              0.012       0.1         0.05        0.1         25
    OUTLET
72  DMA-6               0.012       0.1         0.05        0.1         25
    OUTLET
73  BMP-A               0.012       0.1         0.05        0.1         25
    OUTLET
74  BMP-F               0.012       0.1         0.05        0.1         25
    OUTLET
75  BMP-C               0.012       0.1         0.05        0.1         25
    OUTLET
76  BMP-K               0.012       0.1         0.05        0.1         25
    OUTLET
77  BMP-F.2             0.012       0.1         0.05        0.1         25
    OUTLET
78  3                   0.012       0.1         0.05        0.05        25
    OUTLET
79
80  [INFILTRATION]
81  ;;Subcatchment      Suction     Ksat        IMD
82  ;;--------------    ----------  ----------  ----------
83  DMA-1               6           0.075       0.32
84  DMA-3               6           0.075       0.32
85  DMA-12              6           0.075       0.32
86  DMA-6               6           0.075       0.32
87  BMP-A               6           0.1         0.32
88  BMP-F               6           0.1         0.32
89  BMP-C               6           0.1         0.32
90  BMP-K               6           0.1         0.32
91  BMP-F.2             3.0         0.5         4
92  3                   6           0.075       0.32
93
94  [LID_CONTROLS]
95  ;;Name              Type/Layer  Parameters
96  ;;--------------    ----------  ----------
97  BMP-A               BC
98  BMP-A               SURFACE     6           0.01        0           0
    5
99  BMP-A               SOIL        18          0.4         0.2         0.1
    5           5           1.5
100 BMP-A               STORAGE     48          0.67        0.5         0
101 BMP-A               DRAIN       0.0484924601857531  0.5         3           6
102
103 BMP-F               BC
104 BMP-F               SURFACE     6           0.01        0           5.7
    5
105 BMP-F               SOIL        18          0.4         0.2         0.1
    5           5           1.5
106 BMP-F               STORAGE     48          0.67        0.29        0
107 BMP-F               DRAIN       00          0.5         54          6
108
```

```
BMP-C               BC
BMP-C               SURFACE     6           0.01        0           0
5
BMP-C               SOIL        18          0.4         0.2         0.1
5           5           1.5
BMP-C               STORAGE     48          0.67        0.29        0
BMP-C               DRAIN       0           0.5         54          6

BMP-K               BC
BMP-K               SURFACE     6           0.0         0           0
5
BMP-K               SOIL        18          0.4         0.2         0.1
5           5           1.5
BMP-K               STORAGE     48          0.67        0.29        0
BMP-K               DRAIN       0           0.5         54          6

BMP-F.2             BC
BMP-F.2             SURFACE     6           0.0         0           0
5
BMP-F.2             SOIL        18          0.4         0.2         0.1
5           5           1.5
BMP-F.2             STORAGE     6           0.67        0.29        0
BMP-F.2             DRAIN       56.1432957441115    0.5         3           6

[LID_USAGE]
;;Subcatchment      LID Process         Number  Area        Width       InitSat
FromImp     ToPerv      RptFile                         DrainTo
;;--------------    ----------------    ------- ----------  ----------  ----------
----------  ----------  ------------------------    ----------------
BMP-A               BMP-A               1       1688.42     0           0
0           0           "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\BMP-A.txt"
POC-3
BMP-F               BMP-F               1       620.00      0           0
0           0           "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\BMP-F.txt"
BMP-C               BMP-C               1       144.01      0           0
0           0           "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\BMP-C.txt"
BMP-K               BMP-K               1       219.02      0           0
0           0
BMP-F.2             BMP-F.2             1       210.00      0           0
0           0           *                           2

[OUTFALLS]
;;Name              Elevation   Type        Stage Data          Gated       Route
To
;;--------------    ----------  ----------  ----------------    --------
----------------
POC-3               0           FREE
NO
Out_Sto-1           0           FREE                            NO
Bmp-A
Out-to-BMP-F.2      0           FREE                            NO
BMP-F.2

[STORAGE]
;;Name              Elev.       MaxDepth    InitDepth   Shape       Curve
Name/Params               N/A         Fevap       Psi         Ksat        IMD
;;--------------    --------    ----------  ----------- ----------
----------------------------    --------    --------                --------    --------
Sto-1               0           2.5         0           TABULAR
Sto-1                           0           0
1                   0           0.75        0           TABULAR
Sto-Green                       0           0
2                   0           3           0           TABULAR
Sto-Chmbr                       0           0           6           0.29        0.32

[ORIFICES]
;;Name              From Node           To Node             Type            Offset
Qcoeff      Gated       CloseTime
;;--------------    ----------------    ----------------    ------------    ----------
```

```
---------- --------    ----------
1                   Sto-1               Out_Sto-1           SIDE            0
0.61        NO          0
3                   Sto-1               Out_Sto-1           SIDE            1
0.61        NO          0

[WEIRS]
;;Name              From Node           To Node             Type            CrestHt
Qcoeff      Gated       EndCon      EndCoeff    Surcharge   RoadWidth   RoadSurf
;;--------------    ----------------    ----------  ----------  ----------  ----------
---------- --------    --------    ----------  ----------  ----------  ----------
2                   Sto-1               Out_Sto-1           SIDEFLOW        2
3.33        NO          0           0           YES
4                   1                   Out-to-BMP-F.2      SIDEFLOW        0
3.33        NO          0           0           YES

[XSECTIONS]
;;Link              Shape           Geom1               Geom2       Geom3
Geom4       Barrels     Culvert
;;--------------    ------------    ----------------    ----------  ----------
---------- ----------  ----------
1                   RECT_CLOSED     0.08333             0.08333     0           0
3                   RECT_CLOSED     0.16667             0.25        0           0
2                   RECT_OPEN       1.5                 3           0
0
4                   RECT_OPEN       0.5                 6           0
0

[CURVES]
;;Name              Type        X-Value     Y-Value
;;--------------    ----------  ----------  ----------
Sto-BMP-C           Storage     0           147
Sto-BMP-C                       1.5         147
Sto-BMP-C                       3           147
;
STO-BMP-E           Storage     0           272
STO-BMP-E                       1.5         272
STO-BMP-E                       272         3
;
Sto-BMP-G           Storage     0           356
Sto-BMP-G                       1.5         356
Sto-BMP-G                       3           356
;
BMP-A               Storage     0           1523
BMP-A                           0.3333      1692
;
;2.5'Dia-132' L
Sto-1               Storage     0           0
Sto-1                           0.25        386.4
Sto-1                           0.5         284.8
Sto-1                           0.75        531.2
Sto-1                           1           364.8
Sto-1                           1.25        571.2
Sto-1                           1.5         364.8
Sto-1                           1.75        531.2
Sto-1                           2           284.8
Sto-1                           2.25        385.6
Sto-1                           2.5         1.13687E-13
;
Sto-Green           Storage     0           80
Sto-Green                       0.5         100
Sto-Green                       0.75        120
;
Sto-Chmbr           Storage     0           1000
Sto-Chmbr                       2           1000
Sto-Chmbr                       3           1000

[REPORT]
;;Reporting Options
```

```
INPUT       NO
CONTROLS    NO
SUBCATCHMENTS   ALL
NODES   ALL
LINKS   ALL

[TAGS]

[MAP]
DIMENSIONS  -2500.000   0.000   12500.000   10000.000
Units       None

[COORDINATES]
;;Node              X-Coord             Y-Coord
;;--------------    ------------------  ------------------
POC-3               1573.628            3349.374
Out_Sto-1           423.941             3735.335
Out-to-BMP-F.2      1067.403            4452.925
Sto-1               201.223             4239.021
1                   1077.915            4747.269
2                   1288.160            4323.274

[VERTICES]
;;Link              X-Coord             Y-Coord
;;--------------    ------------------  ------------------
1                   420.515             4221.888
1                   554.146             4026.582
3                   354.714             4158.393
3                   449.742             3983.887
2                   33.328              4149.933
2                   252.620             3755.893
4                   1190.046            4817.351
4                   1302.177            4670.179

[Polygons]
;;Subcatchment      X-Coord             Y-Coord
;;--------------    ------------------  ------------------
DMA-1               -678.537            4513.956
DMA-3               861.405             4023.099
DMA-12              192.263             4465.698
DMA-6               426.835             4740.357
BMP-A               622.675             3728.482
BMP-F               913.223             4551.040
BMP-C               996.064             3889.448
BMP-K               337.574             4474.081
BMP-F.2             1158.509            4382.844
3                   709.986             4449.421

[SYMBOLS]
;;Gage              X-Coord             Y-Coord
;;--------------    ------------------  ------------------
Escondido           3901.291            9418.665


