Development Services Department

Storm Water Quality Management Plan (SWQMP) Requirements

3/14/2024

The City of SAN DIEGO

AGENDA

1. Introductions
2. SWQMP Basics
3. Infiltration Feasibility
4. Pollutant Control BMPs
5. Hydromodification Management Plans
6. Recap
7. Q&A

1. Introductions

Department Roles

- Storm Water Department (SWD) is the asset owner of the City's storm water system and has an over-arching role in coordinating the MS4 permit requirements.

- Development Services Department (DSD) is responsible for the review, approval, and building inspection of private development.

- Engineering and Capital Projects (E&CP) is responsible for the design and construction of the Capital Improvement Program (CIP). E&CP staff is also responsible for inspection of grading and public improvements for private development projects.

2. SWQMP Basics

When is a SWQMP needed and why is it important?

- Impervious Area Development – 10,000 SF New, 5,000 SF Redevelopment, 2,500 SF Development in Environmentally Sensitive Areas (ESA)
- Projects that require a SWQMP are known as Priority Development Projects (PDPs)
- PDPs must implement Pollutant Control BMPs and a Hydromodification Management Plan (HMP)
- Prevents pollutants from entering the stormwater conveyance system, minimizes erosion of natural channels, and protects our waterways and waterbodies

3. Infiltration Feasibility

Infiltration Feasibility Steps

1. Harvest and Use

	Design Capture Volume	Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=		inches
2	Area tributary to BMP (s)	A=		acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=		unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=		cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=		cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=		cubic-feet

3. Infiltration Feasibility

Infiltration Feasibility Steps

1. Harvest and Use

Harvest and Use Feasibility Checklist		Worksheet B.3-1 : Form I-7
1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season? ☐ Toilet and urinal flushing ☐ Landscape irrigation ☐ Other:_____		
2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2. [Provide a summary of calculations here]		
3. Calculate the DCV using worksheet B-2.1. DCV = _____ (cubic feet) [Provide a summary of calculations here]		
3a. Is the 36-hour demand greater than or equal to the DCV? ☐ Yes / ☐ No ⇩ ⇨	3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV? ☐ Yes ⇩ / ☐ No ⇨	3c. Is the 36-hour demand less than 0.25DCV? ☐ Yes ⇩
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	Harvest and use is considered to be infeasible.
☐ Is harvest and use feasible based on further evaluation? ☐ Yes, refer to Appendix E to select and size harvest and use BMPs. ☐ No, select alternate BMPs.		

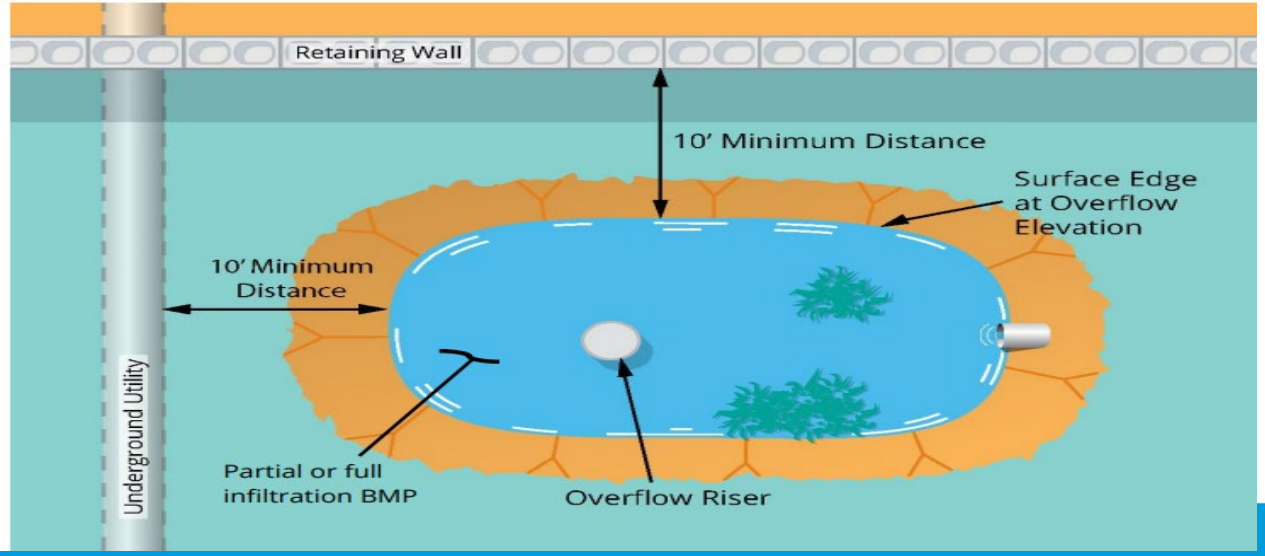
3. Infiltration Feasibility

Infiltration Feasibility Steps

1. Harvest and Use
2. Infiltration
(Full, Partial, No Infiltration)

OPTION 1 Simple Feasibility Criteria

- Submit Infiltration Feasibility Letter per Appendix C.1
- No Infiltration Condition based on the following
  - Existing Fill Materials Greater Than Five (5) feet
  - Existing Underground Utilities, Structures or Retaining Walls within 10 feet
  - Existing Natural Slope (>25%) within 50 feet or fill slope within 1.5 times the height of slope
  - Within 100 feet of contaminated soil or groundwater sites
  - Other physical impairments (i.e., fire road egress, public safety considerations, etc.)



