County of San Diego

Stormwater Quality Management Plan (SWQMP)
For Priority Development Projects (PDPs)

Use for all PDPs (see Stormwater Intake Form, Part 4)

Priority Development Project

Project Information		Development type ☒ New development ☐ Redevelopment
Project Name	Ramona 9th Street TM	
Project Address	915 9th Street Ramona, CA 92065	
Assessor's Parcel # (APN)	284-203-08-00	
Permit # / Record ID	PDS2025-TM-5665, PDS2025-DB-25-005	
Project category (select one)	☐ Commercial	☐ Minor subdivision*
	☐ Industrial	☒ Major subdivision*
	☐ Single family residential lot	☐ Multi-family residential*
	*If residential, is a Homeowners Association (HOA) proposed? ☒ Yes ☐ No	

Project Applicant / Project Proponent		
Name	Matthew Esquivel	
Address	3090 Pullman Street Costa Mesa, Ca 92626	
Phone	Phone	Email: MEsquivel@warmingtongroup.com

SWQMP Preparer		
Name	Dane McDougall	
Company (if applicable)	C & V Consulting	
Address	9830 Irvine Center Drive, Irvine, CA 92618	
Phone	949.916.3800	Email: dmcdougall@cvc-inc.net
PE Number (if applicable)	80705	

Preparer's Certification

I understand that the County of San Diego has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the County of San Diego BMP Design Manual. The BMP Design Manual is a design manual for compliance with local County of San Diego Watershed Protection Ordinance (Sections 67.801 et seq.) and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2013-0001, as amended by Order No. R9-2015-0001 and Order No. R9-2015-0100) requirements for storm water management.

This SWQMP is intended to comply with applicable requirements of the BMP Design Manual. I certify that it 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 SWQMP by County staff is confined to a review and does not relieve me as the person in charge of overseeing the selection and design of storm water BMPs for this project, of my responsibilities for project design.

Signature  Date 10/2/2026

COUNTY ACCEPTED

SWQMP Approved By: *Approval Date*:

** NOTE* Approval does not constitute compliance with regulatory requirements.*

Scope of SWQMP Submittal (Required)

Select the option that describes the scope of this SWQMP Submittal. Document your selection as indicated.

SWQMP Scope	Required Documentation
☒ *a. SWQMP addresses the entire project*	No additional documentation.
☐ *b. SWQMP implements requirements of an earlier master SWQMP submittal*	Include a copy of the previous submittal as Attachment 4.
☐ *c. First of multiple SWQMP submittals*	Identify below the elements addressed in this submittal and in future submittals.

(1) Elements addressed in current submittal (streets, common areas, first project phase, etc.):

Whole site

(2) Elements to be addressed in future submittal(s) (individual lots, future project phases, etc.):

Submittal Record: List the dates of SWQMP and plan submittals and updates. Briefly describe key changes from previous versions. If responding to plan check comments, note this in the entry and attach the responses as applicable.

No.	Date	Summary of Changes
Preliminary Design / Planning / CEQA		
1	8/18/2025	Initial Submittal
2	12/18/2025	Updated Template
3	3/27/2026	Third Submittal
No.	8/10/2026	Fourth Submittal
Final Design		
1	Date	Initial Submittal
2	Date	Summary of Change
3	Date	Summary of Change
No.	Date	Summary of Change
Plan Changes		
1	Date	Initial Submittal
2	Date	Summary of Change
3	Date	Summary of Change
No.	Date	Summary of Change

PDP SWQMP Submittal Checklist

SWQMP Tables: All of the tables below must be completed.

☒ Table 1: Baseline BMPs for Existing and Proposed Site Features ..... Page 2

☒ Table 2: Baseline BMPs for Pollutant-generating Sources ..... Page 3

☒ Table 3: Explanations and Justifications for Table 1 and 2 Baseline BMPs ..... Page 4

☒ Table 4: DMA Structural Compliance Strategies and Documentation ..... Page 5

☒ Table 5: Critical Coarse Sediment Yield Area (CCSYA) Requirements ..... Page 6

☒ Table 6: Minimum Construction Stormwater BMPs ..... Page 7

☒ Table 7: Explanations and Justifications for Construction Phase BMPs ..... Page 8

SWQMP Attachments[1]: Use the checklist below to identify which attachments will be included with this submittal. Attachments with boxes already checked (☒) are required for all projects. The applicability of other attachments will be determined upon completing this form.

☒ Attachment 1: Storm Water Intake Form

☒ Attachment 2: DMA Exhibits and Construction Plan Sheets

☐ Attachment 3: Reserved for Future Use

☐ Attachment 4: Previous SWQMP Submittals

☒ Attachment 5: Existing Site and Drainage Description

☐ Attachment 6: Documentation of DMAs without Structural BMPs

☒ Attachment 7: Documentation of DMAs with Structural Pollutant Control BMPs

☒ Attachment 8: Documentation of DMAs with Structural Hydromodification Management BMPs

☒ Attachment 9: Management of Critical Coarse Sediment Yield Areas

☒ Attachment 10: BMP Installation Verification Form

☐ Attachment 11: BMP Maintenance Agreements and Plans

☐ Attachment 12: Documentation of Alternative Compliance Projects (ACPs)

☒ Attachment 13: Green Streets PDP Exempt Form

After completing the remainder of this form, check the applicable SWQMP Attachment boxes to summarize your selections.

[1] All SWQMP Attachments are available at www.sandiego.gov/stormwater under the Development Resources tab, Submittal Templates.

Table 1 – Baseline BMPs for Existing and Proposed Site Features

A. BMPs for Existing Natural Site Features (See Fact Sheet BL-1)

1. Check the boxes below for each existing feature on the site.

2. Select the BMPs to be implemented for each identified feature. Explain why any BMP not selected is infeasible in Table 3.

	Conserve natural features (SD-G)	Provide buffers around waterbodies (SD-H)
☐ Natural waterbodies	☐	☐
☐ Natural storage reservoirs & drainage corridors	☐	---
☒ Natural areas, soils, & vegetation (incl. trees)	☐	---

B. BMPs for Common Impervious Outdoor Site Features (See Fact Sheet BL-2)

1. Check the boxes below for each proposed feature.

2. Select the BMPs to be implemented for each proposed feature. If neither BMP SD-B nor SD-I is selected for a feature, explain why both BMPs are infeasible in Table 3.

	a. Direct runoff to pervious areas (SD-B)	b. Construct surfaces from permeable materials (SD-I)	c. Minimize the size of impervious areas
☒ Streets and roads	☐	☐	☒ *Check this box to confirm that all impervious areas on the site will be minimized where feasible.*
☒ Sidewalks & walkways	☒	☐	
☒ Parking areas & lots	☐	☐	
☒ Driveways	☒	☐	*If this box is not checked, identify the surfaces that cannot be minimized in Table 3, and explain why it is infeasible to do so.*
☐ Patios, decks, & courtyards	☐	☐	
☐ Hardcourt recreation areas	☐	☐	
☐ Other:	☐	☐	

C. ☐ BMPs for Rooftop Areas: *Check this box if rooftop areas are proposed and select at least one BMP below.* (See Fact Sheet BL-3)

If no BMPs are selected, explain why they are infeasible in Table 3.

1. Direct runoff to pervious areas (SD-B)	2. Install green roofs (SD-C)	3. Install rain barrels (SD-E)
☐	☐	☐

D. ☒ BMPs for Landscaped Areas: *Check this box if landscaping is proposed and select at least one BMP below.* (See Fact Sheet BL-4)

If no BMPs are selected, explain why they are infeasible in Table 3.

1. Sustainable Landscaping (SD-K)
☒

Note: All features and BMPs must be shown on applicable construction plans. See applicable Fact Sheets in Appendix C of the BMP Design Manual for additional information.

Note: Use Table 3 to explain BMP infeasibility or inapplicability, or to describe features or BMPs not listed in this table. Additional explanation may be required by the County.

Table 2 – Baseline BMPs for Pollutant-generating Sources

☐ If this is a Small Residential Project, check this box and skip the rest of this table.