[BACKDROP]
FILE        "V:\17\17046\Engineering\Current\GPIP\Storm\SWMM\current
Itteration\17046-DMA-Exhibit-EXCEL.jpg"
DIMENSIONS  -2500.000   0.000   12500.000   10000.000

```

ATTACHMENT 2B

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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

The Hydromodification Management Exhibit must identify:

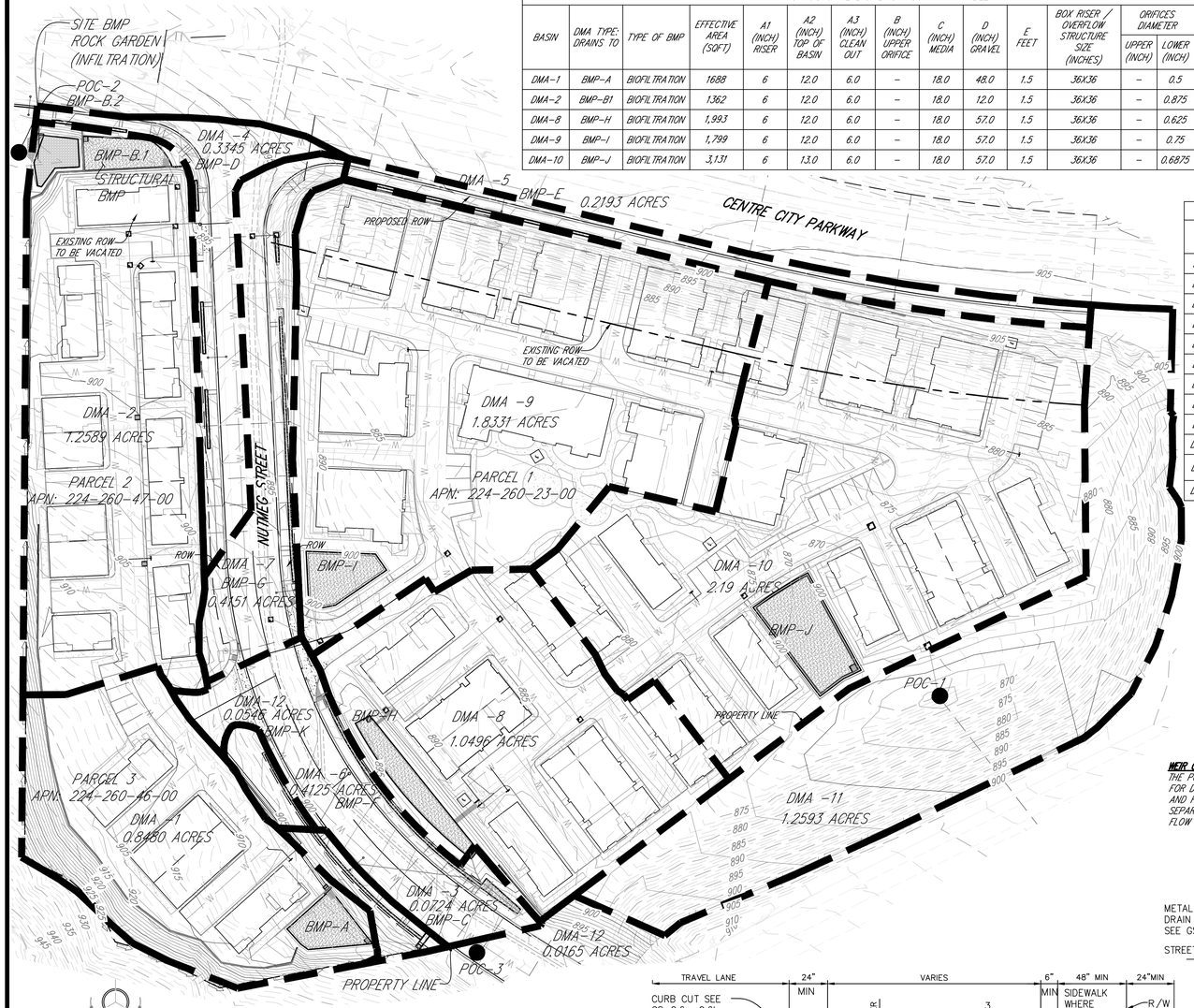
☒ Underlying hydrologic soil group
☒ Approximate depth to groundwater
☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☒ Critical coarse sediment yield areas to be protected
☒ Existing topography
☒ Existing and proposed site drainage network and connections to drainage 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)

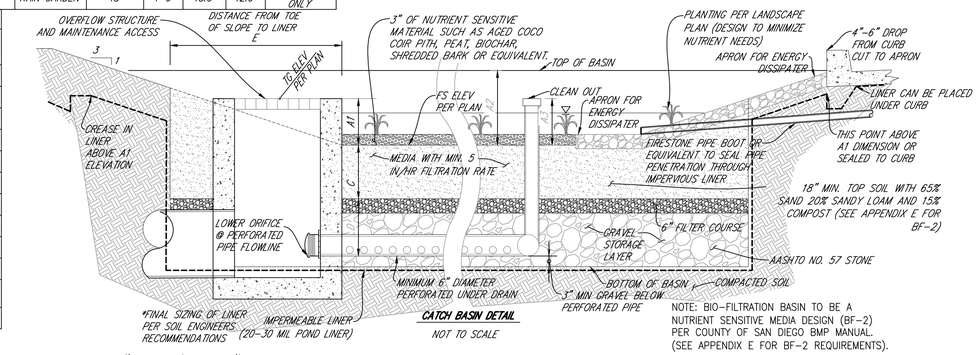
STRUCTURAL BIO-BASIN SUMMARY TABLE													
BASIN	DMA TYPE: DRAINS TO	TYPE OF BMP	EFFECTIVE AREA (SQFT)	A1 (INCH) RISER	A2 (INCH) TOP OF BASIN	A3 (INCH) CLEAN OUT	B (INCH) UPPER ORIFICE	C (INCH) MEDIA	D (INCH) GRAVEL	E FEET	BOX RISER / OVERFLOW STRUCTURE SIZE (INCHES)	ORIFICES DIAMETER		IMPERMEABLE LINER?
												UPPER (INCH)	LOWER (INCH)	
DMA-1	BMP-A	BIOFILTRATION	1688	6	12.0	6.0	–	18.0	48.0	1.5	36X36	–	0.5	YES
DMA-2	BMP-B1	BIOFILTRATION	1,362	6	12.0	6.0	–	18.0	12.0	1.5	36X36	–	0.875	YES
DMA-8	BMP-H	BIOFILTRATION	1,993	6	12.0	6.0	–	18.0	57.0	1.5	36X36	–	0.625	YES
DMA-9	BMP-I	BIOFILTRATION	1,799	6	12.0	6.0	–	18.0	57.0	1.5	36X36	–	0.75	YES
DMA-10	BMP-J	BIOFILTRATION	3,131	6	13.0	6.0	–	18.0	57.0	1.5	36X36	–	0.6875	YES

SITE BMP SUMMARY TABLE							
BASIN	DMA TYPE: DRAINS TO	TYPE OF BMP	EFFECTIVE AREA (SQFT)	POND (IN)	MEDIA (IN)	G GRAVEL (IN)	IMPERMEABLE LINER?
*BMP-D, BMP-B.1	BMP-B.2	ROCK GARDEN	820	4-6	–	60.0	NO
DMA-3	BMP-C	RAIN GARDEN	144	4-6	18.0	36.0	SIDEWALLS ONLY
DMA-4	BMP-D	RAIN GARDEN	347	4-6	—	18.0	SIDEWALLS ONLY
DMA-5	BMP-E	RAIN GARDEN	400	4-6	18.0	18.0	SIDEWALLS ONLY
DMA-6	BMP-F	RAIN GARDEN	580	4-6	18.0	48.0	SIDEWALLS ONLY
DMA-7	BMP-G	RAIN GARDEN	275	4-6	18.0	48.0	SIDEWALLS ONLY
DMA-12	BMP-K	RAIN GARDEN	48	4-6	18.0	12.0	SIDEWALLS ONLY

*NOTE: BMP-D AND BMP-B.1 ARE DRAINING TO AN ADDITIONAL AREA TO ALLOW FOR INFILTRATION. THIS BASIN IS NOT USED FOR CLEANING, HOWEVER EXTRA RETENTION OF FLOOD CONDITIONS MAY ALLOW FOR ADDITIONAL CLEANING. THIS BASIN IS ONLY BEING USED FOR STORAGE FOR HYDROMODIFICATION.

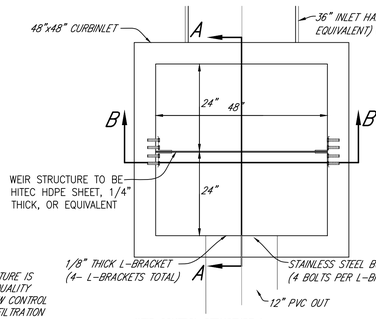
DMA SUMMARY TABLE		
DMA	DMA TO BE TREATED BY:	AREA (ACRES)
DMA-1	BIOFILTRATION	0.848003
DMA-2	BIOFILTRATION	1.2589
DMA-3	SITE BMP	0.1137
DMA-4	SITE BMP	0.3345
DMA-5	SITE BMP	0.2193
DMA-6	SITE BMP	0.4093
DMA-7	SITE BMP	0.4151
DMA-8	BIOFILTRATION	1.0496
DMA-9	BIOFILTRATION	1.8331
DMA-10	BIOFILTRATION	2.1900
DMA-11	SELF MITIGATION	1.2593
DMA-12	SITE BMP	0.0546





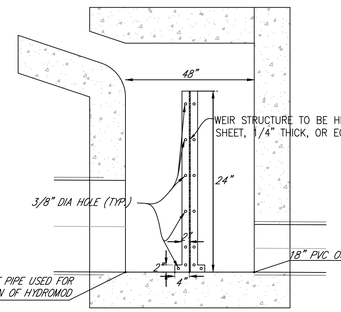
CATCH BASIN DETAIL
NOT TO SCALE

NOTE: BIO-FILTRATION BASIN TO BE A NUTRIENT SENSITIVE MEDIA DESIGN (BF-2) PER COUNTY OF SAN DIEGO BMP MANUAL. (SEE APPENDIX E FOR BF-2 REQUIREMENTS).

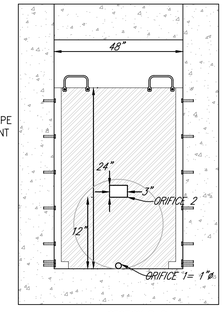


WEIR CONTROL NOTE:
THE PURPOSE OF THIS STRUCTURE IS FOR DETENTION FOR WATER QUALITY AND HYDROMODIFICATION FLOW CONTROL SEPARATE FROM TYPICAL BIOFILTRATION FLOW MODELING.

WEIR CONTROL STRUCTURE 1 PLAN VIEW (SEE SHEET 6)
NOT TO SCALE

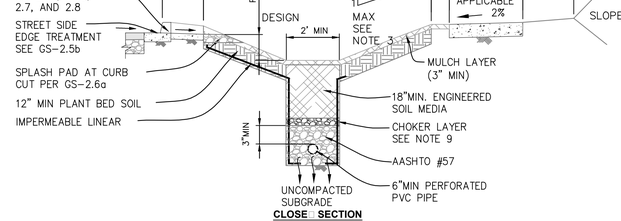


SECTION A-A
NOT TO SCALE



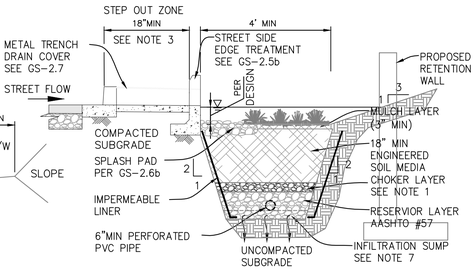
SECTION B-B
NOT TO SCALE

WEIR CONTROL STRUCTURE 1 DETAIL



CLOSE SECTION

RAIN GARDEN SECTION
TYPICAL SECTION
NOT TO SCALE

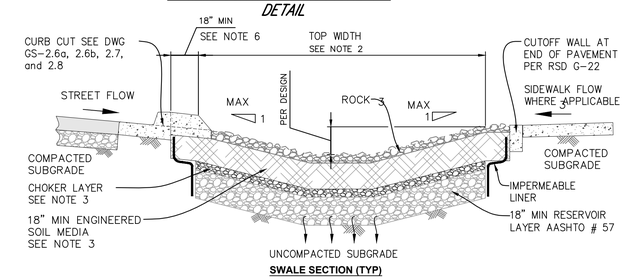


SECTION A-A

RAIN GARDEN SECTION
TYPICAL SECTION
NOT TO SCALE

NOTES:

1. CHOKER LAYER IS OPTIONAL PER GEOTECHNICAL ENGINEER RECOMMENDATION.
2. MATERIALS AND CONSTRUCTION SHALL MEET CURRENT SPECIFICATION FOR PLANTING AND ENGINEERED SOIL MEDIA.
3. STEP OUT ZONE REQUIRED WHEN PARALLEL PARKING IS PROVIDED. INSTALLATION MAY BE STANDARD CONCRETE SIDEWALK OR PAVEMENT BASED ON SURROUNDING CONDITIONS.
4. FOR EDGE TREATMENT OPTIONS SEE DWG GS-2.5
5. PLANTINGS SHALL BE INSTALLED IN ACCORDANCE WITH DESIGN PLAN.
6. BOTTOM OF RAIN GARDEN SHALL BE AT LEAST 10' ABOVE THE SEASONAL HIGH WATER TABLE OR 2' ABOVE BEDROCK, AS DETERMINED BY GEOTECHNICAL INVESTIGATION.
7. DEPTH OF INFILTRATION SUMP AS SHOWN ON DESIGN PLANS SHOULD BE SIZED TO ADDRESS STORMWATER MANAGEMENT REQUIREMENTS.
8. OUTLET REQUIRED AS SPECIFIED BY PLANS.

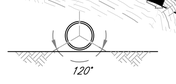


SWALE SECTION (TYP)

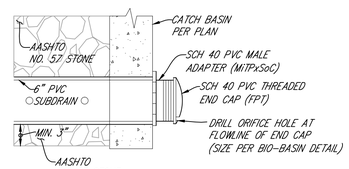
RAIN GARDEN SECTION
TYPICAL SECTION
NOT TO SCALE

NOTES:

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED SWALE AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.
2. DIMENSIONS:
   a. WIDTH 4' MINIMUM.
   b. DEPTH FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION; SIMPLIFIED: 6"-18".
   c. LONGITUDINAL SLOPE OF SWALE: 2.5% MAX.
3. MATERIALS
   a. ENGINEERED SOIL MEDIA: 65% SAND, 20% SANDY LOAM, 15% COMPOST (OR PER SPECIFICATIONS).
   b. CHOKER LAYER: 2"-4" WASHED SAND OVER 2" CHOKING STONE.
4. OVERFLOW:
   a. ALLOW FOR 2" OF FREEBOARD, MINIMUM.
   b. PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
5. BOTTOM OF SWALE SHALL BE AT LEAST 10' ABOVE THE SEASONAL HIGH WATER TABLE OR 2' ABOVE BEDROCK, AS DETERMINED BY GEOTECHNICAL INVESTIGATION.
6. 18" MINIMUM CONCRETE STEP OUT ZONE REQUIRED WHEN PARKING IS ADJACENT TO CURB.



6" PVC PIPE PERFORATION LAYOUT DETAIL
NOT TO SCALE



ORIFICE DETAIL
NOT TO SCALE

SITE INFORMATION
HYDROLOGIC SOIL TYPE C AND D GREATER THAN 40' TO GROUNDWATER

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)

SCALE 1:50
0 50 100 150 200

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.

NOTES:

1. *MATERIALS AND CONSTRUCTION SHALL MEET CURRENT APPROVED COUNTY SPECIFICATION FOR PLANTING AND ENGINEERED SOIL MEDIA.*
2. *STEP OUT ZONE REQUIRED WHEN PARALLEL PARKING IS PROVIDED. INSTALLATION MAY BE STANDARD CONCRETE SIDEWALK OR PAVEMENT BASED ON SURROUNDING CONDITIONS.*
3. *SIDE SLOPES STEEPER THAN 3:1 MAY BE ALLOWED WITH COUNTY APPROVAL.*
4. *TREES AND PLANTS SHALL BE INSTALLED IN ACCORDANCE WITH DESIGN PLANS.*
5. *BOTTOM OF SWALES SHALL BE AT LEAST 10' ABOVE THE SEASONAL HIGH WATER TABLE OR 2' ABOVE BEDROCK, AS DETERMINED BY GEOTECHNICAL INVESTIGATION.*
6. *OFFSET TO SWALES MAY BE REDUCED IF ALTERNATIVE EDGE TREATMENT IS USED, SEE DWG GS-2.5*
7. *DEPTH OF INFILTRATION SUMP AS SHOWN ON DESIGN PLANS SHOULD BE SIZED TO ADDRESS STORMWATER REQUIREMENTS.*
8. *INSTALL TRAFFIC BARRIER AS NECESSARY BASED ON ROADWAY DESIGN.*
9. *CHOKER LAYER IS OPTIONAL PER GEOTECHNICAL ENGINEER RECOMMENDATION.*

NUTMEG HYDROMODIFICATION EXHIBIT SHEET

EXCEL ENGINEERING
LAND PLANNING • ENGINEERING • SURVEYING
440 STATE PLACE, ESCONDIDO, CA 92029
PH (760)745-8118 FX (760)745-1890

V:\1210\Engineering\Current\DWG\Storm Water\1210-HYDROMODIFICATION.dwg 1/31/2019 6:49 PM ORIGINAL PLOT SIZE: ----

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ATTACHMENT 2C


WMAA Map
Potential Critical Coarse Sediment Exhibit
Legend
Nutmeg
Potential Critical Course Sediment
Direction of Flow
EXISTING NATURAL CHANNEL THAT CONVEYS PCCSYA
NUTMEG
Cheyenne Rd
Oakwind Ln
Flume
Coyote Hill Glen
N Centre City Pkwy
N Nutmeg St
Escondido Fwy
Google Earth
© 2018 Google
N
700 ft

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ATTACHMENT 2D

Not performed

ATTACHMENT 2E

Not Required

ATTACHMENT 3

Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Plan (Required)	☒Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3b	Draft Storm Water Control Facilities Maintenance Agreement (SWCFMA) (when applicable)	☐Included ☐Not Applicable

OPERATION & MAINTENANCE (O&M) PLAN

Contents

ATTACHMENTS

1. PROJECT DESCRIPTION

The project is 137 residential homes which range in square foot from 1,104 square feet to 1,950 square feet; and an overall density of 18 DU/AC. As part of the new construction, associated improvements will include walkways, grass and landscaped areas, parking spaces, landscaping throughout the parking areas and frontages, and all necessary utilities (storm, sewer, water, dry, etc.).

Normal uses of such a development will generate storm water runoff with the potential to carry pollutants to off-site tributaries. Biofiltration ponds are planned to be incorporated throughout the site to treat and detain runoff from impervious and landscaped areas.

2. OPERATION & MAINTENANCE PLAN

The Operation and Maintenance Plan (O&M) needs to address construction and post-construction concerns as shown in the Storm Water Mitigation Plan. Refer to Precise Grading and Private Improvement Plans for Nutmeg Homes for additional information on BMPs.

3. Operation & Maintenance of BMP'S

It shall be the responsibility of the owner to train all employees for the maintenance and operation of all BMPs, to achieve the maximum pollutant reduction, as addressed in the approved Project's SWQMP. The following schedule of (O&M's) must be followed to satisfy the Conditions of Concern and the Pollutants of Concern as addressed in the approved Project's SWQMP and the City's Storm Water Design Manual. This schedule shall include periodic inspections of all Source Control and Treatment Control BMP's. All maintenance records for training, inspection and maintenance shall be retained and provided to the city upon request.

All BMPs shall be inspected 30 days prior to October 1st each year and certified to the City's Environmental Programs Division as to their readiness to receive runoff from the annual rainfall season.

The owner will also provide to the City, as part of the maintenance and operation agreement, an executed maintenance and access easement that shall be binding on the land throughout the life of the project.