3. Infiltration Feasibility

Infiltration Feasibility Steps

1. Harvest and Use
2. Infiltration
(Full, Partial, No Infiltration)

OPTION 2 Site Specific Infiltration Test

- Perform Infiltration Test suitable for Design Phase per Table D.3-1

Table D.3-1: Comparison of Infiltration Rate Estimation and Testing Methods[18]

Test	Suitability at Planning Phase	Suitability at Design Phase[19]
NRCS Soil Survey Maps	Yes, but mapped soil types must be confirmed with site observations. Regional soil maps are known to contain inaccuracies at the scale of typical development sites.	Yes, for partial infiltration designs when mapped soils are corroborated with soil samples collected during investigation activities. No, for full infiltration designs.
Grain Size Analysis	Not preferred. Should only be used if a strong correlation has been developed between grain size analysis and measured infiltration rate testing results of site soils.	No
Cone Penetrometer Test (CPT)	Not preferred. Should only be used if a strong correlation has been developed between CPT results and measured infiltration rate testing results of site soils.	No
Simple Open Pit Test	Yes	Yes, with appropriate correction for infiltration into side walls and elevated factor of safety.
Open Pit Falling Head Test	Yes	Yes, with appropriate correction for infiltration into side walls and elevated factor of safety.
Double Ring Infiltrometer Test (ASTM 3385)	Yes	Yes
Single Ring Infiltrometer Test	Yes	Yes
Large-scale Pilot Infiltration Test	Yes, but generally cost prohibitive and too water-intensive for preliminary screening of a large area.	Yes, but should consider relatively large water demand associated with this test.
Smaller-scale Pilot Infiltration Test	Yes	Yes

3. Infiltration Feasibility

Infiltration Feasibility Steps

1. Harvest and Use
2. Infiltration (Full, Partial, No Infiltration)

OPTION 2 Site Specific Infiltration Test

- Perform Infiltration Test suitable for Design Phase per Table D.3-1
- Provide Reliable Infiltration Rate
  - Full Infiltration – > 0.5 in/hr
  - Partial Infiltration – >= 0.05 in/hr and <= 0.5 in/hr
  - No Infiltration - < 0.05 in/hr
- Determine constraints based on Geotechnical Conditions
- Identify Infiltration Feasibility Condition and Submit Forms

3. Infiltration Feasibility

Infiltration Feasibility Steps

1. Harvest and Use
2. Infiltration

(Full, Partial, No Infiltration)

OPTION 2 Site Specific Infiltration Test

Attachment 1d	Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition: • No Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A (optional) ○ Form I-8B (optional) • Partial Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A ○ Form I-8B • Full Infiltration Condition: ○ Form I-8A ○ Form I-8B ○ Worksheet C.4-3 ○ Form I-9 Refer to Appendices C and D of the BMP Design Manual for guidance.

4. Pollutant Control BMPs

Hierarchy

- Retention - Harvest and Use
- Retention - Infiltration (Full/ Partial Infiltration)
- Biofiltration (No Infiltration)
- Flow-thru w/ Alternative Compliance

Table 5-1. Permanent Structural BMPs for PDPs

MS4 Permit Category	Manual Category	BMPs
Retention	Harvest and Use (HU)	HU-1: Cistern
Retention	Infiltration (INF)	INF-1: Infiltration basin INF-2: Bioretention INF-3: Permeable pavement INF-4: Dry Wells
NA	Partial Retention (PR)	PR-1: Biofiltration with partial retention
Biofiltration	Biofiltration (BF)	BF-1: Biofiltration BF-2: Nutrient Sensitive Media Design BF-3: Proprietary Biofiltration
Flow-thru treatment control	Flow-thru treatment control with Alternative Compliance (FT)	FT-1: Vegetated swales FT-2: Media filters FT-3: Sand filters FT-4: Dry extended detention basins FT-5: Proprietary flow-thru treatment control

4. Pollutant Control BMPs

BF-1 Biofiltration Systems

For use in Full, Partial or no infiltration conditions

- 3:1 Side Slopes
- Fencing required for ponding depth over 18”
- Required orifices must be clearly shown on Biofiltration.
- Biofiltration must be sized using Worksheet B.5-1
- BMP Parameters on worksheet B.5.1 must be consistent with BMP Sections
- Biofiltration designed for Storm Water Management and Flood Control must be sized per the County of San Diego “conjunctive use facilities for storm water management and flood control January 21, 2020” guidelines

