

Appendix J2

Stormwater Quality Management Plan

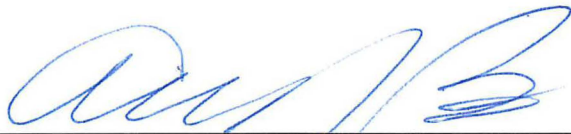
City of Escondido
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

North Iris Lane
Project ID: PHG20-0032

2039, 2047, 2085 & 2089 North Iris Lane
Escondido, Ca 92078

ASSESSOR'S PARCEL NUMBER(S):
224-310-05, 06, 07, 08, 20

ENGINEER OF WORK:



Allen L. Butcher, PE

Hall Land Company, Inc.
740 Lomas Santa Fe Drive, Suite 204
Solana Beach, California 92075
(858) 481-3310

SB&O INC.
PLANNING ENGINEERING SURVEYING
3990 Ruffin Road, Suite 120
San Diego, Ca. 92123
858-560-1141
858-560-8157 Fax

DATE OF SWQMP: Dec 09, 2021

Exhibits Updated 3-17-2021

Plans Prepared By:
SB&O, Inc
3990 Ruffin Rd. Suite 120
San Diego, CA 92123
858.560.1141
JN 75280.65

SWQMP APPROVED:
[For City Staff Only]



PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

This page was left intentionally blank.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

TABLE OF CONTENTS

TABLE OF CONTENTS	iii
ATTACHMENTS	iv
ACRONYMS	iv
PDP SWQMP PREPARER'S CERTIFICATION PAGE	v
SUBMITTAL RECORD	vii
PROJECT VICINITY MAP.....	viii
Step 1: Project type determination (Standard or Priority Development Project) (Form I-2a)..	1
Step 1.1: Storm Water Quality Management Plan requirements	4
Step 1.2: Exception to PDP definitions	4
Step 2: Construction Storm Water BMPs	5
Step 3: City of Escondido PDP SWQMP Site Information Checklist (Form I-2a)	6
Step 3.1: Description of Existing Site Condition	6
Step 3.2: Description of Existing Site Drainage Patterns	7
Step 3.3: Description of Proposed Site Development	8
Step 3.4: Description of Proposed Site Drainage Patterns.....	9
Step 3.5: Potential Pollutant Source Areas	10
Step 3.6: Identification and Narrative of Receiving Water and Pollutants of Concern	11
Step 3.7: Hydromodification Management Requirements	12
Step 3.7.1: Critical Coarse Sediment Yield Areas*	13
Step 3.7.2: Flow Control for Post-Project Runoff*	14
Step 3.8: Other Site Requirements and Constraints	15
Step 4: Source Control BMP Checklist (Form I-2b).....	16
Step 5: Site Design BMP Checklist (Form I-2c)	18
Step 6: PDP Structural BMPs (Form I-3)	20
Step 6.1: Description of structural BMP strategy.....	20
Step 6.2: Structural BMP Checklist.....	22
Step 6.3: Offsite Alternative Compliance Participation Form.....	23

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENTS

Attachment 1: Backup for PDP Pollutant Control BMPs

Attachment 1a: Storm Water Pollutant Control Worksheet Calculations (Worksheet B.2-1 DCV, Form I-4)

Attachment 1b: Form I-5, Categorization of Infiltration Feasibility Condition

Attachment 1c: Form I-6, Factor of Safety and Design Infiltration Rate Worksheet

Attachment 1d: Drainage Management Area (DMA) Exhibit

Attachment 1e: Individual Structural BMP DMA Map book

Attachment 2: Backup for PDP Hydromodification Control Measures

Attachment 2a: Flow Control Facility Design

Attachment 2b: Hydromodification Management Exhibit

Attachment 2c: Management of Critical Coarse Sediment Yield Areas

Attachment 2d: Geomorphic Assessment of Receiving Channels (optional)

Attachment 2e: Vector Control Plan (if applicable)

Attachment 3: Structural BMP Maintenance Plan

Attachment 3a: Structural BMP Maintenance Thresholds and Actions

Attachment 3b: Draft Maintenance Agreements / Notifications (when applicable)

Attachment 4: City of Escondido PDP Structural BMP Verification

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

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

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

PDP SWQMP PREPARER'S CERTIFICATION PAGE

Project Name: North Iris Lane

Permit Application Number: PHG20-0032

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.



C47107 Exp 12/31/2021

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

Allen L, Butcher

Print Name

SB&O, Inc.

Company

December 9 , 2021

Date



PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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 plan check comments is included. When applicable, insert response to plan check comments behind this page.

Preliminary Design / Planning / CEQA

Submittal Number	Date	Summary of Changes
1	March 1, 2021	Initial Submittal
2	July 1, 2021	Second Submittal – Updated DMAs, clarified BMP details.
3	December 9, 2021	Third submittal. Revised SWMM. Change to Green Streets.
4		

Final Design

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

Plan Changes

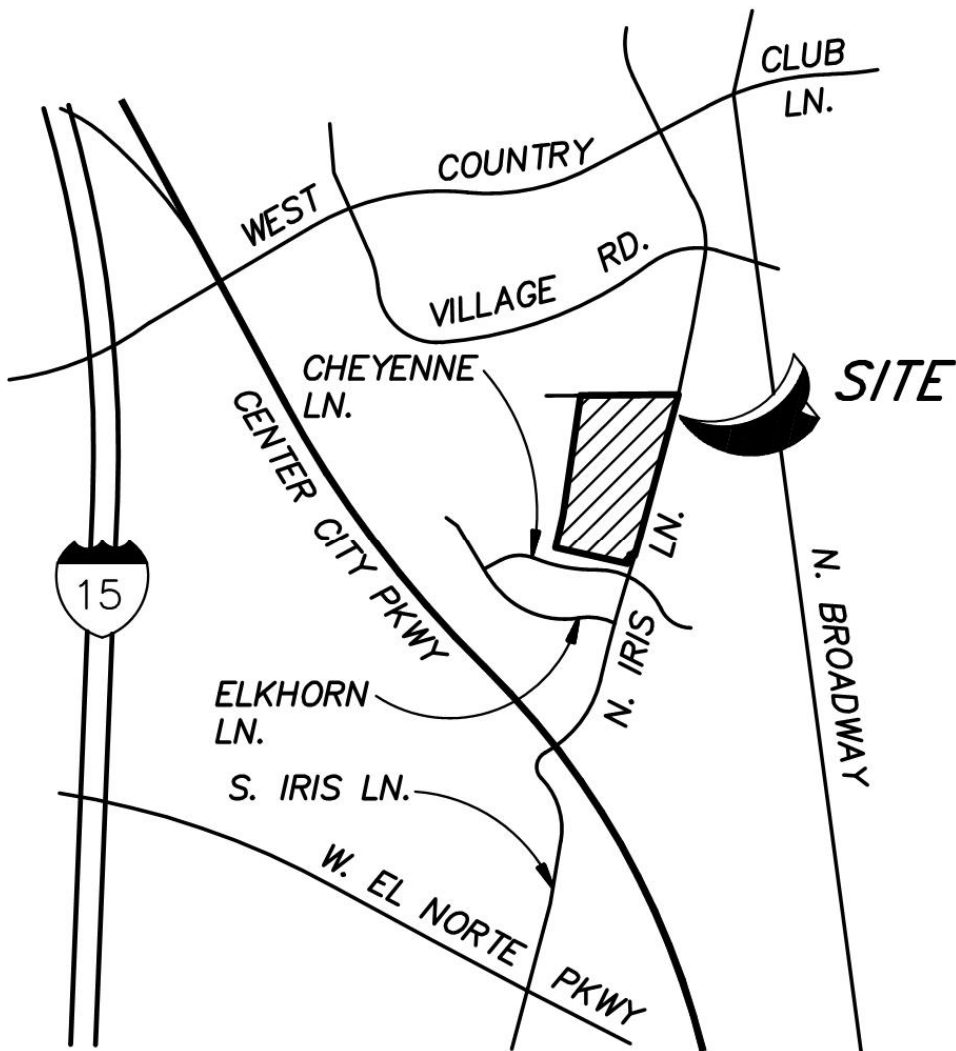
Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

PROJECT VICINITY MAP

Project Name: North Iris Lane

Record ID: PHG20-0032



PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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

Project Summary Information	
Project Name	North Iris Lane
Project Address	2039, 2047, 2085 & 2089 North Iris Lane Escondido, Ca 92078
Assessor's Parcel Number(s)	224-310-05, 06, 07, 08, 20
Permit Application Number	PHG20-0032
Project Watershed (Hydrologic Unit)	Select One: Carlsbad 904
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	<u>7.894</u> Acres (<u>343,863</u> Square Feet)
Area to be disturbed by the project (Project Area)	<u>7.712</u> Acres (<u>335,919</u> Square Feet)
Project Proposed Impervious Area (subset of Project Area)	<u>5.547</u> Acres (<u>241,630</u> Square Feet)
Project Proposed Pervious Area (subset of Project Area)	<u>2.165</u> Acres (<u>94,289</u> Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area. Includes street frontage improvements	
Confirmation of Priority Development Project Determination	
The project is (select one): ☐ New Development ☒ Redevelopment¹	
The total proposed newly created or replaced impervious area is: <u>>50%</u>	

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.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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) Restaurant. 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). <i>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.</i>
Yes ☐	No ☒	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that supports 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.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Yes ☐	No X	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that supports 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 X	(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. <i>Note: See Storm Water Design Manual Section 1.4.2 for additional guidance.</i>

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).

X 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: 38,500 ft² (A)

The total proposed newly created or replaced impervious area is 241,630 ft² (B)

Percent impervious surface created or replaced (B/A)*100: >50%

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

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

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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?	☐ Standard Project	<u>Standard Project</u> requirements apply, including <u>Standard Project SWQMP</u> . Complete Form I-1.
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 <i>in its entirety</i> .	☒ PDP	<u>Standard and PDP</u> requirements apply, including <u>PDP SWQMP</u> . SWQMP Required.
	☐ 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;	<u>Standard Project</u> requirements apply, AND <u>any additional requirements specific to the type of project</u> . <u>City concurrence</u> with the exemption is required. <i>Provide discussion and list any additional requirements below in this form.</i>
☐ 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.	PDP Exempt.
<i>Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:</i>	

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).

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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 <i>Description / Additional Information:</i>
Existing Land Cover Includes (select all that apply and provide each area on site): ☒ Vegetative Cover 1.837 Acres (<u>80,000</u> Square Feet) ☒ Non-Vegetated Pervious Areas 4.872 acres (<u>212,244</u> Square Feet) ☒ Impervious Areas <u>0.884</u> Acres (<u>38,500</u> Square Feet) <i>Description / Additional Information:</i>
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 <i>Description / Additional Information:</i>

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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:

1. Drainage patterns are rural, predominately overland flow.
2. Offsite flows enter the site in a shallow (18" deep) trapezoidal channel which runs through the southerly ¼ of the site. The 100-year peak runoff from approximately 24 acres or low density residential is estimated at 45 cfs, which is tributary to the existing box culvert under North Iris Lane at the southeast corner of the site. Additional minor runoff occurs from a small area at the northwest corner of the property, which travel overland to Robin Hill Lane.
3. Site drain is generally overland flow toward the existing earth channel in the southerly ¼ of the site, which flow easterly toward the box culvert under North Iris Lane.
4. Approximately 6.0 acres drain to the southeast. The southerly discharge location is a shallow 12' x 3' box culvert under North Iris Lane, which has a capacity of approximately 200 cfs. The northerly 1.5 acres flows to the North Iris gutter, which has an approximate capacity of 7 cfs (street grade is 0.87% north of Robin Hill Lane intersection).

Discharge Location	Site Discharge (cfs)	Tributary Area (ac)	Existing Capacity (cfs)
North Iris Gutter	4.5	1.6	7.0
SE – Box Culvert	17.7	6.3	200

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Step 3.3: Description of Proposed Site Development

Project Description / Proposed Land Use and/or Activities:

Redevelopment of site. Demolition of existing residences and associated structures. Re-grading of the site to allow multi-family residential buildings and private driveways. Construction of frontage improvements. .

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

Site: Buildings roofs, driveways, parking spaces, walkways, patios, recreational areas.
Frontage: Street paving, curb & gutter, sidewalks.

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

Landscaping, manufactured slopes, water quality basins

Does the project include grading and changes to site topography?

☒ Yes

☐ No

Description / Additional Information:

Site grading will include cut and fill to provide a more uniform slope rate across the site.

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	1.837	2.165	+18
Pervious (non-vegetated)	4.782	0	N/A
Impervious	0.884	5.547	+527%

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Step 3.4: Description of Proposed Site Drainage Patterns

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

☒ Yes

☐ No

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

Describe proposed site drainage patterns:

The project proposes surface ditch to intercept offsite flows along the westerly boundary.

A bypass storm drain system will intercept flows at the existing earth channel at the westerly boundary and route flows to the existing box culvert near the southeast corner of the site at N Iris Lane.

Site drainage will consist of paved private streets with curbs and surface gutters, and private storm drains directed to the basins along the east boundary / North Iris Lane frontage. Surface drainage from the southerly portion of North Iris Lane will be directed to the tow (2) southerly basins. The northerly street sections (North Iris Lane & Robin Hill Lane) will discharge to the gutter and continue northerly along the existing gutter on the west side of North Iris Lane.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Step 3.5: Potential Pollutant Source Areas

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

- ☒ 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:

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Step 3.6: Identification and Narrative of Receiving Water and Pollutants of Concern

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

List any 303(d) impaired water bodies² 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	Benthic/Pesticides/Nutrients	Riparian Habitat Degradation
San Elijo Lagoon	Eutrophic/Sediment/Silt/ Turbidity	Indicator bacteria

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			
Nutrients			
Heavy Metals			
Organic Compounds			
Trash & Debris			
Oxygen Demanding Substances			
Oil & Grease			
Bacteria & Viruses			
Pesticides			

² The current list of Section 303(d) impaired water bodies can be found at

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

http://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Step 3.7: 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 WMAA³ for the watershed in which the project resides.

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

³The 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

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Step 3.7.1: 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:

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Flow Control for Post-Project Runoff*

*This Section only required if hydromodification management requirements apply <i>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.</i> Project has 1 POC located at the outlet of the south basins (near the existing box culvert). .
Has a geomorphic assessment been performed for the receiving channel(s)? ☒ No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐ Yes, the result is the low flow threshold is 0.1Q2 ☐ Yes, the result is the low flow threshold is 0.3Q2 ☐ Yes, the result is the low flow threshold is 0.5Q2 <i>If a geomorphic assessment has been performed, provide title, date, and preparer:</i> <i>Discussion / Additional Information: (optional)</i>

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Step 3.8: Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

City improvement standards for frontage improvements. Offsite bypass storm drain and shallow downstream connection point at box culvert. Site topography, building setbacks, minimum open space requirements and fire accessibility.

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.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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: _____			
<i>Discussion / justification if SC-1 not implemented:</i>			
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			
<i>Discussion / justification if SC-2 not implemented:</i>			
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			
<i>Discussion / justification if SC-3 not implemented:</i>			

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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 <i>Discussion / justification if SC-4 not implemented:</i>			
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 <i>Discussion / justification if SC-5 not implemented:</i>			
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
<i>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.</i>			

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

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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 <i>Discussion / justification if SD-1 not implemented:</i> Site was previously developed.			
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 <i>Discussion / justification if SD-2 not implemented:</i> Existing trees and vegetation are non-native.			
SD-3 Minimize Impervious Area	☒ Yes	☐ No	☐ N/A
☐ Install parking and driving aisles to minimum width required to meet standards <i>Discussion / justification if SD-3 not implemented:</i>			

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

SD-4 Minimize Soil Compaction	☐ Yes	☐ No	☒ N/A
☐ Avoid compaction in planned landscaped spaces ☐ Till and amend soil for improved infiltration capacity <i>Discussion / justification if SD-4 not implemented:</i> Redevelopment site. Landscape slopes must be 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 <i>Discussion / justification if SD-5 not implemented:</i> The soil types (C and D) and the adjacent landscape areas are not large enough to achieve dispersion.			
SD-6 Runoff Collection	☐ Yes		
<i>Discussion / justification if SD-6 not implemented:</i>	☒ Yes	☐ No	☐ N/A
SD-7 Landscaping with Native or Drought Tolerant Species			
<i>Discussion / justification if SD-7 not implemented:</i>	☒ Yes	☐ No	☐ N/A
SD-8 Harvesting and Using Precipitation			
<i>Discussion / justification if SD-8 not implemented:</i> Harvest & Reuse is not Warranted.	☐ 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.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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 Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate. At the end of this discussion provide a summary of all the structural BMPs within the project including the type and number.

The project development requires both treatment and HMP mitigation. The project site includes both Type "C" and "D" soils. Based upon limited infiltration rates at the site, the infiltration feasibility worksheet supports only partial infiltration. Due to space constraints, combined treatment & HMP basins were selected, to be located near the North Iris Lane right-of-way.

The majority of site runoff is directed to the south. Two linear basins are proposed on either side of the emergency entry. SWMM modeling includes all three (3) basins together to address site runoff. Low flow and HMP discharge from all 3 basins are tributary to the box culvert (POC-1). Due to the lack of existing storm drain, overflow from the north basin will discharge to the North Iris Lane gutter and flow northerly.

The project frontage improvements on Robin Hill Lane and the northerly improvements near the North Iris intersection will use street trees in accordance with Green Streets.

Continue on following page as necessary.)

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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

(Continued from previous page)

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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-1 (South Basin)	
Construction Plan Sheet No. See DMA Exhibit	
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)	Engineer of Work
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)
<i>Discussion (as needed):</i> <i>(Continue on subsequent pages as necessary)</i>	

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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-2 (Middle Basin)	
Construction Plan Sheet No. See DMA Exhibit	
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)	Engineer of Work
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)
<i>Discussion (as needed):</i> <i>(Continue on subsequent pages as necessary)</i>	

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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-3 (North Basin)	
Construction Plan Sheet No. See DMA Exhibit	
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)	Engineer of Work
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)
<i>Discussion (as needed):</i> <i>(Continue on subsequent pages as necessary)</i>	

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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) _____

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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; Required) -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
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 Map book (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 <u>Not applicable for Discretionary Phase.</u>

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)

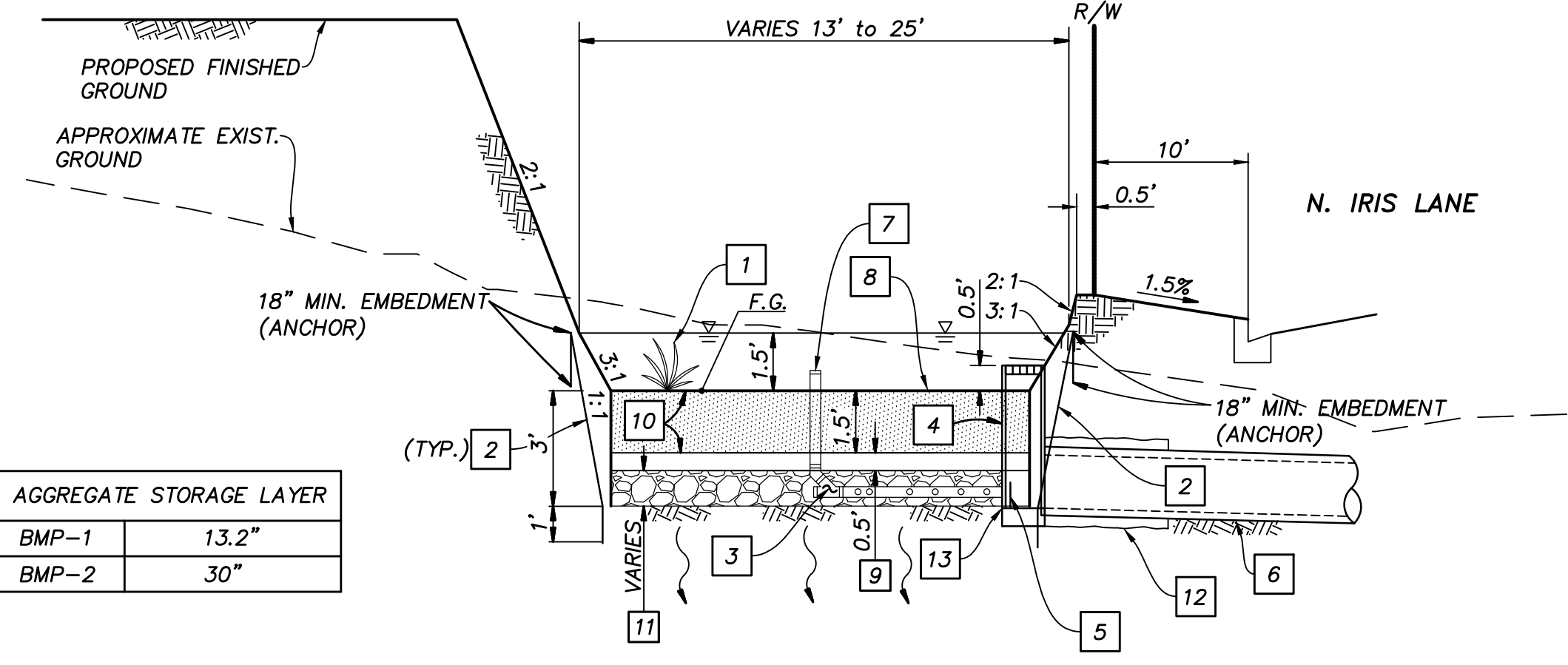
☒ **Point(s) of Compliance (POC) for Hydromodification Management**

DMA AND HMP EXHIBIT FOR:
N. IRIS LANE

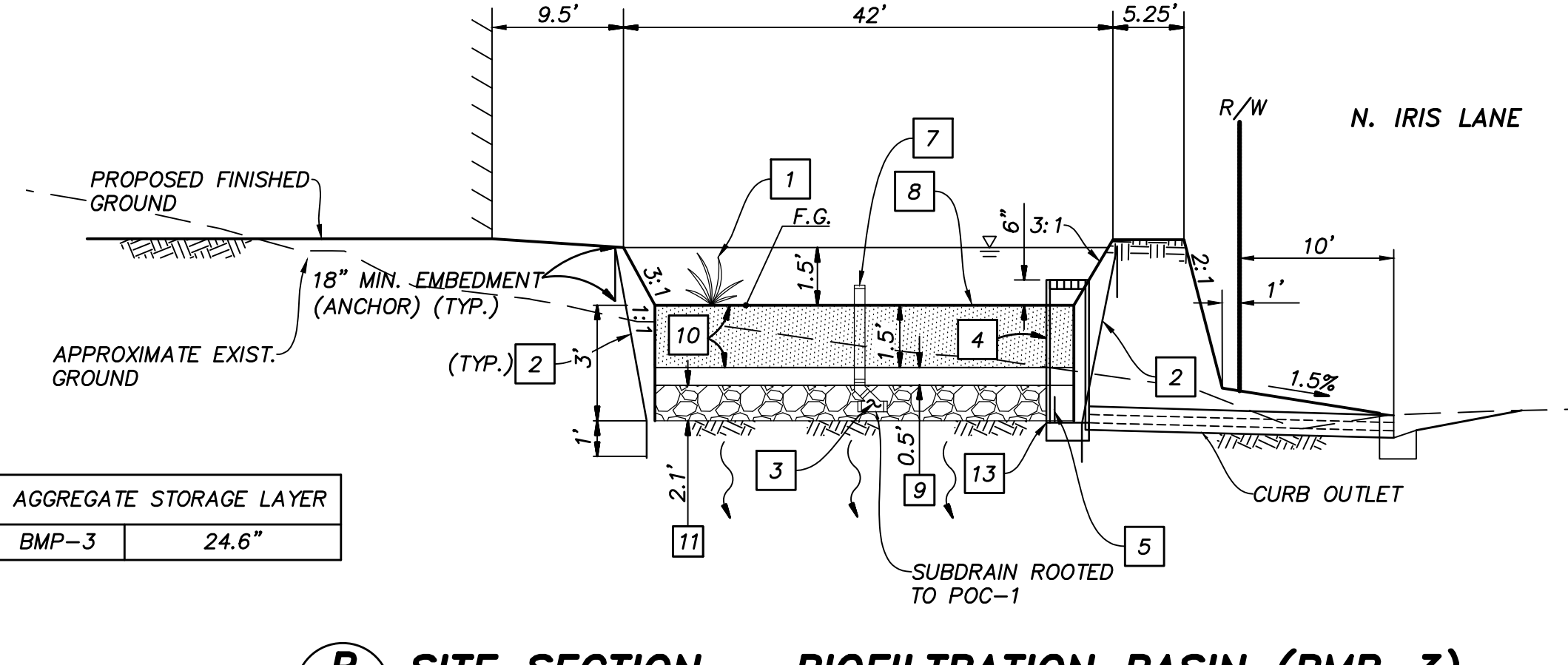


D.M.A. LEGEND	
DESCRIPTION	SYMBOL
PROPERTY LINE/PROJECT BOUNDARY	---
PROPOSED CURB AND GUTTER	---
EXISTING CONTOUR	---
PROPOSED DMA LIMITS	---
SOIL LIMITS	---
DIRECTION OF DRAINAGE	---
STORM DRAIN PIPE SIZE PER PLAN	---
TREE WELL	---
BASIN IDENTIFIER	E-5
BASIN AREA (AC.)	1.9600
UNDERLYING HYDROLOGIC SOILS GROUP:	TYPE "C" & "D"
APPROXIMATE DEPTH TO GROUNDWATER:	GREATER THAN 10 FEET
EXISTING NATURAL HYDROLOGIC FEATURES:	N/A
POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS:	N/A
EXISTING TOPOGRAPHY:	SHOWN
EXISTING IMPERVIOUS AREAS:	SHOWN
EXISTING DRAINAGE SYSTEM:	SHOWN
PROPOSED DRAINAGE SYSTEM:	SHOWN
PROPOSED DEMOLITION:	SHOWN
PROPOSED GRADING:	SHOWN
PROPOSED IMPERVIOUS SURFACES:	SEE TABLE
DMA AREAS:	SEE TABLE
POLLUTANT SOURCES:	STRUCTURAL, SOURCE CONTROL:
INLET SODAGE:	SHOWN
TRASH ENCLOSURE CONTROLS:	PROVIDED
TREATMENT BMP:	SEE TABLE

SOURCE CONTROL BMPs	SITE DESIGN BMPs
1 STORM DRAIN INLETS.	7 RUNOFF COLLECTION
2 LANDSCAPE/OUTDOOR PESTICIDE USE.	8 LANDSCAPE WITH NATIVE OR DRAUGHT TOLERANT SPECIES.
3 FIRE SPRINKLER TEST WATER.	9 INDOOR/STRUCTURAL PEST CONTROL.
4 MISCELLANEOUS DRAIN OR WASH WATER.	
5 PLAZAS, SIDEWALKS, AND PARKING LOTS.	
6 MINIMIZE IMPERVIOUS AREA.	



A SITE SECTION ~ BIOFILTRATION BASIN (BMP-1 AND BMP-2)



B SITE SECTION ~ BIOFILTRATION BASIN (BMP-3)

1

PLANTING.

2

30 MIL. P.V.C. LINER. ALL JOINTS TO BE SEALED WITH 12" MIN. OVERLAP. SEAL ALL PENETRATIONS.

3

6" SLOTTED P.V.C. SUBDRAIN (ASTM D-3034), 3" MIN. FROM BOTTOM.