Responsible Party for O&M and For Training- Property Owner

Responsibility of BMPS			
BMP Name	**Type of BMP**	**Public/ Private**	**Responsible Party**
BMP-A	BIOFILTRATION	PRIVATE	ADJ HOLDINGS, LLC
BMP-B1	BIOFILTRATION	PRIVATE	ADJ HOLDINGS, LLC
BMP-B.2	ROCK GARDEN	PUBLIC	CITY OF ESCONDIDO
BMP-C	RAIN GARDEN	PUBLIC	CITY OF ESCONDIDO
BMP-D	TREE WELL	PUBLIC	CITY OF ESCONDIDO
BMP-E	TREE WELL	PUBLIC	CITY OF ESCONDIDO
BMP-F	RAIN GARDEN	PUBLIC	CITY OF ESCONDIDO
BMP-G	RAIN GARDEN	PUBLIC	CITY OF ESCONDIDO
BMP-G.1	TREE WELL	PUBLIC	CITY OF ESCONDIDO
BMP-H	BIOFILTRATION	PRIVATE	ADJ HOLDINGS, LLC
BMP-I	BIOFILTRATION	PRIVATE	ADJ HOLDINGS, LLC
BMP-J	BIOFILTRATION	PRIVATE	ADJ HOLDINGS, LLC
BMP-K	RAIN GARDEN	PUBLIC	CITY OF ESCONDIDO

A. Training

Training of Operation and Maintenance personnel is of primary importance to provide knowledge of the operation and maintenance of BMPs. Proper training shall provide information that will enable employees to have in place an effective preventive maintenance program as described in this O & M manual. The responsible party mentioned above should take the course provided by the "BUILDING INDUSTRIES ASSOCIATION of SAN DIEGO COUNTY" to be trained in the purpose and use of BMPs and the maintenance thereof. Proper preventive maintenance will prevent environmental incidents that may be a health and safety hazard.

New employees should be trained as to the purpose and proper maintenance within the first week of their employment.

Employee training shall include receiving a copy of this O & M manual; a discussion on the location and purpose of site specific BMPs, such as Source Control and Treatment Control BMPs; training on how to inspect and report maintenance problems and to whom they report to; They shall be trained in site specific Pollutants of Concern so that they can evaluate the functioning of all on-site BMPs .
These Pollutants are identified in section 2 of this report.

A log of all training and reported inspections and maintenance problems along with what was

done to correct the problem shall be keep on the premises at all times.

Employees shall be periodically trained, at a minimum of once a year, to refresh their abilities to Operate and Maintain all on-site BMPs.

B. Landscaping

Operational and maintenance needs include:

- Vegetation management to maintain adequate hydraulic functioning and to limit habitat for disease-carrying animals.
- Animal and vector control.
- Periodic sediment removal to optimize performance.
- Trash, debris, grass trimmings, tree pruning, dead vegetation collection and removal.
- Removal of standing water, which may contribute to the development of aquatic plant communities or mosquito breeding areas.
- Erosion and structural maintenance to prevent the loss of soil and maintain the performance of all landscaping.

Inspection Frequency

The facility will be inspected and inspection visits will be completely documented:

- Once a month at a minimum.
- After every large storm (after every storm monitored or these storms with more than 0.50 inch of precipitation.)
- On a weekly basis during extended periods of wet weather.

Inspect for proper irrigation and fertilizer use, and ensure that all landscaped areas have minimum of 80% coverage.

Aesthetic Maintenance

The following activities will be included in the aesthetic maintenance program:

Grass Trimming: Trimming of grass will be done on all landscaped areas, around fences, at the inlet and outlet structures, and sampling structures.
Weed Control. Weeds will be removed through mechanical means. Herbicide will not be used because these chemicals may impact the water quality monitoring.

Functional Maintenance

Functional maintenance has two components:

- Preventive maintenance
- Corrective maintenance

Preventive Maintenance

Preventive maintenance activities to be instituted for landscaped areas are:

- Grass Mowing: Vegetation seed, mix within the landscaped areas, are to be designed to be kept short to maintain adequate hydraulic functioning and to limit the development of faunal habitats.
- Trash and Debris: During each inspection and maintenance visit to the site, debris and trash removal will be conducted to reduce the potential for inlet and outlet structures and other components from becoming clogged and inoperable during storm events.
- Sediment Removal: Sediment accumulation, as part of the operation and maintenance program at of landscaped areas, will be monitored once a month during the dry season, after every large storm (0.50 inch), and monthly during the wet season. Specifically, if sediment reaches a level at or near plant height, or could interfere with flow or operation, the sediment shall be removed. If accumulation of debris or sediment is determined to be the cause of decline in design performance, prompt action (i.e., within ten working days) will be taken to restore the landscaped areas to design performance standards. Actions will include using additional vegetation and/or removing accumulated sediment to correct channeling or ponding. Characterization and Appropriate disposal of sediment will comply with applicable local, county, state, or federal requirements.
- Landscaped areas will be re-graded, if the flow gradient has been altered. This should be a sign that the BMP is failing, and the soil matrix may need to be replaced.

- Removal of Standing Water: Standing water must be removed if it contributes to the development of aquatic plant communities or mosquito breeding areas.
- Fertilization and Irrigation: fertilization and irrigation is to be keep at a minimum.
- Elimination of Mosquito Breeding Habitats. The most effective mosquito control program is one that eliminates standing water over a period less than 96 hours.

Corrective Maintenance

Corrective maintenance is required on an emergency or non-routine basis to correct problems and to restore the intended operation and safe function of all landscaped areas.

Corrective maintenance activities include:

- Removal of Debris and Sediment: Sediment, debris, and trash, which impede the hydraulic functioning of landscaping and prevent vegetative growth, will be removed and properly disposed. Temporary arrangements will be made for handling the sediments until a permanent arrangement is made. Vegetation will be re-established after sediment removal.
- Structural Repairs: Once deemed necessary, repairs to structural components of landscaping will be done within l0 working days. Qualified individuals (i.e., the designers or contractors) will conduct repairs where structural damage has occurred.
- Embankment and Slope Repairs: Once deemed necessary, damage to the embankments and slopes of landscaped areas will be repaired within l0 working days.
- Erosion Repair: Where a reseeding program has been ineffective, or where other factors have created erosive conditions (i.e., pedestrian traffic, concentrated flow, etc.), corrective steps will be taken to prevent loss of soil and any subsequent danger to the performance and use of landscaped areas as BMPs. There are a number of corrective actions than can be taken.
- These include erosion control blankets, riprap, or reducing flow velocity.

- Consult with an engineer and contractor to address frequently occurring erosion problems.
- Elimination of Animal Burrows: animal burrows will be filled and steps taken to remove the animals if burrowing problems continue to occur (filling and compacting). If the problem persists, vector control specialists will be consulted regarding removal steps. This consulting is necessary as the threat of rabies in some areas may necessitate the animals being destroyed rather than relocated. If the BMP performance is affected, abatement will begin. Otherwise, abatement will be performed annually in September.
- General Facility Maintenance: In addition to the above elements of corrective maintenance, general corrective maintenance will address the overall facility and its associated components. If corrective maintenance is being done to one component, other components will be inspected to see if maintenance is needed.

Maintenance Frequency

The maintenance indicators for selected BMPs are included in Attachment Al.

Debris and Sediment Disposal

Waste generated onsite is ultimately the responsibility of the Owner. Disposal of sediments, debris, and trash will comply with applicable local, county, state, and federal waste control programs.

Hazardous Waste

Suspected hazardous wastes will be analyzed to determine disposal options. Hazardous wastes generated onsite will be handled and disposed of according to applicable local, state, and federal regulations. A solid or liquid waste is considered a hazardous waste if it exceeds the criteria listed in the CCR, Title 22, Article Il.

C. Irrigation System

Inspection Frequency and Procedure

The Irrigation system shall be checked each week as a minimum. The following items shall be checked to insure that they are functioning properly:

- Shut-off devices.
- All piping and sprinkler heads to insure there are no leaks and that proper water spread is maintained.
- All flow reducers.
- Check for overspray/runoff

D. Roof Drains

All roof drains shall be inspected 30 days prior to October lst of each year to insure that they are clean and free from trash and in good repair. They shall be flushed and any leaks or damages piping shall be either replaced or repaired. Where roof drains flow onto grass areas splash structures and or rock rip- rap shall be maintained so the flow from the roof drains do not cause erosion or damage to the grass area. During the rain season roof drains shall be