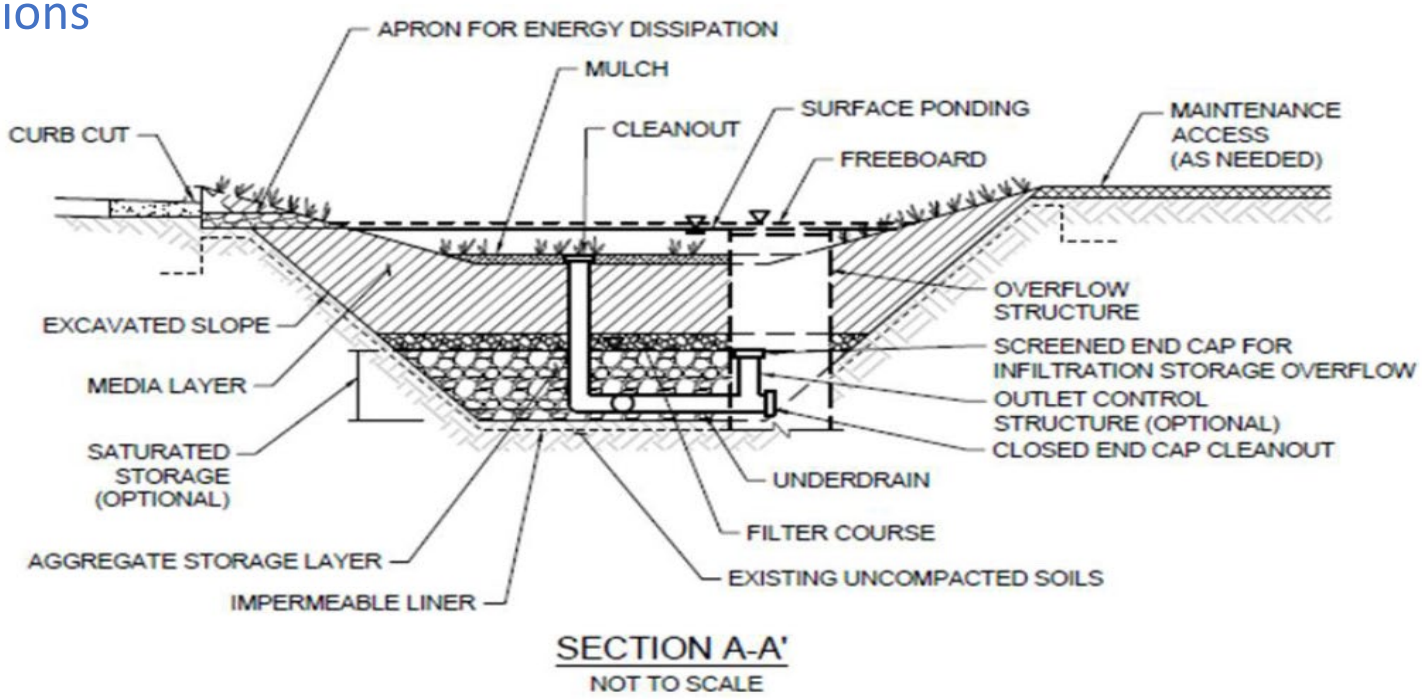


Figure E.18-1 : Typical Plan and Section View of a Biofiltration BMP

4. Pollutant Control BMPs

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Sizing Method for Pollutant Removal Criteria		Worksheet B.5-1	
1	Area draining to the BMP	4487	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.65	
3	85th percentile 24-hour rainfall depth	0.54	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	131	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	24	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	0.14	in/hr.

4. Pollutant Control BMPs

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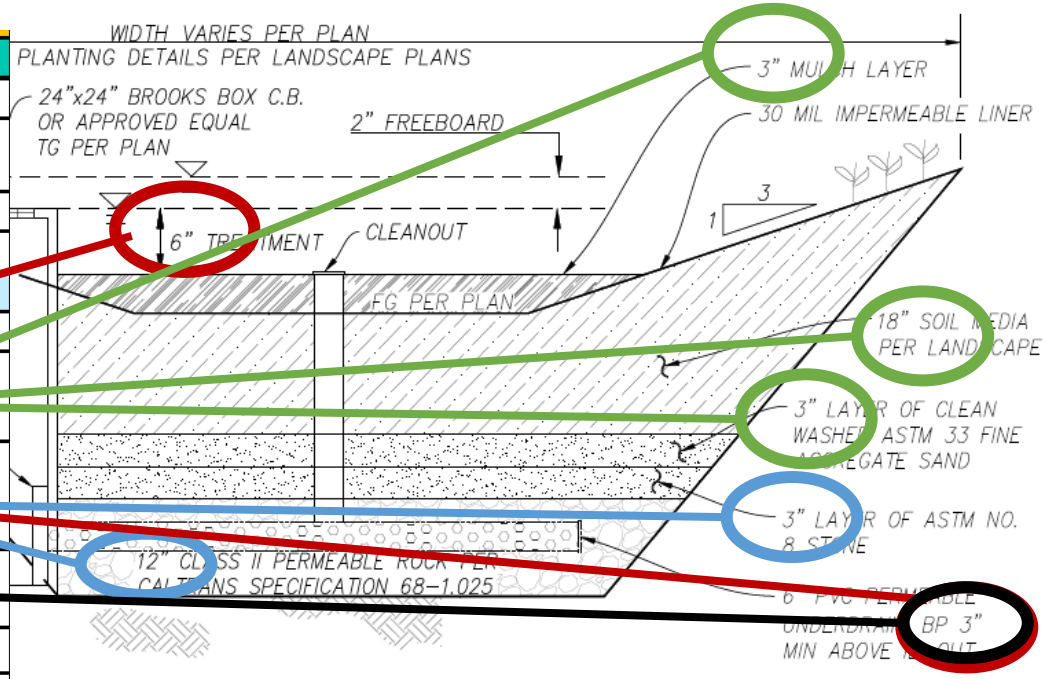