A. Management of Stormwater Discharges

1. Identify all proposed outdoor work areas below (☒ *Check here if none are proposed*)	2. Which BMPs will be used to prevent materials from contacting rainfall or runoff? (See Fact Sheet BL-5) *(Select all feasible BMPs for each work area[2])*			3. Where will runoff from the work area be routed? (See Fact Sheet BL-6) *(Select one or more option for each work area)*			
	Overhead covering (rooftops, etc.) (SC-A)	Separation of flows from adjacent areas (berms, etc.) (SC-B)	Wind protection (screens, etc.) (SC-C)	Sanitary sewer[3] (SC-D)	Containment system (SC-E)	Stormwater S-BMP or SSD-BMP[4]	Other[5]
☐ Trash & Refuse Storage	☐	☐	☐	☐	☐	☐	☐
☐ Materials & Equipment Storage	☐	☐	☐	☐	☐	☐	☐
☐ Loading & Unloading	☐	☐	---	☐	☐	☐	☐
☐ Fueling	☐	☐	---	☐	☐	☐	☐
☐ Maintenance & Repair	☐	☐	---	☐	☐	☐	☐
☐ Vehicle & Equipment Cleaning	☐	☐	---	☐	☐	☐	☐
☐ Other:	☐	☐	---	☐	☐	☐	☐

B. Prevention of Non-stormwater Discharges (See Fact Sheet BL-7)

Select one option for each feature below:

• **Storm drain inlets and catch basins ...**	☐ are not proposed	☒ will be labeled with stenciling or signage to discourage dumping (SC-F)
• **Educational BMP Signage ...**	☐ are not proposed	☒ will be labeled with educational signage for BMP (SC-G)
• **Interior work surfaces, floor drains, & sumps ...**	☒ are not proposed	☐ will not discharge directly or indirectly to the MS4 or receiving waters
• **Drain lines (e.g., air conditioning, boiler, etc.) ...**	☐ are not proposed	☒ will not discharge directly or indirectly to the MS4 or receiving waters
• **Fire sprinkler test water ...**	☐ are not proposed	☒ will not discharge directly or indirectly to the MS4 or receiving waters

Note: All outdoor features and BMPs in this table must be shown on applicable construction plans. See applicable Fact Sheets in Appendix C of the BMP Design Manual for additional information.

Note: Use Table 3 to explain BMP infeasibility or inapplicability, or to describe features or BMPs not listed in this table. Additional explanation may be required by the County.

[2] Each BMP is required where feasible. If none are selected for any feature, explain why they are infeasible in Table 3.

[3] Separate wastewater agency approvals may be required.

[4] Structural Treatment Control BMPs (S-BMPs) and Significant Site Design BMPs (SSD-BMPs) may not receive discharges from work areas that concentrate pollutants in a manner that will impair their functioning. Discharges from the proposed work area must also be included in DCV calculations for the applicable BMP.

[5] Describe other proposed options for managing stormwater discharges in Table 3.

Table 3 – Explanations and Justifications for Table 1 and 2 Baseline BMPs

☐ Check here if no explanations or justifications for Table 1 or 2 BMPs are required.

- Required Justifications: Provide explanations of BMP inapplicability and/or infeasibility as indicated per Tables 1 and 2.
- If Requested: Justify why specific BMPs will not be implemented or will only be partially implemented.
- Additional Explanation: Describe any proposed features and/or BMPs not listed in Tables 1 or 2.

BMP-Feature Combination		Explanation
Feature	Natural areas, soils, & vegetation (incl. trees)	Because of the nature of the development, natural areas, soils, & vegetation (incl. trees) will not be preserved.
BMP	MWS Units	
Feature	Streets and Roads	Runoff from the roads will be conveyed into the Biolfiltration Vaults for Water Quality Treatment
BMP	MWS Units	
Feature	Parking Areas	Runoff from the parking areas will be conveyed into the Biolfiltration Vaults for Water Quality Treatment
BMP	MWS Units	
Feature	Feature	Explanation
BMP	BMP	
Feature	Feature	Explanation
BMP	BMP	
Feature	Feature	Explanation
BMP	BMP	
Feature	Feature	Explanation
BMP	BMP	

Table 4: DMA Structural Compliance Strategies and Documentation

Part A – Selection and Application Structural Performance Standards

1. Selection of Standards (see BMPDM Sections 1.4.3, and 6.1)

☒ a. Pollutant control + hydromodification

☐ b. Pollutant control only (project is exempt from hydromodification requirements)

☒ c. Green Streets PDP Exemption - pollutant control only (applicable portions exempt from hydromodification requirements)

2. Application of Structural Performance Standards (select one; see BMPDM Section 1.7)

☒ New Development Projects: Standards apply to all impervious surfaces.

☐ Redevelopment Projects: Complete the calculations below. Select the applicable scenario based on the results.

a. Existing impervious area (ft^2)	b. Impervious area created / replaced (ft^2)	c. % Impervious created / replaced [(b/a)*100]

☐ *Scenario 1: c is 50% or more*: Performance standards apply to all impervious surfaces (a + b).

☐ *Scenario 2: c is less than 50%*: Performance standards apply only to created or replaced impervious surfaces (b only).

Part B – Compliance Strategies and Required Attachments

1. Complete and submit each of the applicable attachments on the right.

Att. 1	Att. 2	Att. 3	Att. 4	Att. 5
Storm Water Intake Form ☒	DMA Exhibits and Construction Plan Sheets ☒	N/A ☐	Previous SWQMP Submittals (see inside cover) ☐	Existing Site and Drainage Description ☒

2. Indicate each compliance strategy below that will be used for one or more DMAs on the site.

	Att. 6 DMAs without Structural BMPs	Att. 7 DMAs w/ Structural Pollutant Control BMPs	Att. 8 DMAs w/ Structural Hydromod. BMPs	Att. 9 Critical Coarse Sediment Yield Areas	Att. 10 BMP Installation Verification Form	Att. 11 Maintenance Agreements/ Plans	Att. 12 Alternative Compliance Projects	Att. 13 Green Streets PDP Exempt Form
☐Self-mitigating DMAs (BMPDM Section 5.2.1)	☐			☐				
☐De Minimis DMAs (BMPDM Section 5.2.2)	☐			☐				
☐Self-retaining DMAs (BMPDM Section 5.2.3)	☐			☐	☐			
Structural BMPs (select all that apply)								
☒Pollutant Control BMPs (BMPDM Section 5.3, 5.4, App K)		☒		☒	☒	☒		☒
☒Hydromodification Control BMPs (BMPDM Chapter 6)			☒	☒	☒	☒		
☐Alternative Compliance Project (BMPDM Section 1.8)				☐	☐	☐	☐	

☒ Please check this box after you complete this list. Corresponding attachments will be automatically selected on the right.

- *Attachments 1, 2, and 5 are required for all projects.*

Table 5: Critical Coarse Sediment Yield Area (CCSYA) Requirements

o Identify one applicable compliance pathway for the PDP below. o Document your selection in Attachment 9.
A. Hydromodification Management Exemption (BMPDM Sections 1.6 and 6.1)
☐ PDP is Exempt from Hydromodification Management Requirements Select if hydromodification management exemption was selected in Table 4 Part A.1.
B. Watershed Management Area (WMAA) Mapping (BMPDM Appendix H.1.1.2)
☒ WMAA mapping demonstrates the following: a. <5% of potential onsite CCYSAs will be impacted (built on or obstructed) b. All potential upstream offsite CCYSAs will be bypassed
C. Resource Protection Ordinance (RPO) Methods (BMPDM Appendix H.1.1.1)
☐ RPO Scenario 1: PDP is subject to and in compliance with RPO requirements a. Project requires one or more discretionary permits (RPO applicability is confirmed during discretionary review) b. Onsite AND upstream offsite CCSYAs will be avoided and/or bypassed ☐ RPO Scenario 2: PDP is entirely exempt/not subject to RPO requirements[6] a. Project does not require discretionary permits b. Project will bypass all upstream offsite CCSYAs (no requirements for onsite CCSYAs)
D. No Net Impact Analysis (BMPDM Appendix H.4)
☒ Project demonstrates no net impact to receiving waters

[6] Does not include PDPs utilizing exemption(s) via RPO Section 86.604(e)(2)(cc) or 86.604(e)(3).

Table 6 – Minimum Construction Stormwater BMPs

Minimum Required BMPs by Activity Type Select all applicable activities and at least one BMP for each.	References Caltrans[7]	 County of San Diego	
☒ Erosion Control for Disturbed Slopes (choose at least 1 per season)			
☐ Vegetation Stabilization Planting[8] (Summer)	SS-2, SS-4		
☒ Hydraulic Stabilization Hydroseeding (Summer)	SS-4		
☐ Bonded Fiber Matrix or Stabilized Fiber Matrix[9] (Winter)	SS-3		
☐ Physical Stabilization Erosion Control Blanket (Winter)	SS-7		
☒ Erosion control for disturbed flat areas (slope < 5%)			
☒ County Standard Lot Perimeter Protection Detail	SC-2	PDS 659[10]	
☐ Use of Item A erosion control measures on flat areas	SS-3, SS-4, SS-7		
☐ County Standard Desilting Basin (must treat all site runoff)	SC-2	PDS 660[11]	
☐ Mulch, straw, wood chips, soil application	SS-6, SS-8		
☒ Energy dissipation (required to control velocity for concentrated runoff or dewatering discharge)			
☒ Energy Dissipater Outlet Protection	SS-10	RSD D-40[12]	
☒ Sediment control for all disturbed areas			
☒ Silt Fence	SC-1		
☒ Fiber Rolls (Straw Wattles)	SC-5		
☒ Gravel & Sand Bags	SC-6, SC-8		
☐ Dewatering Filtration	NS-2		
☒ Storm Drain Inlet Protection	SC-10		
☐ Engineered Desilting Basin (sized for 10-year flow)	SC-2		
☒ Preventing offsite tracking of sediment			
☒ Stabilized Construction Entrance	TC-1		
☒ Construction Road Stabilization	TC-2		
☒ Entrance/Exit Tire Wash	TC-3		
☒ Entrance/Exit Inspection & Cleaning Facility	TC-1		
☒ Street Sweeping and Vacuuming	SC-7		
☒ Materials Management			
☒ Material Delivery & Storage	WM-1		
☒ Spill Prevention and Control	WM-4		
☒ Waste Management[13]			
☒ Waste Management Concrete Waste Management	WM-8		
☒ Solid Waste Management	WM-5		
☒ Sanitary Waste Management	WM-9		
☐ Hazardous Waste Management	WM-6		

[7] See Caltrans 2017 Construction Site Best Management Practices (BMP) Manual available at: https://dot.ca.gov/programs/construction/storm-water-and-water-pollution-control/manuals-and-handbooks

[8] Planting or Hydroseeding may be installed between May 1st and August 15th. Slope irrigation must be in place and operable for slopes >3 feet. Vegetation must be watered and established prior to October 1st. A contingency physical BMP must be implemented by August 15th if vegetation is not established by that date. If landscaping is proposed, erosion control measures must also be used while landscaping is being established. Established vegetation must have a subsurface mat of intertwined mature roots with a uniform vegetative coverage of 70 percent of the natural vegetative coverage or more on all disturbed areas.