inspected weekly and after each rain storm to insure that there is no trash and or silt build up that will restrict the run-off flow from the roof. All trash and/or silt build up shall be removed immediately.

E. Trash Storage Areas

- All trash storage areas shall be inspected daily to insure that they are clean from trash. Also the following shall be inspected annually 30 days prior to October lst of each year.
- Pavement is in good repair.
- Drainage will not run-off onto adjacent areas.
- That they remain screened or walled to prevent off-site transport of trash.
- That all lids are closed and/or awnings are in good repair to minimize direct precipitation.

F. Storm Water Conveyance System Stenciling and Signing

- Signage/stenciling are to be inspected for legibility and visual obstruction and shall be Repaired and cleared of any obstruction within 5 working day of inspection.
- Inspection Frequency: Semi-annually, 30 days prior to October lst each year, and monthly during rainy season.

G. Biofiltration

Operational and maintenance needs include:

- Vegetation management to maintain adequate hydraulic functioning and to limit habitat for disease-carrying animals.
- Animal and vector control.
- Periodic sediment removal to optimize performance.
- Trash, debris, grass trimmings, tree pruning, dead vegetation collection and removal.
- Removal of standing water, which may contribute to the development of aquatic plant communities or mosquito breeding areas.
- Erosion and structural maintenance to prevent the loss of soil and maintain the performance of all landscaping.
- Outlet maintenance: maintain trash free; remove silt; clear clogged outlets and standing Water after 96 hours.

Aesthetic Maintenance

The following activities will be included in the aesthetic maintenance program:

- Weed Control. Weeds will be removed through mechanical means. Herbicide shall not be used since the chemicals may impact water quality.

Functional Maintenance

Functional maintenance has two components:

- Preventive maintenance
- Corrective maintenance

Preventive Maintenance

- Trash and Debris: During each inspection and maintenance visit to the site, debris and trash removal will be conducted to reduce the potential for inlet and outlet structures and other components from becoming clogged and inoperable during storm events.
- Sediment Removal: Sediment accumulation, as part of the operation and maintenance program at of landscaped areas, will be monitored once a month during the dry season, after every large storm (0.50 inch), and monthly during the wet season. Specifically, if sediment reaches a level at or near plant height, or could interfere with flow or operation, the sediment shall be removed. If accumulation of debris or sediment is determined to be the cause of decline in design performance, prompt action (i.e., within ten working days) will be taken to restore the landscaped areas to design performance standards. Actions will include using additional vegetation and/or removing accumulated sediment to correct channeling or ponding. Characterization and Appropriate disposal of sediment will comply with applicable local, county, state, or federal requirements. Landscaped areas will be re-graded, if the flow gradient has been altered. This should be a sign that the BMP is failing, and the soil matrix may need to be replaced.
- Removal of Standing Water: Standing water must be removed if it contributes to the development of aquatic plant communities or mosquito breeding areas.
- Fertilization and Irrigation: fertilization and irrigation is to be keep at a minimum.
- Elimination of Mosquito Breeding Habitats. The most effective mosquito control program is one that eliminates standing water over a period less than 96 hours.
- Erosion: Damages from erosion shall be repaired to the original condition.

Corrective Maintenance

Corrective maintenance is required on an emergency or non-routine basis to correct problems and to restore the intended operation and safe function of all landscaped areas.

Corrective maintenance activities include:

- Removal of Debris and Sediment: Sediment, debris, and trash, which impede the hydraulic functioning of landscaping and prevent vegetative growth, will be removed and properly disposed. Temporary arrangements will be made for handling the sediments until a permanent arrangement is made. Vegetation will be re-established after sediment removal.
- Structural Repairs: Once deemed necessary, repairs to structural components of landscaping will be done within l0 working days. Qualified individuals (i.e., the designers or contractors) will conduct repairs where structural damage has occurred.
- Embankment and Slope Repairs: Once deemed necessary, damage to the embankments and slopes of landscaped areas will be repaired within l0 working days.
- Erosion Repair: Where a reseeding program has been ineffective, or where other factors have created erosive conditions (i.e., pedestrian traffic, concentrated flow, etc.), corrective steps will be taken to prevent loss of soil and any subsequent danger to the performance and use of landscaped areas as BMPs. There are a number of corrective actions than can be taken.
- These include erosion control blankets, riprap, or reducing flow velocity.
- Consult with an engineer and contractor to address frequently occurring erosion problems.
- Elimination of Animal Burrows: Animal burrows will be filled and steps taken to

remove the animals if burrowing problems continue to occur (filling and compacting). If the problem persists, vector control specialists will be consulted regarding removal steps. This consulting is necessary as the threat of rabies in some areas may necessitate the animals being destroyed rather than relocated. If the BMP performance is affected, abatement will begin. Otherwise, abatement will be performed annually in September.

- General Facility Maintenance: In addition to the above elements of corrective maintenance, general corrective maintenance will address the overall facility and its associated components. If corrective maintenance is being done to one component, other components will be inspected to see if maintenance is needed.

H. Rain Garden/ Rock Garden

Operational and maintenance needs include:

- Within 6 months following construction, the practice and drainage area should be inspected after storm events.
- Remove stakes, wires, and tags on any new trees.
- Water plants if applicable - initial three years
- Conduct maintenance inspections
- Check curb cuts and inlets for accumulated grit, leaves, and debris that may block inflow
- Identify maintenance tasks needed
- Look for erosion, bare areas, and where mulch, if applicable, needs to be applied
- Spot weed
- Adjust mulch, if applicable, as needed to ensure full cover
- Remove trash and animal waste
- Remove any dead or diseased plants
- Remove sediment in pretreatment cells and inflow points
- Mow filter strips with turf cover
- Mulch as needed to replace 3" surface cover
- Prune trees and shrubs as needed to keep inlets and outlets clear.
- Remove invasive plants using recommended control methods
- Add planting to maintain desired vegetation density, if applicable
- Blow-off cleanouts using compressed air, high pressure water hose, or drain snake in practices that show evidence of clogged underdrain
- Stabilize the surrounding drainage area to prevent erosion.
- Repair or replace cracked pipes or planter box if cracks are greater than l"
- Secure or repair the liner, if applicable, if loose or damaged
- If scouring is occurring at inlets, add splash pads or rock protection
- Adjust the overflow structure if less than 6" above soil surface or 2" below waterproof liner/top of facility
- Replace drain rock surface material, if applicable, if water ponds at surface during storm events or operates at less than 90% of the design infiltration rate.

- Remove and replace the mulch layer, if applicable

I. 30" Detention pipes

Detention pipes upstream of the Biofiltrations shall be inspected a minimum 2 times a year, weekly during the rainy season, and immediately after major rain events. Pipes and the downstream box shall be kept clear of sediment and debris. The pipes can be hosed clean from the upstream cleanouts. Debris and sediment can be removed at the downstream box. The orifice in the downstream box should be blocked when cleaning to prevent unnecessary sediment for draining to the Biofiltration basin.

J. Outlet Structures

All outlet structures shall be kept functional at all times. Routine inspection and corrective maintenance shall include removal of trash sediment and debris and repair of any structural damage or clogging of orifice outlets. The minimum maintenance frequency shall be 30 days prior to October lst each year, weekly during rainy season or within 24 hours prior to rain forecasts.

K. Vector Management Control Requirements

Due to Clean Water Act requirements and mandates imposed by the Water Quality Control Board, large quantities of stormwater will be detained onsite in above ground and underground storage facilities for treatment and storage. These storage facilities are required to dewater or discharge at a very small flow rate in order to comply with these requirements. The outlet structure for the underground storage and bioretention facility had to be sized to a fraction of an inch in order to maintain the maximum allowed discharge flow. The facility was designed to dewater in less than 96 hours. However, due to its small size and if not properly maintained regularly, it is anticipated that the outlet might have a tendency to clog frequently. Consequently, the facility may not drain within 96 hours and possibly take substantially longer time. This creates an increased risk for onsite Vector Issues and bringing their potential for severe harm to human health.