4

OUTLET CONTROL STRUCTURE WITH GRATED TOP.

5

ORIFICE PLATE (SEE TABLE BELOW).

6

OUTLET PIPE.

7

SUBDRAIN CLEANOUT PER SORSO SC-01. RIM = F.G. + 0.6'

8

INSTALL WELL AGED SHREDDED HARDWOOD MULCH THAT HAS BEEN STOCKPILED OR STORED FOR AT LEAST 12 MONTHS. MULCH MUST BE NON-FLOATING.

9

FILTER COURSE TO BE 3" CLEAN AND WASHED SAND (ASTM NO. 33) OVER 3" LAYER OF ASTM NO. 8 STONE.

10

SOIL MEDIA, INFILTRATION = (BSM SPECIFICATION PER APPENDIX G OF COUNTY OF SAN DIEGO L.I.D. HANDBOOK JUNE 2014)

11

PER COUNTY OF SAN DIEGO L.I.D. HANDBOOK:

12

AGGREGATE STORAGE LAYER ASTM NO. 57 ROCK.

13

2-SACK SLURRY BACKFILL AROUND STORM DRAIN LINE, PIPE ZONE. SLURRY BACKFILL TO START AT STORM DRAIN BOX AND EXTEND AT LEAST 5 FEET BEYOND SLOPE FACE.

14

SEAL PVC LINER AROUND PIPES:
USE A PIPE BOOT AND PVC SKIRT TO SEAL ALL LINER PENETRATIONS FOR PIPES. PVC SKIRT SHOULD BE SEALED TO THE PARENT LINER PER MANUFACTURER'S RECOMMENDATIONS (TYPICALLY A WEDGE WELDER). THE PIPE BOOT SLEEVE SHOULD BE ATTACHED TO THE PIPE USING BUTYL TAPE AND STAINLESS STEEL BAND CLAMP.

15

ATTACH THE LINER TO CONCRETE STRUCTURES:
1. PREPARE A PVC SKIRT FOR CONCRETE STRUCTURE.
2. ATTACHED THE LINER TO THE CONCRETE STRUCTURE USING A STAINLESS STEEL BATTEN STRIP. ALSO ADHERE THE LINER TO THE CONCRETE USING A WATER PROOF ADHESIVE PER THE MANUFACTURE'S RECOMMENDATIONS (TYPICALLY A POLYURETHANE).
3. THE PVC SKIRT TO BE SEALED TO THE PARENT LINER PER MANUFACTURER'S RECOMMENDATIONS (TYPICALLY A WEDGE WELDER).

16

EMBED LINER 12" VERTICAL.

SANDY LOAM					
BSM COMPOSITION	SAND	SAND	SILT	CLAY	COMPOST
VOLUME	65%		20%		15%
WEIGHT	75-80%		10% MAX.	3% MAX.	9% MAX. ¹

9% COMPOST BY WEIGHT RESULTS IN APPROXIMATELY 5% ORGANIC MATTER BY WEIGHT.

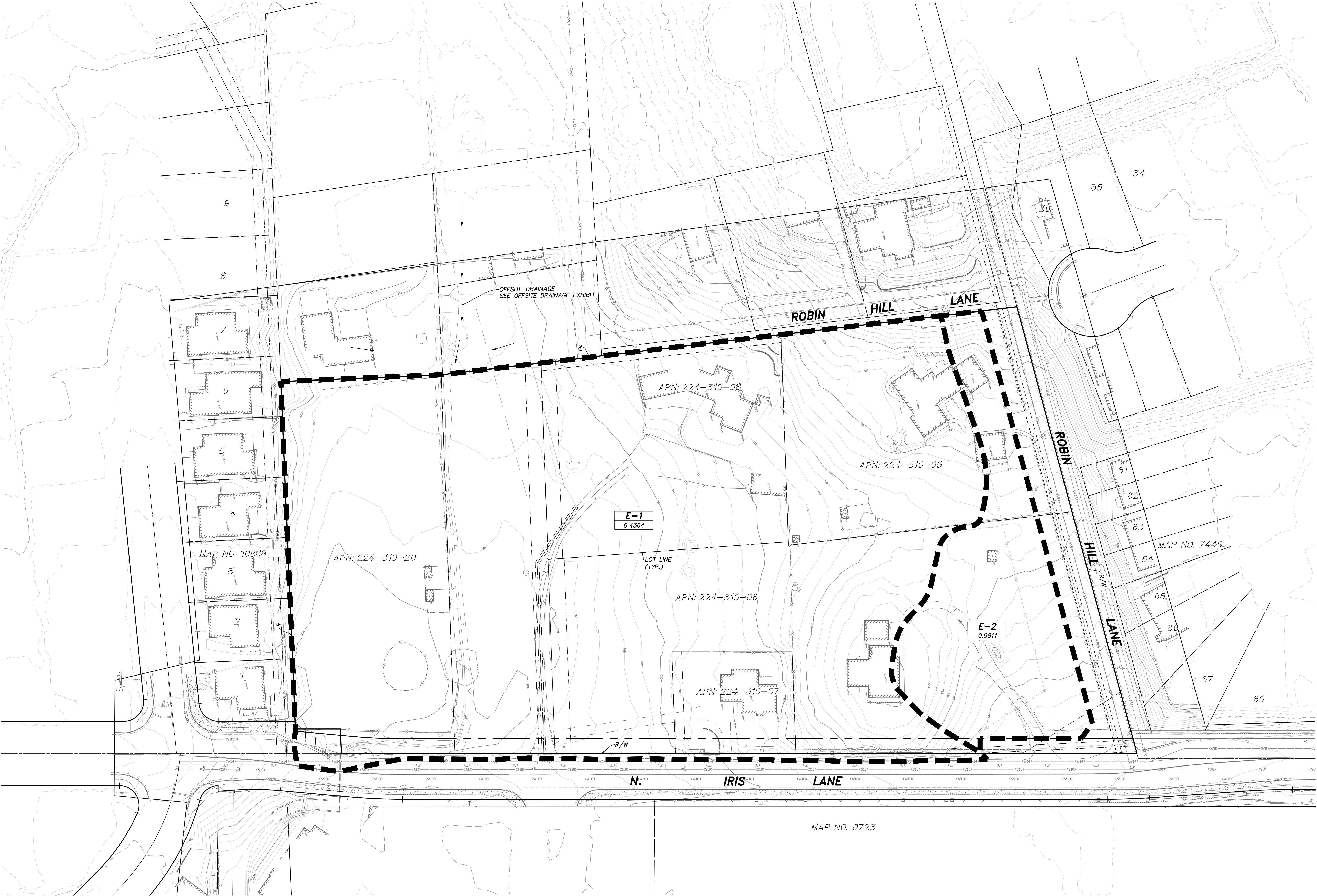
BASIN	CONTROL ORIFICE
BMP-1	1.5"
BMP-2	1.5"
BMP-3	1.5"

DMA & BMP SUMMARY TABLE

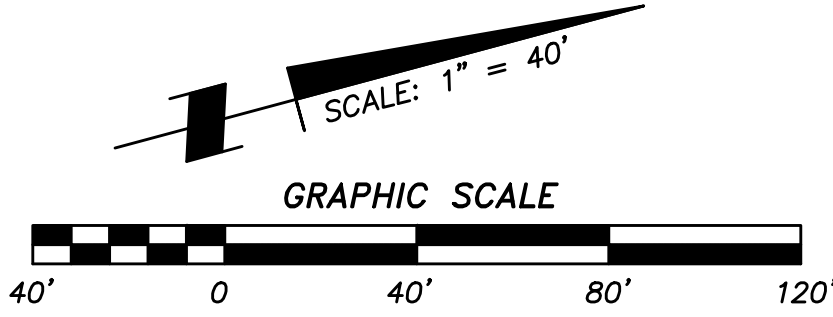
DMA NO	TOTAL AREA (SF)	IMPERVIOUS (SF)	IMPERVIOUS (%)	PERVIOUS (SF)	ADJUSTED IMPERVIOUS (SF)	DCV (CF)	SURFACE AREA REQUIRED (SF)	SURFACE AREA PROVIDED (SF)	BMP TYPE / STANDARD	BMP ID
N1	25,054	17,538	70%	7,516	17,513	1,022	525	2,231	BIOFILTRATION PARTIAL PR-1	BMP-3
S1	166,590	116,613	70%	49,977	118,196	6,895	3,546	4,580	BIOFILTRATION PARTIAL PR-1	BMP-2
S2	111,841	78,289	70%	33,552	80,526	4,697	2,416	3,383	BIOFILTRATION PARTIAL PR-1	BMP-1
TOTAL	303,486	212,440	70%	91,046	216,234	12,614	6,487	10,194		
-	-	-	-	-	-	-	-	-		
-	-	-	-	-	-	-	-	-		
-	-	-	-	-	-	-	-	-		
-	-	-	-	-	-	-	-	-		
-	-	-	-	-	-	-	-	-		
TOTAL	303,486	212,440	70%	91,046	216,234	12,614				

EXISTING DMA AND HMP EXHIBIT FOR:
N. IRIS LANE

LEGEND	SYMBOL
DESCRIPTION	
PROPERTY LINE/PROJECT BOUNDARY	---
EXISTING CONTOUR	- - - 6.30
EXISTING BASIN LIMITS	---
DIRECTION OF DRAINAGE	→
BASIN IDENTIFIER	E-1
BASIN AREA (AC.)	6.4364



EXISTING DMA AND HMP EXHIBIT FOR:
N. IRIS LANE



SB&O INC.
PLANNING ENGINEERING SURVEYING
3990 Ruffin Road, Suite 120
San Diego, Ca. 92123
858-560-1141 858-560-8157
Fax

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition
BMP-2 and BMP-3

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 - Full Infiltration Feasibility Screening Criteria Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: We performed three infiltration tests using a constant head downhole test method. The results indicate design infiltration rates of 0.007, 0.0045, and 0.017 inches per hour (with an applied factor of safety of 2). Full infiltration is considered infeasible since the design rate is below 0.5 iph. Therefore, full infiltration is not considered feasible at the site.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: Infiltration at the proposed locations may result in lateral water migration that could adversely impact adjacent utilities, roadways, and foundations. The adverse impacts of infiltration could be reasonably mitigated to accepted levels provided side liners and a subdrain are incorporated into the design. In addition, an overflow device should be added to prevent overtopping of the BMP slopes.			

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: Perched groundwater is located within 10 feet of the proposed BMP basins. Infiltration of storm water may increase the risk of contamination.			
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 shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: We are not aware of any potential water balance issues or change of ephemeral stream flow as a result of infiltrating storm water. Researching downstream water rights and evaluating water balance issues to stream flows is beyond the scope of the geotechnical engineer.			
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 City Engineer to substantiate findings.

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

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

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

Provide basis: An appreciable rate is typically defined as a factored rate of at least 0.05 inches per hour (using a factor of safety of 2). Based on our experience and field testing, we anticipate that the saturated hydraulic conductivity (Ksat) of the compacted fill will be less than 0.05 inches per hour. The in-situ infiltration test results on the underlying surficial soils indicated an average design rate of 0.028 iph. Therefore, in our opinion the soil and geologic conditions do not allow for partial infiltration based test results and geologic conditions.

6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
---	---	---	--

Provide basis: Infiltration at the proposed locations may result in lateral water migration that could adversely impact adjacent utilities, roadways, and foundations. The adverse impacts of infiltration could be reasonably mitigated to accepted levels provided side liners and a subdrain are incorporated into the design. In addition, an overflow device should be added to prevent overtopping of the BMP slopes.

Worksheet C.4-1 Page 4 of 4

Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: Perched groundwater is located within 10 feet of the proposed BMP basins. Infiltration of storm water may increase the risk of contamination.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: We are not aware of any downstream water rights. Researching downstream water rights is beyond the scope of the geotechnical engineer.			
Part 2 Result*	If all answers from row 5-8 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.	No Infiltration	

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

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

BMP-1

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 - Full Infiltration Feasibility Screening Criteria Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: We performed one infiltration test using a constant head downhole test method. The results indicate design infiltration rates of 0.156 inches per hour (with an applied factor of safety of 2). Full infiltration is considered infeasible since the design rate is below 0.5 iph. Therefore, full infiltration is not considered feasible at the site.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: Full infiltration at the proposed location may result in lateral water migration that could adversely impact adjacent utilities, roadways, and foundations. The adverse impacts of infiltration could be reasonably mitigated to accepted levels provided side liners and a subdrain are incorporated into the design. In addition, an overflow device should be added to prevent overtopping of the BMP slopes.			

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Groundwater was not observed within 10 feet of the proposed BMP basin.			
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 shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: We are not aware of any potential water balance issues or change of ephemeral stream flow as a result of infiltrating storm water. Researching downstream water rights and evaluating water balance issues to stream flows is beyond the scope of the geotechnical engineer.			
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 City Engineer to substantiate findings.

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

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

Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	
Provide basis: An appreciable rate is typically defined as a factored rate of at least 0.05 inches per hour (using a factor of safety of 2). Based on our experience and field testing, we anticipate that the saturated hydraulic conductivity (Ksat) of the compacted fill will be less than 0.05 inches per hour. The in-situ infiltration test results on the underlying surficial soils indicated an average design rate of 0.156 iph. Therefore, in our opinion the soil and geologic conditions allow for partial infiltration based on infiltration rates for the colluvium beneath the NE portion of the site. Impermeable side liners and a subdrain should be incorporated into the design to prevent lateral water migration through compacted fills.			
6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: Infiltration at the proposed locations may result in lateral water migration that could adversely impact adjacent utilities, roadways, and foundations. The adverse impacts of infiltration could be reasonably mitigated to accepted levels provided side liners and a subdrain are incorporated into the design. In addition, an overflow device should be added to prevent overtopping of the BMP slopes.			

Worksheet C.4-1 Page 4 of 4

Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Groundwater was not observed within 10 feet of the proposed BMP basins.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: We are not aware of any downstream water rights. Researching downstream water rights is beyond the scope of the geotechnical engineer.			
Part 2 Result*	If all answers from row 5-8 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.	Partial Infiltration	

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

75280

North Iris Lane

Updated 12-Dec-2021

0.90 Impervious Coefficient
 0.30 Pervious Coefficient
 0.70 85th Percentile

Soil Type C & D

0.23

DMA & BMP SUMMARY TABLE										
DMA NO	TOTAL AREA (SF)	IMPERVIOUS (SF)	IMPERVIOUS (%)	PERVIOUS (SF)	ADJUSTED IMPERVIOUS (SF)	DCV (CF)	SURFACE AREA REQUIRED * (SF)	SURFACE AREA PROVIDED (SF)	BMP TYPE / STANDARD	BMP ID
N1	25,054	17,538	70%	7,516	17,513	1,022	525	2,231	BIOFILTRATION PARTIAL PR-1	BMP-3
S1	166,590	116,613	70%	49,977	118,196	6,895	3,546	4,580	BIOFILTRATION PARTIAL PR-1	BMP-2
S2	111,841	78,289	70%	33,552	80,526	4,697	2,416	3,383	BIOFILTRATION PARTIAL PR-1	BMP-1
-	-	-		-	-	-	-			
TOTAL	303,486	212,440	70%	91,046	216,234	12,614	6,487	10,194		
-	-	-		-	-	-	-			
-	-	-		-	-	-	-			
-	-	-		-	-	-	-			
-	-	-		-	-	-	-			
TOTAL	303,486	212,440	70%	91,046	216,234	12,614				

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	12,614	cubic-feet
	1	Proposed Development Type	Residential	unitless
	2	Number of Residents or Employees at Proposed Development	306	#
	3	Total Planted Area within Development	91,046	sq-ft
	4	Water Use Category for Proposed Planted Areas	Low	unitless
Infiltration Inputs	5	Is Average Site Design Infiltration Rate ≤ 0.500 Inches per Hour?	Yes	yes/no
	6	Is Average Site Design Infiltration Rate ≤ 0.010 Inches per Hour?	No	yes/no
	7	Is Infiltration of the Full DCV Anticipated to Produce Negative Impacts?	No	yes/no
	8	Is Infiltration of Any Volume Anticipated to Produce Negative Impacts?	No	yes/no
Calculations	9	36-Hour Toilet Use Per Resident or Employee	1.86	cubic-feet
	10	Subtotal: Anticipated 36 Hour Toilet Use	571	cubic-feet
	11	Anticipated 1 Acre Landscape Use Over 36 Hours	52.14	cubic-feet
	12	Subtotal: Anticipated Landscape Use Over 36 Hours	109	cubic-feet
	13	Total Anticipated Use Over 36 Hours	680	cubic-feet
	14	Total Anticipated Use / Design Capture Volume	0.05	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?	Yes	yes/no
Result	18	Feasibility Category	4	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 $\geq 3\%$ 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 $\geq 3\%$ 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	#	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	S1	S2	N1								unitless
	1	Basin Drains to the Following BMP Type	Biofiltration	Biofiltration	Biofiltration								unitless
	2	85th Percentile 24-hr Storm Depth	0.70	0.70	0.70								inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.030								in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	116,613	78,289	17,538								sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											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)	24,989		7,516								sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	24,989	33,552									sq-ft
	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No								yes/no
	12	Impervious Surfaces Directed to Dispersion Area per SD-B (C=0.90)											sq-ft
	13	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (C=0.30)											sq-ft
	14	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (C=0.10)											sq-ft
	15	Natural Type A Soil Serving as Dispersion Area per SD-B (C=0.10)											sq-ft
	16	Natural Type B Soil Serving as Dispersion Area per SD-B (C=0.14)											sq-ft
	17	Natural Type C Soil Serving as Dispersion Area per SD-B (C=0.23)											sq-ft
	18	Natural Type D Soil Serving as Dispersion Area per SD-B (C=0.30)											sq-ft
	19	Number of Tree Wells Proposed per SD-A											#
Initial Runoff Factor Calculation	20	Average Mature Tree Canopy Diameter											ft
	21	Number of Rain Barrels Proposed per SD-E											#
	22	Average Rain Barrel Size											gal
	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 (C=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
	28	Total Tributary Area	166,590	111,841	25,054								sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.71	0.72	0.70								unitless
Dispersion Area Adjustments	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00								unitless
	31	Initial Weighted Runoff Factor	0.71	0.72	0.70								unitless
	32	Initial Design Capture Volume	6,900	4,697	1,023								cubic-feet
	33	Total Impervious Area Dispersed to Pervious Surface	0	0	0								sq-ft
	34	Total Pervious Dispersion Area	0	0	0								sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a								ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00								ratio
	37	Runoff Factor After Dispersion Techniques	0.71	0.72	0.70								unitless
	38	Design Capture Volume After Dispersion Techniques	6,900	4,697	1,023								cubic-feet
	39	Total Tree Well Volume Reduction	0	0	0								cubic-feet
Tree & Barrel Adjustments	40	Total Rain Barrel Volume Reduction	0	0	0								cubic-feet
	41	Final Adjusted Runoff Factor	0.71	0.72	0.70								unitless
	42	Final Effective Tributary Area	118,279	80,526	17,538								sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	0	0								cubic-feet
	44	Final Design Capture Volume Tributary to BMP	6,900	4,697	1,023								cubic-feet

Worksheet B.1-1 General Notes:

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

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

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
BMP Inputs	0	Drainage Basin ID or Name	S1	S2	N1	-	-	-	-	-	-	-	sq-ft
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.030	-	-	-	-	-	-	-	in/hr
	2	Effective Tributary Area	118,279	80,526	17,538	-	-	-	-	-	-	-	sq-ft
	3	Minimum Biofiltration Footprint Sizing Factor	0.030	0.030	0.030	-	-	-	-	-	-	-	ratio
	4	Design Capture Volume Tributary to BMP	6,900	4,697	1,023	-	-	-	-	-	-	-	cubic-feet
	5	Is Biofiltration Basin Impermeably Lined or Unlined?	Lined		Unlined								unitless
	6	Provided Biofiltration BMP Surface Area	4,580	3,383	2,231								sq-ft
	7	Provided Surface Ponding Depth	12	12	12								inches
	8	Provided Soil Media Thickness	21	21	21								inches
	9	Provided Depth of Gravel Above Underdrain Invert	10.2	27	21.6								inches
	10	Diameter of Underdrain or Hydromed Orifice (Select Smallest)	1.50	1.50	1.50								inches
Retention Calculations	11	Provided Depth of Gravel Below the Underdrain	6	6	6								inches
	12	Volume Infiltrated Over 6 Hour Storm	0	0	33	0	0	0	0	0	0	0	cubic-feet
	13	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	14	Gravel Pore Space Available for Retention	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	15	Effective Retention Depth	1.05	1.05	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	16	Calculated Retention Storage Drawdown (including 6 Hr Storm)	120	120	86	0	0	0	0	0	0	0	hours
	17	Volume Retained by BMP	401	296	675	0	0	0	0	0	0	0	cubic-feet
	18	Fraction of DCV Retained	0.06	0.06	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	19	Portion of Retention Performance Standard Satisfied	0.07	0.07	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	20	Fraction of DCV Retained (normalized to 36-hr drawdown)	0.03	0.03	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	21	Design Capture Volume Remaining for Biofiltration	6,693	4,556	573	0	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	22	Max Hydromed Flow Rate through Underdrain	0.1111	0.1313	0.1252	n/a	n/a	n/a	n/a	n/a	n/a	n/a	CFS
	23	Max Soil Filtration Rate Allowed by Underdrain Orifice	1.05	1.68	2.42	n/a	n/a	n/a	n/a	n/a	n/a	n/a	in/hr
	24	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	25	Soil Media Filtration Rate to be used for Sizing	1.05	1.68	2.42	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	26	Depth Biofiltered Over 6 Hour Storm	6.29	10.06	14.54	30.00	30.00	30.00	30.00	30.00	30.00	30.00	inches
	27	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	28	Effective Depth of Biofiltration Storage	20.28	27.00	24.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	29	Drawdown Time for Surface Ponding	11	7	5	0	0	0	0	0	0	0	hours
	30	Drawdown Time for Effective Biofiltration Depth	19	16	10	0	0	0	0	0	0	0	hours
	31	Total Depth Biofiltered	26.57	37.06	39.38	30.00	30.00	30.00	30.00	30.00	30.00	30.00	inches
	32	Option 1 - Biofilter 1.50 DCV: Target Volume	10,040	6,834	860	0	0	0	0	0	0	0	cubic-feet
Result	33	Option 1 - Provided Biofiltration Volume	10,040	6,834	860	0	0	0	0	0	0	0	cubic-feet
	34	Option 2 - Store 0.75 DCV: Target Volume	5,020	3,417	430	0	0	0	0	0	0	0	cubic-feet
	35	Option 2 - Provided Storage Volume	5,020	3,417	430	0	0	0	0	0	0	0	cubic-feet
	36	Portion of Biofiltration Performance Standard Satisfied	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	37	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	-	-	-	-	-	-	-	yes/no
	38	Overall Portion of Performance Standard Satisfied	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	39	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	40	Deficit of Effectively Treated Stormwater	0	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cubic-feet

Worksheet B.5-1 General Notes:

A. Applicants may use this worksheet to size Lined or Unlined Biofiltration BMPs (B1-1, 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	S1	S2	N1	-	-	-	-	-	-	-	unitless
	1	85th Percentile Storm Depth	0.70	0.70	0.70	-	-	-	-	-	-	-	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.030	-	-	-	-	-	-	-	in/hr
	3	Total Tributary Area	166,590	111,841	25,054	-	-	-	-	-	-	-	sq-ft
Initial DCV	4	85th Percentile Storm Volume (Rainfall Volume)	9,718	6,524	1,461	-	-	-	-	-	-	-	cubic-feet
	5	Initial Weighted Runoff Factor	0.71	0.72	0.70	-	-	-	-	-	-	-	unitless
	6	Initial Design Capture Volume	6,900	4,697	1,023	-	-	-	-	-	-	-	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	0	-	-	-	-	-	-	-	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	0	0	-	-	-	-	-	-	-	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	118,279	80,526	17,538	-	-	-	-	-	-	-	square feet
	10	Final Design Capture Volume Tributary to BMP	6,900	4,697	1,023	-	-	-	-	-	-	-	cubic-feet
	11	Basin Drains to the Following BMP Type		Biofiltration	Biofiltration	-	-	-	-	-	-	-	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	207	141	450	-	-	-	-	-	-	-	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	0.03	0.03	0.44	-	-	-	-	-	-	-	fraction
	14	Percent of Average Annual Runoff Retention Provided	4.6%	4.6%	50.0%	-	-	-	-	-	-	-	%
	15	Percent of Average Annual Runoff Retention Required	1.5%	1.5%	9.4%	-	-	-	-	-	-	-	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	100.0%	100.0%	100.0%	-	-	-	-	-	-	-	%
	17	Discharges to Secondary Treatment in Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
Treatment Train	18	Impervious Surface Area Still Requiring Treatment	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	-	-	-	-	-	-	-	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 summarized 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.

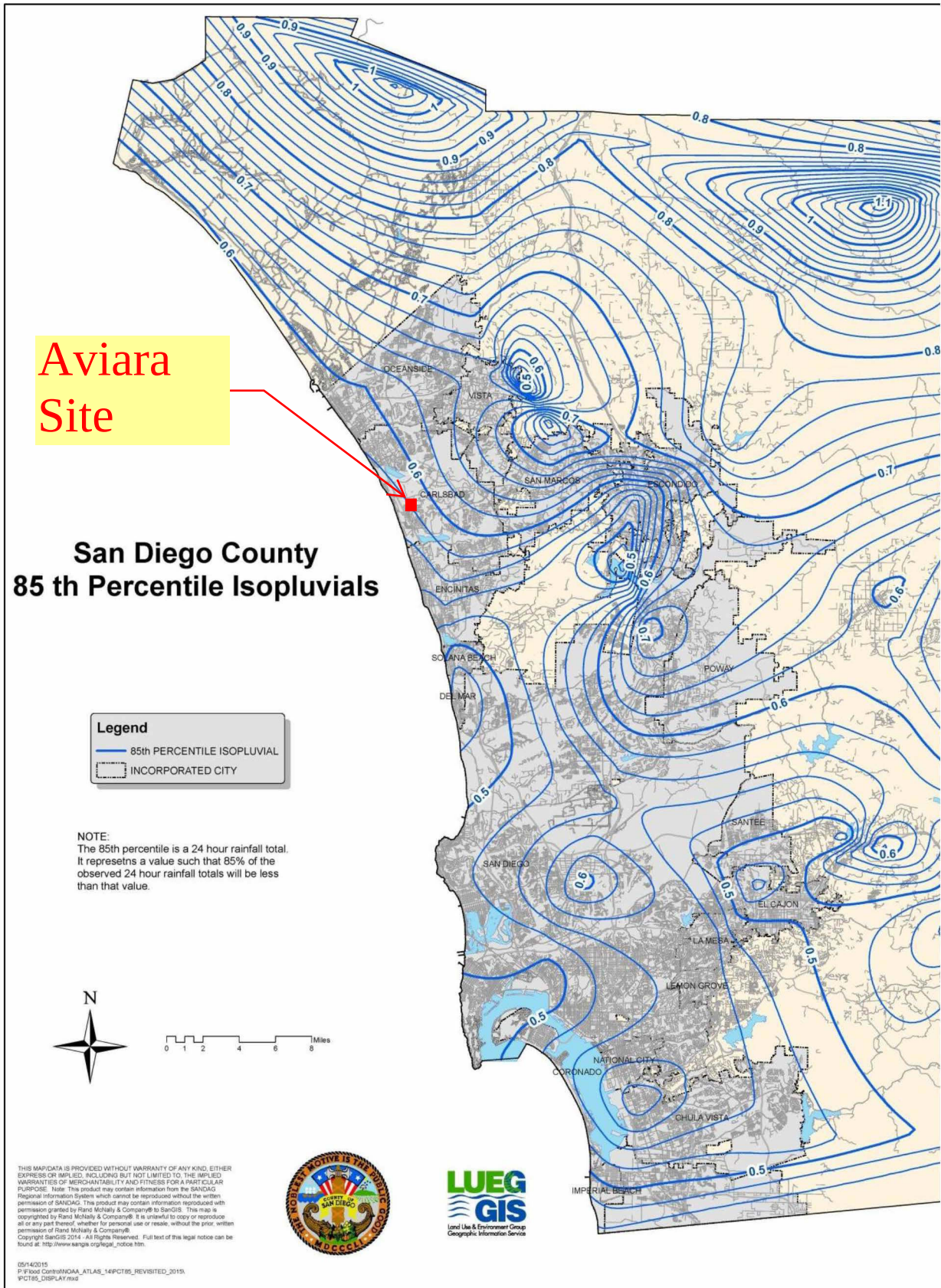


Figure B.1-1: 85th Percentile 2

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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 DMA Exhibit
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 in the WMAA AND, ☐ Demonstration that the project effectively avoids and bypasses sources of mapped critical coarse sediment OR, ☐ Demonstration that project does not generate a net impact on the receiving water.
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

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

This page was left intentionally blank.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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

See DMA 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)

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

This page was left intentionally blank.