[9] All slopes over three feet must have established vegetative cover prior to final permit approval.

[10] County PDS 659. Standard Lot Perimeter Protection Design System (Bldg. Division)

[11] County PDS 660. County Standard Desilting Basin for Disturbed Areas of 1 Acre or Less Bldg. Division

[12] Regional Standard Drawing D-40 – Rip Rap Energy Dissipater (also acceptable for velocity reduction)

[13] Applicants are responsible to apply appropriate BMPs for specific wastes (e.g., BMP WM-8 for concrete).

Table 7 – Explanations and Justifications for Construction Phase BMPs

☒ Check here if no explanations or justifications for Table 6 BMPs are required.		
Justifications for Table 6 Temporary Construction Phase BMPs • Required Justifications: Justify all construction activity types for which NO BMPs were selected. • If Requested: Justify why specific individual BMPs were not selected. • Additional Explanation: Describe any proposed features and/or BMPs not listed in Table 6.		
Activity Type / BMP		Explanation
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	

County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 1: Stormwater Intake Form for All Permit Applications

This form establishes Stormwater Quality Management Plan (SWQMP) requirements for Development Projects per Sections 67.809 and 67.811 of the County of San Diego Watershed Protection Ordinance (WPO).
See *Stormwater Intake Form Instructions* for additional guidance and explanation of terms.

Part 1. Project Information	
Project Name:	Ramona 9th Street TM
Record ID (Permit) No(s):	PDS2025-TM-5665, PDS2025-DB-25-005
Assessor's Parcel No(s):	284-203-08-00
Street Address (or Intersection):	915 9th Street
City, State, Zip:	Ramona, Ca 92065

Part 2. Applicant / Project Proponent Information	
Name:	Matthew Esquivel
Company:	Regent Land Co, LP
Street Address:	3090 Pullman Street
City, State, Zip:	Costa Mesa, Ca 92626
Phone Number	
Email:	MEsquivel@warmingtongroup.com

Part 3. Required Information for All Development Projects

Ⓐ 1. Existing (pre-development) impervious surfaces (ft^2)	2. Created or replaced impervious surfaces (ft^2)	3. Total disturbed area (acres or ft^2)
0 sft	367706.78 sft	459,633.48 sft

Ⓑ ☒ Check here and provide a WDID# if this project is subject to the California Construction General Permit (Order No. 2009-0009-DWQ)[1]	WDID # (if issued)
	NA

For County Use Only	**Reviewed By:**	**Review Date:**
☐ Standard SWQMP	☐ PDP SWQMP	☐ Green Streets PDP Exempt SWQMP

[1] Available at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html

Part 4. Priority Classification & SWQMP Form Selection

(A) *If your project is the following … (select one)*	(B) *You must* ***complete …***
☐ Standard Project ☐ a. Project is East of the Pacific/Salton Sea Divide ☐ b. None of the PDP criteria below applies	➔ Standard *SWQMP Form*
☒ Priority Development Project (PDP) ☐ 1. Project is part of an existing PDP, OR ☒ 2. Project does any of the following: ☒ a. Creates or replaces a total of 10,000 ft² or more of impervious surface ☒ b. Creates or replaces a combined total of 5,000 ft² or more of impervious surface within one or more of the following uses: (1) parking lots; (2) streets, roads, highways, freeways, and/or driveways; (3) restaurants; and (4) hillsides ☐ c. Creates or replaces a combined total of 5,000 ft² or more of impervious surface within one or more of the following uses: (1) automotive repair shops; and (2) retail gasoline outlets ☐ d. Discharges directly to an Environmentally Sensitive Area (ESA) AND creates or replaces 2,500 ft² or more of impervious surface ☐ e. Disturbs one or more acres of land (43,560 ft²) and is expected to generate pollutants post-construction ☐ f. Is a redevelopment project that creates or replaces 5,000 ft² or more of impervious surface on a site already having at least 10,000 ft² of impervious surface Refer to Section 1.4 of the County BMP Design Manual for additional guidance.	➔ PDP *SWQMP Form/ PDP SWQMP Amendment required with scope change*
☐ Green Streets PDP Exemption[2] Select this option only if the entire project qualifies for Green Streets PDP Exemption. Refer to Section 1.4.3 of the County BMP Design Manual for additional guidance.	➔ Green *Streets PDP Exempt SWQMP Form*

Part 5. Applicant Signature

I have reviewed the information in this form, and it is true and correct to the best of my knowledge.

Applicant / Project Proponent Signature:  Date: 08.10.2026

- *Upon completion submit this form to the County.*
- *If requested, attach supporting documentation to justify selections made or exemptions claimed.*
- *If this is a PDP that is part of a larger existing PDP, you will be required to attach a copy of the existing SWQMP to the newer SWQMP submittal.*

[2] *Green Streets PDP Exemption Projects* are those claiming exemption from PDP classification per WPO Section 67.811(b)(2) because they consist exclusively of *either* 1) development of new sidewalks, bike lanes, and/or trails; *or* 2) improvements to existing roads, sidewalks, bike lanes, and/or trails.

2.0 General Requirements

- Attachment 2 consolidates exhibits and plans required for the entire project.
- Complete the table below to indicate which sub-attachments are included with the submittal. Sub-attachments that are not applicable can be excluded from the submittal.
- Unless otherwise stated, features and BMPs identified and described in each corresponding Attachment (6 through 9) must be shown on applicable DMA Exhibits and construction plans submitted for the project.

Sub-attachments	Requirement
☒ **2.1: DMA Exhibits**	All PDPs
☐ **2.2: Individual Structural BMP DMA Mapbook**	PDPs with structural BMPs
☒ **2.3: Construction Plan Sets** *(Preliminary Grading Plan)*	All projects

Sub attachments 2.2 and 2.3 will be provided during final engineering

2.1 DMA Exhibits

- DMA Exhibits must show all DMAs on the project site. Exhibits must include all applicable features identified in applicable SWQMP attachments.
- Exhibits may be prepared individually for the BMPs associated with each applicable SWQMP Attachment (6, 7, 8, 9, and/or 13) or combined into one or more consolidated exhibits. Hatching or other variations in symbology shall be used to differentiate different surface types when an exhibit is demonstrating compliance with two or more performance standards, for example, PDP and green street performance standards.
- Use this checklist to ensure required information is included on each exhibit (copy as needed).

DMA Exhibit ID #:	Preliminary DMA Exhibit

A. Features required for all exhibits

1. Existing Site Features

- ☒ Underlying hydrologic soil group (A, B, C, D)
- ☒ Approximate depth to groundwater
- ☐ Natural hydrologic features
- ☒ Topography and impervious areas
- ☒ Existing drainage network, directions, and offsite connections

2. Drainage Management Area (DMA) Information

- ☒ Proposed drainage network, directions, and offsite connections
- ☐ DMA boundaries, ID numbers, areas, and type (structural BMP, Green Street BMP, de minimis, etc.)