In order to implement vector controls including minimizing the risk for mosquito-borne disease transmission, **It is the responsibility of the Owner to regularly maintain the outlet structures and monitor the site after every storm event to ensure that the system (comprising of above and/or below ground storage facilities) is dewatered in less than 96 hours**. Otherwise the owner will be required to implement a vector control plan in accordance with California Department of Public Health.

ATTACHMENT "A1" INSPECTION & MAINTENANCE SCHEDULE

PREVENTATIVE MAINTENANCE AND ROUTINE INSPECTION					
TYPE BMP	Routine Action	Maintenance Indicator	Maintenance Frequency	MAINTENANCE ACTIVITY	SITE-SPECIFIC REQUIREMENTS
Landscaping & irrigation	Proper irrigation & Fertilizer.	Less than 80% coverage	30 days prior to October 1st each year and Monthly	Re-seed or Re- plant. Repair Irrigation system with-in 5-days.	All slopes and landscaped areas are to have a minimum coverage of 80%
Trash storage areas	Trash free and removal of silt	Visual Inspection	Daily inspection	Remove trash and silt Daily.	All trash storage areas to be free from trash and silt at all times
Roof drain	Trash free and removal of silt, sedimentation & Debris	Silt build up of more than 1" no trash	30 days prior to October 1st each year and weekly during rain season.	Remove all trash and silt and repair any damage to roof drains,	All Roof to be free from trash and silt and in good repair
Bioretention	Trash free and removal of silt. Clear Clogged outlets and Standing Water.	Silt build up of more than 2" no trash, Exposed soils, dead vegetation, ponded water, and excessive vegetation (see TC-32)	30 days prior to October 1st each year, monthly during rainy season, and after Storm Event	Remove trash and silt – repair and reseed exposed areas, maintain grass height so as not be shorter than 2" or higher than 5" remove all ponded water weekly inspections, (See TC-32)	All bio-filters to be free from trash and silt at all times, grass area to be free from exposed soil and maintained to proper height, ponding of water for more than 72 hours maintenance will be required
Storm Water Conveyance system Stenciling & Signing	Must be legible at all times and have a clear view.	Fading of paint or illegible letters or	Semi-annually, 30 days prior to October 1st each year & monthly during rainy season	Repaint stenciling and/or replace signs 30 days prior to October 1st.	Applicable to all stenciling and signs
Outlet Structures	Must be kept functional at all times. Clear Clogged outlets and Standing Water.	Silt, debris, trash accumulation, Ponding Water	30 days prior to October 1st each year and weekly during rainy season or within 24 hours prior to rain forecasts.	Silt, debris, trash accumulation and repair any structural damage to the outlet structures.	All outlet structures shall be kept functional at all times.

ATTACHMENT "A1" INSPECTION & MAINTENANCE

Rain Gardens and Rock Gardens

When	Maintenance Task	Frequency	Time of the Year
Initial maintenance during establishment period (First three years)	Within 6 months following construction, the practice and drainage area should be inspected after storm events.	Twice after installation	Following storm events
	Remove stakes, wires, and tags on any new trees.	One time	One year after planting
	Water plants if applicable - initial three years	Weekly during first 2-3 months after installation, and when rainfall is less than 1 inch per week	April-October
Routine Inspection	• Conduct maintenance inspections • Check curb cuts and inlets for accumulated grit, leaves, and debris that may block inflow • Identify maintenance tasks needed • Look for erosion, bare areas, and where mulch, if applicable, needs to be applied	Quarterly inspection at minimum and maintain as needed.	
Routine Maintenance	• Spot weed • Adjust mulch, if applicable, as needed to ensure full cover • Remove trash and animal waste • Remove any dead or diseased plants • Remove sediment in pretreatment cells and inflow points • Mow filter strips with turf cover	Quarterly inspection at minimum and maintain as needed.	
	Mulch as needed to replace 3" surface cover	Annually or as needed.	February - April
As-Needed Maintenance	Prune trees and shrubs as needed to keep inlets and outlets clear.	As-needed	Feb-April and Sep - Nov as Appropriate

When	Maintenance Task	Frequency	Time of the Year
	Water plants, if applicable, after three years	Weekly during droughts (more than 2 weeks of no rain)	April-October
	• Remove invasive plants using recommended control methods • Add planting to maintain desired vegetation density, if applicable • Blow-off cleanouts using compressed air, high pressure water hose, or drain snake in practices that show evidence of clogged underdrain • Stabilize the surrounding drainage area to prevent erosion. • Repair or replace cracked pipes or planter box if cracks are greater than 1" • Secure or repair the liner, if applicable, if loose or damaged • If scouring is occurring at inlets, add splash pads or rock protection • Adjust the overflow structure if less than 6" above soil surface or 2" below waterproof liner/top of facility	As needed following inspection	• At appropriate time for disease or pest treatment. • October-April
	Replace drain rock surface material, if applicable, if water ponds at surface during storm events or operates at less than 90% of the design infiltration rate.	As needed following inspection	
	Remove and replace the mulch layer, if applicable	Once every 3 years	February-April

BMP: Bioretention Area
MAINTENANCE ACTIVITIES

ROUTINE ACTION	MAINTENANCE INDICATOR	FIELD MEASUREMENT	MEASUREMENT FREQUENCY	MAINTENANCE ACTIVITY	Frequency (# of times per year)	Hours per Event	# of Units Requiring Maintenence	Total Hours of Action	Average Labor Crew Size	Total Hours For Year	Avg. (Pro-Rated) Labor Rate/Hr. ($)	Equipment	Equipment Cost/Hour ($)	Materials & Incidentals Cost or Disposal Cost/Event ($)	Total cost per visit ($)	Total cost per year ($)
Vegetation Management for Aesthetics (optional)	Average vegetation height greater than 12-inches, emergence of trees or woody vegetation,	Visual observation and random measurements through out the side slope area	Annually, prior to start of wet season	Cut vegetation to an average height of 6-inches and remove trimmings. Remove any trees, or woody vegetation.	1.0	1.000	6.0	6.0	2	12	$74.97/hr	Utility Truck	$ 14.39	$ 50.00	$ 1,122	$ 1,122
Soil Repair	Evidence of erosion	Visual observation	Annually, prior to start of wet season	Reseed/revegetate barren spots prior to wet season.	1.0	1.000	6.0	6.0	2	12	$74.97/hr	Utility Truck	$ 14.39	$ 150.00	$ 1,222	$ 1,222
Standing Water	Standing water for more than 96 hrs	Visual observation	Annually, 96 hours after a target storm (0.60 in) event	Drain facility. Corrective action prior to wet season. Consult engineers if immediate solution is not evident.	1.0	1.000	6.0	6.0	2	12	$74.97/hr	Utility Truck	$ 14.39		$ 1,072	$ 1,072
Trash and Debris	Trash and Debris present	Visual observation	Annually, prior to start of wet season	Remove and dispose of trash and debris	1.0	1.000	6.0	6.0	2	12	$74.97/hr	Utility Truck	$ 14.39		$ 1,072	$ 1,072
Sediment Management	Sediment depth exceeds 10% of the facility design	Measure depth at apparent maximum and minimum accumulation of sediment. Calculate average depth	Annually, prior to start of wet season	Remove and properly dispose of sediment. Regrade if necessary. (expected every 2 years)	1.0	1.500	6.0	9.0	2	18	$74.97/hr	Utility Truck, 10-15 yd Truck, Backhoe	$ 56.02	$ 400.00	$ 2,758	$ 2,758
Underdrains	Evidence of Clogging	Visual Observation	Annually, prior to start of wet season	Corrective action prior to wet season. Consult engineers if immediate solution is not evident.	1.0	1.000	6.0	6.0	2	12	$74.97/hr	Utility Truck	$ 14.39		$ 1,072	$ 1,072
General Maintenance Inspection	Inlet structures, outlet structures, side slopes or other features damaged, significant erosion, burrows, emergence of trees or woody vegetation, graffiti or vandalism, fence damage, etc.	Visual observation	Annually, prior to start of wet season	Corrective action prior to wet season. Consult engineers if immediate solution is not evident.	1.0	0.250	6.0	1.5	2	3	$74.97/hr	Utility Truck	$ 14.39		$ 268	$ 268
Trash and Debris from Wier	Trash and Debris present	Visual observation	Monthly during wet season	Remove and dispose of trash and debris	6.0	0.1	2.0	0.3	1	2	$74.97/hr	Utility Truck	$ 14.39		$ 134	$ 804
Water Seal on Wier	Water Seepage Through side of Wier Plate	Visual observation	Monthly during wet season	Remove Caulking around Wier Plate, Recaulk, Replace Wier Plate if Necessary	6.0	0.125	2.0	0.3	2	3	$74.97/hr	Utility Truck	$ 14.39	$ 15.00	$ 283	$ 1,698
Sediment Management Around Orifice of Wier Plate	Any and all Sediment Around Wier Plate	Visual observation	Monthly during wet season	Remove and properly dispose of sediment.	6.0	0.125	2.0	0.3	2	3	$74.97/hr	Utility Truck	$ 14.39	$ 10.00	$ 278	$ 1,668
Reporting					1.0	3.0	1.0	3.0	1	3	$74.97/hr				$ 225	$ 225
				Average Annual Total Hours						91.5				Average Annual Total Cost		$ 12,983.61
														Average Two Year Cost		$ 25,967.22

Labor Rate	$74.97/hr

Equipment	Equipment Cost