ATTACHMENT

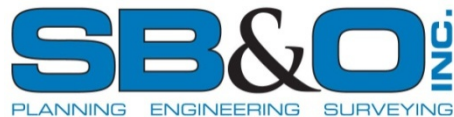
S.W.M.M. ~ HMP CONTINUOUS SIMULATION MODEL FOR:

NORTH IRIS LANE

CITY OF ESCONDIDO, CA

December 15, 2021

PREPARED BY:



3990 RUFFIN ROAD, SUITE 120

SAN DIEGO, CA 92123

858-560-1141

TABLE OF CONTENTS

INTRODUCTION.....	1
STORM WATER MANAGEMENT MODEL SOFTWARE.....	1
POINT OF COMPLIANCE (POC).....	2
ANALYSIS.....	2
RAINFALL DATA.....	2
EVAPORATION	3
SUBCATCHMENTS	3
STORAGE UNITS.....	6
STATISTICS	6
RESULTS	7

INTRODUCTION

This report, "S.W.M.M. ~ HMP CONTINUOUS SIMULATION MODELING FOR NORTH IRIS LANE", is an attachment to the project Storm Water Quality Management Plan (SWQMP) and is not intended to be an independent document.

The San Diego County final Hydromodification Management Plan (HMP) became effective in January of 2011, and is applicable to all priority projects regardless of size. The HMP model seeks to limit post development increases in runoff (magnitude and duration) for runoff event ranging from a fraction of the Q2 up to Q10.

Hydromodification flow control is achieved for this project by routing runoff through the HMP control facility (basins). Outflow is restricted by using multiple control openings at each discharge. To determine the hydromodification controls and tank dimensions, Continuous Simulation Modeling was done using the EPA Storm Water Management Model (SWMM) software. Separate reports have been prepared to analyze the onsite 100-year storm capacity and to analyze the capacity of the downstream public drainage system.

STORM WATER MANAGEMENT MODEL SOFTWARE

EPA's Storm Water Management Model (SWMM) was first developed in 1971, and has since undergone several major upgrades. It continues to be widely used throughout the world for planning, analysis and design related to stormwater runoff, combined sewers, sanitary sewers, and other drainage systems in urban areas, with many applications in non-urban areas as well.

This general purpose urban hydrology and conveyance system hydraulics software is a dynamic rainfall-runoff simulation model used for single event or long-term (continuous) simulation of runoff quantity and quality from primarily urban areas. The runoff component of SWMM operates on a collection of subcatchment areas that receive precipitation and generate runoff and pollutant loads. The routing portion of SWMM transports this runoff through a system of pipes, channels, storage/treatment devices, pumps, and regulators. SWMM tracks the quantity and quality of runoff generated within each subcatchment, and the flow rate, flow depth, and quality of water in each pipe and channel during a simulation period comprised of multiple time steps.

EPA has recently extended SWMM 5 to explicitly model the hydrologic performance of specific types of low impact development (LID) controls, such as porous pavement, bio-retention areas (e.g., rain gardens, green roofs, and street planters), rain barrels, infiltration trenches, and vegetative swales. The updated model allows engineers and planners to accurately represent any combination of LID controls within a study area to determine their effectiveness in managing stormwater and combined sewer overflows.

SWMM 5 was produced in a joint development effort with CDM, Inc., a global consulting, engineering, construction, and operations firm.

POINT OF COMPLIANCE (POC)

The two southern DMAs, S-1 and S-2, will convey runoff through a private storm drain system to their respective BMP/Hydromodification basins, BF-1 and BF-2. These basins discharge into the culvert crossing N Iris Lane and eventually discharging into Reidy Canyon. The northern DMA, N-1, will convey runoff overland into BMP/Hydromodification basin, BF-3. The subdrain is connected to POC1. This basin overflow outlets to the curb and gutter on N Iris Lane, then runs north into an existing inlet. The water is then conveyed across N Iris Lane and subsequently turning south to discharge into Reidy Canyon. Thus, there is one POC for all onsite DMAs. The location of the POC is consistent with the pre-development condition.

ANALYSIS

For each of the POCs, two models were simulated: pre-development and post-development mitigated. The pre-development condition simulation is a representation of the undeveloped site. The post-developed site adds BMPs and the detention facilities to reduce flows to meet the HMP requirements.

The performance standard requires the following:

1. For flow rates from 10% of the pre-project 2-year runoff event (0.1Q2) to the pre-project 10-year runoff event (Q10), the post-project discharge rates and durations shall not deviate above the pre-project rates and durations by more than 10% over more than 10% of the length of the flow duration curve.
2. For flow rates from 0.1 Q2 to Q5, the post-project peak flows shall not exceed pre-project peak flows. For flow rates from Q5 to Q10, post-project peak flows may exceed pre-project flows by up to 10% for a 1-year frequency interval. For example, post-project flows could exceed pre-project flows by up to 10% for the interval from Q9 to Q10 or from Q5.5 to Q6.5, but not from Q8 to Q10.

RAINFALL DATA

Precipitation is the principal driving variable in rainfall-runoff-quantity simulation. The volume and rate of stormwater runoff depends directly on the precipitation magnitude, and its spatial and temporal distribution over the catchment. Each subcatchment in SWMM is linked to a Rain Gage object that describes the format and source of the rainfall input for the subcatchment. The same rain gage and time series is applied to all scenarios for this project.

Long-term hourly rainfall records have been prepared for the San Diego rainfall stations. Sources of the rainfall data include ALERT data from the County of San Diego (which extend back to 1982), the California Climatic Data Archive, National Oceanic and Atmospheric Administration (NOAA), the National Climatic Data Center, and the Western Regional Climate Center. In all cases, the length of the overall rainfall station record is 35 years or the overall length of the rainfall record, whichever is longer. The **ESCONDIDO** ALERT Station rainfall data was used for this project and can be found at, www.projectcleanwater.org.

ESCONDIDO RESERVOIR was chosen for this site due to its geographic proximity and similarity in elevation to this site.

EVAPORATION

Single event simulations are usually insensitive to the evaporation rate. Thus, evaporation is typically neglected when a single rainfall event or a synthetic storm is simulated. However, this process is more significant when a continuous simulation is performed because it is through evaporation that depression storage is recovered and water levels in extended detention and wet ponds are reduced; thus it becomes an important component of the overall water budget.

This project is located in the California Irrigation Management Information System (CIMIS) Zone 6. Monthly averages are applied to this site as provided by CIMIS.

SUBCATCHMENTS

SWMM is a distributed model, which means that a study area can be subdivided into any number of irregular subcatchments to best capture the effect that spatial variability in topography, drainage pathways, land cover, and soil characteristics have on runoff generation. Each subcatchment can be further divided into three subareas: an impervious area with depression (detention) storage, an impervious area without depression storage, and a pervious area with depression storage. Only the latter area allows for rainfall losses due to infiltration into the soil. Described below are some of the characteristics of a subcatchment.

Width/Length

$$W = \text{AREA} \div \text{LENGTH OF OVERLAND FLOW}$$

The width can be defined as the subcatchment area divided by the length of the longest un-concentrated overland flow path that water can travel. If there are several such paths, then one would use an average of their lengths to compute a width. In urbanized catchments, true overland flow can be very short before it is collected into channels or pipes.

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 to be the overland flow path, or its area-weighted average, if there are several such paths in the subcatchment.

The existing site is largely undeveloped with less than 1 dwelling unit per acre and an approximate grade of 4%. The largest area, E-1, flows southerly to the culvert that runs under N Iris Lane. The north area, E-2, flows northerly to the gutter on N Iris Lane.

Proposed finished grades in the development areas are expected to be mild (0.5% to 1.0% range), with manufactured slopes along the perimeter.

Imperviousness

This is the percentage of the subcatchment area that is covered by impervious surfaces, such as roofs and roadways, through which rainfall cannot infiltrate. Imperviousness tends to be the most sensitive parameter in the hydrologic characterization of a catchment, and can range anywhere from 0% for undeveloped areas up to 100% for high-density areas.

The existing site is 90% pervious low density residential.

The developed condition for is approximately 70% impervious and the on-site.

Roughness Coefficient

The roughness coefficient reflects the amount of resistance that overland flow encounters as it runs off of the subcatchment surface. Since SWMM uses the Manning equation to compute the overland flow rate, this coefficient is the same as Manning's roughness coefficient n . Separate values are required for the impervious and pervious fractions of a subcatchment since the pervious n is generally an order of magnitude higher than the impervious n .

N-imperv = 0.012

N-perv = 0.15

Depression Storage "Dstore"

Depression storage corresponds to a volume that must be filled prior to the occurrence of any runoff. Different values can be used for the pervious and impervious areas of a subcatchment. It represents initial abstractions such as surface ponding, interception by flat roofs and vegetation, and surface wetting.

Typical "D" values:

Surface	D (in)
Impervious surfaces (AC,PCC)	0.05
Proposed Landscaping	0.10
Existing Natural Terrain	0.15

Percent of Impervious Area without Depression Storage

This parameter accounts for immediate runoff that occurs at the beginning of rainfall before depression storage is satisfied. It represents pavement close to the gutters that has no surface storage, pitched rooftops that drain directly to street gutters, new pavement that may not have surface ponding, etc. By default the value of this variable is 25%, but it can be changed in each subcatchment. Unless special circumstances are known to exist, a percent imperviousness area without depression storage of 25% is recommended.

Subarea Routing

Choice of internal routing of runoff between pervious and impervious areas:

IMPERVIOUS: Runoff from pervious areas flow to impervious areas

PERVIOUS: Runoff from impervious areas flow to pervious areas.

OUTLET: Runoff from both areas flow directly to outlets.

This project utilizes only the OUTLET routing option, as recommended in the San Diego County BMP Design Manual.

Percent Routed

The percentage of runoff from the subcatchment that is to be routed. In all cases this is 100%.

Infiltration Model

Three different methods for computing infiltration loss on the pervious areas of a subcatchment are available in SWMM. They are the Horton, Green-Ampt and Curve Number models. There is no general agreement on which model is best. The Horton model has a long history of use in dynamic simulations, the Green-Ampt model is more physically-based, and the Curve Number model is derived from (but not the same as) the well-known SCS Curve Number method used in simplified runoff models.

We have chosen to use the Green-Ampt model for this project for type “D” soil:

Suction Head = 9.0 inches

Conductivity = 0.025

Initial Deficit = 0.3

Low Impact Development (LID) Controls

LID Controls are low impact development practices designed to capture surface runoff and provide some combination of detention, infiltration, and evapotranspiration. They are considered as properties of a given subcatchment, similar to how Aquifers and Snow Packs are treated. SWMM can explicitly model five different generic types of LID controls: Bio-retention Cells (with impermeable liner option), Infiltration Trenches, Continuous Porous Pavement Systems, Rain Barrels (or Cisterns) and Vegetative Swales.

Bio-retention cells, infiltration trenches, and porous pavement systems can all contain optional underdrain systems in their gravel storage beds to convey captured runoff off of the site rather than letting it all infiltrate. They can also have an impermeable floor or liner that prevents any infiltration into the native soil from occurring. Infiltration trenches and porous pavement systems can also be subject to a decrease in hydraulic conductivity over time due to clogging.

This project models BMPs as Bio-Retention Cells with a liner on the sides. The program is setup to route all flows from a Subcatchment into a smaller subcatchment that is fully occupied by the LID control. The project geotechnical engineer has found that infiltration is minimal, so the on-site BMP is lined on the sides.

STORAGE

SWMM routes runoff through storage units such as ponds and tanks with outlet orifices and weirs. Tanks can be modeled using either a storage curve function or a depth-area table. For this project we inputted a depth-area table and do allow for storage infiltration.

The project is required to provide water quality treatment and flow control for post development runoff. The project proposes a surface biofiltration basin with enhanced below grade storage to provide treatment and flow control. The surface basin has additional storage depth and an overflow structure with both an orifice opening and grated top to provide attenuation of larger storm events. In order to ensure that post development flows do not exceed existing peak flows, detention routing analyses were prepared to determine peak outflows, and to provide adjusted discharge estimate for comparison to the existing condition. Raw test results of the surficial soils indicate poor infiltration rates. However, the bottom of the BMP has been left unlined to attain infiltration on the low flows.

Basin 1 Storage 11,440 cf. (0.27 ac-ft) AT 0.5' surface depth

Elevation	Description	Dimension/Size (sf)	Comment
705.5	Top of Earth Berm	3,790	1.5' surface depth
704.5	Grated overflow 5' x5'	3,180	0.5' surface depth
704.5	surface depth @ 6"	3,180	Treatment Surface Area
704.0	Floor of Surface Basin	2,590	
702.5	Bottom of Soil Layer	2,590	30% Void Ratio
700.9	Bottom of Crushed Rock	2,590	40% Void Ratio
701.4	Low Flow Orifice	1.5" dia.	

Basin 2 Storage 17,200 cf. (0.4 ac-ft) AT 0.5' surface depth

Elevation	Description	Dimension/Size (sf)	Comment
707.5	Top of Earth Berm	4,580	1.5' surface depth
706.5	Grated overflow 5' x5'	3,440	0.5' surface depth
706.5	surface depth @ 6"	3,440	Treatment Surface Area
706.0	Floor of Surface Basin	2,320	
704.5	Bottom of Soil Layer	2,320	30% Void Ratio
701.5	Bottom of Crushed Rock	2,320	40% Void Ratio
702.0	Low Flow Orifice	1.5" dia.	

Basin 3 Storage 9,840 cf. (0.23 ac-ft) AT 0.5' surface depth

Elevation	Description	Dimension/Size (sf)	Comment
717.1	Top of Earth Berm	2,580	1.5' surface depth
716.1	Grated overflow 5' x5'	2,290	0.5' surface depth
716.1	surface depth @ 6"	2,290	Treatment Surface Area
715.6	Floor of Surface Basin	2,010	
714.1	Bottom of Soil Layer	2,010	30% Void Ratio
711.55	Bottom of Crushed Rock	2,010	40% Void Ratio
711.8	Low Flow Orifice	1.5" dia.	

STATISTICS

SWMM computes peak flow frequency statistics by constructing a partial-duration series. This involves examining the entire runoff time series generated by the model, dividing the runoff time series into a set of discrete unrelated events, determining the peak flow for each event, ranking the peak flows for all events and then computing the recurrence interval or plotting position for each storm event. A separation event, defined as a time period in which runoff does not exceed a prescribed threshold, is required to parse the long-term flow records into discrete runoff events. The separation event corresponds to the required number of consecutive time intervals (24 hours in this case) with a flow value less than Flow Floor 1 (0.002 cfs/acre).

SWMM uses the Weibull method for construction of the partial-duration series, but the Final HMP gives preference to the Cunnane method. Both the Weibull and Cunnane methods result in very similar return periods and frequencies for events that occur below the Q10, and do not begin significantly contrasting until the low frequency (high flow) ranges. We have converted the SWMM partial duration series to a Cunnane plotting for this report and have included a table at the end of this report.

AREA SUMMARY

	TOTAL	BMP	IMPERV	PERVIOUS	IMP. %
PRE-	7.418	0.0000	0.7418	6.6762	10
POST-	7.418	0.456	5.1926	2.2254	70%

NOTE: ALL AREAS SHOWN IN ACRES

RESULTS

For each HMP facility (each POC) the results are included at the end of this report and are summarized as follows:

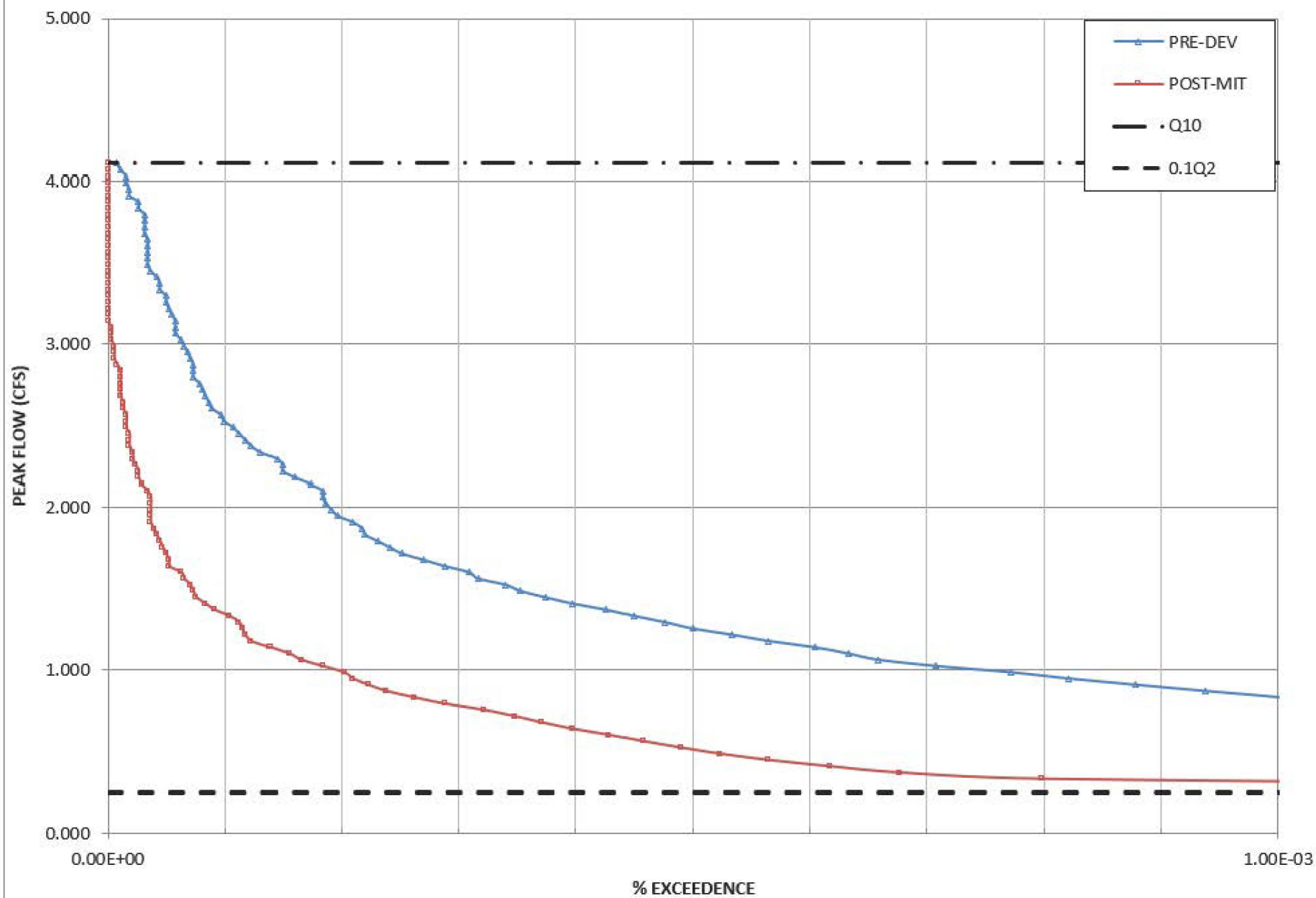
- A. PEAK FLOW-EXCEEDANCE CURVE
- B. RUNOFF-DURATION CURVE (LOGARITHMIC)
- C. FLOW-DURATION DATA TABLE
- D. PEAK EVENT TABLE – EXISTING (INCLUDES Q2-Q10 THRESHOLDS)
- E. PEAK EVENT TABLE – POST-MITIGATED

Observing flows between 0.1Q2 and Q10, each of these charts or tables show the flow control openings for the project HMP facility reduces the runoff from the site to below the pre-developed condition, and meets the performance standard requirements described above.

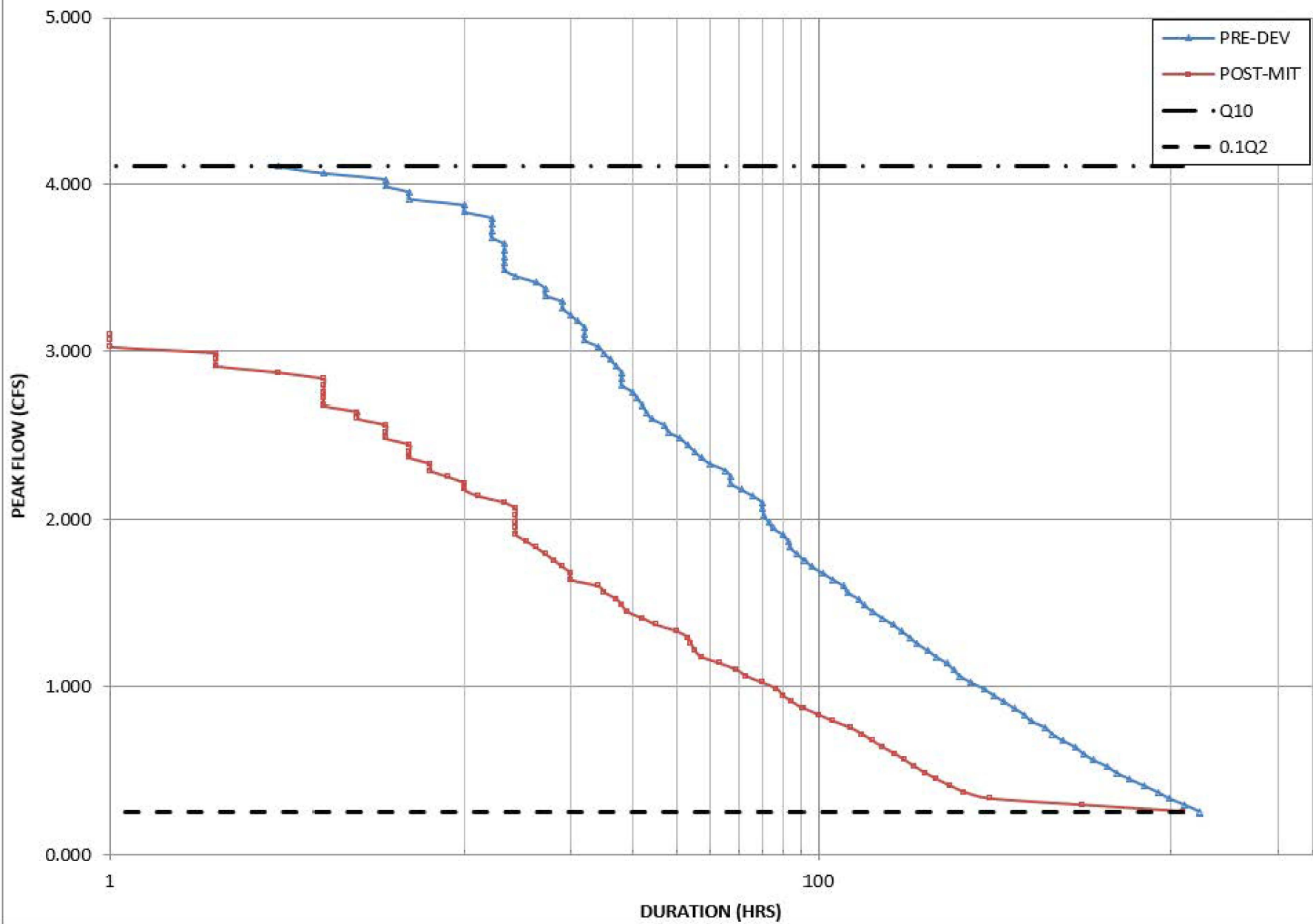
APPENDIX I: POC #1 SWMM RESULTS

- A. PEAK FLOW-EXCEEDANCE CURVE
- B. RUNOFF-DURATION CURVE (LOGARITHMIC)
- C. FLOW-DURATION DATA TABLE
- D. PEAK EVENT TABLE – EXISTING (INCLUDES Q2-Q10 THRESHOLDS)
- E. PEAK EVENT TABLE – POST-MITIGATED
- F. POND STAGE-STORAGE-DISCHARGE TABLE

P.O.C. 1: FLOW EXCEEDENCE



P.O.C. 1: DURATION



POC. #1: FLOW-DURATION TABLE

Q2 = 2.501 CFS
 0.1Q2= 0.250100072 CFS
 Q10 = 4.107 CFS
 STEP = 0.039 CFS

FRACTION = 1.0%

INTERVAL	EXISTING			POST-MITIGATED		PERCENT POST/PRE	PASS OR FAIL
	Q (CFS)	HRS>Q	% EXCEEDED	HRS>Q	% EXCEEDED		
0	0.250	1199	3.13E-03	1082	2.83E-03	90%	PASS
1	0.289	1093	2.86E-03	560	1.46E-03	51%	PASS
2	0.327	988	2.58E-03	305	7.97E-04	31%	PASS
3	0.366	915	2.39E-03	259	6.77E-04	28%	PASS
4	0.404	836	2.18E-03	236	6.17E-04	28%	PASS
5	0.443	762	1.99E-03	216	5.64E-04	28%	PASS
6	0.482	700	1.83E-03	200	5.23E-04	29%	PASS
7	0.520	657	1.72E-03	187	4.89E-04	28%	PASS
8	0.559	600	1.57E-03	175	4.57E-04	29%	PASS
9	0.597	563	1.47E-03	164	4.28E-04	29%	PASS
10	0.636	534	1.40E-03	152	3.97E-04	28%	PASS
11	0.674	493	1.29E-03	142	3.71E-04	29%	PASS
12	0.713	461	1.20E-03	133	3.47E-04	29%	PASS
13	0.752	440	1.15E-03	123	3.21E-04	28%	PASS
14	0.790	401	1.05E-03	110	2.87E-04	27%	PASS
15	0.829	383	1.00E-03	100	2.61E-04	26%	PASS
16	0.867	359	9.38E-04	91	2.38E-04	25%	PASS
17	0.906	336	8.78E-04	85	2.22E-04	25%	PASS
18	0.944	314	8.20E-04	80	2.09E-04	25%	PASS
19	0.983	295	7.71E-04	77	2.01E-04	26%	PASS
20	1.022	271	7.08E-04	70	1.83E-04	26%	PASS
21	1.060	252	6.58E-04	63	1.65E-04	25%	PASS
22	1.099	242	6.32E-04	59	1.54E-04	24%	PASS
23	1.137	231	6.04E-04	53	1.38E-04	23%	PASS
24	1.176	216	5.64E-04	47	1.23E-04	22%	PASS
25	1.214	204	5.33E-04	45	1.18E-04	22%	PASS
26	1.253	191	4.99E-04	44	1.15E-04	23%	PASS
27	1.292	182	4.76E-04	43	1.12E-04	24%	PASS
28	1.330	172	4.49E-04	40	1.05E-04	23%	PASS
29	1.369	163	4.26E-04	35	9.14E-05	21%	PASS
30	1.407	152	3.97E-04	32	8.36E-05	21%	PASS
31	1.446	143	3.74E-04	29	7.58E-05	20%	PASS
32	1.484	135	3.53E-04	28	7.32E-05	21%	PASS
33	1.523	130	3.40E-04	27	7.05E-05	21%	PASS
34	1.562	121	3.16E-04	25	6.53E-05	21%	PASS
35	1.600	118	3.08E-04	24	6.27E-05	20%	PASS
36	1.639	110	2.87E-04	20	5.23E-05	18%	PASS
37	1.677	103	2.69E-04	20	5.23E-05	19%	PASS
38	1.716	96	2.51E-04	19	4.96E-05	20%	PASS
39	1.754	92	2.40E-04	18	4.70E-05	20%	PASS
40	1.793	88	2.30E-04	17	4.44E-05	19%	PASS
41	1.832	84	2.19E-04	16	4.18E-05	19%	PASS
42	1.870	83	2.17E-04	15	3.92E-05	18%	PASS
43	1.909	80	2.09E-04	14	3.66E-05	18%	PASS
44	1.947	75	1.96E-04	14	3.66E-05	19%	PASS
45	1.986	73	1.91E-04	14	3.66E-05	19%	PASS
46	2.024	71	1.86E-04	14	3.66E-05	20%	PASS
47	2.063	70	1.83E-04	14	3.66E-05	20%	PASS
48	2.102	70	1.83E-04	13	3.40E-05	19%	PASS