4. Pollutant Control BMPs

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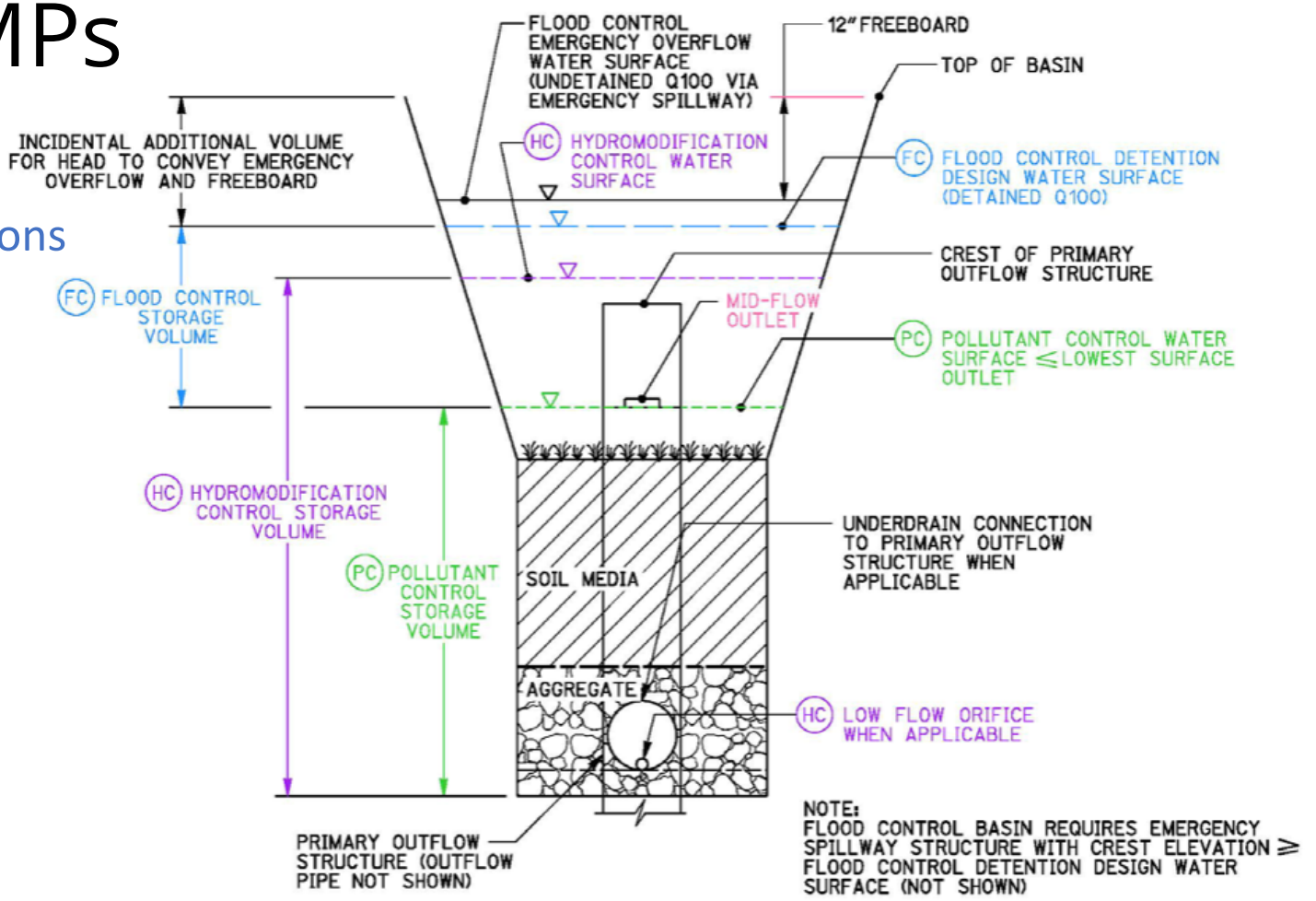

Figure 3
Conjunctive Use Facility for Storm Water Management and Flood Control:
Pollutant Control, Hydromodification Control, and Flood Control Detention; With Mid-flow Outlet

4. Pollutant Control BMPs

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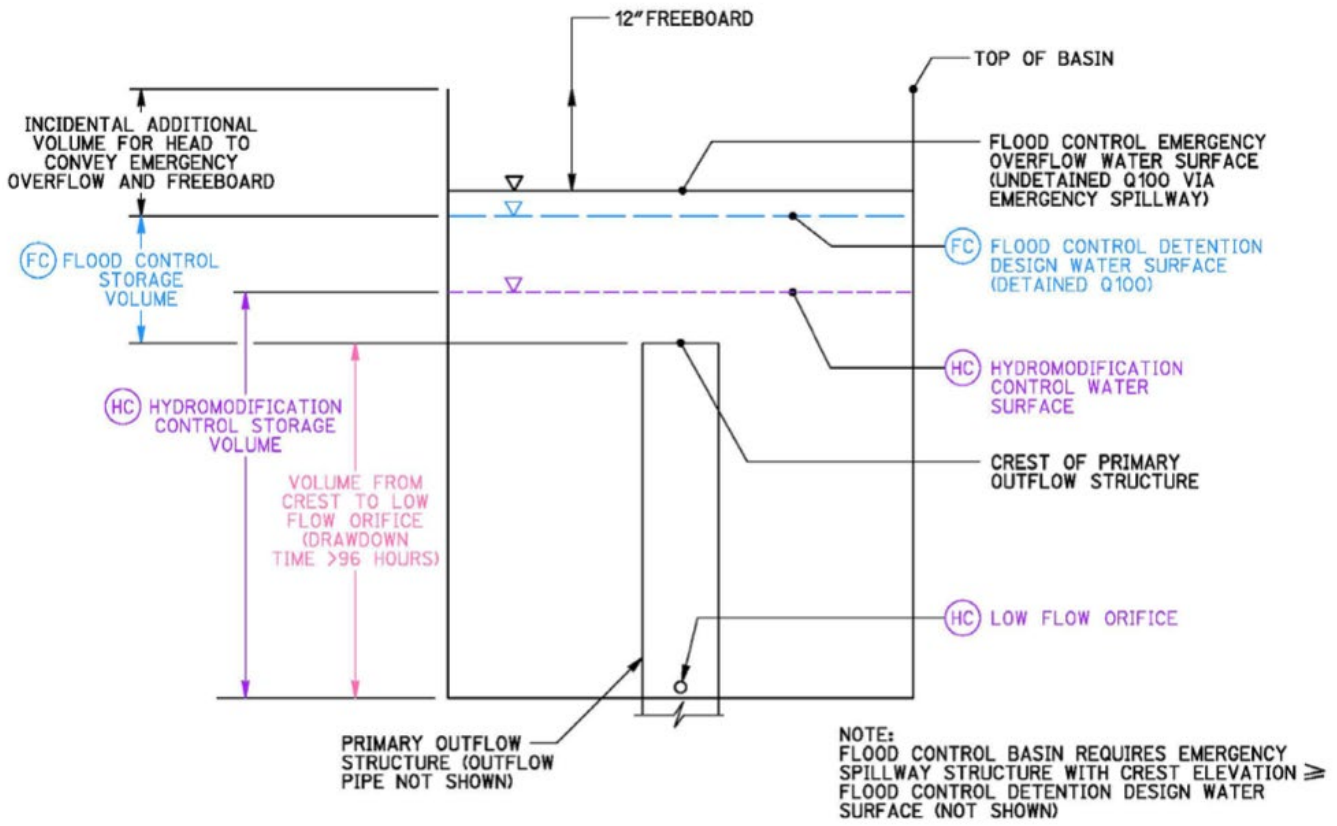
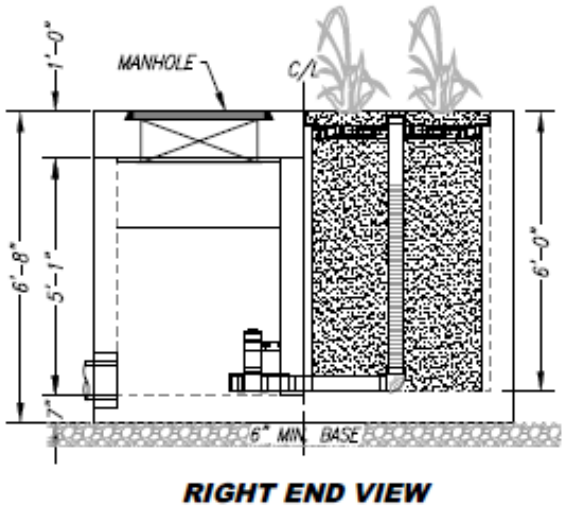