Utility Truck	$14.39/hr
10-15 yd truck	$28.27/hr
Backhoe	$13.36/hr
Vactor	$62.70/hr
Sweeper	$123.26/hr

ATTACHMENT "C1"

BMP TRAINING LOG			
Date Mo/Day/Yr	**Type of Training**	**Personnel Trained**	**Trainer**

MAINTENACE INDICATORS

Typical Maintenance Indicator(s) for Vegetated BMPs	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).
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.
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 County must 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, County staff in the Watershed Protection Program must 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	Clear obstructions.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.
*These BMPs typically include a surface ponding layer as part of their function which may take 96 hours to drain following a storm event.	

ACCESS AND MAINTENANCE

Structural BMP-A

Structural BMP-A is constructed near the Southwest corner of the proposed site on the Northside of Nutmeg Street. Please see Figure I.11-2 of Attachment 3b for site overview and BMP location. Access for inspection and maintenance is provided to the south of the structural BMP off the main northbound driveway.

BMP-A is designed as a Biofiltration basin with a 24"x24" boxer riser to attenuate a 100-year storm event. The basin design consist of layered sand and gravel aggregate with 6" surface ponding. Inspection of the outlet pipe will be performed through the grated lid of the catch basin. No proprietary parts have been used in the construction of this Biofiltration basin.

Maintenance of BMPS will be performed, at minimum, when these thresholds are exceeded:

- Grass higher than 4"
- Wilting and/or dying trees, shrubs or grass
- Erosive conditions cause ponding area side slopes to exceed 3:1
- Silt buildup of more than 2"
- Ponding surface drawdown time exceeds 24 hours
- Ponding elevation exceeds top of pond elevation

In order to perform maintenance on the structural BMP, it is recommended that lawn and shrub care equipment be used. Compaction of BMP soils shall be avoided and it is recommended that heavy equipment not be used.

No special training or certification is needed in inspecting or maintaining this BMP.

Structural BMP-B

Structural BMP-B is constructed in the Eastern side of the proposed site on the North side of Nutmeg. Please see Figure I.11-2 of Attachment 3b for site overview and BMP location. Access for inspection and maintenance is provided off the private road to the east of the structural BMP.

BMP-B is designed as a Biofiltration basin with a 24"x24" box riser to attenuate a 100-year storm event. The basin design consist of layered sand and gravel aggregate with 6" surface ponding. Inspection of the outlet pipe will be performed through the grated lid of the catch basin. No proprietary parts have been used in the construction of this Biofiltration basin.

Maintenance of BMP-B will be performed, at minimum, when these thresholds are exceeded:

- Grass higher than 4"
- Wilting and/or dying trees, shrubs or grass
- Erosive conditions cause ponding area side slopes to exceed 3:1
- Silt buildup of more than 2"
- Ponding surface drawdown time exceeds 24 hours
- Ponding elevation exceeds top of pond elevation

In order to perform maintenance on the structural BMP, it is recommended that lawn and shrub care equipment be used. Compaction of BMP soils shall be avoided and it is recommended that heavy equipment not be used.

No special training or certification is needed in inspecting or maintaining this BMP.

Structural BMP-H

Structural BMP-H is constructed on the South side of Nutmeg Street to treat public end of the Courtyard of the proposed building along the south side. Please see Figure I.11-2 of Attachment 3b for site overview and BMP location. Access for inspection and maintenance is provided off the private road to the east of the structural BMP.

BMP-H is designed as a Biofiltration basin with a 24"x24" box riser to attenuate a 100-year storm event. The basin design consist of layered sand and gravel aggregate with 6" surface ponding. Inspection of the outlet pipe will be performed through the grated lid of the catch basin. No proprietary parts have been used in the construction of this Biofiltration basin.

Maintenance of BMP-H will be performed, at minimum, when these thresholds are exceeded:

- Grass higher than 4"
- Wilting and/or dying trees, shrubs or grass
- Erosive conditions cause ponding area side slopes to exceed 3:1
- Silt buildup of more than 2"
- Ponding surface drawdown time exceeds 24 hours
- Ponding elevation exceeds top of pond elevation

In order to perform maintenance on the structural BMP, it is recommended that lawn and shrub care equipment be used. Compaction of BMP soils shall be avoided and it is recommended that heavy equipment not be used.

No special training or certification is needed in inspecting or maintaining this BMP.

Structural BMP-I

Structural BMP-I is constructed on the South side of Nutmeg Street to treat public end of the Courtyard of the proposed building along the south side. Please see Figure I.11-2 of Attachment 3b for site overview and BMP location. Access for inspection and maintenance is provided off the private road to the east of the structural BMP.

BMP-I is designed as a Biofiltration basin with a 24"x24" box riser to attenuate a 100-year storm event. The basin design consist of layered sand and gravel aggregate with 6" surface ponding. Inspection of the outlet pipe will be performed through the grated lid of the catch basin. No proprietary parts have been used in the construction of this Biofiltration basin.

Maintenance of BMP-I will be performed, at minimum, when these thresholds are exceeded:

- Grass higher than 4"
- Wilting and/or dying trees, shrubs or grass
- Erosive conditions cause ponding area side slopes to exceed 3:1

- Silt buildup of more than 2”
- Ponding surface drawdown time exceeds 24 hours
- Ponding elevation exceeds top of pond elevation

In order to perform maintenance on the structural BMP, it is recommended that lawn and shrub care equipment be used. Compaction of BMP soils shall be avoided and it is recommended that heavy equipment not be used.

No special training or certification is needed in inspecting or maintaining this BMP.

Structural BMP-J

Structural BMP-J is constructed on the South side of Nutmeg Street to treat public end of the Courtyard of the proposed building along the south side. Please see Figure I.11-2 of Attachment 3b for site overview and BMP location. Access for inspection and maintenance is provided off the private road to the east of the structural BMP.

BMP-J is designed as a Biofiltration basin with a 24”x24” box riser to attenuate a 100-year storm event. The basin design consist of layered sand and gravel aggregate with 6” surface ponding. Inspection of the outlet pipe will be performed through the grated lid of the catch basin. No proprietary parts have been used in the construction of this Biofiltration basin.

Maintenance of BMP-J will be performed, at minimum, when these thresholds are exceeded:

- Grass higher than 4”
- Wilting and/or dying trees, shrubs or grass
- Erosive conditions cause ponding area side slopes to exceed 3:1
- Silt buildup of more than 2”
- Ponding surface drawdown time exceeds 24 hours
- Ponding elevation exceeds top of pond elevation

In order to perform maintenance on the structural BMP, it is recommended that lawn and shrub care equipment be used. Compaction of BMP soils shall be avoided and it is recommended that heavy equipment not be used.

No special training or certification is needed in inspecting or maintaining this BMP.

FREE RECORDING REQUESTED
PURSUANT TO GOVERNMENT
CODE SECTION 27383
RECORDING REQUESTED BY:

CITY OF ESCONDIDO

WHEN RECORDED MAIL TO:

CITY ENGINEER
CITY OF ESCONDIDO
201 N. BROADWAY
ESCONDIDO, CA 92025

(SPACE ABOVE FOR RECORDER'S USE ONLY)

Documentary Transfer Tax $_____
Signature _____

STORM WATER CONTROL FACILITY MAINTENANCE AGREEMENT
APN NO. 224-260-23, 46,47

THIS AGREEMENT for the design, construction, maintenance and repair of the Storm Water Control Facilities (SWCF(s)), installed on the property as identified in the San Diego County Assessor Tax Roll for 20__, as APN No. 224-260-23, 46, 47, and commonly known as Nutmeg Development, Escondido, California, ("Property") is entered into between the **CITY OF ESCONDIDO**, a municipal corporation ("CITY") and ADJ Holdings, LLC, Developer and/or Property Owner ("LOT OWNER(s)"), and in accordance with the CITY of Escondido Grading Plan No. GP__-_____ ("Grading Plan"). ("Agreement")

WHEREAS, installation and maintenance of Storm Water Control Facilities is required pursuant to the Escondido Municipal Code, the California Regional Water Quality Control Board ("RWQCB") and by the CITY as a condition of approval of property development; and

WHEREAS, LOT OWNER(s) is the owner of certain real property being developed that provides benefit to the general public and the CITY and meets the requirements of the California RWQCB Order R9-2013-0001 and National Pollution Discharge Elimination System No. CAS0109266 and subsequent amendments; and

WHEREAS, the current and future subdivision LOT OWNER(s) will use the SWCF(s) as installed per the Grading Plan and the provisions of the Storm Water Quality Management Plan ("Storm Water Plan") prepared by the LOT OWNER(s) and approved by the CITY on _____, 201__; and

WHEREAS, it is the mutual desire of the parties to this Agreement that the SWCF(s) be maintained in a safe and usable condition by the LOT OWNER(s); and