3. Proposed Site Changes, Features, and BMPs

- ☒ Proposed demolition and grading
- ☒ Group 1, 2, and 3 Features[1]
- ☐ Group 4 Features
- ☐ Construction BMPs[2]
- ☒ Baseline source control BMPs
- ☒ Baseline site design BMPs
- ☐ Green street PDP exempt areas – new impervious areas, existing/replaced impervious areas, and removed impervious areas

B. Proposed Features and BMPs Specific to Individual SWQMP Attachments[3]

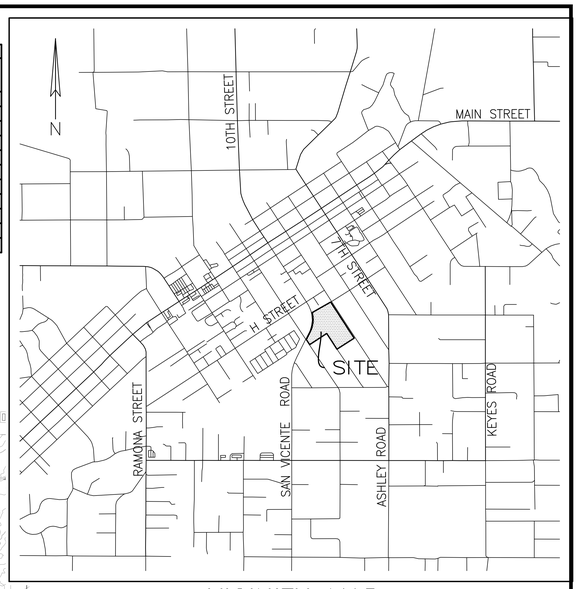
☐ Attachment 6	☐ SSD-BMP impervious dispersion areas ☐ SSD-BMP tree wells	
☒ Attachment 7	☒ Structural pollutant control BMPs	
☒ Attachment 8	☒ Structural hydromodification management BMPs ☒ Point(s) of Compliance (POC) for hydromodification management ☒ Proposed drainage boundary and drainage area to each POC	
☐ Attachment 9	☐ Onsite CCSYAs	☐ Bypass of onsite CCSYAs ☐ Bypass of upstream offsite CCSYAs
☒ Attachment 13		☐ Green Street pollutant control BMPs

[1] Group 1-4 features and baseline BMPs from PDP SWQMP Tables 2 and 3.
[2] Minimum Construction Stormwater BMPs from PDP SWQMP Table 7.
[3] Identify the location, ID numbers, type, and size/detail of BMPs.

DMA EXHIBIT

915 9TH STREET
CITY OF RAMONA, COUNTY OF SAN DIEGO

REQUIRED RETENTION VOLUME			
DMA NUMBER	REQUIRED RETENTION VOLUME (CFT)	AREA PROVIDED (SFT)	PROVIDED RETENTION VOLUME (0.75 INCH DEPRESSION)
DMA 1	104	1910	119
DMA 2	123	859	53
DMA 3	53	0	0
DMA 4	80	1139	71
DMA 5	67	2346	146
DMA 6	114	4369	273
DMA 7	96	3909	244
DMA 8	76	2405	150
DMA 9	32	784	49
DMA 10	17	300	18
SITE TOTAL	762	18021	1126



VICINITY MAP
N.T.S.



LEGEND

- EXISTING RIGHT-OF-WAY/ BOUNDARY
- PROPOSED RIGHT-OF-WAY/ BOUNDARY
- DRAINAGE MANAGEMENT AREA (DMA)
- PROPOSED STORM DRAIN
- PROPOSED MWS BIOFILTRATION VAULT
- PROPOSED CATCH BASIN
- PROPOSED LANDSCAPING (FOR REQUIRED RETENTION)
- PROPOSED VEGETATED SWALE
- PROPOSED ASPHALT CONCRETE (AC) PAVEMENT
- DMA X / X.XX AC — DRAINAGE MANAGEMENT AREA (DMA) / ACREAGE
- X.X AC — ACREAGE OF AREA EXCLUDED FROM MWS SIZING CALCULATIONS
- RUNOFF FLOW ARROWS
- STORM DRAIN FLOW ARROWS

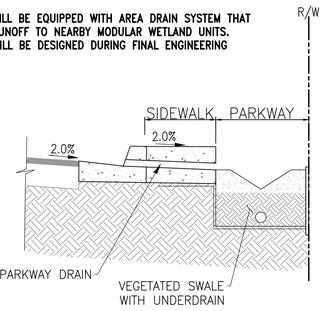
SITE INFORMATION:

- UNDERLYING HYDROLOGIC SOIL GROUP: ENTIRE SITE IS GROUP C.
- APPROXIMATE DEPTH TO GROUNDWATER: BETWEEN 7 TO 11 FEET BELOW THE EXISTING SURFACE SITE GRADES.
- GROSS SITE AREA: 830,158.1 SF (19.06 AC)
- TOTAL NET AREA (DISTURBED AREA): 854,510.27 SF (19.62 AC) INCLUDES IMPROVEMENTS TO 9TH STREET
- EXISTING SITE IMPERVIOUSNESS: 0% IMPERVIOUS
- PROPOSED SITE IMPERVIOUSNESS: 80% IMPERVIOUS (15.54 AC) BASED ON NET AREA
- NO KNOWN SEEPS, SPRINGS AND/ OR WETLANDS LOCATED ONSITE.
- NO KNOWN CRITICAL COARSE SEDIMENT YIELD AREAS ONSITE.
- PER WORKSHEET B-2.1: DCV, THE DESIGN CAPTURE VOLUME (DCV) FOR THIS SITE IS 38,087 CF BASED ON TOTAL NET SITE AREA.
- AREA DRAIN SYSTEM FOR COMMON AREAS AND PRIVATE YARDS WILL BE DESIGNED DURING FINAL ENGINEERING
- 9TH STREET IMPROVEMENTS WILL INCLUDE A VEGETATED SWALE FOR WATER QUALITY TREATMENT AND GREEN STREET REQUIREMENTS

BEST MANAGEMENT PRACTICES (BMPS)

- SC-1 PREVENTION OF ILLICIT DISCHARGES INTO THE MS4 (WHOLE SITE)
- SC-2 STORM DRAIN STENCILING AND SIGNAGE
- SC-6A ONSITE STORM DRAIN INLETS
- SC-602 LANDSCAPE DESIGN/OUTDOOR PESTICIDE USE
- FT-1 VEGETATED SWALE
- SC-6P PLAZAS, SIDEWALKS AND PARKING LOT SWEEPING
- SD-5 IMPERVIOUS AREA DISPERSION (WHOLE SITE)
- SD-6 COLLECT RUNOFF (ROOF)
- SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES
- BF-3 PROPRIETARY BIOFILTRATION – MODULAR WETLANDS SYSTEM (MWS)

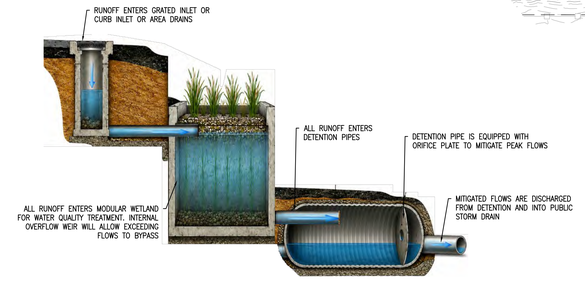
NOTE: YARDS WILL BE EQUIPPED WITH AREA DRAIN SYSTEM THAT WILL CONVEY RUNOFF TO NEARBY MODULAR WETLAND UNITS. AREA DRAINS WILL BE DESIGNED DURING FINAL ENGINEERING



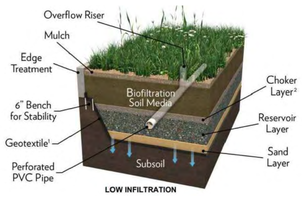
BMP SUMMARY TABLE				
UNIT NUMBER	DMA NUMBER	MWS UNIT MODEL	REQUIRED TREATMENT FLOWRATE	PROVIDED TREATMENT FLOWRATE
MWS UNIT #1	DMA 1	MWS-L-10-20(3.6)	0.718	0.734
MWS UNIT #2	DMA 2	MWS-L-8-24(3.95)	0.848	0.805*
MWS UNIT #3	DMA 3	MWS-L-8-12(3.6)	0.362	0.367
MWS UNIT #4	DMA 4	MWS-L-8-20(3.4)	0.548	0.577
MWS UNIT #5	DMA 5	MWS-L-8-16(3.5)	0.464	0.476
MWS UNIT #6	DMA 6	MWS-L-8-24(3.85)	0.783	0.785
MWS UNIT #7	DMA 7	MWS-L-8-20(3.9)	0.662	0.662
MWS UNIT #8	DMA 8	MWS-L-8-16(3.9)	0.527	0.530
MWS UNIT #9	DMA 9	MWS-L-8-8(3.4)	0.219	0.231
MWS UNIT #10	DMA 10	MWS-L-4-8(3.4)	0.110	0.115

* PROVIDED TREATMENT FLOWRATE<REQUIRED TREATMENT FLOW RATE. IMPERVIOUS AREA WILL BE RE-EVALUATED DURING FINAL ENGINEERING AND PROVIDED FLOW RATES VERIFIED FOR COMPLIANCE

ENERGY DISSIPATION
CONCRETE APRON & DISSIPATORS
NTS



SCHEMATIC SD SYSTEM
NTS



LOW INFILTRATION

VEGETATIVE SWALE DETAIL FOR 9TH STREET
NTS

1" = 40'
0 20 40 80

1" = 40'
0 20 40 80

PREPARED BY :
C&V CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING
9830 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618
(949) 916-3800
INFO@CVC-INC.NET
WWW.CVC-INC.NET

PRELIMINARY DMA EXHIBIT
915 9TH STREET
RAMONA, CA
SHEET 1 OF 1
SCALE: 1"=40' | DRAWN BY: sm | CHECKED BY: --
CITY OF RAMONA

COUNTY OF SAN DIEGO VESTING TENTATIVE MAP 5665

IN THE UNINCORPORATED TERRITORY OF SAN DIEGO COUNTY, STATE OF CALIFORNIA

PRELIMINARY GRADING

PDS2025-TM-5665, PDS2025-DB-25-005, PDS2025-ER-09-003

APN: 284-202-21-00, 284-203-08-00, AND 284-244-01-00

LEGAL DESCRIPTION:

REAL PROPERTY IN THE UNINCORPORATED AREA OF THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

LD PARCEL 1: (APN: 284-203-08-00)

LOT 159 AND LOT 178 OF TOWN OF RAMONA, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 643, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, OCTOBER 15, 1890.