Figure 5
Conjunctive Use Facility for Storm Water Management and Flood Control:
Hydromodification Control and Flood Control Detention;
Drawdown Time from Crest of Primary Outflow Structure to Low Flow Orifice Greater than 96 Hours

4. Pollutant Control BMPs

BF-3 Proprietary Biofiltration Systems

For use in Partial and No-Infiltration conditions



RIGHT END VIEW

MWS

- Vegetated Units
- I-10 Form
- TAPE Certification
- Treat 1.5 times the DCV.
- Use worksheet B.6-1 To Calculate the Design Flow Rate.
- Demonstrates that an appropriate unit size is provided
- DMA must meet the target Volume Retention
- Units downstream of a Storage unit must be sized per section B.5.2.2 (Volume based)

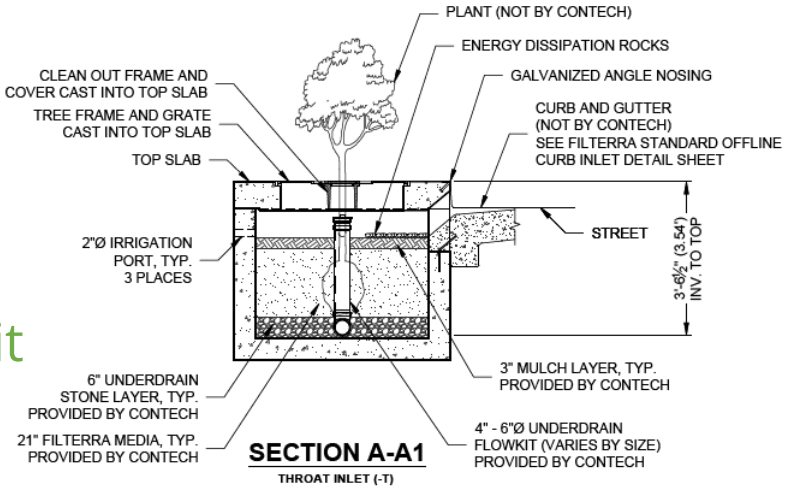


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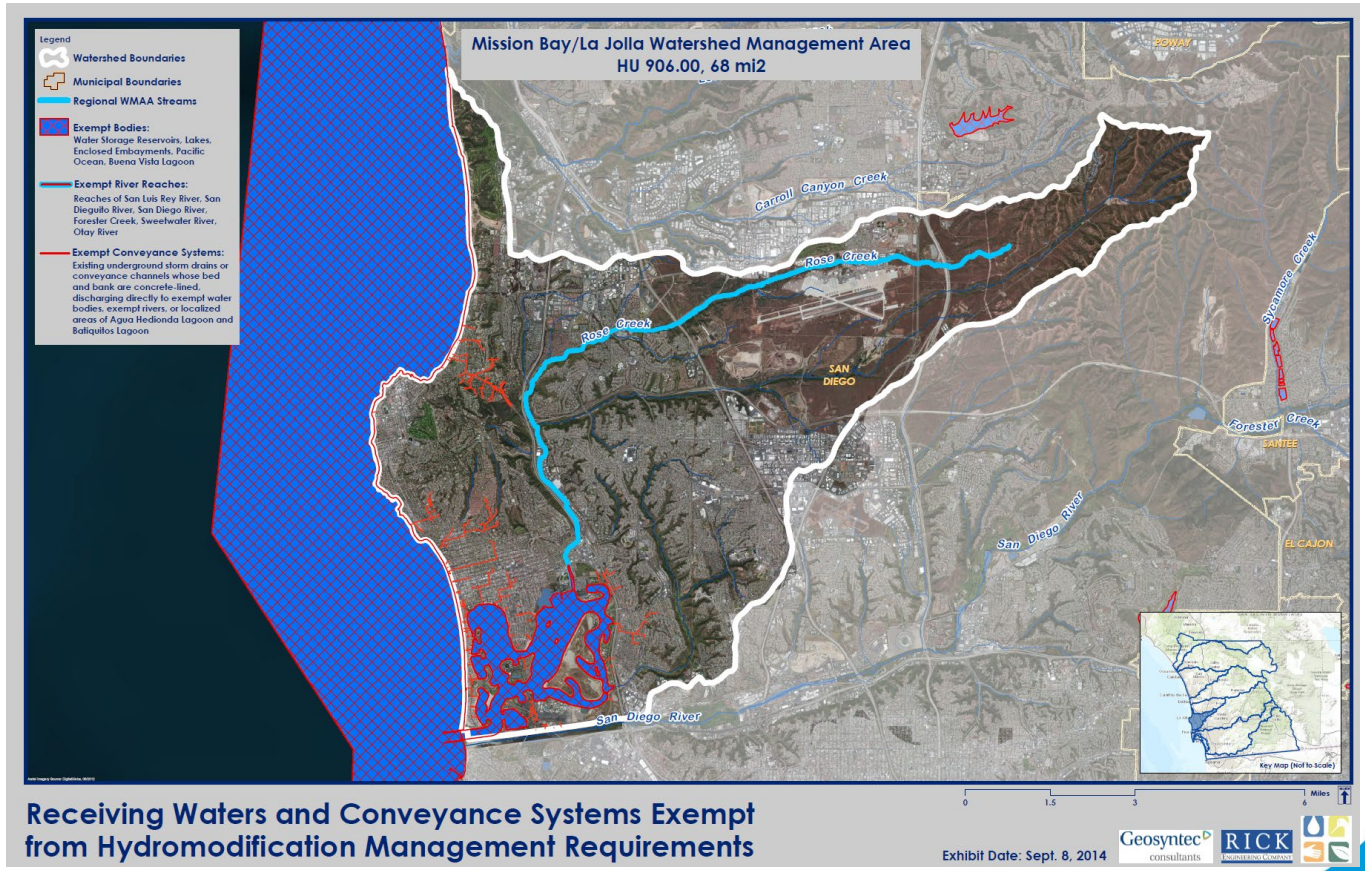
Photo Credit: Contech Engineered Solutions

5. Hydromodification Management Plans (HMP)

Is my project HMP Exempt or not?

- Project discharges to a hardened conveyance all the way to an exempt waterbody (Pacific Ocean, Embayment, Lake or Reservoir)
- Outfall must not be located within or on top of a bluff