49	2.140	66	1.72E-04	11	2.87E-05	17%	PASS
50	2.179	61	1.59E-04	10	2.61E-05	16%	PASS
51	2.217	57	1.49E-04	10	2.61E-05	18%	PASS
52	2.256	57	1.49E-04	9	2.35E-05	16%	PASS
53	2.294	55	1.44E-04	8	2.09E-05	15%	PASS
54	2.333	50	1.31E-04	8	2.09E-05	16%	PASS
55	2.372	47	1.23E-04	7	1.83E-05	15%	PASS
56	2.410	45	1.18E-04	7	1.83E-05	16%	PASS
57	2.449	43	1.12E-04	7	1.83E-05	16%	PASS
58	2.487	41	1.07E-04	6	1.57E-05	15%	PASS
59	2.526	38	9.93E-05	6	1.57E-05	16%	PASS
60	2.564	37	9.67E-05	6	1.57E-05	16%	PASS
61	2.603	34	8.88E-05	5	1.31E-05	15%	PASS
62	2.642	33	8.62E-05	5	1.31E-05	15%	PASS
63	2.680	32	8.36E-05	4	1.05E-05	13%	PASS
64	2.719	31	8.10E-05	4	1.05E-05	13%	PASS
65	2.757	30	7.84E-05	4	1.05E-05	13%	PASS
66	2.796	28	7.32E-05	4	1.05E-05	14%	PASS
67	2.835	28	7.32E-05	4	1.05E-05	14%	PASS
68	2.873	28	7.32E-05	3	7.84E-06	11%	PASS
69	2.912	27	7.05E-05	2	5.23E-06	7%	PASS
70	2.950	26	6.79E-05	2	5.23E-06	8%	PASS
71	2.989	25	6.53E-05	2	5.23E-06	8%	PASS
72	3.027	24	6.27E-05	1	2.61E-06	4%	PASS
73	3.066	22	5.75E-05	1	2.61E-06	5%	PASS
74	3.105	22	5.75E-05	1	2.61E-06	5%	PASS
75	3.143	22	5.75E-05	0	0.00E+00	0%	PASS
76	3.182	21	5.49E-05	0	0.00E+00	0%	PASS
77	3.220	20	5.23E-05	0	0.00E+00	0%	PASS
78	3.259	19	4.96E-05	0	0.00E+00	0%	PASS
79	3.297	19	4.96E-05	0	0.00E+00	0%	PASS
80	3.336	17	4.44E-05	0	0.00E+00	0%	PASS
81	3.375	17	4.44E-05	0	0.00E+00	0%	PASS
82	3.413	16	4.18E-05	0	0.00E+00	0%	PASS
83	3.452	14	3.66E-05	0	0.00E+00	0%	PASS
84	3.490	13	3.40E-05	0	0.00E+00	0%	PASS
85	3.529	13	3.40E-05	0	0.00E+00	0%	PASS
86	3.567	13	3.40E-05	0	0.00E+00	0%	PASS
87	3.606	13	3.40E-05	0	0.00E+00	0%	PASS
88	3.645	13	3.40E-05	0	0.00E+00	0%	PASS
89	3.683	12	3.14E-05	0	0.00E+00	0%	PASS
90	3.722	12	3.14E-05	0	0.00E+00	0%	PASS
91	3.760	12	3.14E-05	0	0.00E+00	0%	PASS
92	3.799	12	3.14E-05	0	0.00E+00	0%	PASS
93	3.837	10	2.61E-05	0	0.00E+00	0%	PASS
94	3.876	10	2.61E-05	0	0.00E+00	0%	PASS
95	3.915	7	1.83E-05	0	0.00E+00	0%	PASS
96	3.953	7	1.83E-05	0	0.00E+00	0%	PASS
97	3.992	6	1.57E-05	0	0.00E+00	0%	PASS
98	4.030	6	1.57E-05	0	0.00E+00	0%	PASS
99	4.069	4	1.05E-05	0	0.00E+00	0%	PASS
100	4.107	3	7.84E-06	0	0.00E+00	0%	PASS

P.O.C. #1: PEAK EVENTS - EXISTING

WEIBULL (SWMM)

$F = m/(nr+1)$ where F = frequency
 m = event rank
 nr = total number of event
 n = number of year analyzed

CUNNANE

$F = (i-0.4)/(n+0.2)$
 i = rank
 n = sample size = # of storms

Number of Years Analyzed (n): 43.69
 Total number of events (nr) 818

m or i	Weibull		Cunnane		Q	SUMMARY OF PEAK EVENTS	
	F	Return (yrs)	F	Return			
1	0.12%	44.69	0.07%	73.15	5.320	Q2	2.501
2	0.24%	22.35	0.20%	27.43	4.616	Q3	2.977
3	0.37%	14.90	0.32%	16.88	4.331	Q4	3.051
4	0.49%	11.17	0.44%	12.19	4.079	Q5	3.371
5	0.61%	8.94	0.56%	9.54	4.056	Q6	4.518
6	0.73%	7.45	0.68%	7.84	4.044	Q7	4.054
7	0.85%	6.38	0.81%	6.65	3.891	Q8	3.902
8	0.98%	5.59	0.93%	5.78	3.885	Q9	4.229
9	1.10%	4.97	1.05%	5.10	3.803	Q10	4.107
10	1.22%	4.47	1.17%	4.57	3.422	START 9/24/1964 13:00 END 5/23/2008 23:00 TOTAL YRS 43.69 TOTAL HRS 382738	
11	1.34%	4.06	1.30%	4.14	3.324		
12	1.47%	3.72	1.42%	3.78	3.306		
13	1.59%	3.44	1.54%	3.48	3.222		
14	1.71%	3.19	1.66%	3.23	3.047		
15	1.83%	2.98	1.78%	3.01	3.046		
16	1.95%	2.79	1.91%	2.81	2.979		
17	2.08%	2.63	2.03%	2.64	2.885		
18	2.20%	2.48	2.15%	2.49	2.769		
19	2.32%	2.35	2.27%	2.36	2.753		
20	2.44%	2.23	2.40%	2.24	2.712		
21	2.56%	2.13	2.52%	2.13	2.667		
22	2.69%	2.03	2.64%	2.03	2.600		
23	2.81%	1.94	2.76%	1.94	2.569		
24	2.93%	1.86	2.88%	1.86	2.509		
25	3.05%	1.79	3.01%	1.78	2.494		
26	3.17%	1.72	3.13%	1.71	2.466		
27	3.30%	1.66	3.25%	1.65	2.407		
28	3.42%	1.60	3.37%	1.59	2.337		
29	3.54%	1.54	3.50%	1.53	2.315		
30	3.66%	1.49	3.62%	1.48	2.297		
31	3.79%	1.44	3.74%	1.43	2.290		
32	3.91%	1.40	3.86%	1.39	2.212		
33	4.03%	1.35	3.98%	1.35	2.189		
34	4.15%	1.31	4.11%	1.31	2.177		
35	4.27%	1.28	4.23%	1.27	2.155		
36	4.40%	1.24	4.35%	1.23	2.127		
37	4.52%	1.21	4.47%	1.20	1.989		
38	4.64%	1.18	4.60%	1.17	1.986		
39	4.76%	1.15	4.72%	1.14	1.985		
40	4.88%	1.12	4.84%	1.11	1.945		

41	5.01%	1.09	4.96%	1.08	1.925
42	5.13%	1.06	5.08%	1.06	1.840
43	5.25%	1.04	5.21%	1.03	1.824
44	5.37%	1.02	5.33%	1.01	1.766
45	5.49%	0.99	5.45%	0.98	1.750
46	5.62%	0.97	5.57%	0.96	1.675
47	5.74%	0.95	5.70%	0.94	1.632
48	5.86%	0.93	5.82%	0.92	1.621
49	5.98%	0.91	5.94%	0.90	1.609
50	6.11%	0.89	6.06%	0.88	1.589
51	6.23%	0.88	6.18%	0.87	1.585
52	6.35%	0.86	6.31%	0.85	1.560
53	6.47%	0.84	6.43%	0.83	1.553
54	6.59%	0.83	6.55%	0.82	1.544
55	6.72%	0.81	6.67%	0.80	1.543
56	6.84%	0.80	6.80%	0.79	1.500
57	6.96%	0.78	6.92%	0.78	1.458
58	7.08%	0.77	7.04%	0.76	1.449
59	7.20%	0.76	7.16%	0.75	1.434
60	7.33%	0.74	7.28%	0.74	1.426
61	7.45%	0.73	7.41%	0.72	1.405
62	7.57%	0.72	7.53%	0.71	1.400
63	7.69%	0.71	7.65%	0.70	1.397
64	7.81%	0.70	7.77%	0.69	1.396
65	7.94%	0.69	7.90%	0.68	1.380
66	8.06%	0.68	8.02%	0.67	1.371
67	8.18%	0.67	8.14%	0.66	1.369
68	8.30%	0.66	8.26%	0.65	1.365
69	8.42%	0.65	8.38%	0.64	1.340
70	8.55%	0.64	8.51%	0.63	1.329
71	8.67%	0.63	8.63%	0.62	1.310
72	8.79%	0.62	8.75%	0.61	1.264
73	8.91%	0.61	8.87%	0.60	1.243
74	9.04%	0.60	9.00%	0.60	1.235
75	9.16%	0.60	9.12%	0.59	1.234
76	9.28%	0.59	9.24%	0.58	1.233
77	9.40%	0.58	9.36%	0.57	1.227
78	9.52%	0.57	9.48%	0.57	1.226
79	9.65%	0.57	9.61%	0.56	1.219
80	9.77%	0.56	9.73%	0.55	1.204
81	9.89%	0.55	9.85%	0.54	1.199
82	10.01%	0.55	9.97%	0.54	1.168
83	10.13%	0.54	10.10%	0.53	1.140
84	10.26%	0.53	10.22%	0.53	1.129
85	10.38%	0.53	10.34%	0.52	1.099
86	10.50%	0.52	10.46%	0.51	1.095
87	10.62%	0.51	10.58%	0.51	1.071
88	10.74%	0.51	10.71%	0.50	1.062
89	10.87%	0.50	10.83%	0.50	1.059
90	10.99%	0.50	10.95%	0.49	1.058
91	11.11%	0.49	11.07%	0.48	1.054
92	11.23%	0.49	11.20%	0.48	1.052
93	11.36%	0.48	11.32%	0.47	1.049
94	11.48%	0.48	11.44%	0.47	1.045
95	11.60%	0.47	11.56%	0.46	1.044

96	11.72%	0.47	11.68%	0.46	1.036
97	11.84%	0.46	11.81%	0.45	1.020
98	11.97%	0.46	11.93%	0.45	1.017
99	12.09%	0.45	12.05%	0.45	1.008
100	12.21%	0.45	12.17%	0.44	1.002
101	12.33%	0.44	12.30%	0.44	1.002
102	12.45%	0.44	12.42%	0.43	0.994
103	12.58%	0.43	12.54%	0.43	0.981
104	12.70%	0.43	12.66%	0.42	0.976
105	12.82%	0.43	12.78%	0.42	0.973
106	12.94%	0.42	12.91%	0.42	0.963
107	13.06%	0.42	13.03%	0.41	0.961
108	13.19%	0.41	13.15%	0.41	0.956
109	13.31%	0.41	13.27%	0.40	0.936
110	13.43%	0.41	13.40%	0.40	0.922
111	13.55%	0.40	13.52%	0.40	0.906
112	13.68%	0.40	13.64%	0.39	0.904
113	13.80%	0.40	13.76%	0.39	0.904
114	13.92%	0.39	13.88%	0.39	0.899
115	14.04%	0.39	14.01%	0.38	0.897
116	14.16%	0.39	14.13%	0.38	0.887
117	14.29%	0.38	14.25%	0.38	0.879
118	14.41%	0.38	14.37%	0.37	0.876
119	14.53%	0.38	14.50%	0.37	0.856
120	14.65%	0.37	14.62%	0.37	0.853
121	14.77%	0.37	14.74%	0.36	0.852
122	14.90%	0.37	14.86%	0.36	0.848
123	15.02%	0.36	14.98%	0.36	0.844
124	15.14%	0.36	15.11%	0.36	0.840
125	15.26%	0.36	15.23%	0.35	0.826
126	15.38%	0.35	15.35%	0.35	0.825
127	15.51%	0.35	15.47%	0.35	0.814
128	15.63%	0.35	15.60%	0.34	0.804
129	15.75%	0.35	15.72%	0.34	0.803
130	15.87%	0.34	15.84%	0.34	0.785
131	16.00%	0.34	15.96%	0.34	0.778
132	16.12%	0.34	16.08%	0.33	0.773
133	16.24%	0.34	16.21%	0.33	0.773
134	16.36%	0.33	16.33%	0.33	0.769
135	16.48%	0.33	16.45%	0.33	0.763
136	16.61%	0.33	16.57%	0.32	0.763
137	16.73%	0.33	16.70%	0.32	0.762
138	16.85%	0.32	16.82%	0.32	0.749
139	16.97%	0.32	16.94%	0.32	0.746
140	17.09%	0.32	17.06%	0.31	0.743
141	17.22%	0.32	17.18%	0.31	0.732
142	17.34%	0.31	17.31%	0.31	0.697
143	17.46%	0.31	17.43%	0.31	0.695
144	17.58%	0.31	17.55%	0.31	0.694
145	17.70%	0.31	17.67%	0.30	0.689
146	17.83%	0.31	17.80%	0.30	0.689
147	17.95%	0.30	17.92%	0.30	0.687
148	18.07%	0.30	18.04%	0.30	0.678
149	18.19%	0.30	18.16%	0.30	0.669
150	18.32%	0.30	18.28%	0.29	0.659

151	18.44%	0.30	18.41%	0.29	0.649
152	18.56%	0.29	18.53%	0.29	0.648
153	18.68%	0.29	18.65%	0.29	0.623
154	18.80%	0.29	18.77%	0.29	0.622
155	18.93%	0.29	18.90%	0.28	0.621
156	19.05%	0.29	19.02%	0.28	0.620
157	19.17%	0.28	19.14%	0.28	0.616
158	19.29%	0.28	19.26%	0.28	0.610
159	19.41%	0.28	19.38%	0.28	0.599
160	19.54%	0.28	19.51%	0.28	0.599
161	19.66%	0.28	19.63%	0.27	0.593
162	19.78%	0.28	19.75%	0.27	0.591
163	19.90%	0.27	19.87%	0.27	0.590
164	20.02%	0.27	20.00%	0.27	0.584
165	20.15%	0.27	20.12%	0.27	0.581
166	20.27%	0.27	20.24%	0.27	0.579
167	20.39%	0.27	20.36%	0.26	0.573
168	20.51%	0.27	20.48%	0.26	0.555
169	20.63%	0.26	20.61%	0.26	0.545
170	20.76%	0.26	20.73%	0.26	0.541
171	20.88%	0.26	20.85%	0.26	0.532
172	21.00%	0.26	20.97%	0.26	0.531
173	21.12%	0.26	21.10%	0.25	0.530
174	21.25%	0.26	21.22%	0.25	0.524
175	21.37%	0.26	21.34%	0.25	0.522
176	21.49%	0.25	21.46%	0.25	0.519
177	21.61%	0.25	21.58%	0.25	0.517
178	21.73%	0.25	21.71%	0.25	0.509
179	21.86%	0.25	21.83%	0.25	0.506
180	21.98%	0.25	21.95%	0.24	0.505
181	22.10%	0.25	22.07%	0.24	0.493
182	22.22%	0.25	22.20%	0.24	0.481
183	22.34%	0.24	22.32%	0.24	0.480
184	22.47%	0.24	22.44%	0.24	0.454
185	22.59%	0.24	22.56%	0.24	0.440
186	22.71%	0.24	22.68%	0.24	0.425
187	22.83%	0.24	22.81%	0.24	0.425
188	22.95%	0.24	22.93%	0.23	0.417
189	23.08%	0.24	23.05%	0.23	0.410
190	23.20%	0.24	23.17%	0.23	0.407
191	23.32%	0.23	23.30%	0.23	0.407
192	23.44%	0.23	23.42%	0.23	0.399
193	23.57%	0.23	23.54%	0.23	0.389
194	23.69%	0.23	23.66%	0.23	0.383
195	23.81%	0.23	23.78%	0.23	0.383
196	23.93%	0.23	23.91%	0.22	0.371
197	24.05%	0.23	24.03%	0.22	0.368
198	24.18%	0.23	24.15%	0.22	0.363
199	24.30%	0.22	24.27%	0.22	0.352
200	24.42%	0.22	24.40%	0.22	0.346
201	24.54%	0.22	24.52%	0.22	0.346
202	24.66%	0.22	24.64%	0.22	0.343
203	24.79%	0.22	24.76%	0.22	0.342
204	24.91%	0.22	24.88%	0.22	0.338
205	25.03%	0.22	25.01%	0.21	0.338

206	25.15%	0.22	25.13%	0.21	0.334
207	25.27%	0.22	25.25%	0.21	0.332
208	25.40%	0.21	25.37%	0.21	0.327
209	25.52%	0.21	25.49%	0.21	0.324
210	25.64%	0.21	25.62%	0.21	0.321
211	25.76%	0.21	25.74%	0.21	0.320
212	25.89%	0.21	25.86%	0.21	0.310
213	26.01%	0.21	25.98%	0.21	0.307
214	26.13%	0.21	26.11%	0.21	0.300
215	26.25%	0.21	26.23%	0.20	0.296
216	26.37%	0.21	26.35%	0.20	0.294
217	26.50%	0.21	26.47%	0.20	0.294
218	26.62%	0.21	26.59%	0.20	0.292
219	26.74%	0.20	26.72%	0.20	0.289
220	26.86%	0.20	26.84%	0.20	0.288
221	26.98%	0.20	26.96%	0.20	0.283
222	27.11%	0.20	27.08%	0.20	0.273
223	27.23%	0.20	27.21%	0.20	0.269
224	27.35%	0.20	27.33%	0.20	0.264
225	27.47%	0.20	27.45%	0.20	0.262
226	27.59%	0.20	27.57%	0.19	0.255
227	27.72%	0.20	27.69%	0.19	0.253
228	27.84%	0.20	27.82%	0.19	0.247
229	27.96%	0.20	27.94%	0.19	0.246
230	28.08%	0.19	28.06%	0.19	0.242
231	28.21%	0.19	28.18%	0.19	0.241
232	28.33%	0.19	28.31%	0.19	0.239
233	28.45%	0.19	28.43%	0.19	0.238
234	28.57%	0.19	28.55%	0.19	0.235
235	28.69%	0.19	28.67%	0.19	0.235
236	28.82%	0.19	28.79%	0.19	0.235
237	28.94%	0.19	28.92%	0.19	0.229
238	29.06%	0.19	29.04%	0.18	0.228
239	29.18%	0.19	29.16%	0.18	0.226
240	29.30%	0.19	29.28%	0.18	0.225
241	29.43%	0.19	29.41%	0.18	0.221
242	29.55%	0.18	29.53%	0.18	0.221
243	29.67%	0.18	29.65%	0.18	0.219
244	29.79%	0.18	29.77%	0.18	0.219
245	29.91%	0.18	29.89%	0.18	0.214
246	30.04%	0.18	30.02%	0.18	0.206
247	30.16%	0.18	30.14%	0.18	0.203
248	30.28%	0.18	30.26%	0.18	0.198
249	30.40%	0.18	30.38%	0.18	0.192
250	30.53%	0.18	30.51%	0.18	0.192
251	30.65%	0.18	30.63%	0.18	0.190
252	30.77%	0.18	30.75%	0.17	0.187
253	30.89%	0.18	30.87%	0.17	0.180
254	31.01%	0.18	30.99%	0.17	0.180
255	31.14%	0.18	31.12%	0.17	0.176
256	31.26%	0.17	31.24%	0.17	0.176
257	31.38%	0.17	31.36%	0.17	0.175
258	31.50%	0.17	31.48%	0.17	0.175
259	31.62%	0.17	31.61%	0.17	0.175
260	31.75%	0.17	31.73%	0.17	0.174

261	31.87%	0.17	31.85%	0.17	0.174
262	31.99%	0.17	31.97%	0.17	0.174
263	32.11%	0.17	32.09%	0.17	0.174
264	32.23%	0.17	32.22%	0.17	0.172
265	32.36%	0.17	32.34%	0.17	0.172
266	32.48%	0.17	32.46%	0.17	0.170
267	32.60%	0.17	32.58%	0.16	0.167
268	32.72%	0.17	32.71%	0.16	0.167
269	32.84%	0.17	32.83%	0.16	0.166
270	32.97%	0.17	32.95%	0.16	0.164
271	33.09%	0.16	33.07%	0.16	0.163
272	33.21%	0.16	33.19%	0.16	0.163
273	33.33%	0.16	33.32%	0.16	0.161
274	33.46%	0.16	33.44%	0.16	0.153
275	33.58%	0.16	33.56%	0.16	0.150
276	33.70%	0.16	33.68%	0.16	0.148
277	33.82%	0.16	33.81%	0.16	0.148
278	33.94%	0.16	33.93%	0.16	0.148
279	34.07%	0.16	34.05%	0.16	0.147
280	34.19%	0.16	34.17%	0.16	0.147
281	34.31%	0.16	34.29%	0.16	0.147
282	34.43%	0.16	34.42%	0.16	0.147
283	34.55%	0.16	34.54%	0.16	0.147
284	34.68%	0.16	34.66%	0.15	0.147
285	34.80%	0.16	34.78%	0.15	0.147
286	34.92%	0.16	34.91%	0.15	0.147
287	35.04%	0.16	35.03%	0.15	0.147
288	35.16%	0.16	35.15%	0.15	0.147
289	35.29%	0.15	35.27%	0.15	0.147
290	35.41%	0.15	35.39%	0.15	0.147
291	35.53%	0.15	35.52%	0.15	0.147
292	35.65%	0.15	35.64%	0.15	0.147
293	35.78%	0.15	35.76%	0.15	0.147
294	35.90%	0.15	35.88%	0.15	0.147
295	36.02%	0.15	36.01%	0.15	0.147
296	36.14%	0.15	36.13%	0.15	0.147
297	36.26%	0.15	36.25%	0.15	0.147
298	36.39%	0.15	36.37%	0.15	0.147
299	36.51%	0.15	36.49%	0.15	0.147
300	36.63%	0.15	36.62%	0.15	0.147
301	36.75%	0.15	36.74%	0.15	0.147
302	36.87%	0.15	36.86%	0.15	0.147
303	37.00%	0.15	36.98%	0.15	0.146
304	37.12%	0.15	37.11%	0.14	0.146
305	37.24%	0.15	37.23%	0.14	0.146
306	37.36%	0.15	37.35%	0.14	0.146
307	37.48%	0.15	37.47%	0.14	0.146
308	37.61%	0.15	37.59%	0.14	0.146
309	37.73%	0.14	37.72%	0.14	0.146
310	37.85%	0.14	37.84%	0.14	0.146
311	37.97%	0.14	37.96%	0.14	0.146
312	38.10%	0.14	38.08%	0.14	0.146
313	38.22%	0.14	38.21%	0.14	0.146
314	38.34%	0.14	38.33%	0.14	0.146
315	38.46%	0.14	38.45%	0.14	0.146

316	38.58%	0.14	38.57%	0.14	0.146
317	38.71%	0.14	38.69%	0.14	0.146
318	38.83%	0.14	38.82%	0.14	0.146
319	38.95%	0.14	38.94%	0.14	0.145
320	39.07%	0.14	39.06%	0.14	0.145
321	39.19%	0.14	39.18%	0.14	0.145
322	39.32%	0.14	39.31%	0.14	0.145
323	39.44%	0.14	39.43%	0.14	0.145
324	39.56%	0.14	39.55%	0.14	0.145
325	39.68%	0.14	39.67%	0.14	0.145
326	39.80%	0.14	39.79%	0.13	0.145
327	39.93%	0.14	39.92%	0.13	0.145
328	40.05%	0.14	40.04%	0.13	0.145
329	40.17%	0.14	40.16%	0.13	0.145
330	40.29%	0.14	40.28%	0.13	0.145
331	40.42%	0.14	40.41%	0.13	0.145
332	40.54%	0.13	40.53%	0.13	0.145
333	40.66%	0.13	40.65%	0.13	0.145
334	40.78%	0.13	40.77%	0.13	0.144
335	40.90%	0.13	40.89%	0.13	0.144
336	41.03%	0.13	41.02%	0.13	0.144
337	41.15%	0.13	41.14%	0.13	0.144
338	41.27%	0.13	41.26%	0.13	0.143
339	41.39%	0.13	41.38%	0.13	0.143
340	41.51%	0.13	41.51%	0.13	0.143
341	41.64%	0.13	41.63%	0.13	0.143
342	41.76%	0.13	41.75%	0.13	0.140
343	41.88%	0.13	41.87%	0.13	0.139
344	42.00%	0.13	41.99%	0.13	0.136
345	42.12%	0.13	42.12%	0.13	0.135
346	42.25%	0.13	42.24%	0.13	0.131
347	42.37%	0.13	42.36%	0.13	0.125
348	42.49%	0.13	42.48%	0.13	0.120
349	42.61%	0.13	42.61%	0.13	0.118
350	42.74%	0.13	42.73%	0.13	0.118
351	42.86%	0.13	42.85%	0.13	0.118
352	42.98%	0.13	42.97%	0.12	0.118
353	43.10%	0.13	43.09%	0.12	0.118
354	43.22%	0.13	43.22%	0.12	0.118
355	43.35%	0.13	43.34%	0.12	0.118
356	43.47%	0.13	43.46%	0.12	0.118
357	43.59%	0.13	43.58%	0.12	0.118
358	43.71%	0.12	43.71%	0.12	0.118
359	43.83%	0.12	43.83%	0.12	0.118
360	43.96%	0.12	43.95%	0.12	0.118
361	44.08%	0.12	44.07%	0.12	0.118
362	44.20%	0.12	44.19%	0.12	0.117
363	44.32%	0.12	44.32%	0.12	0.117
364	44.44%	0.12	44.44%	0.12	0.117
365	44.57%	0.12	44.56%	0.12	0.116
366	44.69%	0.12	44.68%	0.12	0.116
367	44.81%	0.12	44.81%	0.12	0.116
368	44.93%	0.12	44.93%	0.12	0.116
369	45.05%	0.12	45.05%	0.12	0.116
370	45.18%	0.12	45.17%	0.12	0.116