WHEREAS, it is the mutual desire of the parties to this Agreement to establish a method for the maintenance and repair of the SWCF(s); and

WHEREAS, the CITY shall have the right but not the obligation to enforce full compliance with the

terms and conditions of this Agreement; and

WHEREAS, it is the mutual intention of the parties that this Agreement constitute a covenant running with the land, binding upon each successive LOT OWNER of all or any portion of the property.

NOW, THEREFORE, IT IS HEREBY AGREED AS FOLLOWS:

1. The Property is benefited by this Agreement, and present and successive LOT OWNER(s) of all or any portion of the property are expressly bound hereby for the benefit of the land. In the event any of the herein described parcels of land are subdivided further, the LOT OWNER(s), heirs, assigns and successors in interest of each such newly created parcel shall be liable under this Agreement for their then pro rata share of expenses and such pro rata shares of expenses shall be computed to reflect such newly created parcels.

2. The cost and expense of maintaining the SWCF(s) shall be the responsibility of and paid by the LOT OWNER(s) or their heirs, assigns and successors in interest. The SWCF(s) shall be constructed and maintained by the LOT OWNER(s) in accordance with the CITY- approved Grading Plan and Storm Water Plan, on file with the CITY.

3. Repair and maintenance responsibilities for all structural SWCF(s) and required Best Management Practices associated with the project are set forth in the Storm Water Plan. LOT OWNER(s) shall, as changes occur, provide the CITY with the name, title, and phone number the persons or entities responsible for maintenance and reporting activity, the persons or entities responsible for funding, schedules and procedures for inspection and maintenance of the SWCF(s) and implementation of worker training requirements, and any other activities necessary to ensure BMP maintenance. The Storm Water Plan shall provide for the servicing of all SWCF(s) as needed and at least once during August or September of each year, and for the retention of inspection and maintenance records for at least three (3) years. LOT OWNER(s) shall submit annual certification to the CITY's Department of Engineering Services between September 1 and October 1 of each year until the property is redeveloped. The certification shall document all maintenance performed and compliance with applicable permits.

4. CITY shall have the right to inspect the SWCF(s) and records as needed to ensure the SWCF(s) are being properly maintained.

5. Should any LOT OWNER(s) fail to pay their share of costs and expenses as required to use, maintain or repair the SWCF(s) in this Agreement, then the CITY or any other LOT OWNER shall be entitled without further notice to institute legal action for the collection of funds advanced on behalf of the LOT OWNER who did not pay their share of costs and expenses and shall be entitled to recover in such action in addition to the funds advanced, interest thereon at the current prime rate of interest, until paid, all costs and disbursements of such action, including such sum or sums as the court may fix as and for a reasonable attorney's fees.

6. Any liability of the LOT OWNER(s) to any worker employed to make repairs or provide maintenance under this Agreement, or to third persons, as well as any liability of the LOT OWNER(s) for damage to the property of agent, or any such worker, or any third persons, as a result of or arising out of repairs and maintenance under this Agreement, shall be borne, as between the LOT OWNER(s) in the same percentages as they bear the costs and expenses of

such repairs and maintenance. Each LOT OWNER shall be responsible for and maintain his own insurance, if any. By this Agreement, the parties do not intend to provide for the sharing of liability with respect to personal injury or property damage other than that attributable to the repairs and maintenance undertaken under this Agreement. Each of the LOT OWNER(s) agrees to indemnify the others from any and all liability for injury to him or damage to their property when such injury or damage results from, arises out of, or is attributable to any maintenance or repairs undertaken pursuant to this Agreement.

7. CITY Indemnification.

a) To the fullest extent permitted by law, LOT OWNER(s) shall jointly and severally indemnify, defend with legal counsel reasonably satisfactory to the CITY, and hold harmless the CITY and the CITY's officers, directors, employees, and council members (hereinafter referred to as "Indemnitees") from all actions, fines, sanctions, levies, penalties, orders and assessments of any kind harmless against any and all liability, loss, damage, fine, penalty, expense, claim, or cost (including without limitation costs and fees of litigation) of every nature (collectively referred to as "RWQCB Orders") that may arise out of or relate to LOT OWNER(s)'s obligations for implementation of storm water management in accordance with the RWQCB Order R9-2013-0001 and subsequent amendments, including any reasonable attorney's fees, costs and expenses incurred by the Indemnitees in responding to any RWQCB Orders arising out of or relating to implementation of storm water management. LOT OWNER(s) obligations shall include but not be limited to design, construction, maintenance and required documentation of the maintenance activities related to all storm water treatment measures proposed for the project and included in the STORM WATER PLAN, approved _____, arising out of or in connection with this Agreement or its performance (including acts of omission) except for liability caused by the Indemnitiees' willful misconduct.

b) LOT OWNER(s) obligation to defend shall apply whether or not Indemnitees were negligent or otherwise at fault and whether or not the RWQCB's Orders have any merit. LOT OWNER(s) obligation to defend shall apply with full force and effect regardless of any concurrent negligence or fault by the Indemnitees, or any of them. However LOT OWNER(s) shall not be obligated under this Agreement to indemnify any Indemnitee after entry of a non-appealable final judgment after trial or award in a judicial proceeding for that portion of the final judgment that arises from the willful misconduct of that Indemnitee.

c) LOT OWNER(s) duty to defend the Indemnitees is separate, independent and free standing from LOT OWNER(s) duty to indemnify and hold harmless the Indemnitees. LOT OWNER(s) defense obligation shall arise immediately upon receipt by CITY or LOT OWNER(s) of any written Notice of Violation or equivalent notice of intent to levy any fines, penalties or sanctions against Indemnitees by the RWQCB or other enforcement agency, and shall continue until the entry of any final and non-appealable RWQCB or other enforcement orders.

d) LOT OWNER(s) obligation to indemnify, defend and hold harmless shall be carried on to future property OWNERS and shall continue until the time that the site is redeveloped.

e) It is expressly understood and agreed that the foregoing provisions will survive termination of this Agreement, unless the property is properly redeveloped.

(f) The indemnity protections provided by this Agreement are not intended to exceed the indemnity available under applicable law. If the indemnity protections are found by a court to be unlawful in any way, the protection shall be curtailed or adjusted, but only to the minimum extent required to conform to applicable law.

(g) Nothing in the Agreement, the specifications or other contract documents or CITY approval of the plans and specifications or inspection of the work is intended to include a review, inspection, acknowledgment of any responsibility for any such matter, and CITY, CITY's engineer, and their consultants, and each of their officials, directors, officers, employees and agents, shall have absolutely no responsibility or liability thereof.

8. If, in the CITY's sole judgment said SWCF(s) are not being maintained to standards set forth in paragraph 3 of this Agreement, the CITY may thereupon provide written notice to all LOT OWNER(s) to initiate repairs or construction within ninety (90) days. Upon failure to demonstrate good faith to make repairs or construction within ninety (90), the LOT OWNER(s) agree that the CITY may make all needed repairs to said SWCF(s) and/or construct SWCF(s) to meet the standards set forth in paragraph 3 and to then assess costs to all LOT OWNER(s) equally.

9. If the CITY elects to make necessary maintenance or repairs in accordance with this Agreement, said work shall be without warranty. Said repairs shall be accepted "as is" by the LOT OWNER(s) without any warranty of workmanship and be guaranteed and indemnified by them in accordance this Agreement.

10. The foregoing covenants shall run with the land and shall be deemed to be for the benefit of the land of each of the LOT OWNER(s) and each and every person who shall at any time own all or any portion of the property referred to herein.

11. It is understood and agreed that the covenants herein contained shall be binding on the heirs, executors, administrators, successors, and assigns of each of the LOT OWNER(s).

12. This Agreement shall be recorded and that all obligations created shall constitute a covenant running with the land and any subsequent purchaser of all or any portion thereof, by acceptance of delivery of a deed and/or conveyance regardless of form shall be deemed to have consented to and become bound by this Agreement.