LD PARCEL 2: (APN: 284-202-21-00)

LOT 179 OF TOWN OF RAMONA, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 643, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, OCTOBER 15, 1890.

EXCEPTING THEREFROM THAT PORTION DEEDED TO THE COUNTY OF SAN DIEGO IN DEED RECORDED MARCH 27, 1972 AS INSTRUMENT NO. 72000 OF OFFICIAL RECORDS.

ALSO EXCEPTING THEREFROM THAT PORTION DEEDED TO THE COUNTY OF SAN DIEGO IN DEED RECORDED JULY 15, 1998 AS INSTRUMENT NO. 1998-0437610 OF OFFICIAL RECORDS.

LD PARCEL 3: (APN: 284-244-01)

LOTS 484, 486, 495, 496, 516, 517, 528 AND 529 OF TOWN OF RAMONA, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 643, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, OCTOBER 15, 1890.

APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00

SITE ADDRESS:

APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00

UTILITY PURVEYORS & SERVICES:

WATER:	RAMONA MUNICIPAL WATER DISTRICT	(760) 789-1330
SEWER:	RAMONA MUNICIPAL WATER DISTRICT	(760) 789-1330
ELECTRIC:	SAN DIEGO GAS & ELECTRIC	(800) 336-7343
GAS:	SAN DIEGO GAS & ELECTRIC	(800) 336-7343
TELEPHONE:	AT&T	(800) 255-5288
CABLE:	TIME WARNER CABLE	(800) 961-9941
TRASH/REFUSE:	RAMONA DISPOSAL SERVICE	(760) 789-516
SCHOOL DISTRICT:	RAMONA UNIFIED SCHOOL DISTRICT	(760) 787-2000

NOTE:

1. TENTATIVE MAP PREPARED BY: C&V CONSULTING, INC.
   9830 IRVINE CENTER DRIVE
   IRVINE, CA 92618
   PH: 949-916-3800
2. TOTAL GROSS AREA: 19.43 ACRES | NET AREA: 19.37 ACRES
3. TOTAL NUMBER OF LOTS: 99
   SINGLE FAMILY HOMES – 88
   PRIVATE STREET – 3
   LANDSCAPE AREA – 7
   HISTORICAL PRESERVATION – 1
4. TOTAL NUMBER OF DWELLING UNITS: 88
5. ALL PROPOSED UTILITIES TO BE UNDERGROUND.
6. EXISTING TOPOGRAPHY FROM C&V CONSULTING, INC. AERIAL PHOTOGRAMMETRY ON SEPTEMBER 6, 2024.
7. ALL ONSITE STREETS WILL BE PRIVATE WITH PUBLIC ACCESS EASEMENTS.
8. EXISTING STRUCTURES WITHIN THE DEVELOPMENT FOOTPRINT WILL BE DEMOLISHED UNLESS OTHERWISE NOTED.

GRADING QUANTITIES:

ALL GRADING QUANTITIES ARE PRELIMINARY ONLY

PROPOSED CUT:	176,831 CY
PROPOSED FILL:	60,900 CY
PROPOSED EXPORT:	115,931 CY

SUBDIVIDER:

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626
PHONE: (714) 557-5511

ENGINEER:

C&V CONSULTING, INC.
9830 IRVINE CENTER DRIVE
IRVINE, CA 92618
(949)916-3800

OWNER'S REPRESENTATIVE CERTIFICATE:

WE HEREBY CERTIFY THAT WE ARE THE RECORD OWNERS/REPRESENTATIVES OF THE PROPERTY SHOWN ON THE TENTATIVE SUBDIVISION MAP AND THAT SAID MAP SHOWS ALL OUR CONTIGUOUS OWNERSHIP IN WHICH WE HAVE ANY DEED OR TRUST INTEREST. WE UNDERSTAND THAT OUR PROPERTY IS CONSIDERED CONTIGUOUS EVEN IF IT IS SEPARATED BY ROADS, STREETS, UTILITY EASEMENTS, OR RAILROAD RIGHT-OF-WAYS. WE WILL COMPLY WITH THE PARK AND LAND DEDICATION ORDINANCE.

_____

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626
(714)434-4416

COMMUNITY PLAN:

RAMONA COMMUNITY PLAN

GENERAL PLAN DESIGNATION:

RAMONA LAND USE:

APN	LAND USE
284-202-21	VILLAGE RESIDENTIAL (VR-7.3)
284-203-08	VILLAGE RESIDENTIAL (VR-7.3)
284-244-01	VILLAGE RESIDENTIAL (VR-2)

LOT AREA SUMMARY:

Lot	Gross Area (SF)	Net Area (SF)	Lot Designation
***LOT A	104,799	104,799	Private Street
***LOT B	28,544	28,544	Private Street
***LOT C	32,104	32,104	Private Street
LOT D	16,365	16,365	Historic Preservation
***LOT E	15,473	14,997	Recreation
***LOT F	1,456	1,456	Landscape
***LOT G	1,281	1,281	Landscape
***LOT H	1,966	1,966	Landscape
***LOT I	1,151	1,151	Landscape
***LOT J	6,685	4,849	Landscape/Water Quality
***LOT K	3,881	3,881	Recreation
1	9,665	9,665	Single Family Home
2	8,396	8,396	Single Family Home
3	7,163	7,163	Single Family Home
4	8,399	8,399	Single Family Home
5	7,412	7,412	Single Family Home
6	8,402	8,402	Single Family Home
7	7,167	7,167	Single Family Home
8	8,405	8,405	Single Family Home
9	7,417	7,417	Single Family Home
10	8,407	8,407	Single Family Home
**11	7,172	7,172	Single Family Home
12	9,020	9,020	Single Family Home
13	7,199	7,199	Single Family Home
14	6,360	6,360	Single Family Home
**15	6,148	6,148	Single Family Home
16	7,208	7,208	Single Family Home
17	6,360	6,360	Single Family Home
**18	6,148	6,148	Single Family Home
19	7,208	7,208	Single Family Home
20	6,360	6,360	Single Family Home
**21	6,148	6,148	Single Family Home
22	7,191	7,191	Single Family Home
23	6,131	6,131	Single Family Home
24	6,360	6,360	Single Family Home
25	7,208	7,208	Single Family Home
26	6,360	6,360	Single Family Home
27	7,208	7,208	Single Family Home
**28	6,148	6,148	Single Family Home
29	7,208	7,208	Single Family Home
30	6,360	6,360	Single Family Home
**31	6,148	6,148	Single Family Home
32	7,199	7,199	Single Family Home
33	7,985	7,985	Single Family Home
34	7,260	7,260	Single Family Home
35	8,228	8,228	Single Family Home
*36	7,018	7,018	Single Family Home
37	8,228	8,228	Single Family Home
38	7,260	7,260	Single Family Home
39	8,228	8,228	Single Family Home
40	7,018	7,018	Single Family Home
41	8,228	8,228	Single Family Home
42	7,260	7,260	Single Family Home
43	8,228	8,228	Single Family Home
44	9,992	9,992	Single Family Home
45	8,110	8,110	Single Family Home
46	7,243	7,243	Single Family Home
47	6,379	6,379	Single Family Home
**48	7,802	7,802	Single Family Home
49	5,476	5,476	Single Family Home
50	4,732	4,732	Single Family Home
51	4,982	4,982	Single Family Home
52	4,745	4,745	Single Family Home
53	4,995	4,995	Single Family Home
54	4,758	4,758	Single Family Home
55	5,008	5,008	Single Family Home
56	4,909	4,909	Single Family Home
57	5,992	5,992	Single Family Home
58	11,741	11,741	Single Family Home
59	4,984	4,984	Single Family Home
60	4,739	4,739	Single Family Home
61	4,979	4,979	Single Family Home
62	4,734	4,734	Single Family Home
63	4,975	4,975	Single Family Home
64	5,360	5,360	Single Family Home
65	7,379	7,094	Single Family Home
66	6,442	6,442	Single Family Home
67	7,379	7,379	Single Family Home
68	6,208	6,208	Single Family Home
69	7,379	7,379	Single Family Home
70	6,442	6,442	Single Family Home
71	7,782	7,782	Single Family Home
72	8,354	8,354	Single Family Home
**73	6,390	6,390	Single Family Home
74	6,646	6,646	Single Family Home
75	7,804	7,804	Single Family Home
*76	8,019	8,019	Single Family Home
77	10,884	10,884	Single Family Home
78	9,806	9,806	Single Family Home
79	11,656	11,656	Single Family Home
80	7,931	7,931	Single Family Home
81	9,146	9,146	Single Family Home
*82	6,483	6,483	Single Family Home
83	6,748	6,748	Single Family Home
84	6,503	6,503	Single Family Home
85	7,505	7,505	Single Family Home
86	8,678	8,678	Single Family Home
87	9,748	9,748	Single Family Home
88	10,318	10,318	Single Family Home