371	45.30%	0.12	45.29%	0.12	0.116
372	45.42%	0.12	45.42%	0.12	0.116
373	45.54%	0.12	45.54%	0.12	0.116
374	45.67%	0.12	45.66%	0.12	0.116
375	45.79%	0.12	45.78%	0.12	0.116
376	45.91%	0.12	45.91%	0.12	0.116
377	46.03%	0.12	46.03%	0.12	0.115
378	46.15%	0.12	46.15%	0.12	0.115
379	46.28%	0.12	46.27%	0.12	0.115
380	46.40%	0.12	46.39%	0.12	0.115
381	46.52%	0.12	46.52%	0.12	0.115
382	46.64%	0.12	46.64%	0.12	0.114
383	46.76%	0.12	46.76%	0.11	0.114
384	46.89%	0.12	46.88%	0.11	0.114
385	47.01%	0.12	47.01%	0.11	0.112
386	47.13%	0.12	47.13%	0.11	0.110
387	47.25%	0.12	47.25%	0.11	0.110
388	47.37%	0.12	47.37%	0.11	0.106
389	47.50%	0.11	47.49%	0.11	0.101
390	47.62%	0.11	47.62%	0.11	0.095
391	47.74%	0.11	47.74%	0.11	0.095
392	47.86%	0.11	47.86%	0.11	0.088
393	47.99%	0.11	47.98%	0.11	0.088
394	48.11%	0.11	48.11%	0.11	0.088
395	48.23%	0.11	48.23%	0.11	0.088
396	48.35%	0.11	48.35%	0.11	0.088
397	48.47%	0.11	48.47%	0.11	0.088
398	48.60%	0.11	48.59%	0.11	0.088
399	48.72%	0.11	48.72%	0.11	0.088
400	48.84%	0.11	48.84%	0.11	0.088
401	48.96%	0.11	48.96%	0.11	0.088
402	49.08%	0.11	49.08%	0.11	0.088
403	49.21%	0.11	49.21%	0.11	0.088
404	49.33%	0.11	49.33%	0.11	0.088
405	49.45%	0.11	49.45%	0.11	0.087
406	49.57%	0.11	49.57%	0.11	0.087
407	49.69%	0.11	49.69%	0.11	0.087
408	49.82%	0.11	49.82%	0.11	0.087
409	49.94%	0.11	49.94%	0.11	0.087
410	50.06%	0.11	50.06%	0.11	0.087
411	50.18%	0.11	50.18%	0.11	0.087
412	50.31%	0.11	50.31%	0.11	0.087
413	50.43%	0.11	50.43%	0.11	0.087
414	50.55%	0.11	50.55%	0.11	0.087
415	50.67%	0.11	50.67%	0.11	0.087
416	50.79%	0.11	50.79%	0.11	0.087
417	50.92%	0.11	50.92%	0.11	0.087
418	51.04%	0.11	51.04%	0.11	0.086
419	51.16%	0.11	51.16%	0.10	0.086
420	51.28%	0.11	51.28%	0.10	0.086
421	51.40%	0.11	51.41%	0.10	0.086
422	51.53%	0.11	51.53%	0.10	0.086
423	51.65%	0.11	51.65%	0.10	0.085
424	51.77%	0.11	51.77%	0.10	0.085
425	51.89%	0.11	51.89%	0.10	0.085

426	52.01%	0.10	52.02%	0.10	0.085
427	52.14%	0.10	52.14%	0.10	0.085
428	52.26%	0.10	52.26%	0.10	0.085
429	52.38%	0.10	52.38%	0.10	0.084
430	52.50%	0.10	52.51%	0.10	0.084
431	52.63%	0.10	52.63%	0.10	0.084
432	52.75%	0.10	52.75%	0.10	0.084
433	52.87%	0.10	52.87%	0.10	0.083
434	52.99%	0.10	52.99%	0.10	0.083
435	53.11%	0.10	53.12%	0.10	0.081
436	53.24%	0.10	53.24%	0.10	0.078
437	53.36%	0.10	53.36%	0.10	0.074
438	53.48%	0.10	53.48%	0.10	0.074
439	53.60%	0.10	53.61%	0.10	0.074
440	53.72%	0.10	53.73%	0.10	0.074
441	53.85%	0.10	53.85%	0.10	0.074
442	53.97%	0.10	53.97%	0.10	0.074
443	54.09%	0.10	54.09%	0.10	0.074
444	54.21%	0.10	54.22%	0.10	0.074
445	54.33%	0.10	54.34%	0.10	0.074
446	54.46%	0.10	54.46%	0.10	0.074
447	54.58%	0.10	54.58%	0.10	0.074
448	54.70%	0.10	54.71%	0.10	0.074
449	54.82%	0.10	54.83%	0.10	0.074
450	54.95%	0.10	54.95%	0.10	0.074
451	55.07%	0.10	55.07%	0.10	0.074
452	55.19%	0.10	55.19%	0.10	0.074
453	55.31%	0.10	55.32%	0.10	0.074
454	55.43%	0.10	55.44%	0.10	0.074
455	55.56%	0.10	55.56%	0.10	0.074
456	55.68%	0.10	55.68%	0.10	0.074
457	55.80%	0.10	55.81%	0.10	0.074
458	55.92%	0.10	55.93%	0.10	0.074
459	56.04%	0.10	56.05%	0.10	0.074
460	56.17%	0.10	56.17%	0.10	0.074
461	56.29%	0.10	56.29%	0.10	0.074
462	56.41%	0.10	56.42%	0.10	0.074
463	56.53%	0.10	56.54%	0.09	0.074
464	56.65%	0.10	56.66%	0.09	0.074
465	56.78%	0.10	56.78%	0.09	0.074
466	56.90%	0.10	56.91%	0.09	0.074
467	57.02%	0.10	57.03%	0.09	0.074
468	57.14%	0.10	57.15%	0.09	0.074
469	57.26%	0.10	57.27%	0.09	0.074
470	57.39%	0.10	57.39%	0.09	0.074
471	57.51%	0.09	57.52%	0.09	0.074
472	57.63%	0.09	57.64%	0.09	0.074
473	57.75%	0.09	57.76%	0.09	0.074
474	57.88%	0.09	57.88%	0.09	0.074
475	58.00%	0.09	58.01%	0.09	0.074
476	58.12%	0.09	58.13%	0.09	0.074
477	58.24%	0.09	58.25%	0.09	0.074
478	58.36%	0.09	58.37%	0.09	0.074
479	58.49%	0.09	58.49%	0.09	0.074
480	58.61%	0.09	58.62%	0.09	0.074

481	58.73%	0.09	58.74%	0.09	0.074
482	58.85%	0.09	58.86%	0.09	0.074
483	58.97%	0.09	58.98%	0.09	0.074
484	59.10%	0.09	59.11%	0.09	0.074
485	59.22%	0.09	59.23%	0.09	0.074
486	59.34%	0.09	59.35%	0.09	0.074
487	59.46%	0.09	59.47%	0.09	0.074
488	59.58%	0.09	59.59%	0.09	0.074
489	59.71%	0.09	59.72%	0.09	0.074
490	59.83%	0.09	59.84%	0.09	0.074
491	59.95%	0.09	59.96%	0.09	0.074
492	60.07%	0.09	60.08%	0.09	0.074
493	60.20%	0.09	60.21%	0.09	0.074
494	60.32%	0.09	60.33%	0.09	0.074
495	60.44%	0.09	60.45%	0.09	0.074
496	60.56%	0.09	60.57%	0.09	0.074
497	60.68%	0.09	60.69%	0.09	0.074
498	60.81%	0.09	60.82%	0.09	0.074
499	60.93%	0.09	60.94%	0.09	0.074
500	61.05%	0.09	61.06%	0.09	0.074
501	61.17%	0.09	61.18%	0.09	0.074
502	61.29%	0.09	61.31%	0.09	0.074
503	61.42%	0.09	61.43%	0.09	0.074
504	61.54%	0.09	61.55%	0.09	0.074
505	61.66%	0.09	61.67%	0.09	0.074
506	61.78%	0.09	61.79%	0.09	0.074
507	61.90%	0.09	61.92%	0.09	0.074
508	62.03%	0.09	62.04%	0.09	0.074
509	62.15%	0.09	62.16%	0.09	0.074
510	62.27%	0.09	62.28%	0.09	0.074
511	62.39%	0.09	62.41%	0.09	0.074
512	62.52%	0.09	62.53%	0.09	0.074
513	62.64%	0.09	62.65%	0.09	0.074
514	62.76%	0.09	62.77%	0.09	0.074
515	62.88%	0.09	62.89%	0.09	0.074
516	63.00%	0.09	63.02%	0.09	0.074
517	63.13%	0.09	63.14%	0.08	0.074
518	63.25%	0.09	63.26%	0.08	0.074
519	63.37%	0.09	63.38%	0.08	0.074
520	63.49%	0.09	63.51%	0.08	0.074
521	63.61%	0.09	63.63%	0.08	0.074
522	63.74%	0.09	63.75%	0.08	0.074
523	63.86%	0.09	63.87%	0.08	0.074
524	63.98%	0.09	63.99%	0.08	0.074
525	64.10%	0.09	64.12%	0.08	0.074
526	64.22%	0.08	64.24%	0.08	0.074
527	64.35%	0.08	64.36%	0.08	0.074
528	64.47%	0.08	64.48%	0.08	0.074
529	64.59%	0.08	64.61%	0.08	0.074
530	64.71%	0.08	64.73%	0.08	0.074
531	64.84%	0.08	64.85%	0.08	0.074
532	64.96%	0.08	64.97%	0.08	0.074
533	65.08%	0.08	65.09%	0.08	0.074
534	65.20%	0.08	65.22%	0.08	0.074
535	65.32%	0.08	65.34%	0.08	0.074

536	65.45%	0.08	65.46%	0.08	0.074
537	65.57%	0.08	65.58%	0.08	0.074
538	65.69%	0.08	65.71%	0.08	0.074
539	65.81%	0.08	65.83%	0.08	0.074
540	65.93%	0.08	65.95%	0.08	0.074
541	66.06%	0.08	66.07%	0.08	0.074
542	66.18%	0.08	66.19%	0.08	0.074
543	66.30%	0.08	66.32%	0.08	0.074
544	66.42%	0.08	66.44%	0.08	0.074
545	66.54%	0.08	66.56%	0.08	0.074
546	66.67%	0.08	66.68%	0.08	0.074
547	66.79%	0.08	66.81%	0.08	0.074
548	66.91%	0.08	66.93%	0.08	0.074
549	67.03%	0.08	67.05%	0.08	0.074
550	67.16%	0.08	67.17%	0.08	0.074
551	67.28%	0.08	67.29%	0.08	0.074
552	67.40%	0.08	67.42%	0.08	0.074
553	67.52%	0.08	67.54%	0.08	0.074
554	67.64%	0.08	67.66%	0.08	0.074
555	67.77%	0.08	67.78%	0.08	0.074
556	67.89%	0.08	67.91%	0.08	0.074
557	68.01%	0.08	68.03%	0.08	0.074
558	68.13%	0.08	68.15%	0.08	0.074
559	68.25%	0.08	68.27%	0.08	0.074
560	68.38%	0.08	68.39%	0.08	0.074
561	68.50%	0.08	68.52%	0.08	0.074
562	68.62%	0.08	68.64%	0.08	0.074
563	68.74%	0.08	68.76%	0.08	0.074
564	68.86%	0.08	68.88%	0.08	0.074
565	68.99%	0.08	69.01%	0.08	0.074
566	69.11%	0.08	69.13%	0.08	0.074
567	69.23%	0.08	69.25%	0.08	0.074
568	69.35%	0.08	69.37%	0.08	0.074
569	69.47%	0.08	69.49%	0.08	0.074
570	69.60%	0.08	69.62%	0.08	0.074
571	69.72%	0.08	69.74%	0.08	0.074
572	69.84%	0.08	69.86%	0.08	0.074
573	69.96%	0.08	69.98%	0.08	0.074
574	70.09%	0.08	70.11%	0.08	0.074
575	70.21%	0.08	70.23%	0.08	0.074
576	70.33%	0.08	70.35%	0.08	0.074
577	70.45%	0.08	70.47%	0.08	0.074
578	70.57%	0.08	70.59%	0.08	0.074
579	70.70%	0.08	70.72%	0.08	0.074
580	70.82%	0.08	70.84%	0.08	0.074
581	70.94%	0.08	70.96%	0.08	0.074
582	71.06%	0.08	71.08%	0.08	0.074
583	71.18%	0.08	71.21%	0.08	0.074
584	71.31%	0.08	71.33%	0.08	0.074
585	71.43%	0.08	71.45%	0.08	0.074
586	71.55%	0.08	71.57%	0.07	0.074
587	71.67%	0.08	71.69%	0.07	0.074
588	71.79%	0.08	71.82%	0.07	0.074
589	71.92%	0.08	71.94%	0.07	0.074
590	72.04%	0.08	72.06%	0.07	0.074

591	72.16%	0.08	72.18%	0.07	0.074
592	72.28%	0.08	72.31%	0.07	0.074
593	72.41%	0.08	72.43%	0.07	0.074
594	72.53%	0.08	72.55%	0.07	0.074
595	72.65%	0.08	72.67%	0.07	0.074
596	72.77%	0.07	72.79%	0.07	0.074
597	72.89%	0.07	72.92%	0.07	0.074
598	73.02%	0.07	73.04%	0.07	0.074
599	73.14%	0.07	73.16%	0.07	0.074
600	73.26%	0.07	73.28%	0.07	0.074
601	73.38%	0.07	73.41%	0.07	0.074
602	73.50%	0.07	73.53%	0.07	0.074
603	73.63%	0.07	73.65%	0.07	0.074
604	73.75%	0.07	73.77%	0.07	0.074
605	73.87%	0.07	73.89%	0.07	0.074
606	73.99%	0.07	74.02%	0.07	0.074
607	74.11%	0.07	74.14%	0.07	0.074
608	74.24%	0.07	74.26%	0.07	0.074
609	74.36%	0.07	74.38%	0.07	0.074
610	74.48%	0.07	74.51%	0.07	0.074
611	74.60%	0.07	74.63%	0.07	0.074
612	74.73%	0.07	74.75%	0.07	0.074
613	74.85%	0.07	74.87%	0.07	0.074
614	74.97%	0.07	74.99%	0.07	0.074
615	75.09%	0.07	75.12%	0.07	0.074
616	75.21%	0.07	75.24%	0.07	0.074
617	75.34%	0.07	75.36%	0.07	0.074
618	75.46%	0.07	75.48%	0.07	0.074
619	75.58%	0.07	75.60%	0.07	0.074
620	75.70%	0.07	75.73%	0.07	0.074
621	75.82%	0.07	75.85%	0.07	0.074
622	75.95%	0.07	75.97%	0.07	0.074
623	76.07%	0.07	76.09%	0.07	0.074
624	76.19%	0.07	76.22%	0.07	0.074
625	76.31%	0.07	76.34%	0.07	0.074
626	76.43%	0.07	76.46%	0.07	0.074
627	76.56%	0.07	76.58%	0.07	0.074
628	76.68%	0.07	76.70%	0.07	0.074
629	76.80%	0.07	76.83%	0.07	0.074
630	76.92%	0.07	76.95%	0.07	0.074
631	77.05%	0.07	77.07%	0.07	0.074
632	77.17%	0.07	77.19%	0.07	0.074
633	77.29%	0.07	77.32%	0.07	0.074
634	77.41%	0.07	77.44%	0.07	0.074
635	77.53%	0.07	77.56%	0.07	0.074
636	77.66%	0.07	77.68%	0.07	0.074
637	77.78%	0.07	77.80%	0.07	0.074
638	77.90%	0.07	77.93%	0.07	0.074
639	78.02%	0.07	78.05%	0.07	0.074
640	78.14%	0.07	78.17%	0.07	0.074
641	78.27%	0.07	78.29%	0.07	0.074
642	78.39%	0.07	78.42%	0.07	0.074
643	78.51%	0.07	78.54%	0.07	0.074
644	78.63%	0.07	78.66%	0.07	0.074
645	78.75%	0.07	78.78%	0.07	0.074

646	78.88%	0.07	78.90%	0.07	0.074
647	79.00%	0.07	79.03%	0.07	0.074
648	79.12%	0.07	79.15%	0.07	0.074
649	79.24%	0.07	79.27%	0.07	0.074
650	79.37%	0.07	79.39%	0.07	0.074
651	79.49%	0.07	79.52%	0.07	0.074
652	79.61%	0.07	79.64%	0.07	0.074
653	79.73%	0.07	79.76%	0.07	0.074
654	79.85%	0.07	79.88%	0.07	0.074
655	79.98%	0.07	80.00%	0.07	0.074
656	80.10%	0.07	80.13%	0.07	0.074
657	80.22%	0.07	80.25%	0.07	0.074
658	80.34%	0.07	80.37%	0.07	0.074
659	80.46%	0.07	80.49%	0.07	0.074
660	80.59%	0.07	80.62%	0.07	0.074
661	80.71%	0.07	80.74%	0.07	0.074
662	80.83%	0.07	80.86%	0.07	0.074
663	80.95%	0.07	80.98%	0.07	0.074
664	81.07%	0.07	81.10%	0.07	0.074
665	81.20%	0.07	81.23%	0.07	0.074
666	81.32%	0.07	81.35%	0.07	0.074
667	81.44%	0.07	81.47%	0.07	0.074
668	81.56%	0.07	81.59%	0.07	0.074
669	81.68%	0.07	81.72%	0.07	0.074
670	81.81%	0.07	81.84%	0.07	0.074
671	81.93%	0.07	81.96%	0.07	0.074
672	82.05%	0.07	82.08%	0.07	0.074
673	82.17%	0.07	82.20%	0.07	0.074
674	82.30%	0.07	82.33%	0.07	0.074
675	82.42%	0.07	82.45%	0.07	0.074
676	82.54%	0.07	82.57%	0.06	0.074
677	82.66%	0.07	82.69%	0.06	0.074
678	82.78%	0.07	82.82%	0.06	0.074
679	82.91%	0.07	82.94%	0.06	0.074
680	83.03%	0.07	83.06%	0.06	0.074
681	83.15%	0.07	83.18%	0.06	0.065
682	83.27%	0.07	83.30%	0.06	0.061
683	83.39%	0.07	83.43%	0.06	0.058
684	83.52%	0.07	83.55%	0.06	0.058
685	83.64%	0.07	83.67%	0.06	0.058
686	83.76%	0.07	83.79%	0.06	0.058
687	83.88%	0.07	83.92%	0.06	0.058
688	84.00%	0.06	84.04%	0.06	0.058
689	84.13%	0.06	84.16%	0.06	0.058
690	84.25%	0.06	84.28%	0.06	0.058
691	84.37%	0.06	84.40%	0.06	0.058
692	84.49%	0.06	84.53%	0.06	0.058
693	84.62%	0.06	84.65%	0.06	0.058
694	84.74%	0.06	84.77%	0.06	0.058
695	84.86%	0.06	84.89%	0.06	0.058
696	84.98%	0.06	85.02%	0.06	0.058
697	85.10%	0.06	85.14%	0.06	0.058
698	85.23%	0.06	85.26%	0.06	0.058
699	85.35%	0.06	85.38%	0.06	0.058
700	85.47%	0.06	85.50%	0.06	0.058

701	85.59%	0.06	85.63%	0.06	0.058
702	85.71%	0.06	85.75%	0.06	0.058
703	85.84%	0.06	85.87%	0.06	0.058
704	85.96%	0.06	85.99%	0.06	0.058
705	86.08%	0.06	86.12%	0.06	0.058
706	86.20%	0.06	86.24%	0.06	0.058
707	86.32%	0.06	86.36%	0.06	0.058
708	86.45%	0.06	86.48%	0.06	0.058
709	86.57%	0.06	86.60%	0.06	0.058
710	86.69%	0.06	86.73%	0.06	0.058
711	86.81%	0.06	86.85%	0.06	0.058
712	86.94%	0.06	86.97%	0.06	0.058
713	87.06%	0.06	87.09%	0.06	0.058
714	87.18%	0.06	87.22%	0.06	0.058
715	87.30%	0.06	87.34%	0.06	0.058
716	87.42%	0.06	87.46%	0.06	0.058
717	87.55%	0.06	87.58%	0.06	0.058
718	87.67%	0.06	87.70%	0.06	0.057
719	87.79%	0.06	87.83%	0.06	0.057
720	87.91%	0.06	87.95%	0.06	0.057
721	88.03%	0.06	88.07%	0.06	0.057
722	88.16%	0.06	88.19%	0.06	0.057
723	88.28%	0.06	88.32%	0.06	0.057
724	88.40%	0.06	88.44%	0.06	0.057
725	88.52%	0.06	88.56%	0.06	0.057
726	88.64%	0.06	88.68%	0.06	0.057
727	88.77%	0.06	88.80%	0.06	0.057
728	88.89%	0.06	88.93%	0.06	0.057
729	89.01%	0.06	89.05%	0.06	0.057
730	89.13%	0.06	89.17%	0.06	0.057
731	89.26%	0.06	89.29%	0.06	0.057
732	89.38%	0.06	89.42%	0.06	0.057
733	89.50%	0.06	89.54%	0.06	0.057
734	89.62%	0.06	89.66%	0.06	0.057
735	89.74%	0.06	89.78%	0.06	0.057
736	89.87%	0.06	89.90%	0.06	0.057
737	89.99%	0.06	90.03%	0.06	0.057
738	90.11%	0.06	90.15%	0.06	0.057
739	90.23%	0.06	90.27%	0.06	0.057
740	90.35%	0.06	90.39%	0.06	0.056
741	90.48%	0.06	90.52%	0.06	0.056
742	90.60%	0.06	90.64%	0.06	0.056
743	90.72%	0.06	90.76%	0.06	0.055
744	90.84%	0.06	90.88%	0.06	0.055
745	90.96%	0.06	91.00%	0.06	0.055
746	91.09%	0.06	91.13%	0.06	0.055
747	91.21%	0.06	91.25%	0.06	0.054
748	91.33%	0.06	91.37%	0.06	0.054
749	91.45%	0.06	91.49%	0.06	0.054
750	91.58%	0.06	91.62%	0.06	0.050
751	91.70%	0.06	91.74%	0.06	0.050
752	91.82%	0.06	91.86%	0.06	0.050
753	91.94%	0.06	91.98%	0.06	0.050
754	92.06%	0.06	92.10%	0.06	0.048
755	92.19%	0.06	92.23%	0.06	0.048

756	92.31%	0.06	92.35%	0.06	0.047
757	92.43%	0.06	92.47%	0.06	0.047
758	92.55%	0.06	92.59%	0.06	0.042
759	92.67%	0.06	92.72%	0.06	0.042
760	92.80%	0.06	92.84%	0.06	0.042
761	92.92%	0.06	92.96%	0.06	0.035
762	93.04%	0.06	93.08%	0.06	0.035
763	93.16%	0.06	93.20%	0.06	0.035
764	93.28%	0.06	93.33%	0.06	0.035
765	93.41%	0.06	93.45%	0.06	0.035
766	93.53%	0.06	93.57%	0.06	0.035
767	93.65%	0.06	93.69%	0.06	0.035
768	93.77%	0.06	93.82%	0.06	0.035
769	93.89%	0.06	93.94%	0.06	0.034
770	94.02%	0.06	94.06%	0.06	0.032
771	94.14%	0.06	94.18%	0.06	0.032
772	94.26%	0.06	94.30%	0.06	0.028
773	94.38%	0.06	94.43%	0.06	0.028
774	94.51%	0.06	94.55%	0.06	0.028
775	94.63%	0.06	94.67%	0.06	0.028
776	94.75%	0.06	94.79%	0.06	0.028
777	94.87%	0.06	94.92%	0.06	0.028
778	94.99%	0.06	95.04%	0.06	0.028
779	95.12%	0.06	95.16%	0.06	0.028
780	95.24%	0.06	95.28%	0.06	0.028
781	95.36%	0.06	95.40%	0.06	0.028
782	95.48%	0.06	95.53%	0.06	0.028
783	95.60%	0.06	95.65%	0.06	0.028
784	95.73%	0.06	95.77%	0.06	0.028
785	95.85%	0.06	95.89%	0.06	0.028
786	95.97%	0.06	96.02%	0.06	0.028
787	96.09%	0.06	96.14%	0.06	0.028
788	96.21%	0.06	96.26%	0.06	0.028
789	96.34%	0.06	96.38%	0.06	0.028
790	96.46%	0.06	96.50%	0.06	0.028
791	96.58%	0.06	96.63%	0.06	0.027
792	96.70%	0.06	96.75%	0.06	0.027
793	96.83%	0.06	96.87%	0.06	0.027
794	96.95%	0.06	96.99%	0.06	0.027
795	97.07%	0.06	97.12%	0.06	0.027
796	97.19%	0.06	97.24%	0.06	0.027
797	97.31%	0.06	97.36%	0.06	0.027
798	97.44%	0.06	97.48%	0.06	0.027
799	97.56%	0.06	97.60%	0.05	0.027
800	97.68%	0.06	97.73%	0.05	0.027
801	97.80%	0.06	97.85%	0.05	0.027
802	97.92%	0.06	97.97%	0.05	0.026
803	98.05%	0.06	98.09%	0.05	0.026
804	98.17%	0.06	98.22%	0.05	0.025
805	98.29%	0.06	98.34%	0.05	0.025
806	98.41%	0.06	98.46%	0.05	0.025
807	98.53%	0.06	98.58%	0.05	0.025
808	98.66%	0.06	98.70%	0.05	0.025
809	98.78%	0.06	98.83%	0.05	0.025
810	98.90%	0.06	98.95%	0.05	0.025

811	99.02%	0.06	99.07%	0.05	0.025
812	99.15%	0.06	99.19%	0.05	0.024
813	99.27%	0.05	99.32%	0.05	0.024
814	99.39%	0.05	99.44%	0.05	0.024
815	99.51%	0.05	99.56%	0.05	0.024
816	99.63%	0.05	99.68%	0.05	0.020
817	99.76%	0.05	99.80%	0.05	0.019
818	99.88%	0.05	99.93%	0.05	0.019

POC #1: PEAK EVENTS - POST MITIGATED

WEIBULL (SWMM)

$F = m/(nr+1)$ where F = frequency
 m = event rank
 nr = total number of event
 n = number of year analyzed