- Outfall must not be located within a wildlife refuge or reserve area
- Provide exhibit and supporting documentation for HMP Exemption



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As shown here in the current HMP exemption mapping of Mission Bay, the Kendall Frost Marsh Lands

5. Hydromodification Management Plans (HMP)

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- Provide exhibit and supporting documentation for HMP Exemption

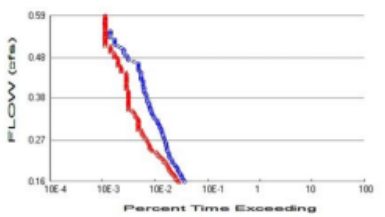
5. Hydromodification Management Plans (HMP)

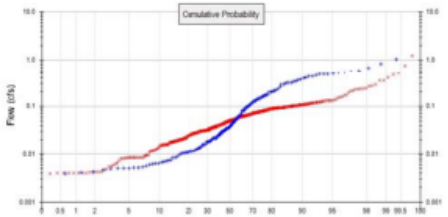
HMP Required

- Determine Low Flow Threshold (0.1Q2, 0.3Q2, 0.5Q2)
- Size your HMP Structure (Continuous Simulation, Sizing Factors)
- Provide drawdown times for HMP structure
- Provide HMP exhibit

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 1.79
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.02
Total Impervious Area: 0.77

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.315585
5 year	0.482891
10 year	0.592549
25 year	0.874481

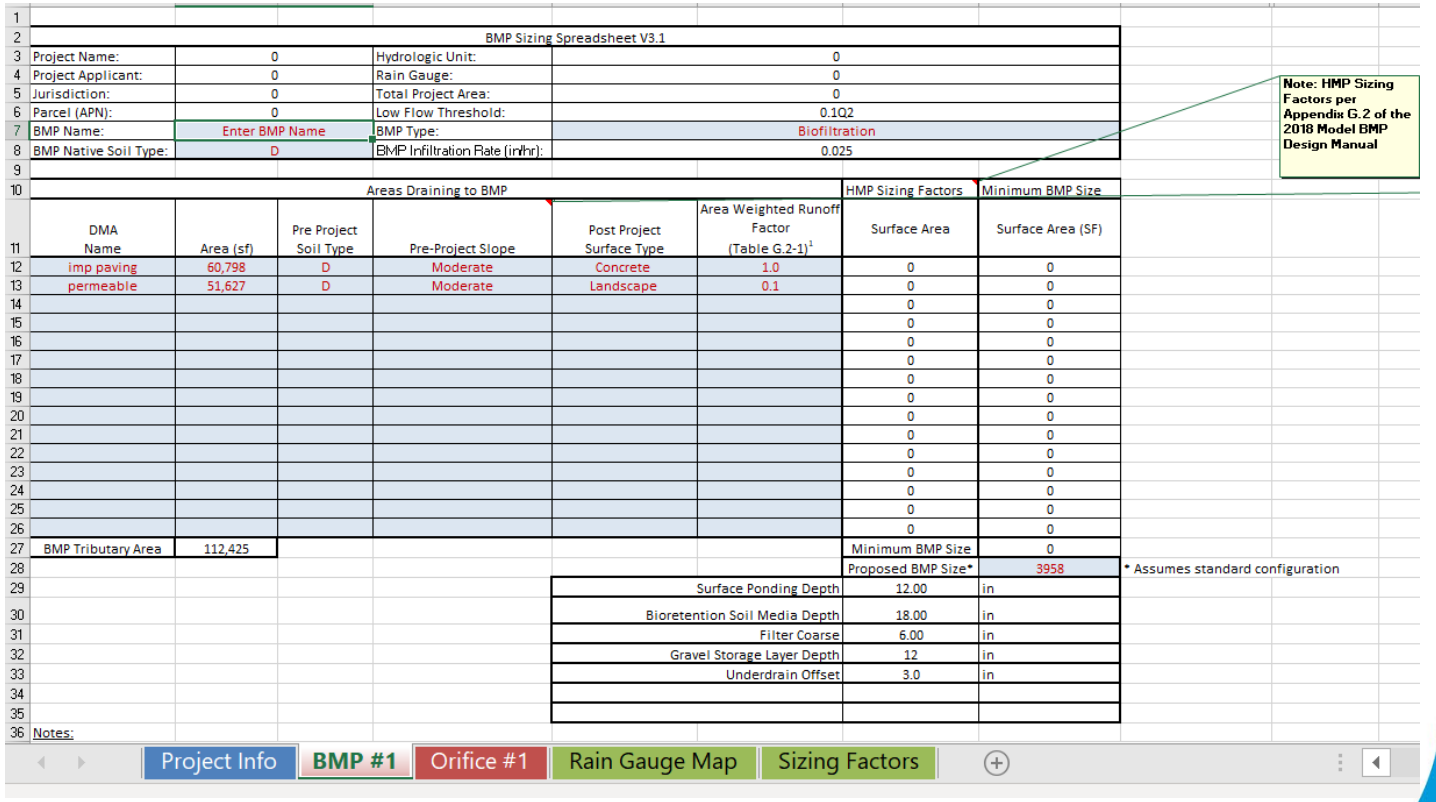
Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.164688
5 year	0.278987
10 year	0.454712
25 year	0.862219