Note: * Indicates affordable home (Moderate)

Note: ** Indicates affordable home (Very Low)

Note: *** Indicates proposed HOA lot

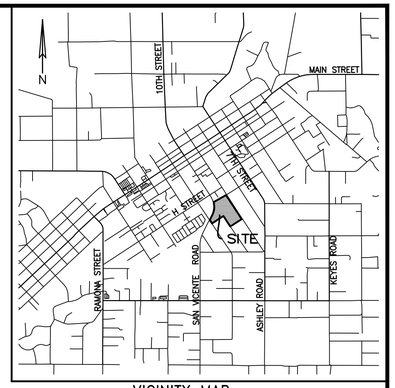
AFFORDABLE UNITS:

*MODERATE –
LOTS 36, 76, 82

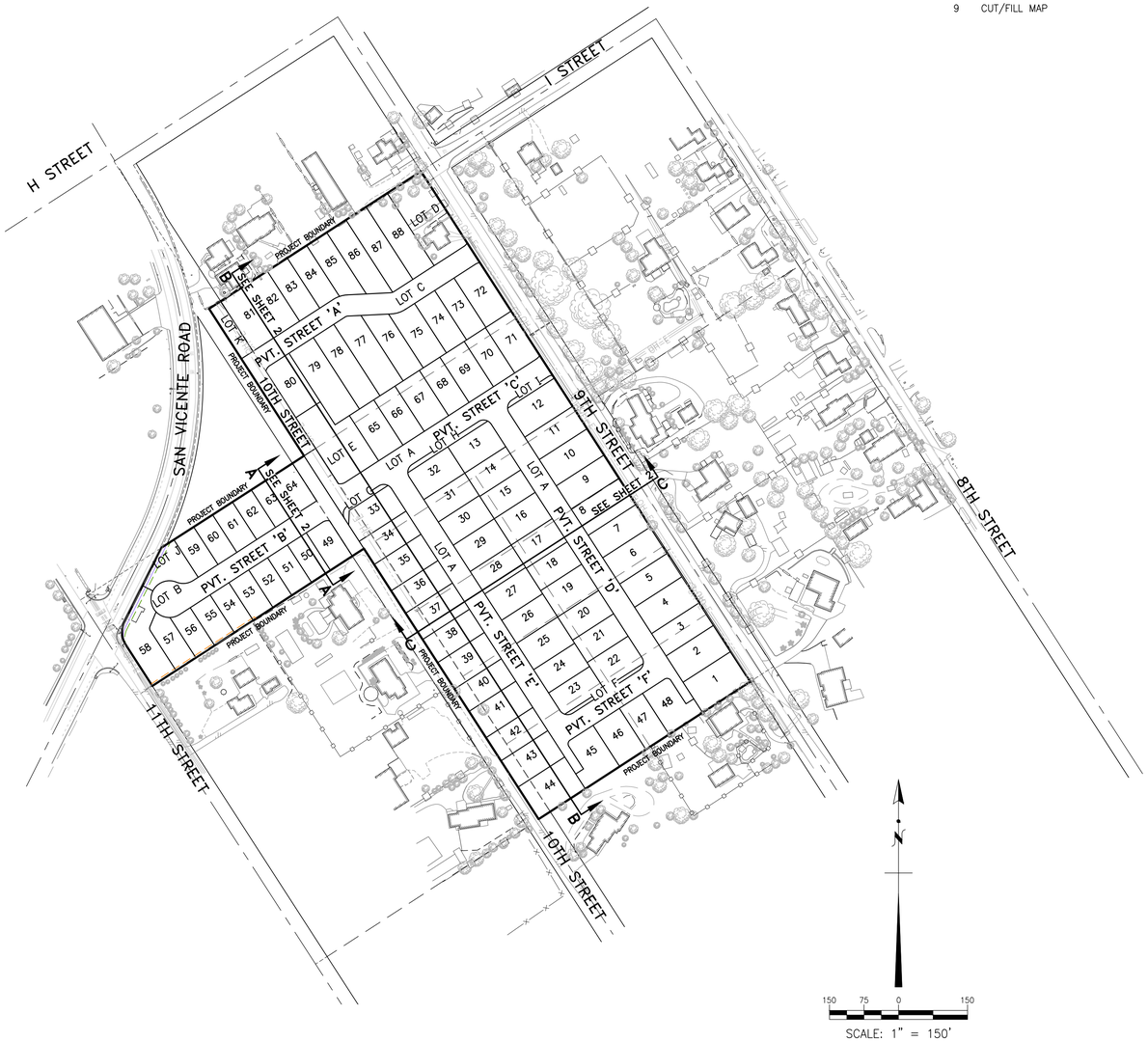
**VERY LOW –
LOTS 11, 15, 18, 21, 28, 31, 48, 73

SHEET INDEX:

1 TITLE SHEET
2 SITE SECTIONS
3 PRELIMINARY GRADING PLAN
4 PRELIMINARY GRADING PLAN
5 PRELIMINARY UTILITY PLAN
6 PRELIMINARY UTILITY PLAN
7 PRELIMINARY FIRE ACCESS & HYDRANT LOCATION PLAN
8 SLOPE ANALYSIS PLAN
9 CUT/FILL MAP



VICINITY MAP
SCALE: NONE



SCALE: 1" = 150'

SYMBOLS:

○ BO	BLOW-OFF VALVE
□ DI	DRAIN INLET
FH	FIRE HYDRANT
	LIGHT STANDARD
Ⓓ	STORM DRAIN MANHOLE
Ⓢ	SANITARY SEWER MANHOLE
	SIGN POST
Ⓜ GM	GAS METER
□ WM	WATER METER
⊗ V	UTILITY VALVE
	UTILITY/POWER POLE
	BLOCK/RETAINING SCREEN WALL
	BLOCK/RETAINING LOW WALL
	PLANTER/DECORATIVE WALL
OH-E	OVERHEAD WIRE
	EDGE OF ASPHALT PAVEMENT
	WOOD/WROUGHT IRON FENCE
X	CHAIN LINK FENCE
	DIRECTION OF FLOW
93	MINOR CONTOUR (1' INTERVAL)
100	MAJOR CONTOUR (5' INTERVAL)
×91.5	SPOT ELEVATION

LEGEND:

AP	ANGLE POINT
ASPH	ASPHALT PAVEMENT
BC	BUILDING CORNER
BEG	BEGIN
BO	BLOW-OFF VALVE
BLDG	BUILDING
BW	BLOCK WALL
CB	CATCH BASIN
CF	CURB FACE
CLF	CHAIN LINK FENCE
CMF	CORRUGATED METAL FENCE
CONC	CONCRETE PAVEMENT
DI	DRAIN INLET
DW	DOMESTIC WATER
DWY	DRIVEWAY
EX	EXISTING
FH	FIRE HYDRANT
FW	FIRE WATER
GM	GAS METER
HH	HAND HOLE
LAT	LATERAL
LS	LANDSCAPING
MH	MANHOLE
MWS	MODULAR WETLAND SYSTEM
PKWY	PARKWAY
PP	POWER POLE
PR	PROPOSED
PVT	PRIVATE
P/L	PROPERTY LINE
RET	RETAINING
ROW	RIGHT-OF-WAY
SD	STORM DRAIN
SFH	SINGLE-FAMILY HOME
SS	SANITARY SEWER
SSCO	SANITARY SEWER CLEANOUT
SSMH	SANITARY SEWER MANHOLE
ST LT	STREET LIGHT
SVC	SERVICE
TE	TRASH ENCLOSURE
TEMP	TEMPORARY
TF	TRANSFORMER
TS	TRAFFIC SIGNAL
TYP	TYPICAL
WF	WOOD FENCE
WL	WALL
WM	WATER METER
V	VALVE

REGISTERED PROFESSIONAL ENGINEER
DANIE P. MCDOUGALL
C 80705
CIVIL
STATE OF CALIFORNIA

PREPARED BY:

C&V CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING
9830 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618
(949) 916-3800
INFO@CVC-INC.NET
WWW.CVC-INC.NET

PREPARED FOR:

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626
(714) 557-5511

COUNTY OF SAN DIEGO
DEPARTMENT OF PLANNING AND DEVELOPMENT

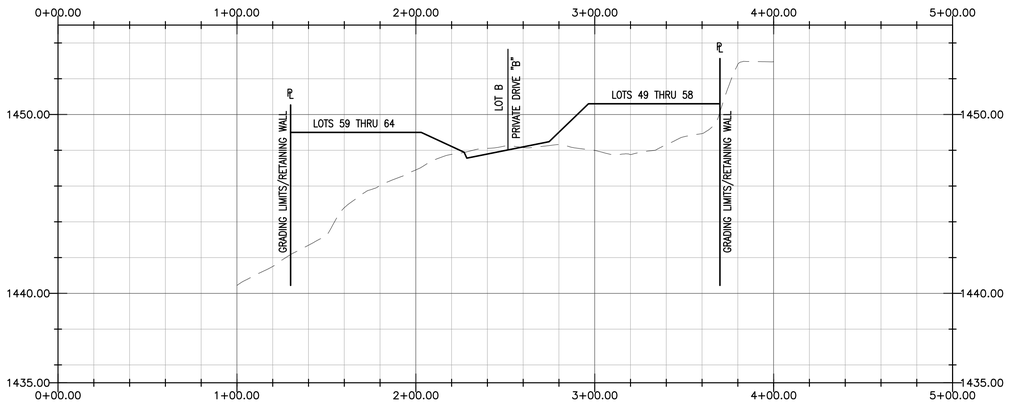
PROJECT NO.
WARM-021

PRELIMINARY GRADING PLANS
PDS2025-TM-5665, PDS2025-DB-25-005, PDS2025-ER-09-003
APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00

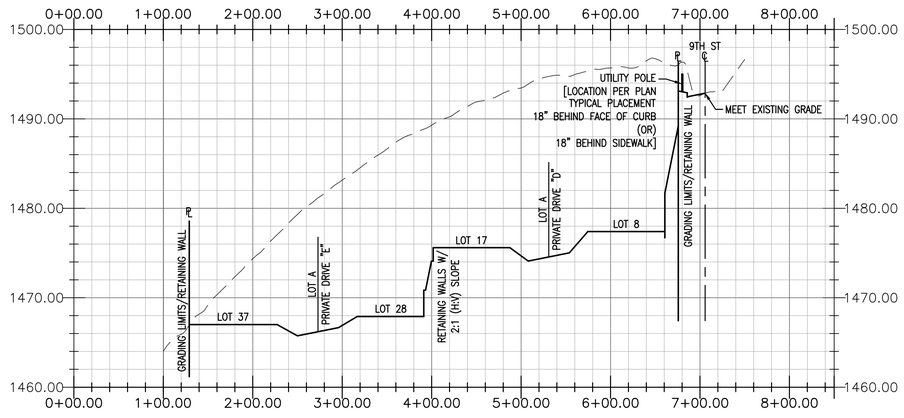
TITLE SHEET

SHEET 1 OF 9

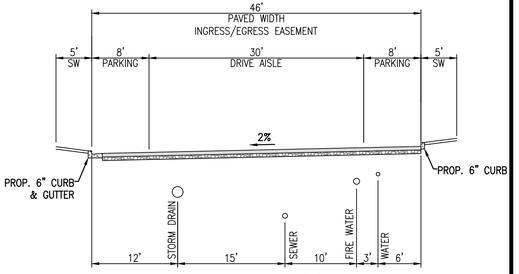
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DATE: 10/07/2026
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BY: SARAH MCMATTERS



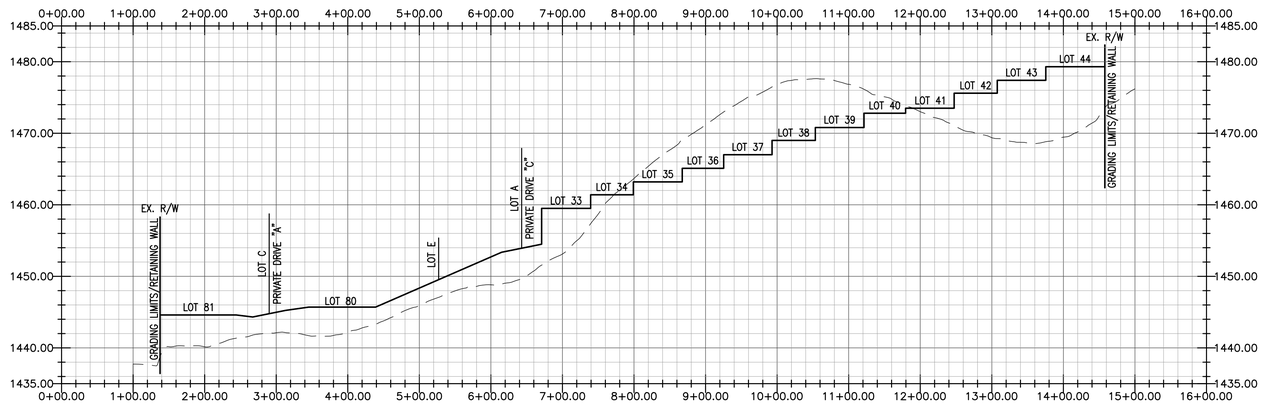
SECTION A-A
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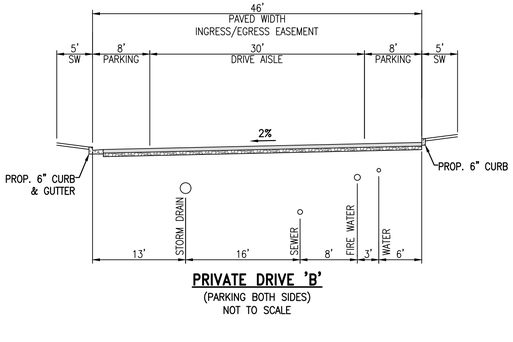
SECTION C-C
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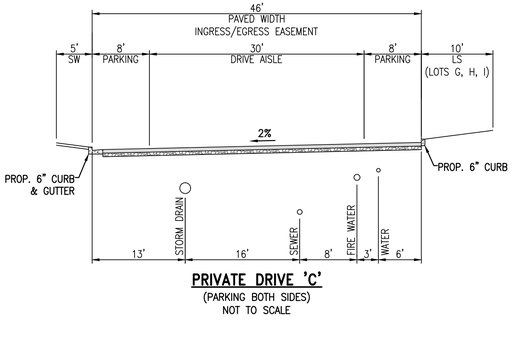
PRIVATE DRIVE 'A'
(PARKING BOTH SIDES)
NOT TO SCALE



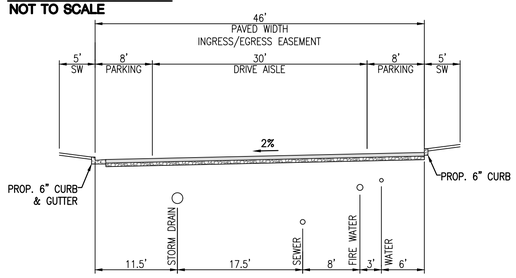
SECTION B-B
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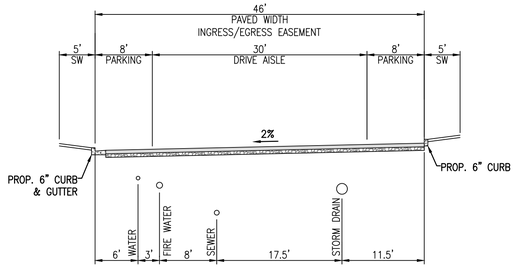
PRIVATE DRIVE 'B'
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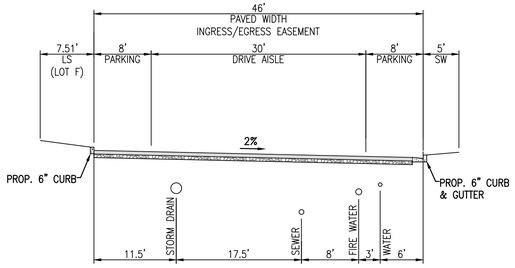
PRIVATE DRIVE 'C'
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NOT TO SCALE



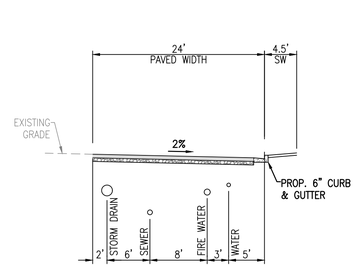
PRIVATE DRIVE 'D'
(PARKING BOTH SIDES)
NOT TO SCALE



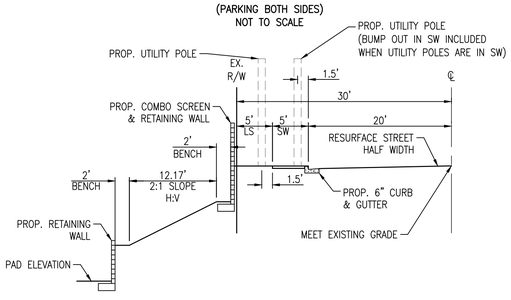
PRIVATE DRIVE 'E'
(PARKING BOTH SIDES)
NOT TO SCALE



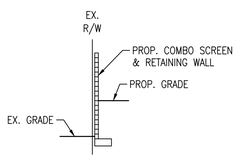
PRIVATE DRIVE 'F'
(PARKING BOTH SIDES)
NOT TO SCALE



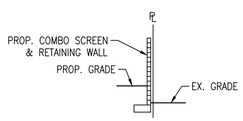
10TH STREET (PRIVATE STREET)
(NO PARKING)
NOT TO SCALE