CUNNANE

$F = (i-0.4)/(n+0.2)$
 i = rank
 n = sample size = # of storms

Number of Years Analyzed (n): 43.69
 Total number of events (nr) 517

SUMMARY OF PEAK EVENTS

m or i	Weibull		Cunnane		Q		
	F	Return (yrs)	F	Return			
1	0.19%	44.69	0.12%	73.15	3.132	Q2	0.656
2	0.39%	22.35	0.31%	27.43	2.994	Q3	1.075
3	0.58%	14.90	0.50%	16.88	2.458	Q4	1.551
4	0.77%	11.17	0.70%	12.19	2.338	Q5	1.855
5	0.97%	8.94	0.89%	9.54	2.273	Q6	1.735
6	1.16%	7.45	1.08%	7.84	2.079	Q7	2.000
7	1.35%	6.38	1.28%	6.65	1.764	Q8	1.816
8	1.54%	5.59	1.47%	5.78	1.735	Q9	2.460
9	1.74%	4.97	1.66%	5.10	1.606	Q10	2.432
10	1.93%	4.47	1.86%	4.57	1.537	START 9/24/1964 13:00 END 5/23/2008 23:00 TOTAL YRS 43.69 TOTAL HRS 382738	
11	2.12%	4.06	2.05%	4.14	1.536		
12	2.32%	3.72	2.24%	3.78	1.413		
13	2.51%	3.44	2.44%	3.48	1.403		
14	2.70%	3.19	2.63%	3.23	1.294		
15	2.90%	2.98	2.82%	3.01	1.224		
16	3.09%	2.79	3.02%	2.81	1.103		
17	3.28%	2.63	3.21%	2.64	1.043		
18	3.47%	2.48	3.40%	2.49	1.016		
19	3.67%	2.35	3.60%	2.36	0.895		
20	3.86%	2.23	3.79%	2.24	0.862		
21	4.05%	2.13	3.98%	2.13	0.856		
22	4.25%	2.03	4.18%	2.03	0.799		
23	4.44%	1.94	4.37%	1.94	0.769		
24	4.63%	1.86	4.56%	1.86	0.744		
25	4.83%	1.79	4.76%	1.78	0.739		
26	5.02%	1.72	4.95%	1.71	0.713		
27	5.21%	1.66	5.14%	1.65	0.684		
28	5.41%	1.60	5.34%	1.59	0.604		
29	5.60%	1.54	5.53%	1.53	0.597		
30	5.79%	1.49	5.72%	1.48	0.593		
31	5.98%	1.44	5.92%	1.43	0.588		
32	6.18%	1.40	6.11%	1.39	0.586		
33	6.37%	1.35	6.30%	1.35	0.529		
34	6.56%	1.31	6.50%	1.31	0.521		
35	6.76%	1.28	6.69%	1.27	0.488		
36	6.95%	1.24	6.88%	1.23	0.485		
37	7.14%	1.21	7.08%	1.20	0.473		
38	7.34%	1.18	7.27%	1.17	0.461		
39	7.53%	1.15	7.46%	1.14	0.352		
40	7.72%	1.12	7.66%	1.11	0.334		
41	7.92%	1.09	7.85%	1.08	0.318		
42	8.11%	1.06	8.04%	1.06	0.317		
43	8.30%	1.04	8.24%	1.03	0.308		
44	8.49%	1.02	8.43%	1.01	0.304		
45	8.69%	0.99	8.62%	0.98	0.302		
46	8.88%	0.97	8.82%	0.96	0.302		
47	9.07%	0.95	9.01%	0.94	0.299		
48	9.27%	0.93	9.20%	0.92	0.299		
49	9.46%	0.91	9.40%	0.90	0.298		
50	9.65%	0.89	9.59%	0.88	0.296		
51	9.85%	0.88	9.78%	0.87	0.296		
52	10.04%	0.86	9.98%	0.85	0.295		
53	10.23%	0.84	10.17%	0.83	0.293		
54	10.42%	0.83	10.36%	0.82	0.292		
55	10.62%	0.81	10.56%	0.80	0.291		
56	10.81%	0.80	10.75%	0.79	0.291		

Summary of Existing Events

2.501001 Pass
 2.977166 Pass
 3.050669 Pass
 3.370661 Pass
 4.517618 Pass
 4.053516 Pass
 3.901726 Pass
 4.228862 Pass
 4.107427 Pass

57	11.00%	0.78	10.94%	0.78	0.290
58	11.20%	0.77	11.14%	0.76	0.290
59	11.39%	0.76	11.33%	0.75	0.290
60	11.58%	0.74	11.52%	0.74	0.290
61	11.78%	0.73	11.72%	0.72	0.290
62	11.97%	0.72	11.91%	0.71	0.289
63	12.16%	0.71	12.10%	0.70	0.288
64	12.36%	0.70	12.30%	0.69	0.287
65	12.55%	0.69	12.49%	0.68	0.287
66	12.74%	0.68	12.68%	0.67	0.286
67	12.93%	0.67	12.88%	0.66	0.286
68	13.13%	0.66	13.07%	0.65	0.285
69	13.32%	0.65	13.26%	0.64	0.285
70	13.51%	0.64	13.46%	0.63	0.284
71	13.71%	0.63	13.65%	0.62	0.284
72	13.90%	0.62	13.84%	0.61	0.284
73	14.09%	0.61	14.04%	0.60	0.283
74	14.29%	0.60	14.23%	0.60	0.280
75	14.48%	0.60	14.42%	0.59	0.280
76	14.67%	0.59	14.62%	0.58	0.279
77	14.86%	0.58	14.81%	0.57	0.279
78	15.06%	0.57	15.00%	0.57	0.278
79	15.25%	0.57	15.20%	0.56	0.278
80	15.44%	0.56	15.39%	0.55	0.278
81	15.64%	0.55	15.58%	0.54	0.277
82	15.83%	0.55	15.78%	0.54	0.276
83	16.02%	0.54	15.97%	0.53	0.275
84	16.22%	0.53	16.16%	0.53	0.275
85	16.41%	0.53	16.36%	0.52	0.274
86	16.60%	0.52	16.55%	0.51	0.274
87	16.80%	0.51	16.74%	0.51	0.272
88	16.99%	0.51	16.94%	0.50	0.272
89	17.18%	0.50	17.13%	0.50	0.272
90	17.37%	0.50	17.32%	0.49	0.271
91	17.57%	0.49	17.52%	0.48	0.271
92	17.76%	0.49	17.71%	0.48	0.271
93	17.95%	0.48	17.90%	0.47	0.270
94	18.15%	0.48	18.10%	0.47	0.269
95	18.34%	0.47	18.29%	0.46	0.269
96	18.53%	0.47	18.48%	0.46	0.268
97	18.73%	0.46	18.68%	0.45	0.268
98	18.92%	0.46	18.87%	0.45	0.268
99	19.11%	0.45	19.06%	0.45	0.268
100	19.31%	0.45	19.26%	0.44	0.265
101	19.50%	0.44	19.45%	0.44	0.265
102	19.69%	0.44	19.64%	0.43	0.265
103	19.88%	0.43	19.84%	0.43	0.265
104	20.08%	0.43	20.03%	0.42	0.262
105	20.27%	0.43	20.22%	0.42	0.262
106	20.46%	0.42	20.42%	0.42	0.261
107	20.66%	0.42	20.61%	0.41	0.260
108	20.85%	0.41	20.80%	0.41	0.260
109	21.04%	0.41	21.00%	0.40	0.258
110	21.24%	0.41	21.19%	0.40	0.257
111	21.43%	0.40	21.38%	0.40	0.257
112	21.62%	0.40	21.58%	0.39	0.256
113	21.81%	0.40	21.77%	0.39	0.252
114	22.01%	0.39	21.96%	0.39	0.251
115	22.20%	0.39	22.16%	0.38	0.250
116	22.39%	0.39	22.35%	0.38	0.250
117	22.59%	0.38	22.54%	0.38	0.249
118	22.78%	0.38	22.74%	0.37	0.245
119	22.97%	0.38	22.93%	0.37	0.245
120	23.17%	0.37	23.12%	0.37	0.243
121	23.36%	0.37	23.32%	0.36	0.240
122	23.55%	0.37	23.51%	0.36	0.238
123	23.75%	0.36	23.70%	0.36	0.235
124	23.94%	0.36	23.90%	0.36	0.234
125	24.13%	0.36	24.09%	0.35	0.233
126	24.32%	0.35	24.28%	0.35	0.230
127	24.52%	0.35	24.48%	0.35	0.230

128	24.71%	0.35	24.67%	0.34	0.229
129	24.90%	0.35	24.86%	0.34	0.224
130	25.10%	0.34	25.06%	0.34	0.223
131	25.29%	0.34	25.25%	0.34	0.222
132	25.48%	0.34	25.44%	0.33	0.222
133	25.68%	0.34	25.64%	0.33	0.221
134	25.87%	0.33	25.83%	0.33	0.219
135	26.06%	0.33	26.02%	0.33	0.219
136	26.25%	0.33	26.22%	0.32	0.218
137	26.45%	0.33	26.41%	0.32	0.217
138	26.64%	0.32	26.60%	0.32	0.216
139	26.83%	0.32	26.80%	0.32	0.216
140	27.03%	0.32	26.99%	0.31	0.216
141	27.22%	0.32	27.18%	0.31	0.216
142	27.41%	0.31	27.38%	0.31	0.216
143	27.61%	0.31	27.57%	0.31	0.215
144	27.80%	0.31	27.76%	0.31	0.215
145	27.99%	0.31	27.96%	0.30	0.214
146	28.19%	0.31	28.15%	0.30	0.214
147	28.38%	0.30	28.34%	0.30	0.213
148	28.57%	0.30	28.54%	0.30	0.212
149	28.76%	0.30	28.73%	0.30	0.212
150	28.96%	0.30	28.92%	0.29	0.212
151	29.15%	0.30	29.12%	0.29	0.211
152	29.34%	0.29	29.31%	0.29	0.211
153	29.54%	0.29	29.51%	0.29	0.209
154	29.73%	0.29	29.70%	0.29	0.209
155	29.92%	0.29	29.89%	0.28	0.209
156	30.12%	0.29	30.09%	0.28	0.209
157	30.31%	0.28	30.28%	0.28	0.209
158	30.50%	0.28	30.47%	0.28	0.208
159	30.69%	0.28	30.67%	0.28	0.208
160	30.89%	0.28	30.86%	0.28	0.207
161	31.08%	0.28	31.05%	0.27	0.207
162	31.27%	0.28	31.25%	0.27	0.206
163	31.47%	0.27	31.44%	0.27	0.205
164	31.66%	0.27	31.63%	0.27	0.205
165	31.85%	0.27	31.83%	0.27	0.205
166	32.05%	0.27	32.02%	0.27	0.205
167	32.24%	0.27	32.21%	0.26	0.204
168	32.43%	0.27	32.41%	0.26	0.204
169	32.63%	0.26	32.60%	0.26	0.204
170	32.82%	0.26	32.79%	0.26	0.203
171	33.01%	0.26	32.99%	0.26	0.202
172	33.20%	0.26	33.18%	0.26	0.201
173	33.40%	0.26	33.37%	0.25	0.201
174	33.59%	0.26	33.57%	0.25	0.200
175	33.78%	0.26	33.76%	0.25	0.199
176	33.98%	0.25	33.95%	0.25	0.198
177	34.17%	0.25	34.15%	0.25	0.197
178	34.36%	0.25	34.34%	0.25	0.197
179	34.56%	0.25	34.53%	0.25	0.196
180	34.75%	0.25	34.73%	0.24	0.196
181	34.94%	0.25	34.92%	0.24	0.196
182	35.14%	0.25	35.11%	0.24	0.196
183	35.33%	0.24	35.31%	0.24	0.196
184	35.52%	0.24	35.50%	0.24	0.195
185	35.71%	0.24	35.69%	0.24	0.195
186	35.91%	0.24	35.89%	0.24	0.195
187	36.10%	0.24	36.08%	0.24	0.194
188	36.29%	0.24	36.27%	0.23	0.193
189	36.49%	0.24	36.47%	0.23	0.192
190	36.68%	0.24	36.66%	0.23	0.191
191	36.87%	0.23	36.85%	0.23	0.187
192	37.07%	0.23	37.05%	0.23	0.187
193	37.26%	0.23	37.24%	0.23	0.184
194	37.45%	0.23	37.43%	0.23	0.181
195	37.64%	0.23	37.63%	0.23	0.180
196	37.84%	0.23	37.82%	0.22	0.179
197	38.03%	0.23	38.01%	0.22	0.178
198	38.22%	0.23	38.21%	0.22	0.176

199	38.42%	0.22	38.40%	0.22	0.176
200	38.61%	0.22	38.59%	0.22	0.176
201	38.80%	0.22	38.79%	0.22	0.176
202	39.00%	0.22	38.98%	0.22	0.175
203	39.19%	0.22	39.17%	0.22	0.175
204	39.38%	0.22	39.37%	0.22	0.174
205	39.58%	0.22	39.56%	0.21	0.171
206	39.77%	0.22	39.75%	0.21	0.171
207	39.96%	0.22	39.95%	0.21	0.169
208	40.15%	0.21	40.14%	0.21	0.168
209	40.35%	0.21	40.33%	0.21	0.166
210	40.54%	0.21	40.53%	0.21	0.165
211	40.73%	0.21	40.72%	0.21	0.164
212	40.93%	0.21	40.91%	0.21	0.162
213	41.12%	0.21	41.11%	0.21	0.162
214	41.31%	0.21	41.30%	0.21	0.162
215	41.51%	0.21	41.49%	0.20	0.160
216	41.70%	0.21	41.69%	0.20	0.160
217	41.89%	0.21	41.88%	0.20	0.159
218	42.08%	0.21	42.07%	0.20	0.158
219	42.28%	0.20	42.27%	0.20	0.157
220	42.47%	0.20	42.46%	0.20	0.157
221	42.66%	0.20	42.65%	0.20	0.156
222	42.86%	0.20	42.85%	0.20	0.153
223	43.05%	0.20	43.04%	0.20	0.153
224	43.24%	0.20	43.23%	0.20	0.152
225	43.44%	0.20	43.43%	0.20	0.151
226	43.63%	0.20	43.62%	0.19	0.150
227	43.82%	0.20	43.81%	0.19	0.149
228	44.02%	0.20	44.01%	0.19	0.149
229	44.21%	0.20	44.20%	0.19	0.149
230	44.40%	0.19	44.39%	0.19	0.146
231	44.59%	0.19	44.59%	0.19	0.146
232	44.79%	0.19	44.78%	0.19	0.144
233	44.98%	0.19	44.97%	0.19	0.144
234	45.17%	0.19	45.17%	0.19	0.143
235	45.37%	0.19	45.36%	0.19	0.143
236	45.56%	0.19	45.55%	0.19	0.140
237	45.75%	0.19	45.75%	0.19	0.139
238	45.95%	0.19	45.94%	0.18	0.137
239	46.14%	0.19	46.13%	0.18	0.137
240	46.33%	0.19	46.33%	0.18	0.137
241	46.53%	0.19	46.52%	0.18	0.135
242	46.72%	0.18	46.71%	0.18	0.135
243	46.91%	0.18	46.91%	0.18	0.133
244	47.10%	0.18	47.10%	0.18	0.133
245	47.30%	0.18	47.29%	0.18	0.132
246	47.49%	0.18	47.49%	0.18	0.132
247	47.68%	0.18	47.68%	0.18	0.132
248	47.88%	0.18	47.87%	0.18	0.131
249	48.07%	0.18	48.07%	0.18	0.131
250	48.26%	0.18	48.26%	0.18	0.131
251	48.46%	0.18	48.45%	0.18	0.129
252	48.65%	0.18	48.65%	0.17	0.126
253	48.84%	0.18	48.84%	0.17	0.124
254	49.03%	0.18	49.03%	0.17	0.124
255	49.23%	0.18	49.23%	0.17	0.123
256	49.42%	0.17	49.42%	0.17	0.122
257	49.61%	0.17	49.61%	0.17	0.121
258	49.81%	0.17	49.81%	0.17	0.121
259	50.00%	0.17	50.00%	0.17	0.121
260	50.19%	0.17	50.19%	0.17	0.120
261	50.39%	0.17	50.39%	0.17	0.120
262	50.58%	0.17	50.58%	0.17	0.119
263	50.77%	0.17	50.77%	0.17	0.118
264	50.97%	0.17	50.97%	0.17	0.118
265	51.16%	0.17	51.16%	0.17	0.118
266	51.35%	0.17	51.35%	0.17	0.117
267	51.54%	0.17	51.55%	0.16	0.117
268	51.74%	0.17	51.74%	0.16	0.116
269	51.93%	0.17	51.93%	0.16	0.116

270	52.12%	0.17	52.13%	0.16	0.116
271	52.32%	0.16	52.32%	0.16	0.115
272	52.51%	0.16	52.51%	0.16	0.113
273	52.70%	0.16	52.71%	0.16	0.111
274	52.90%	0.16	52.90%	0.16	0.111
275	53.09%	0.16	53.09%	0.16	0.110
276	53.28%	0.16	53.29%	0.16	0.110
277	53.47%	0.16	53.48%	0.16	0.110
278	53.67%	0.16	53.67%	0.16	0.109
279	53.86%	0.16	53.87%	0.16	0.108
280	54.05%	0.16	54.06%	0.16	0.108
281	54.25%	0.16	54.25%	0.16	0.108
282	54.44%	0.16	54.45%	0.16	0.108
283	54.63%	0.16	54.64%	0.16	0.108
284	54.83%	0.16	54.83%	0.15	0.107
285	55.02%	0.16	55.03%	0.15	0.107
286	55.21%	0.16	55.22%	0.15	0.106
287	55.41%	0.16	55.41%	0.15	0.106
288	55.60%	0.16	55.61%	0.15	0.106
289	55.79%	0.15	55.80%	0.15	0.106
290	55.98%	0.15	55.99%	0.15	0.105
291	56.18%	0.15	56.19%	0.15	0.105
292	56.37%	0.15	56.38%	0.15	0.105
293	56.56%	0.15	56.57%	0.15	0.105
294	56.76%	0.15	56.77%	0.15	0.105
295	56.95%	0.15	56.96%	0.15	0.104
296	57.14%	0.15	57.15%	0.15	0.103
297	57.34%	0.15	57.35%	0.15	0.103
298	57.53%	0.15	57.54%	0.15	0.102
299	57.72%	0.15	57.73%	0.15	0.101
300	57.92%	0.15	57.93%	0.15	0.101
301	58.11%	0.15	58.12%	0.15	0.101
302	58.30%	0.15	58.31%	0.15	0.100
303	58.49%	0.15	58.51%	0.15	0.099
304	58.69%	0.15	58.70%	0.14	0.099
305	58.88%	0.15	58.89%	0.14	0.099
306	59.07%	0.15	59.09%	0.14	0.098
307	59.27%	0.15	59.28%	0.14	0.098
308	59.46%	0.15	59.47%	0.14	0.098
309	59.65%	0.14	59.67%	0.14	0.098
310	59.85%	0.14	59.86%	0.14	0.097
311	60.04%	0.14	60.05%	0.14	0.097
312	60.23%	0.14	60.25%	0.14	0.097
313	60.42%	0.14	60.44%	0.14	0.097
314	60.62%	0.14	60.63%	0.14	0.096
315	60.81%	0.14	60.83%	0.14	0.096
316	61.00%	0.14	61.02%	0.14	0.096
317	61.20%	0.14	61.21%	0.14	0.096
318	61.39%	0.14	61.41%	0.14	0.095
319	61.58%	0.14	61.60%	0.14	0.095
320	61.78%	0.14	61.79%	0.14	0.094
321	61.97%	0.14	61.99%	0.14	0.094
322	62.16%	0.14	62.18%	0.14	0.094
323	62.36%	0.14	62.37%	0.14	0.093
324	62.55%	0.14	62.57%	0.14	0.093
325	62.74%	0.14	62.76%	0.14	0.093
326	62.93%	0.14	62.95%	0.13	0.093
327	63.13%	0.14	63.15%	0.13	0.093
328	63.32%	0.14	63.34%	0.13	0.093
329	63.51%	0.14	63.53%	0.13	0.092
330	63.71%	0.14	63.73%	0.13	0.092
331	63.90%	0.14	63.92%	0.13	0.092
332	64.09%	0.13	64.11%	0.13	0.092
333	64.29%	0.13	64.31%	0.13	0.092
334	64.48%	0.13	64.50%	0.13	0.092
335	64.67%	0.13	64.69%	0.13	0.091
336	64.86%	0.13	64.89%	0.13	0.091
337	65.06%	0.13	65.08%	0.13	0.090
338	65.25%	0.13	65.27%	0.13	0.089
339	65.44%	0.13	65.47%	0.13	0.089
340	65.64%	0.13	65.66%	0.13	0.089

341	65.83%	0.13	65.85%	0.13	0.089
342	66.02%	0.13	66.05%	0.13	0.088
343	66.22%	0.13	66.24%	0.13	0.088
344	66.41%	0.13	66.43%	0.13	0.086
345	66.60%	0.13	66.63%	0.13	0.086
346	66.80%	0.13	66.82%	0.13	0.086
347	66.99%	0.13	67.01%	0.13	0.086
348	67.18%	0.13	67.21%	0.13	0.086
349	67.37%	0.13	67.40%	0.13	0.085
350	67.57%	0.13	67.59%	0.13	0.085
351	67.76%	0.13	67.79%	0.13	0.084
352	67.95%	0.13	67.98%	0.12	0.084
353	68.15%	0.13	68.17%	0.12	0.084
354	68.34%	0.13	68.37%	0.12	0.083
355	68.53%	0.13	68.56%	0.12	0.083
356	68.73%	0.13	68.75%	0.12	0.083
357	68.92%	0.13	68.95%	0.12	0.083
358	69.11%	0.12	69.14%	0.12	0.082
359	69.31%	0.12	69.33%	0.12	0.082
360	69.50%	0.12	69.53%	0.12	0.081
361	69.69%	0.12	69.72%	0.12	0.081
362	69.88%	0.12	69.91%	0.12	0.080
363	70.08%	0.12	70.11%	0.12	0.080
364	70.27%	0.12	70.30%	0.12	0.079
365	70.46%	0.12	70.49%	0.12	0.079
366	70.66%	0.12	70.69%	0.12	0.079
367	70.85%	0.12	70.88%	0.12	0.079
368	71.04%	0.12	71.08%	0.12	0.078
369	71.24%	0.12	71.27%	0.12	0.078
370	71.43%	0.12	71.46%	0.12	0.077
371	71.62%	0.12	71.66%	0.12	0.077
372	71.81%	0.12	71.85%	0.12	0.076
373	72.01%	0.12	72.04%	0.12	0.076
374	72.20%	0.12	72.24%	0.12	0.076
375	72.39%	0.12	72.43%	0.12	0.076
376	72.59%	0.12	72.62%	0.12	0.075
377	72.78%	0.12	72.82%	0.12	0.075
378	72.97%	0.12	73.01%	0.12	0.075
379	73.17%	0.12	73.20%	0.12	0.075
380	73.36%	0.12	73.40%	0.12	0.075
381	73.55%	0.12	73.59%	0.12	0.074
382	73.75%	0.12	73.78%	0.12	0.074
383	73.94%	0.12	73.98%	0.11	0.073
384	74.13%	0.12	74.17%	0.11	0.072
385	74.32%	0.12	74.36%	0.11	0.072
386	74.52%	0.12	74.56%	0.11	0.072
387	74.71%	0.12	74.75%	0.11	0.071
388	74.90%	0.12	74.94%	0.11	0.071
389	75.10%	0.11	75.14%	0.11	0.071
390	75.29%	0.11	75.33%	0.11	0.071
391	75.48%	0.11	75.52%	0.11	0.070
392	75.68%	0.11	75.72%	0.11	0.069
393	75.87%	0.11	75.91%	0.11	0.069
394	76.06%	0.11	76.10%	0.11	0.069
395	76.25%	0.11	76.30%	0.11	0.068
396	76.45%	0.11	76.49%	0.11	0.067
397	76.64%	0.11	76.68%	0.11	0.067
398	76.83%	0.11	76.88%	0.11	0.066
399	77.03%	0.11	77.07%	0.11	0.066
400	77.22%	0.11	77.26%	0.11	0.066
401	77.41%	0.11	77.46%	0.11	0.065
402	77.61%	0.11	77.65%	0.11	0.064
403	77.80%	0.11	77.84%	0.11	0.064
404	77.99%	0.11	78.04%	0.11	0.064
405	78.19%	0.11	78.23%	0.11	0.064
406	78.38%	0.11	78.42%	0.11	0.063
407	78.57%	0.11	78.62%	0.11	0.063
408	78.76%	0.11	78.81%	0.11	0.062
409	78.96%	0.11	79.00%	0.11	0.062
410	79.15%	0.11	79.20%	0.11	0.062
411	79.34%	0.11	79.39%	0.11	0.061

412	79.54%	0.11	79.58%	0.11	0.061
413	79.73%	0.11	79.78%	0.11	0.061
414	79.92%	0.11	79.97%	0.11	0.060
415	80.12%	0.11	80.16%	0.11	0.060
416	80.31%	0.11	80.36%	0.11	0.060
417	80.50%	0.11	80.55%	0.11	0.060
418	80.69%	0.11	80.74%	0.11	0.059
419	80.89%	0.11	80.94%	0.10	0.059
420	81.08%	0.11	81.13%	0.10	0.059
421	81.27%	0.11	81.32%	0.10	0.058
422	81.47%	0.11	81.52%	0.10	0.058
423	81.66%	0.11	81.71%	0.10	0.057
424	81.85%	0.11	81.90%	0.10	0.057
425	82.05%	0.11	82.10%	0.10	0.056
426	82.24%	0.10	82.29%	0.10	0.056
427	82.43%	0.10	82.48%	0.10	0.056
428	82.63%	0.10	82.68%	0.10	0.056
429	82.82%	0.10	82.87%	0.10	0.055
430	83.01%	0.10	83.06%	0.10	0.055
431	83.20%	0.10	83.26%	0.10	0.054
432	83.40%	0.10	83.45%	0.10	0.052
433	83.59%	0.10	83.64%	0.10	0.052
434	83.78%	0.10	83.84%	0.10	0.052
435	83.98%	0.10	84.03%	0.10	0.050
436	84.17%	0.10	84.22%	0.10	0.049
437	84.36%	0.10	84.42%	0.10	0.048
438	84.56%	0.10	84.61%	0.10	0.048
439	84.75%	0.10	84.80%	0.10	0.048
440	84.94%	0.10	85.00%	0.10	0.045
441	85.14%	0.10	85.19%	0.10	0.044
442	85.33%	0.10	85.38%	0.10	0.044
443	85.52%	0.10	85.58%	0.10	0.043
444	85.71%	0.10	85.77%	0.10	0.041
445	85.91%	0.10	85.96%	0.10	0.040
446	86.10%	0.10	86.16%	0.10	0.040
447	86.29%	0.10	86.35%	0.10	0.038
448	86.49%	0.10	86.54%	0.10	0.038
449	86.68%	0.10	86.74%	0.10	0.037
450	86.87%	0.10	86.93%	0.10	0.037
451	87.07%	0.10	87.12%	0.10	0.036
452	87.26%	0.10	87.32%	0.10	0.036
453	87.45%	0.10	87.51%	0.10	0.035
454	87.64%	0.10	87.70%	0.10	0.035
455	87.84%	0.10	87.90%	0.10	0.033
456	88.03%	0.10	88.09%	0.10	0.033
457	88.22%	0.10	88.28%	0.10	0.032
458	88.42%	0.10	88.48%	0.10	0.032
459	88.61%	0.10	88.67%	0.10	0.032
460	88.80%	0.10	88.86%	0.10	0.031
461	89.00%	0.10	89.06%	0.10	0.031
462	89.19%	0.10	89.25%	0.10	0.031
463	89.38%	0.10	89.44%	0.09	0.031
464	89.58%	0.10	89.64%	0.09	0.031
465	89.77%	0.10	89.83%	0.09	0.031
466	89.96%	0.10	90.02%	0.09	0.030
467	90.15%	0.10	90.22%	0.09	0.030
468	90.35%	0.10	90.41%	0.09	0.029
469	90.54%	0.10	90.60%	0.09	0.029
470	90.73%	0.10	90.80%	0.09	0.029
471	90.93%	0.09	90.99%	0.09	0.029
472	91.12%	0.09	91.18%	0.09	0.028
473	91.31%	0.09	91.38%	0.09	0.028
474	91.51%	0.09	91.57%	0.09	0.028
475	91.70%	0.09	91.76%	0.09	0.028
476	91.89%	0.09	91.96%	0.09	0.028
477	92.08%	0.09	92.15%	0.09	0.027
478	92.28%	0.09	92.34%	0.09	0.026
479	92.47%	0.09	92.54%	0.09	0.026
480	92.66%	0.09	92.73%	0.09	0.025
481	92.86%	0.09	92.92%	0.09	0.025
482	93.05%	0.09	93.12%	0.09	0.025