5. Hydromodification Management Plans (HMP)

HMP Required

- Determine Low Flow Threshold (0.1Q2, 0.3Q2, 0.5Q2)
- Size your HMP Structure (Continuous Simulation, Sizing Factors)
- Provide drawdown times for HMP structure
- Provide HMP exhibit



BMP Sizing Spreadsheet V3.1

Project Name:	0	Hydrologic Unit:	0
Project Applicant:	0	Rain Gauge:	0
Jurisdiction:	0	Total Project Area:	0
Parcel (APN):	0	Low Flow Threshold:	0.1Q2
BMP Name:	Enter BMP Name	BMP Type:	Biofiltration
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.025

Note: HMP Sizing Factors per Appendix G.2 of the 2018 Model BMP Design Manual

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
imp paving	60,798	D	Moderate	Concrete	1.0	0	0
permeable	51,627	D	Moderate	Landscape	0.1	0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	112,425					Minimum BMP Size	0
						Proposed BMP Size*	3958

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

Project Info | BMP #1 | Orifice #1 | Rain Gauge Map | Sizing Factors

5. Hydromodification Management Plans (HMP)

HMP Required

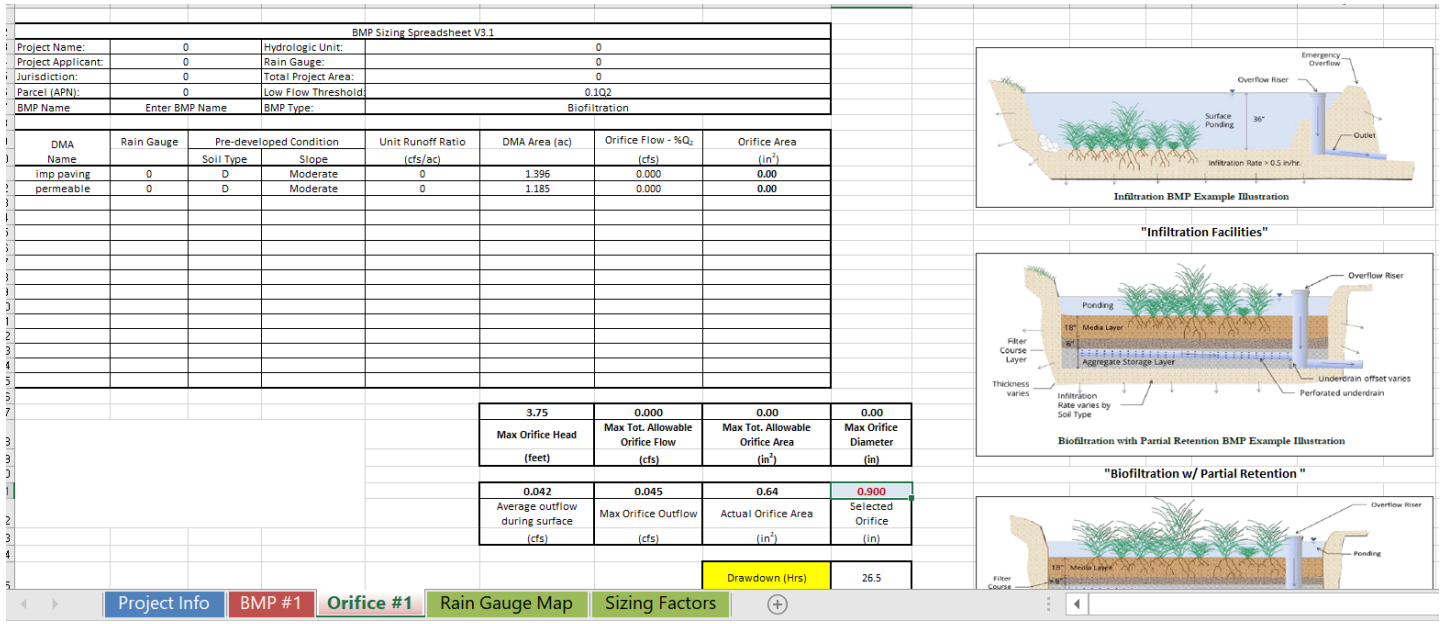
Determine Low Flow Threshold (0.1Q2, 0.3Q2, 0.5Q2)