13. The terms of this Agreement may be amended in writing upon majority approval of the LOT OWNER(s) and consent of the CITY.

14. This Agreement shall be governed by the laws of the State of California. In the event that any of the provisions of this Agreement are held to be unenforceable or invalid by any court of competent jurisdiction, the validity, and enforceability of the remaining provisions shall not be affected thereby.

SIGNATURE PAGE FOLLOWS ON PAGE 5:

SIGNATURE PAGE

LOT OWNER(s): _____

_____
PRINT NAME AND TITLE

_____ _____
SIGNATURE DATE SIGNED

_____
PRINT NAME AND TITLE

_____ _____
SIGNATURE DATE SIGNED

_____
PRINT NAME AND TITLE

_____ _____
SIGNATURE DATE SIGNED

ATTACH CALIFORNIA ALL PURPOSE NOTARY ACKNOWLEDGMENT FOR ABOVE SIGNATURES

CITY OF ESCONDIDO,
a municipal Corporation

Date Signed: _____ By: _____
Director of Public Works / City Engineer

APPROVED AS TO FORM:
Jeffrey Epp, City Attorney

By: _____

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PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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

Attachment 3a must identify:

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

Attachment 3b: For all Structural BMPs, Attachment 3b must include a draft maintenance agreement in the City's standard format depending on the Category (PDP applicant to contact City staff to obtain the current maintenance agreement forms). Refer to Section 7.3 in the Storm Water Design Manual for a description of the different categories.

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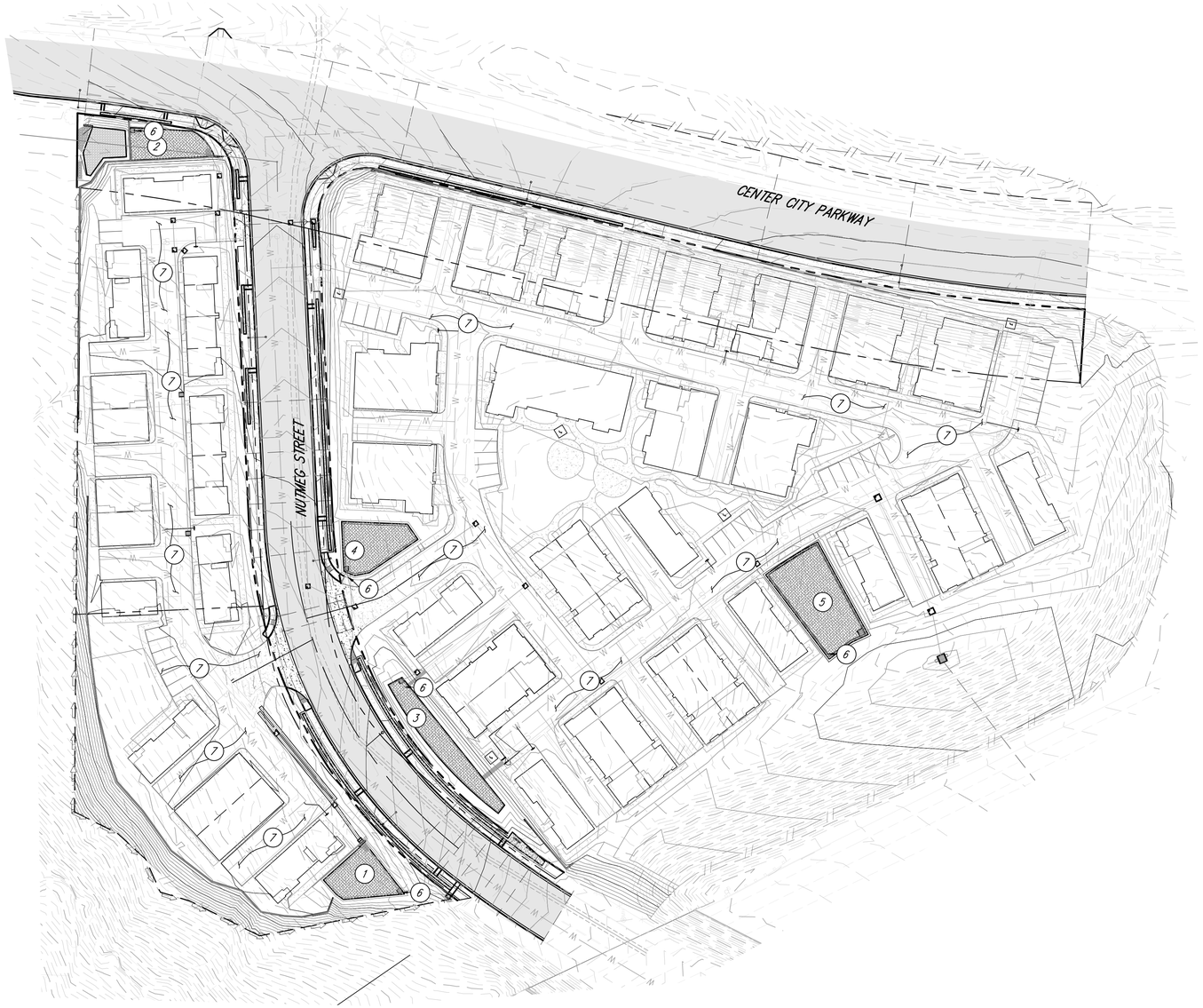
ATTACHMENT 4

City of Escondido PDP Structural BMP Verification for Permitted Land Development Projects

ATTACHMENT 4

SINGLE SHEET BMP PLAN

NUTMEG HOMES



SCALE 1:50

0 50 100 150 200

Underground Service Alert

CALL BEFORE YOU DIG

CALL 811

TWO WORKING DAYS BEFORE YOU DIG

BMP TABLE

BMP #	BMP TYPE	SYMBOL	CASQA NO.	QUANTITY	DRAWING #	SHEET NO.(S)	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY
HYDROMODIFICATION & TREATMENT CONTROL								
(1)-(5)	BIOFILTRATION AREA		TC-32	10,098 SF		3, 4	30 DAYS PRIOR TO OCT. 1ST EACH YEAR AND WEEKLY DURING RAIN SEASON.	BI-MONTHLY (SEE ATTACHMENT 3 OF PROJECT SWQMP)
SOURCE CONTROL								
(6)	INLET STENCILING	NO DUMPING DRAINS TO OCEAN	SD-13	6 EA.		3, 4	SEMI ANNUALLY VISUAL INSPECTION	SEMI ANNUALLY, REPAIR DONE 30 DAYS PRIOR TO OCTOBER 1ST EACH YEAR AND FREQUENCY WILL VARY ACCORDING TO USAGE AND VISUAL INSPECTION
(7)	SWEEPING	N/A	SC-43	12 EA.		3, 4	30 DAYS PRIOR TO OCT. 1ST EACH YEAR. INSPECTION AND FREQUENCY WILL VARY ACCORDING TO USAGE AND VISUAL INSPECTION.	30 DAYS PRIOR TO OCT. 1ST EACH YEAR. INSPECTION AND FREQUENCY WILL VARY ACCORDING TO USAGE AND VISUAL INSPECTION.

PARTY RESPONSIBLE FOR MAINTENANCE:

NAME: ADJ HOLDINGS, LLC

CONTACT: _____

ADDRESS: _____

_____

REGISTERED PROFESSIONAL ENGINEER
ROBERT D. DENTINO
No. 45629
Exp. 12-31-18
CIVIL
STATE OF CALIFORNIA

SIGNATURE

PLAN PREPARED BY:

NAME: ROBERT DENTINO

COMPANY: EXCEL ENGINEERING

ADDRESS: 440 STATE PL
ESCONDIDO, CA 92029

PHONE NO. 706.745.8188

CERTIFICATION: R.C.E. 45629

BMP NOTES:

1. THESE BMPS ARE MANDATORY TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS OR THESE PLANS.
2. NO CHANGES TO THE PROPOSED BMPS ON THIS SHEET WITHOUT PRIOR APPROVAL FROM THE CITY ENGINEER.
3. NO SUBSTITUTIONS TO THE MATERIAL OR TYPES OR PLANTING TYPES WITHOUT PRIOR APPROVAL FROM THE CITY ENGINEER.
4. NO OCCUPANCY WILL BE GRANTED UNTIL THE CITY INSPECTION STAFF HAS INSPECTED THIS PROJECT FOR APPROPRIATE BMP CONSTRUCTION AND INSTALLATION.
5. REFER TO MAINTENANCE AGREEMENT DOCUMENT.
6. SEE PROJECT SWMP FOR ADDITIONAL INFORMATION.

EXCEL ENGINEERING
LAND PLANNING • ENGINEERING • SURVEYING
440 STATE PLACE, ESCONDIDO, CA 92029
PH (760)745-8118 FX (760)745-1890

ESCONDIDO City of Choice

SCALE	Designed By	Drawn By	Checked By
Horizontal	ES	AB	
Vertical	Plans Prepared Under Supervision Of		
	ROBERT D. DENTINO	Date Feb 01, 2019	R.C.E. No. 45629

COMMUNITY DEVELOPMENT DEPARTMENT - PLANNING DEVISION

SINGLE SHEET BMP EXHIBIT FOR:

NUTMEG HOMES

Drawing No.

Sheet 1 of 1

V:\7\7046\Engineering\Current\GPIP\Storm\SWQMP\7046-SSBMP-Exhibit.dwg 2/1/2019 11:07 AM ORIGINAL PLOT SIZE: ---

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City of Escondido Storm Water Structural BMP Verification Form Page 1 of 4	
Project Summary Information	
Project Name	Nutmeg Development
Record ID (e.g., grading/improvement plan number)	
Project Address	2401 Nutmeg Street Escondido, CA 92026
Assessor's Parcel Number(s) (APN(s))	APN 224-260-23, 224-260-46, 224-60-47
Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	904.62 Escondido HSA, Escondido Creek
Maintenance Notification / Agreement No.	
Responsible Party for Construction Phase	
Developer's Name	ADJ Holdings, LLC
Address	30220 Rancho Viejo Road, Ste. B San Juan Capistrano, CA 92625
Email Address	
Phone Number	
Engineer of Work	Robert D. Dentino
Engineer's Phone Number	760-745-8118
Responsible Party for Ongoing Maintenance	
Owner's Name(s)*	ADJ Holdings, LLC
Address	
Email Address	
Phone Number	
*Note: If a corporation or LLC, provide information for principal partner or Agent for Service of Process. If an HOA, provide information for the Board or property manager at time of project closeout.	

City of Escondido Storm Water Structural BMP Verification Form Page 2 of 4				
Stormwater Structural Pollutant Control & Hydromodification Control BMPs* (List all from SWQMP)				
Description/Type of Structural BMP	**Plan Sheet #**	**Structural BMP ID#**	**Maintenance Agreement Recorded Doc #**	**Revisions**
Biofiltration/BF-1		BMP A		
Biofiltration/BF-1		BMP B		
Proprietary Biofiltration/BF-3		BMP C		
Proprietary Biofiltration/BF-3		BMP D		
Proprietary Biofiltration/BF-3		BMP E		
Biofiltration/BF-1		BMP F		
Proprietary Biofiltration/BF-3		BMP G		
Biofiltration/BF-1		BMP H		
Biofiltration/BF-1		BMP I		
Biofiltration/BF-1		BMP J		
*All Priority Development Projects (PDPs) require a Structural BMP				

Note: If this is a partial verification of Structural BMPs, provide a list and map denoting Structural BMPs that have already been submitted, those for this submission, and those anticipated in future submissions.

City of Escondido Storm Structural BMP Verification Form Page 3 of 4

Checklist for Engineer of Work (EOW) to submit to Field Engineering:

- ☐ Copy of the final accepted SWQMP and any accepted addendum.
- ☐ Copy of the most current plan showing the Storm Water Structural BMP Table, plans/cross-section sheets of the Structural BMPs and the location of each verified as-built Structural BMP.
- ☐ Photograph of each Structural BMP.
- ☐ Photograph(s) of each Structural BMP during the construction process to illustrate proper construction.
- ☐ Copy of the approved Structural BMP maintenance agreement and associated security

By signing below, I certify that the Structural BMP(s) for this project have been constructed and all BMPs are in substantial conformance with the approved plans and applicable regulations. I understand the City reserves the right to inspect the above BMPs to verify compliance with the approved plans and Storm Water Ordinance. Should it be determined that the BMPs were not constructed to plan or code, corrective actions may be necessary before permits can be closed.

Please sign your name and seal.

Professional Engineer's Printed Name:

Robert D. Dentino

Professional Engineer's Signed Name:

_____

Date: _____

[SEAL]

City of Escondido Storm Water Structural BMP Verification Form Page 4 of 4

CITY - OFFICIAL USE ONLY:

Permit #:_____

City Inspector: _____

Date Project has/expects to close: _____

Date verification received from Engineer of Work (EOW): _____

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

City Inspector's Signature: _____ Date: _____

FOR Environmental Programs:

Date Received from Field Engineering:_____

Environmental Programs Submittal Reviewer:_____

Environmental Programs Reviewer concurs that the information provided for the following Structural BMPs is acceptable to enter into the Structural BMP Maintenance verification inventory:

List **acceptable** Structural BMPs:

Environmental Programs Reviewer's Signature: _____

Date: _____

ATTACHMENT 5

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

This is the cover sheet for Attachment 5.

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

The plans must identify:

☒Structural BMP(s) with ID numbers matching Step 6 Summary of PDP Structural BMPs
☒The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
☒Details and specifications for construction of structural BMP(s)
☐Signage indicating the location and boundary of structural BMP(s) as required by City staff
☒How to access the structural BMP(s) to inspect and perform maintenance
☒Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
☒Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
☒Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
☒Recommended equipment to perform maintenance
☒When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
☒Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
☒All BMPs must be fully dimensioned on the plans
☒When proprietary BMPs are used, site-specific cross section with outflow, inflow, and model number must be provided. Photocopies of general brochures are not acceptable.
☒Include all source control and site design measures described in Steps 4 and 5 of the SWQMP. Can be included as a separate exhibit as necessary.

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