483	93.24%	0.09	93.31%	0.09	0.025
484	93.44%	0.09	93.50%	0.09	0.024
485	93.63%	0.09	93.70%	0.09	0.024
486	93.82%	0.09	93.89%	0.09	0.024
487	94.02%	0.09	94.08%	0.09	0.024
488	94.21%	0.09	94.28%	0.09	0.023
489	94.40%	0.09	94.47%	0.09	0.023
490	94.59%	0.09	94.66%	0.09	0.023
491	94.79%	0.09	94.86%	0.09	0.023
492	94.98%	0.09	95.05%	0.09	0.023
493	95.17%	0.09	95.24%	0.09	0.022
494	95.37%	0.09	95.44%	0.09	0.022
495	95.56%	0.09	95.63%	0.09	0.022
496	95.75%	0.09	95.82%	0.09	0.021
497	95.95%	0.09	96.02%	0.09	0.021
498	96.14%	0.09	96.21%	0.09	0.021
499	96.33%	0.09	96.40%	0.09	0.021
500	96.53%	0.09	96.60%	0.09	0.021
501	96.72%	0.09	96.79%	0.09	0.021
502	96.91%	0.09	96.98%	0.09	0.020
503	97.10%	0.09	97.18%	0.09	0.020
504	97.30%	0.09	97.37%	0.09	0.020
505	97.49%	0.09	97.56%	0.09	0.020
506	97.68%	0.09	97.76%	0.09	0.019
507	97.88%	0.09	97.95%	0.09	0.019
508	98.07%	0.09	98.14%	0.09	0.019
509	98.26%	0.09	98.34%	0.09	0.018
510	98.46%	0.09	98.53%	0.09	0.018
511	98.65%	0.09	98.72%	0.09	0.018
512	98.84%	0.09	98.92%	0.09	0.018
513	99.03%	0.09	99.11%	0.09	0.017
514	99.23%	0.09	99.30%	0.09	0.017
515	99.42%	0.09	99.50%	0.09	0.016
516	99.61%	0.09	99.69%	0.09	0.016
517	99.81%	0.09	99.88%	0.08	0.015

APPENDIX II: SUMMARY OF INPUT DATA/PARAMETERS

Simulation Options

General
Dates
Time Steps
Dynamic Wave
Files

Process Models
☒ Rainfall/Runoff
☐ Rainfall Dependent I/I
☐ Snow Melt
☐ Groundwater
☐ Flow Routing
☐ Water Quality

Infiltration Model
☐ Horton
☐ Modified Horton
☒ Green-Ampt
☐ Modified Green-Ampt
☐ Curve Number

Routing Model
☐ Steady Flow
☒ Kinematic Wave
☐ Dynamic Wave

Routing Options
☐ Allow Ponding
Minimum Conduit Slope
0 (%)

OK
Cancel
Help

Simulation Options

General
Dates
Time Steps
Dynamic Wave
Files

Date (M/D/Y)
Time (H:M)

Start Analysis on
09/24/1964
13:00

Start Reporting on
09/24/1964
13:00

End Analysis on
05/23/2008
22:00

Start Sweeping on
01/01

End Sweeping on
12/31

Antecedent Dry Days
0

OK
Cancel
Help

Simulation Options

GeneralDatesTime StepsDynamic WaveFiles

Days

Hr:Min:Sec

Reporting Step001:00:00

Runoff Step: Dry Weather001:00:00

Runoff Step: Wet Weather001:00:00

Control Rule Step00:00:00

Routing Step (seconds)60

Steady Flow Periods

☐ Skip Steady Flow Periods

System Flow Tolerance (%)5

Lateral Flow Tolerance (%)5

OKCancelHelp

Simulation Options

GeneralDatesTime StepsDynamic WaveFiles

Inertial TermsDampen

Normal Flow CriterionSlope & Froude

Force Main EquationHazen-Williams

Surcharge MethodExtran

☒ Use Variable Time Steps Adjusted By:75%

Minimum Variable Time Step (sec)0.5

Time Step For Conduit Lengthening (sec)0

Minimum Nodal Surface Area (sq. feet)12.557

Maximum Trials per Time Step8

Head Convergence Tolerance (feet)0.005

Number of Threads1

[Apply Defaults](#)

OKCancelHelp

Climatology Editor

Snow Melt

Temperature

Areal Depletion

Evaporation

Adjustments

Wind Speed

Source of Evaporation Rates

Monthly Averages

Monthly Evaporation (in/day)

Jan	Feb	Mar	Apr	May	Jun
0.062	0.075	0.114	0.15	0.186	0.21
Jul	Aug	Sep	Oct	Nov	Dec
0.217	0.207	0.16	0.124	0.08	0.062

Monthly Soil Recovery Pattern (Optional)

☐ Evaporate Only During Dry Periods

OK

Cancel

Help

Infiltration Editor

Infiltration Method

GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	.025
Initial Deficit	.3

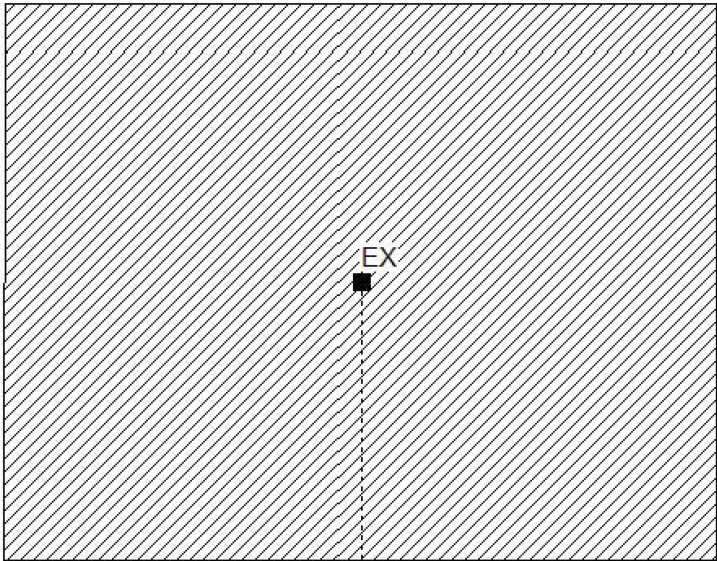
Soil capillary suction head (inches or mm)

OK

Cancel

Help

ESCONDIDO_STATION



EX



POC1



Rain Gage ESCONDIDO_STA... x

Property	Value
Name	ESCONDIDO_STATION
X-Coordinate	4731.429
Y-Coordinate	8322.857
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	ESCONDIDO_RAINFALL
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN
User-assigned name of rain gage	

Subcatchment EX x

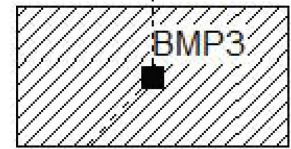
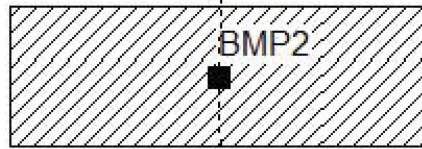
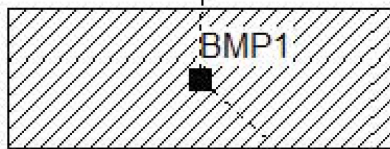
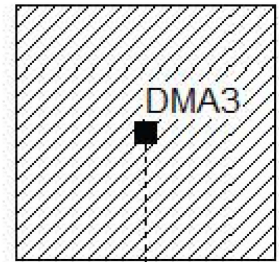
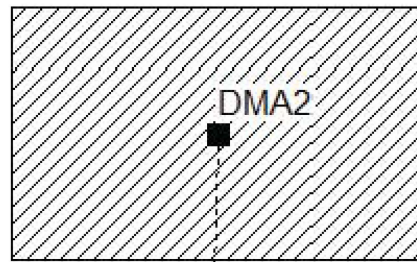
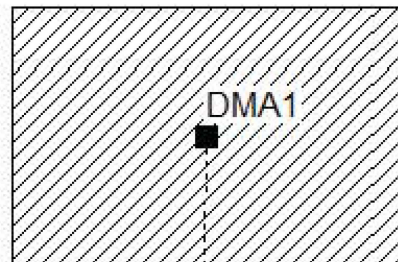
Property	Value
Name	EX
X-Coordinate	4735.502
Y-Coordinate	6778.816
Description	
Tag	
Rain Gage	ESCONDIDO_STATION
Outlet	POC1
Area	7.410
Width	400
% Slope	4
% Imperv	10
N-Imperv	0.117
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Intil. Pattern	
Percent of impervious area (%)	

Outfall POC1



Property	Value
Name	POC1
X-Coordinate	4737.143
Y-Coordinate	4391.429
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Route To	
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*
User-assigned name of outfall	

ESCONDIDO_STATION



POC1



Subcatchment DMA1 		Subcatchment DMA2 	
Property	Value	Property	Value
Name	DMA1	Name	DMA2
X-Coordinate	1580.494	X-Coordinate	4386.017
Y-Coordinate	7206.228	Y-Coordinate	7212.104
Description		Description	
Tag		Tag	
Rain Gage	ESCONDIDO_STATION	Rain Gage	ESCONDIDO_STATION
Outlet	BMP1	Outlet	BMP2
Area	2.476	Area	2.572
Width	268	Width	272
% Slope	1	% Slope	1
% Imperv	70	% Imperv	70
N-Imperv	0.012	N-Imperv	0.012
N-Perv	0.15	N-Perv	0.15
Dstore-Imperv	0.05	Dstore-Imperv	0.05
Dstore-Perv	0.10	Dstore-Perv	0.10
%Zero-Imperv	25	%Zero-Imperv	25
Subarea Routing	OUTLET	Subarea Routing	OUTLET
Percent Routed	100	Percent Routed	100
Infiltration Data	GREEN_AMPT	Infiltration Data	GREEN_AMPT
Groundwater	NO	Groundwater	NO
Snow Pack		Snow Pack	
LID Controls	0	LID Controls	0
Land Uses	0	Land Uses	0
Initial Buildup	NONE	Initial Buildup	NONE
Curb Length	0	Curb Length	0
N-Perv Pattern		N-Perv Pattern	
Dstore Pattern		Dstore Pattern	
Infil. Pattern		Infil. Pattern	
User-assigned name of subcatchment		User-assigned name of subcatchment	

Subcatchment DMA3 		Subcatchment BMP1 	
Property	Value	Property	Value
Name	DMA3	Name	BMP1
X-Coordinate	6828.731	X-Coordinate	1545.241
Y-Coordinate	7220.917	Y-Coordinate	5073.443
Description		Description	
Tag		Tag	
Rain Gage	ESCONDIDO_STATION	Rain Gage	ESCONDIDO_STATION
Outlet	BMP3	Outlet	POC1
Area	0.516	Area	.087
Width	92	Width	20
% Slope	0.5	% Slope	0
% Imperv	70	% Imperv	.5
N-Imperv	0.012	N-Imperv	0.012
N-Perv	0.15	N-Perv	0.15
Dstore-Imperv	0.05	Dstore-Imperv	0.05
Dstore-Perv	0.10	Dstore-Perv	0.10
%Zero-Imperv	25	%Zero-Imperv	25
Subarea Routing	OUTLET	Subarea Routing	OUTLET
Percent Routed	100	Percent Routed	100
Infiltration Data	GREEN_AMPT	Infiltration Data	GREEN_AMPT
Groundwater	NO	Groundwater	NO
Snow Pack		Snow Pack	
LID Controls	0	LID Controls	1
Land Uses	0	Land Uses	0
Initial Buildup	NONE	Initial Buildup	NONE
Curb Length	0	Curb Length	0
N-Perv Pattern		N-Perv Pattern	
Dstore Pattern		Dstore Pattern	
Infil. Pattern		Infil. Pattern	
User-assigned name of subcatchment		User-assigned name of subcatchment	

Subcatchment BMP2



Property	Value
Name	BMP2
X-Coordinate	4330.200
Y-Coordinate	5088.132
Description	
Tag	
Rain Gage	ESCONDIDO_STATION
Outlet	POC1
Area	.105
Width	12
% Slope	1
% Imperv	.5
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	
User-assigned name of subcatchment	

Subcatchment BMP3

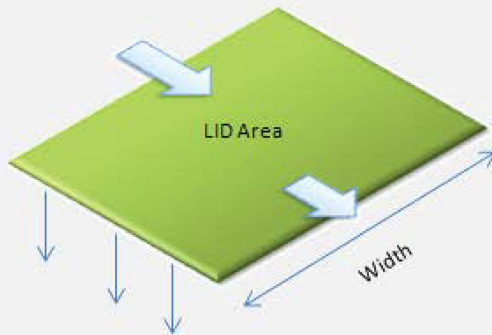


Property	Value
Name	BMP3
X-Coordinate	6830.200
Y-Coordinate	5091.069
Description	
Tag	
Rain Gage	ESCONDIDO_STATION
Outlet	POC1
Area	0.059
Width	62
% Slope	0
% Imperv	.5
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	
User-assigned name of subcatchment	

LID Usage Editor

LID Control Name

BF1



Detailed Report File (Optional)



☒ LID Occupies Full Subcatchment

Area of Each Unit (sq ft or sq m)

3789.72

Number of Units

1

% of Subcatchment Occupied

100.0

Surface Width per Unit (ft or m)

20

% Initially Saturated

0

% of Impervious Area Treated

100

% of Pervious Area Treated

0

Send Drain Flow To:

(Leave blank to use subcatchment outlet)

☐ Return all Outflow to Pervious Area

OK

Cancel

Help

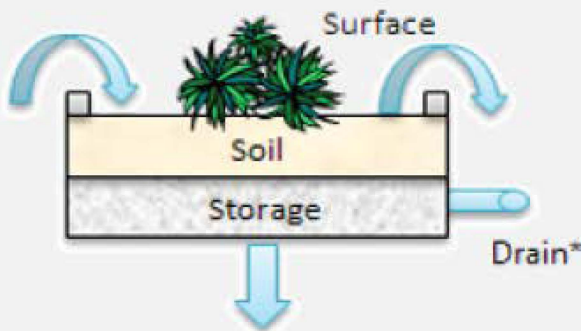
LID Control Editor

Control Name:

BF1

LID Type:

Bio-Retention Cell



*Optional

Surface

Soil

Storage

Drain

Berm Height
(in. or mm)

18

Vegetation Volume
Fraction

0.0

Surface Roughness
(Mannings n)

0.1

Surface Slope
(percent)

0

OK

Cancel

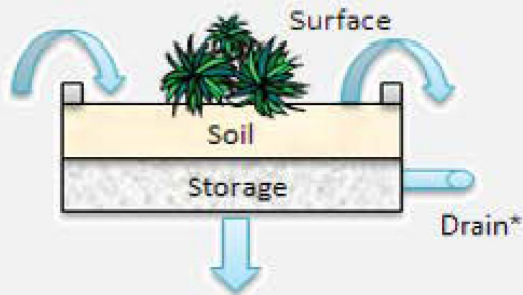
Help

LID Control Editor



Control Name:

LID Type:



*Optional

OK

Cancel

Help

Surface

Soil

Storage

Drain

Thickness
(in. or mm)

Porosity
(volume fraction)

Field Capacity
(volume fraction)

Wilting Point
(volume fraction)

Conductivity
(in/hr or mm/hr)

Conductivity
Slope

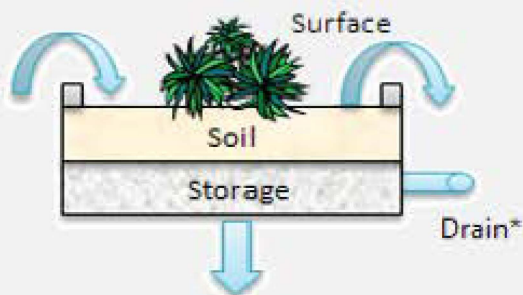
Suction Head
(in. or mm)

LID Control Editor



Control Name:

LID Type:



*Optional

OK

Cancel

Help

Surface

Soil

Storage

Drain

Thickness
(in. or mm)

Void Ratio
(Voids / Solids)

Seepage Rate
(in/hr or mm/hr)

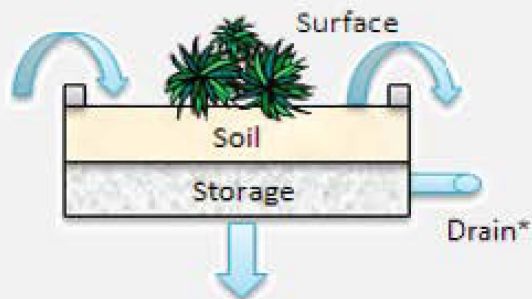
Clogging Factor

LID Control Editor



Control Name:

LID Type:



*Optional

OK

Cancel

Help

Surface Soil Storage **Drain**

Flow Coefficient*

Flow Exponent

Offset (in or mm)

Open Level (in or mm)

Closed Level (in or mm)

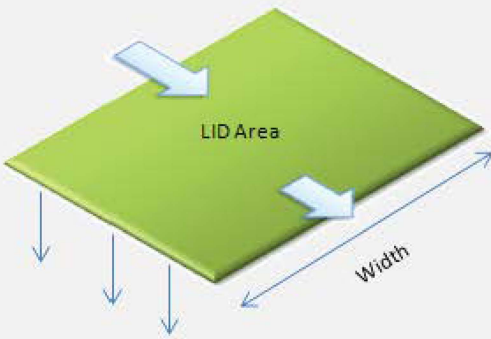
Control Curve

[Drain Advisor](#)

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

LID Usage Editor

LID Control Name:



Detailed Report File (Optional):  

☒ LID Occupies Full Subcatchment

Area of Each Unit (sq ft or sq m):

Number of Units:

% of Subcatchment Occupied:

Surface Width per Unit (ft or m):

% Initially Saturated:

% of Impervious Area Treated:

% of Pervious Area Treated:

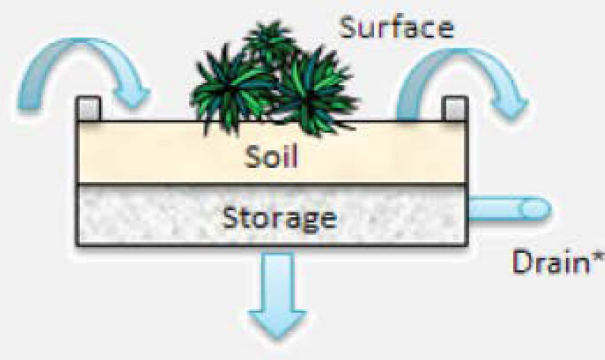
Send Drain Flow To:
(Leave blank to use subcatchment outlet)

☐ Return all Outflow to Pervious Area

LID Control Editor

Control Name:

LID Type:



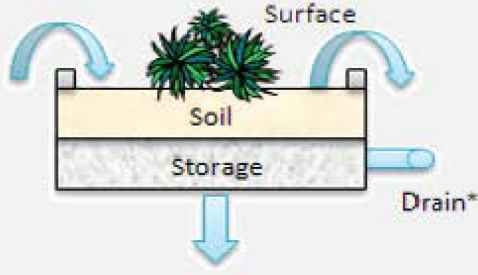
*Optional

Surface	Soil	Storage	Drain
Berm Height (in. or mm)		18	
Vegetation Volume Fraction		0.0	
Surface Roughness (Mannings n)		0.1	
Surface Slope (percent)		1.0	

LID Control Editor

Control Name:

LID Type:



*Optional

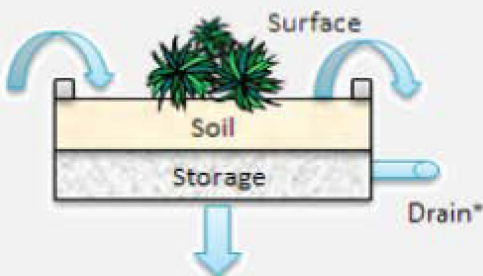
OK Cancel Help

Surface	Soil	Storage	Drain
Thickness (in. or mm)	18		
Porosity (volume fraction)	.4		
Field Capacity (volume fraction)	0.2		
Wilting Point (volume fraction)	0.1		
Conductivity (in/hr or mm/hr)	5		
Conductivity Slope	45		
Suction Head (in. or mm)	1.5		

LID Control Editor

Control Name:

LID Type:



*Optional

OK Cancel Help

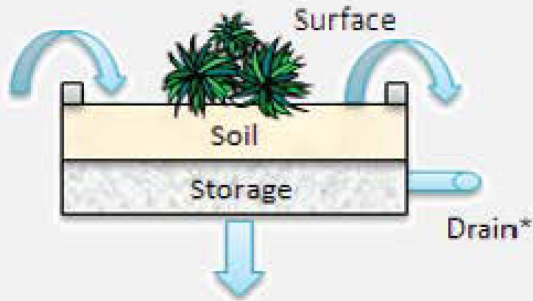
Surface	Soil	Storage	Drain
Thickness (in. or mm)	36		
Void Ratio (Voids / Solids)	.67		
Seepage Rate (in/hr or mm/hr)	.022		
Clogging Factor	0		

LID Control Editor



Control Name:

LID Type:



*Optional

OK

Cancel

Help

Surface Soil Storage **Drain**

Flow Coefficient*

Flow Exponent

Offset (in or mm)

Open Level (in or mm)

Closed Level (in or mm)

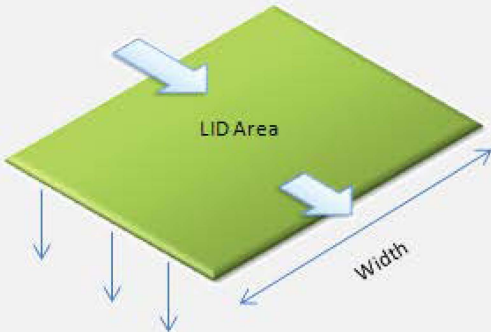
Control Curve

[Drain Advisor](#)

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

LID Usage Editor

LID Control Name:



Detailed Report File (Optional):

☐ LID Occupies Full Subcatchment

Area of Each Unit (sq ft or sq m):

Number of Units:

% of Subcatchment Occupied:

Surface Width per Unit (ft or m):

% Initially Saturated:

% of Impervious Area Treated:

% of Pervious Area Treated:

Send Drain Flow To:
(Leave blank to use subcatchment outlet)

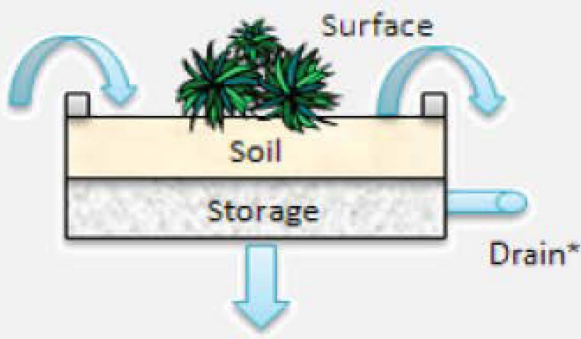
☐ Return all Outflow to Pervious Area

OK Cancel Help

LID Control Editor

Control Name:

LID Type:



*Optional

OK Cancel Help

Surface	Soil	Storage	Drain
Berm Height (in. or mm)		18	
Vegetation Volume Fraction		0.0	
Surface Roughness (Mannings n)		0.1	
Surface Slope (percent)		0	

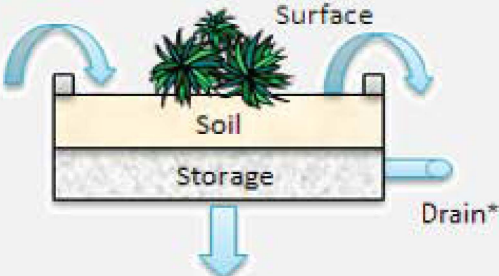
LID Control Editor

Control Name:

LID Type:

Surface
Soil
Storage
Drain

Thickness (in. or mm)	18
Porosity (volume fraction)	.4
Field Capacity (volume fraction)	0.2
Wilting Point (volume fraction)	0.1
Conductivity (in/hr or mm/hr)	5
Conductivity Slope	45
Suction Head (in. or mm)	1.5



*Optional

OK
Cancel
Help

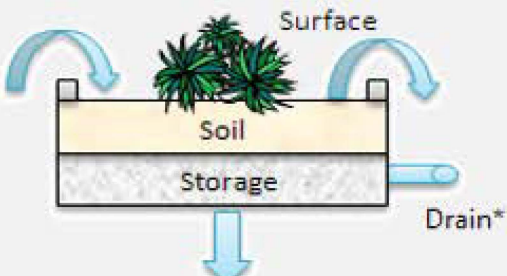
LID Control Editor

Control Name:

LID Type:

Surface
Soil
Storage
Drain

Thickness (in. or mm)	30.6
Void Ratio (Voids / Solids)	.67
Seepage Rate (in/hr or mm/hr)	.311
Clogging Factor	0



*Optional

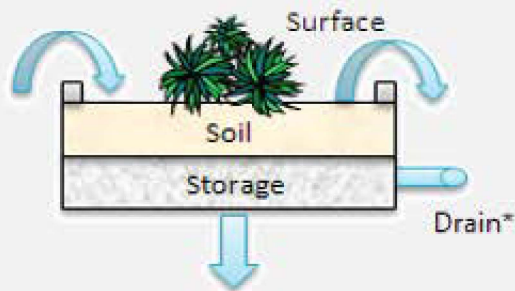
OK
Cancel
Help

LID Control Editor



Control Name:

LID Type:



*Optional

OK

Cancel

Help

Surface Soil Storage **Drain**

Flow Coefficient*

Flow Exponent

Offset (in or mm)

Open Level (in or mm)

Closed Level (in or mm)

Control Curve

[Drain Advisor](#)

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

Data Series Selection

Specify the object and variable to plot:
(Click an object on the map to select it)