Size your HMP Structure

(Continuous Simulation, Sizing Factors)

Provide drawdown times for HMP structure

Provide HMP exhibit



BMP Sizing Spreadsheet V3.1

Project Name:	0	Hydrologic Unit:	0
Project Applicant:	0	Rain Gauge:	0
Jurisdiction:	0	Total Project Area:	0
Parcel (APN):	0	Low Flow Threshold:	0.1Q2
BMP Name	Enter BMP Name	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio	DMA Area (ac)	Orifice Flow - %Q_2	Orifice Area
		Soil Type	Slope	(cfs/ac)		(cfs)	(in^2)
imp paving	0	D	Moderate	0	1.396	0.000	**0.00**
permeable	0	D	Moderate	0	1.185	0.000	**0.00**

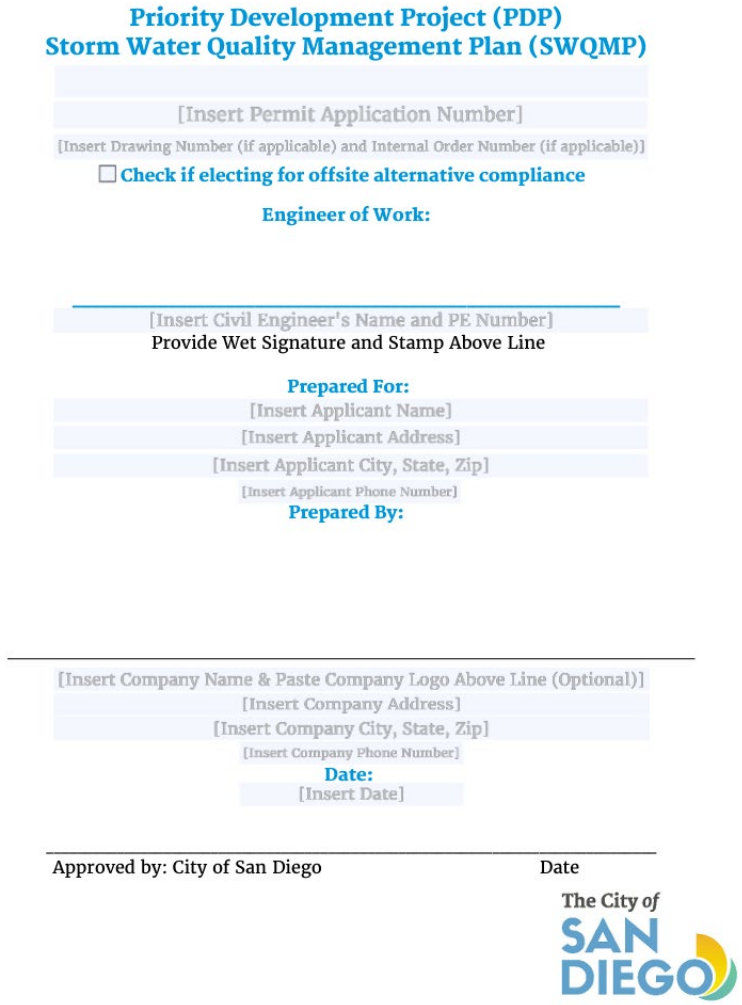
3.75	0.000	0.00	0.00
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**
0.042	0.045	0.64	0.900
Average outflow during surface (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice (in)
		Drawdown (Hrs)	26.5

Project Info | BMP #1 | Orifice #1 | Rain Gauge Map | Sizing Factors

6. Recap

Tips to streamlining the SWQMP approval

- Use the City of San Diego SWQMP Template
- Submit a complete SWQMP
- Determine your infiltration Feasibility (Simple Feasibility Letter or site specific infiltration test)
- Determine your Pollutant Control BMP (Biofiltration, Proprietary)
- Determine HMP Requirement
- Determine and size your HMP structure
- Ensure Consistency between SWQMP Exhibits, Construction Plans, and Storm Water Agreements
- Follow County Recordation Guidelines for Storm Water Agreements



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

[Insert Permit Application Number]

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

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

Engineer of Work:

[Insert Civil Engineer's Name and PE Number]

Provide Wet Signature and Stamp Above Line

Prepared For:

[Insert Applicant Name]

[Insert Applicant Address]

[Insert Applicant City, State, Zip]

[Insert Applicant Phone Number]

Prepared By:

[Insert Company Name & Paste Company Logo Above Line (Optional)]

[Insert Company Address]

[Insert Company City, State, Zip]

[Insert Company Phone Number]

Date:

[Insert Date]

Approved by: City of San Diego Date

The City of SAN DIEGO

6. Recap

Tips to streamlining the SWQMP approval

- Use the City of San Diego SWQMP Template
- Submit a complete SWQMP
- Determine your infiltration Feasibility (Simple Feasibility Letter or site specific infiltration test)
- Determine your Pollutant Control BMP (Biofiltration, Proprietary)
- Determine HMP Requirement
- Determine and size your HMP structure
- Ensure Consistency between SWQMP Exhibits, Construction Plans, and Storm Water Agreements
- Follow County Recordation Guidelines for Storm Water Agreements
- On resubmittals, provide detailed responses.

Questions?

Sean Torres, PE, QSD/P, CFM
Development Services Department
Engineering Division-Bldg/Stormwater/Floodplains
(619)446-5442
satorres@sandiego.gov

The City of SAN DIEGO