Object Type

Object Name

Variable

Legend Label

Axis ☒ Left ☐ Right

Accept

Cancel

Help

Time Series Plot Selection

Time Periods

Start Date

09/24/1964

End Date

05/23/2008

☐ Elapsed Time

☒ Date/Time

Data Series

+ Add

Edit

- Delete

Node POC1 Total Inflow

OK

Cancel

Help

Statistics Report Selection

Object Category

Object Name

Variable Analyzed

Event Time Period

Statistic

Event Thresholds

Total Inflow

Event Volume

Separation Time

OK

Cancel

Help

APPENDIX III: DRAIN COEFFICIENT CALCULATION SUMMARY

BASIN ID	BF-1	
DRAIN COEFF, C	0.20	
T, DRAIN TIME (HRS)	72	HR
D, DEPTH (IN)	43.2	IN
cg	0.6	
ALID	3790	
D	1.5	
g	32.2	

BASIN ID	BF-2	
DRAIN COEFF, C	0.16	
T, DRAIN TIME (HRS)	72	HR
D, DEPTH (IN)	57	IN
cg	0.6	
ALID	4574	
D	1.5	
g	32.2	

BASIN ID	BF-3	
DRAIN COEFF, C	0.29	
T, DRAIN TIME (HRS)	72	HR
D, DEPTH (IN)	51.6	IN
cg	0.6	
ALID	2570	
D	1.5	
g	32.2	

**DMA AND HMP EXHIBIT FOR:
N. IRIS LANE**

TYPE D SOIL

TYPE C SOIL

ROBIN HILL LANE

APN: 224-310-08

APN: 224-310-05

APN: 224-310-06

APN: 224-310-07

APN: 224-310-03

APN: 224-310-04

APN: 224-310-02

APN: 224-310-01

MAP NO. 10888

MAP NO. 7449

MAP NO. 0723

POC 1

BMP-1

BMP-2

BMP-3

HIGH POINT

EXIST. PAVING

STREET TREE

EXIST. 12"x3" BOX CULVERT

EXIST. INLET

LOW FLOW DRAIN FROM BMP-3 TO CONTROL STRUCTURE BMP-2

OVERFLOW DRAIN TO GUTTER

MAP NO. 10888

MAP NO. 7449

MAP NO. 0723

POC 1

BMP-1

BMP-2

BMP-3

HIGH POINT

EXIST. PAVING

STREET TREE

EXIST. 12"x3" BOX CULVERT

EXIST. INLET

LOW FLOW DRAIN FROM BMP-3 TO CONTROL STRUCTURE BMP-2

OVERFLOW DRAIN TO GUTTER

DMA NO	TOTAL AREA (SF)	IMPERVIOUS (SF)	IMPERVIOUS (%)	PERVIOUS (S)	ADJUSTED IMPERVIOUS (SF)	DCV (CF)	SURFACE AREA REQUIRED (SF)	SURFACE AREA PROVIDED (SF)	BMP TYPE / STANDARD	BMP ID
N1	25,054	17,538	70%	7,516	17,513	1,022	525	2,231	BIOFILTRATION PARTIAL PR-1	BMP-3
S1	166,590	116,613	70%	49,977	118,196	6,895	3,546	4,580	BIOFILTRATION PARTIAL PR-1	BMP-2
S2	111,841	78,289	70%	33,552	80,526	4,697	2,416	3,383	BIOFILTRATION PARTIAL PR-1	BMP-1
-	-	-		-	-	-	-			
TOTAL	303,486	212,440	70%	91,046	216,234	12,614	6,487	10,194		
-	-	-		-	-	-	-			
-	-	-		-	-	-	-			
-	-	-		-	-	-	-			
-	-	-		-	-	-	-			
TOTAL	303,486	212,440	70%	91,046	216,234	12,614				

PROPOSED CURB AND GUTTER

EXISTING CONTOUR

PROPOSED DMA LIMITS

SOIL LIMITS

DIRECTION OF DRAINAGE

STORM DRAIN PIPE SIZE PER PLAN

TREE WELL

BASIN IDENTIFIER _____

BASIN AREA (AC.) _____

UNDERLYING HYDROLOGIC SOILS GROUP: _____

APPROXIMATE DEPTH TO GROUNDWATER: _____

EXISTING NATURAL HYDROLOGIC FEATURES: _____

POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS: _____

EXISTING TOPOGRAPHY: _____

EXISTING IMPERVIOUS AREAS: _____

EXISTING DRAINAGE SYSTEM: _____

PROPOSED DRAINAGE SYSTEM: _____

PROPOSED DEMOLITION: _____

PROPOSED GRADING: _____

PROPOSED IMPERVIOUS SURFACES: _____

DMA AREAS: _____

POLLUTANT SOURCES: _____

STRUCTURAL SOURCE CONTROL: _____

INLET SIGNAGE: _____

TRASH ENCLOSURE CONTROLS: _____

TREATMENT BMP: _____

TYPE "G" & "J" GREATER THAN 10 FEET N/A

SHOWN

SHOWN

SHOWN

EXISTING HOUSES AND DRIVEWAYS SHOWN

PAVING AND BUILDINGS SEE TABLE

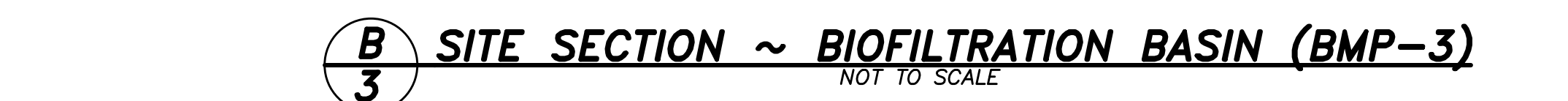
PAVEMENT AND LANDSCAPE AREAS SHOWN

CURB INLETS PROVIDED

SEE TABLE

- 1 STORM DRAIN INLETS.
- 2 LANDSCAPE/OUTDOOR PESTICIDE USE.
- 3 FIRE SPRINKLER TEST WATER.
- 4 MISCELLANEOUS DRAIN OR WASH WATER.
- 5 PLAZAS, SIDEWALKS, AND PARKING LOTS.
- 6 MINIMIZE IMPERVIOUS AREA.

- ☒ 7 RUNOFF COLLECTION.
- ☒ 8 LANDSCAPE WITH NATIVE OR DRAUGHT TOLERANT SPECIES.
- ☒ 10 INDOOR/STRUCTURAL PEST CONTR

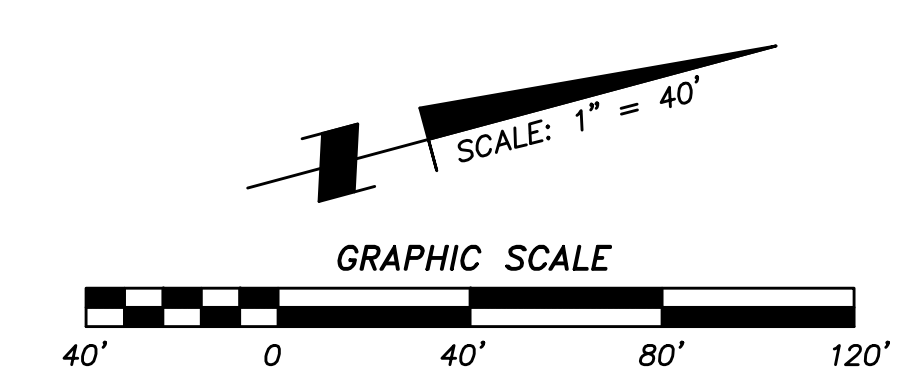


1	PLANTING.	11	AGGREGATE STORAGE LAYER ASTM NO. 57 ROCK.
2	30 MIL. P.V.C. LINER. ALL JOINTS TO BE SEALED WITH 12" MIN. OVERLAP.	12	2-SACK SURFACE BACKFILL AROUND STORM DRAIN LINE, PIPE ZONE.
3	SEAL PENETRATIONS.	13	SURFACE BACKFILL TO START AT STORM DRAIN BOX AND EXTEND AT LEAST 3 FEET BEYOND SLOPE FACE.
4	6" SLOTTED P.V.C. SUBDRAIN (ASTM D-3034), 3" MIN. FROM BOTTOM.	13	SEAL PVC LINER AROUND PIPES.
4	OUTLET CONTROL STRUCTURE WITH GRATED TOP.	14	USE A PIPE BOOT AND PVC SKIRT TO SEAL ALL LINER PENETRATIONS FOR PIPES. PVC SKIRT SHOULD BE SEALED TO THE PARENT LINER PER MANUFACTURER'S RECOMMENDATIONS (TYPICALLY A WEDGE WELDER). THE PIPE BOOT SLEEVE SHOULD BE ATTACHED TO THE PIPE USING BUTYL TAPE AND STAINLESS STEEL STRAPS.
5	ORIFICE PLATE (SEE TABLE BELOW).	14	ATTACH THE LINER TO CONCRETE STRUCTURES:
6	OUTLET PIPE.	1	PREPARE A PVC SKIRT FOR CONCRETE STRUCTURE.
6	SUBDRAIN CLEANOUT PER SORSO SC-01, RIM = G.A. + 0.6'	2	ATTACHED THE LINER TO THE CONCRETE STRUCTURE USING A STAINLESS STEEL BATTEN STRAP AND ADHESIVE.
7	INSTALL WELD AGG. SHREDED HARDWOOD MULCH THAT HAS BEEN STOCKPILED OR STORED FOR AT LEAST 12 MONTHS. MULCH MUST BE HIGH-FLOATING.	3	USE A WATER PROOF ADHESIVE PER THE MANUFACTURER'S RECOMMENDATION (TYPICALLY A POLYURETHANE).
8	FILTER CLOTH TO BE 3" CLEAN AND WASHED SAND (ASTM NO. 33) OVER 3" LAYER OF ASTM NO. 8 STONE.	3	THE PVC SKIRT TO BE SEALED TO THE PARENT LINER PER MANUFACTURER'S RECOMMENDATIONS (TYPICALLY A WEDGE WELDER).
9	SOIL MEDIA INFILTRATION = (BSM SPECIFICATION PER APPENDIX G OF COUNTY OF SAN DIEGO L.I.D. HANDBOOK JUNE 2014)	4	EMBED LINER 12" VERTICAL.
10	PER COUNTY OF SAN DIEGO L.I.D. HANDBOOK:		

BSM COMPOSITION	SANDY LOAM				COMPOST
	SAND	SAND	SILT	CLAY	
VOLUME	65%		20%		15%
WEIGHT	75-80%	10% MAX.	3% MAX.		9% MAX ¹

¹ % COMPOST BY WEIGHT RESULTS IN APPROXIMATELY 5% ORGANIC MATTER BY WEIGHT.

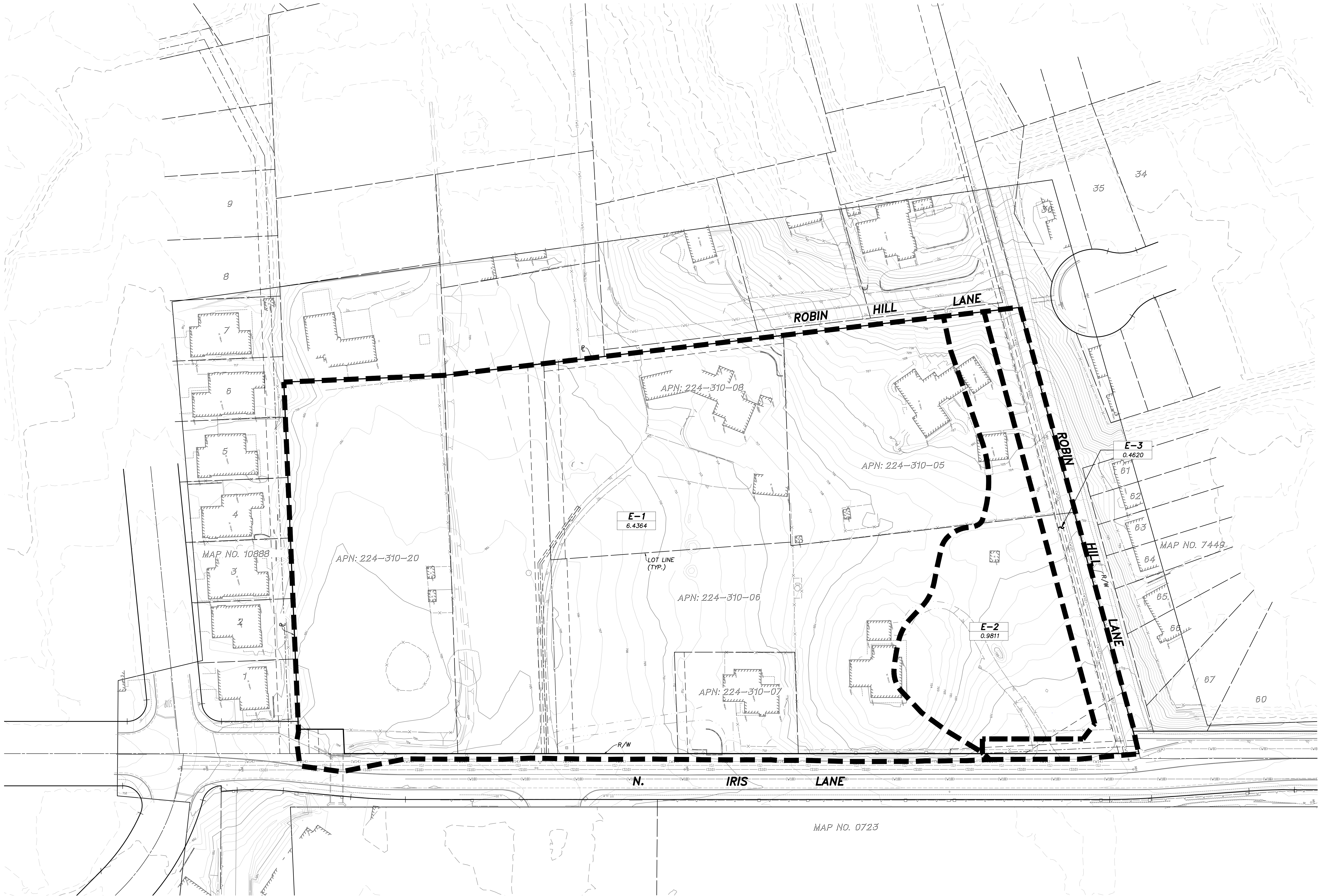
BASIN	CONTROL ORIFICE
BMP-1	1.5"
BMP-2	1.5"
BMP-3	1.5"



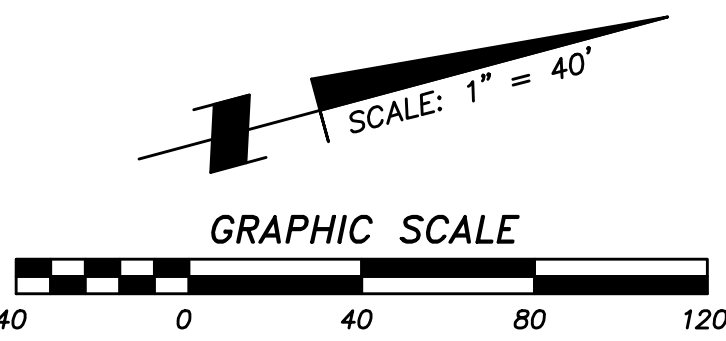
SB&O INC.
PLANNING ENGINEERING SURVEYING
3990 Ruffin Road, Suite 120
San Diego, Ca. 92123
658-560-1141
658-560-8157 Fax

EXISTING DMA AND HMP EXHIBIT FOR:
N. IRIS LANE

D.M.A. LEGEND	
DESCRIPTION	SYMBOL
PROPERTY LINE/PROJECT BOUNDARY	---
EXISTING CONTOUR	630
EXISTING DMA LIMITS	---
DIRECTION OF DRAINAGE	→
BASIN IDENTIFIER	E-5
BASIN AREA (AC.)	1.9600
NODE NUMBER	1
Q ₁₀₀ (C.F.S.)	17.29 ELEV. 6

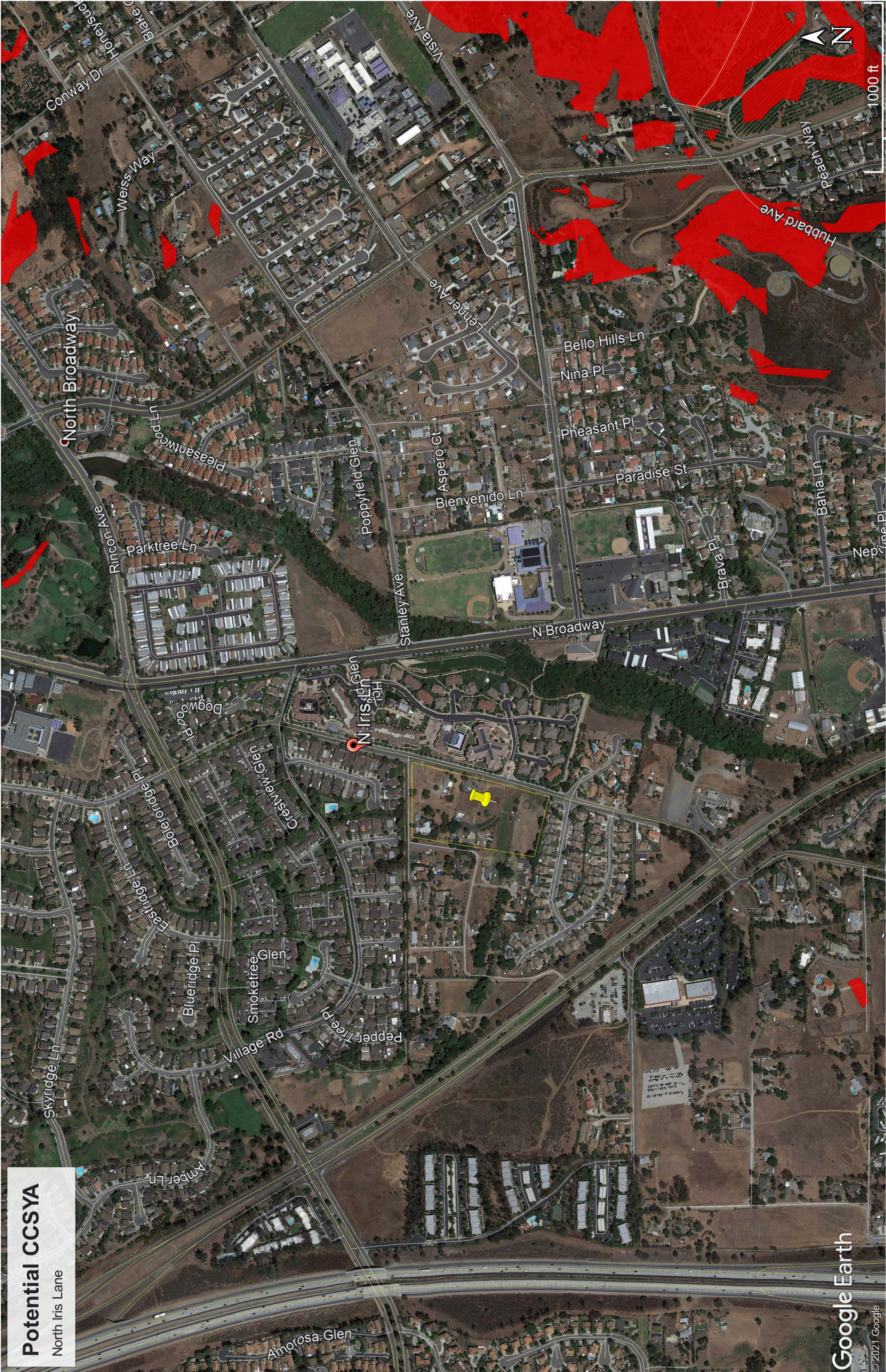


EXISTING DMA AND HMP EXHIBIT FOR:
N. IRIS LANE



SB&O
PLANNING ENGINEERING SURVEYING
3990 Ruffin Road, Suite 120
San Diego, Ca. 92123
658-560-1141
658-560-8157 Fax

Potential CCSYA
North Iris Lane



PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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 for Preliminary

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

This page was left intentionally blank.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

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

See County BMP Maintenance Worksheets

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 (PDP applicant to contact City staff to obtain the current maintenance agreement forms or download from City's website).

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

This page was left intentionally blank.

BF-1

Biofiltration

BMP MAINTENANCE FACT SHEET FOR STRUCTURAL BMP BF-1 BIOFILTRATION

Biofiltration facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Biofiltration facilities have limited or no infiltration. They are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Typical biofiltration components include:

- Inflow distribution mechanisms (e.g., perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure

Normal Expected Maintenance

Biofiltration requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.
- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

BF-1

Biofiltration

Other Special Considerations

Biofiltration is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, routine maintenance is key to preventing this scenario.

BF-1

Biofiltration

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR BF-1 BIOFILTRATION		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	- Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. - Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	- Inspect monthly and after every 0.5-inch or larger storm event. - Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable	- Inspect annually. - Maintenance when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	- Inspect monthly. - Maintenance when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	- Inspect monthly. - Maintenance when needed.
Overgrown vegetation	Mow or trim as appropriate.	- Inspect monthly. - Maintenance when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	- Inspect monthly. - Replenish mulch annually, or more frequently when needed based on inspection.

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

BF-1

Biofiltration

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR BF-1 BIOFILTRATION (Continued from previous page)		
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	- Inspect monthly. - Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	- Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils.	- Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	- Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed.
Underdrain clogged	Clear blockage.	- Inspect if standing water is observed for longer than 24-96 hours following a storm event. - Maintenance when needed.

BF-1

Biofiltration

References

- American Mosquito Control Association. <http://www.mosquito.org/>
- California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook. <https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook>
- County of San Diego. 2014. Low Impact Development Handbook. <http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html>
- San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet BF-1. http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

BF-1

Biofiltration

Page Intentionally Blank for Double-Sided Printing

BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:		Responsible Party Name and Phone Number:
Property Address of BMP:		Responsible Party Address:

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 1 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Accumulation of sediment, litter, or debris Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, without damage to the vegetation ☐ If sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month (25% full*), add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials. ☐ Other / Comments:		
Poor vegetation establishment Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 2 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Dead or diseased vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		
2/3 of mulch has decomposed, or mulch has been removed Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches ☐ Other / Comments:		

BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 3 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 4 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Underdrain clogged (inspect underdrain if standing water is observed for longer than 24-96 hours following a storm event) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 5 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Standing water in BMP for longer than 24-96 hours following a storm event* Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

SD-1

Tree Wells

BMP MAINTENANCE FACT SHEET FOR SITE DESIGN BMP SD-1 TREE WELLS

Tree wells as site design BMPs are trees planted in configurations that allow storm water runoff to be directed into the soil immediately surrounding the tree. The tree may be contained within a planter box or structural cells. The surrounding area will be graded to direct runoff to the tree well. There may be features such as tree grates, suspended pavement design, or shallow surface depressions designed to allow runoff into the tree well. Typical tree well components include:

- Trees of the appropriate species for site conditions and constraints
- Available growing space based on tree species, soil type, water availability, surrounding land uses, and project goals
- Entrance/opening that allows storm water runoff to flow into the tree well (e.g., a curb opening, tree grate, or surface depression)
- Optional suspended pavement design to provide structural support for adjacent pavement without requiring compaction of underlying layers
- Optional root barrier devices as needed; a root barrier is a device installed in the ground, between a tree and the sidewalk, intended to guide roots down and away from the sidewalk in order to prevent sidewalk lifting from tree roots
- Optional tree grates; to be considered to maximize available space for pedestrian circulation and to protect tree roots from compaction related to pedestrian circulation; tree grates are typically made up of porous material that will allow the runoff to soak through
- Optional shallow surface depression for ponding of excess runoff
- Optional planter box drain

Normal Expected Maintenance

Tree health shall be maintained as part of normal landscape maintenance. Additionally, ensure that storm water runoff can be conveyed into the tree well as designed. That is, the opening that allows storm water runoff to flow into the tree well (e.g., a curb opening, tree grate, or surface depression) shall not be blocked, filled, re-graded, or otherwise changed in a manner that prevents storm water from draining into the tree well. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

Tree wells are site design BMPs that normally do not require maintenance actions beyond routine landscape maintenance. The normal expected maintenance described above ensures the BMP functionality. If changes have been made to the tree well entrance / opening such that runoff is prevented from draining into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well, or a surface depression has been filled so runoff flows away from the tree well), the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance will be required to restore drainage into the tree well as designed.

Surface ponding of runoff directed into tree wells is expected to infiltrate/evapotranspire within 24-96 hours following a storm event. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging or compaction of the soils surrounding the tree. Loosen or replace the soils to restore drainage.

SD-1

Tree Wells

Other Special Considerations

Site design BMPs, such as tree wells, installed within a new development or redevelopment project are components of an overall storm water management strategy for the project. The presence of site design BMPs within a project is usually a factor in the determination of the amount of runoff to be managed with structural BMPs (i.e., the amount of runoff expected to reach downstream retention or biofiltration basins that process storm water runoff from the project as a whole). When site design BMPs are not maintained or are removed, this can lead to clogging or failure of downstream structural BMPs due to greater delivery of runoff and pollutants than intended for the structural BMP. Therefore, the [City Engineer] may require confirmation of maintenance of site design BMPs as part of their structural BMP maintenance documentation requirements. Site design BMPs that have been installed as part of the project should not be removed, nor should they be bypassed by re-routing roof drains or re-grading surfaces within the project. If changes are necessary, consult the [City Engineer] to determine requirements.

SD-1

Tree Wells

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR SD-1 TREE WELLS			
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.			
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency	
Tree health	Routine actions as necessary to maintain tree health.	- Inspect monthly. - Maintenance when needed.	
Dead or diseased tree	Remove dead or diseased tree. Replace per original plans.	- Inspect monthly. - Maintenance when needed.	
Standing water in tree well for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to tree health	Loosen or replace soils surrounding the tree to restore drainage.	- Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed.	
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	Disperse any standing water from the tree well to nearby landscaping. Loosen or replace soils surrounding the tree to restore drainage (and prevent standing water).	- Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed	
Entrance / opening to the tree well is blocked such that storm water will not drain into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well; or a surface depression is filled such that runoff drains away from the tree well)	Make repairs as appropriate to restore drainage into the tree well.	- Inspect monthly. - Maintenance when needed.	

SD-1

Tree Wells

References

- American Mosquito Control Association.
<http://www.mosquito.org/>
- County of San Diego. 2014. Low Impact Development Handbook.
<http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html>
- San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet SD-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=2508&Itemid=220

SD-1

Tree Wells

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:		Responsible Party Name and Phone Number:
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR SD-1 TREE WELLS PAGE 1 of 2			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Dead or diseased tree Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased tree ☐ Replace per original plans ☐ Other / Comments:		
Standing water in tree well for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to tree health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Loosen or replace soils surrounding the tree to restore drainage ☐ Other / Comments:		

SD-1

Tree Wells

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR SD-1 TREE WELLS PAGE 2 of 2			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Disperse any standing water from the tree well to nearby landscaping ☐ Loosen or replace soils surrounding the tree to restore drainage (and prevent standing water) ☐ Other / Comments:		
Entrance / opening to the tree well is blocked such that storm water will not drain into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well; or a surface depression is filled such that runoff drains away from the tree well) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make repairs as appropriate to restore drainage into the tree well ☐ Other / Comments:		

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 4

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

Not Applicable for Preliminary Reports

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

This page was left intentionally blank.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 5

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

See DMA / HMP Exhibit

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.

***Note: Plan sheets included in this attachment can be full size or half size.**