EASTERN BOUNDARY/9TH STREET (PUBLIC STREET)
(NO PARKING)
NOT TO SCALE



WESTERN BOUNDARY (SAN VICENTE RD)
& NORTHERN BOUNDARY
NOT TO SCALE



SOUTHERN BOUNDARY
NOT TO SCALE

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PREPARED FOR:

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626
(714) 557-5511

COUNTY OF SAN DIEGO
DEPARTMENT OF PLANNING AND DEVELOPMENT

PRELIMINARY GRADING PLANS
PDS2025-TM-5665, PDS2025-DB-25-005, PDS2025-ER-09-003
APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00

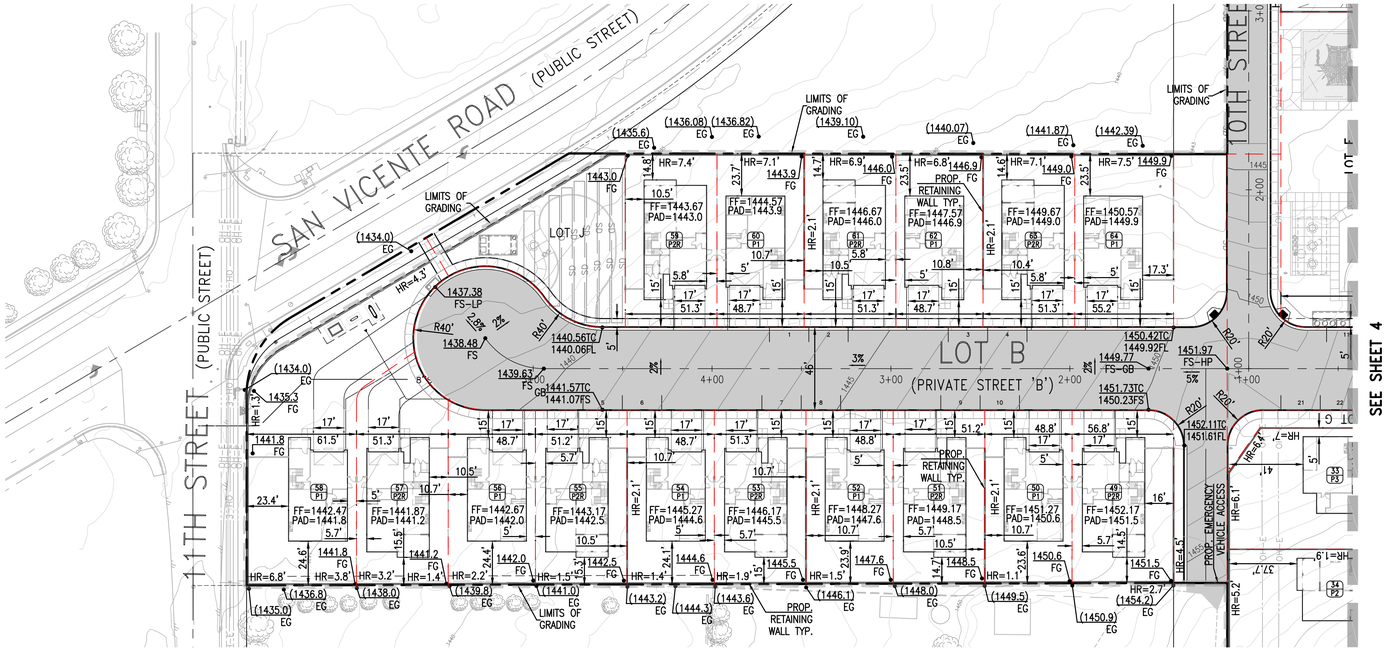
SITE SECTIONS

PROJECT NO. WARM-021

SHEET 2 OF 9

PLAN SET: PDS4
DATE: 10/03/2025

P:\WARM\WARM-021\CIVIL\SHEETS\PRELIM GRADING\TM-05-SECTIONS.DWG
BY: SARAH MCWATTERS





INDEX MAP

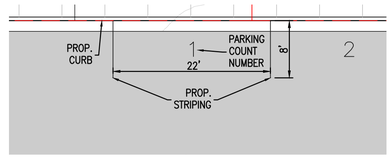
NOTE:
THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF THE PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE APPROVAL TO PERFORM AND GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.

DRAINAGE NOTES:
- LOTS 49–64 AND LOT J SHALL DRAIN TO LOT B (PRIVATE STREET 'B') THROUGH YARD DRAINS AND APPROVED DRAINAGE DEVICES.

AFFORDABLE UNITS

* MODERATE –
LOTS 36, 76, 82

** VERY LOW –
LOTS 11, 15, 18, 21, 28, 31, 48, 73



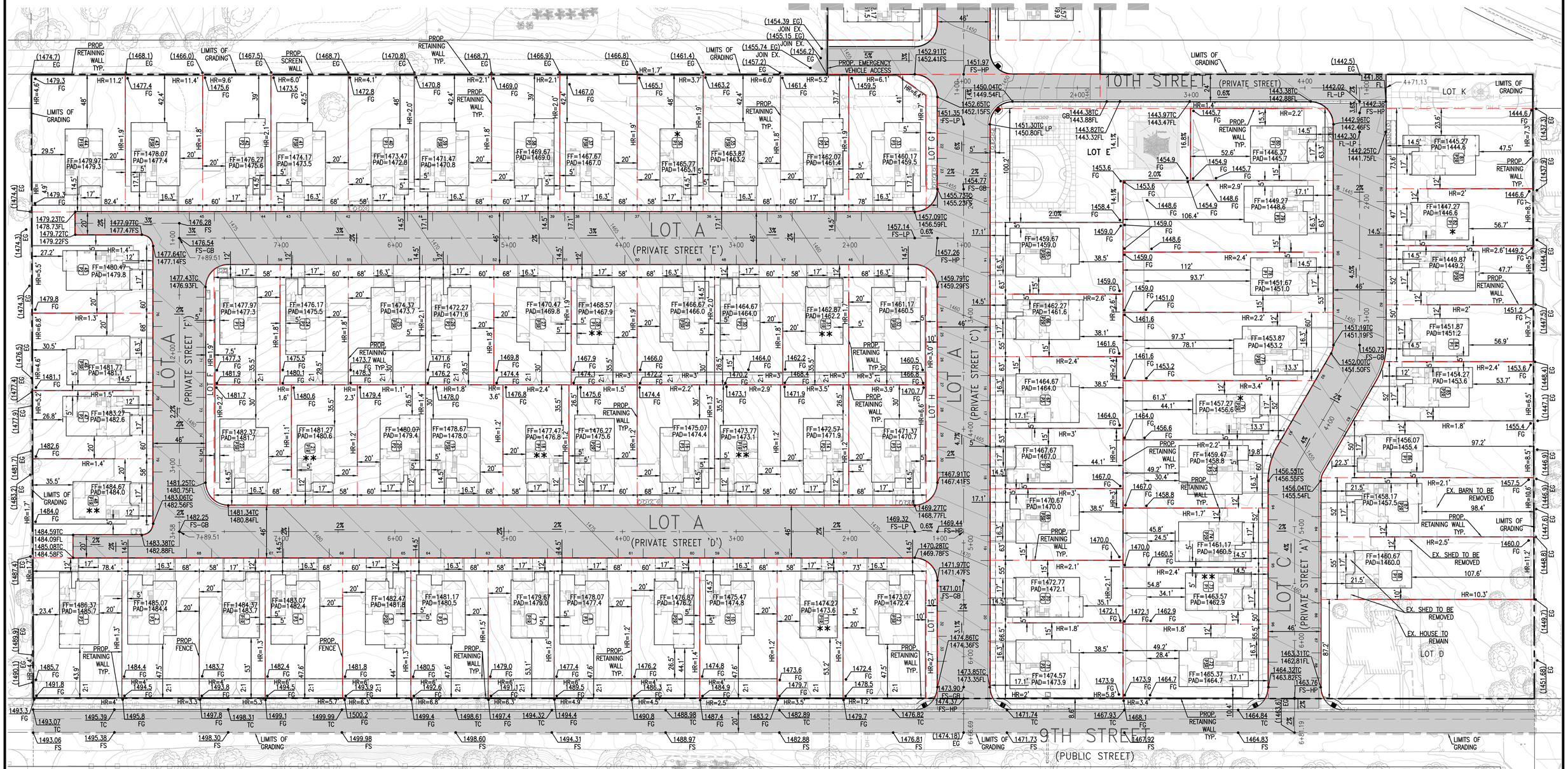
TYPICAL PARALLEL PARKING DETAIL
SCALE 1:10

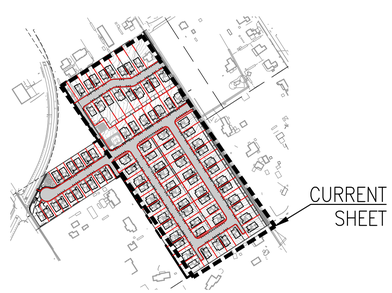
1" = 40'
0 20 40 80

PREPARED BY:	PREPARED FOR:		
C&V CONSULTING, INC. CIVIL ENGINEERING LAND PLANNING & SURVEYING 9830 IRVINE CENTER DRIVE IRVINE, CALIFORNIA 92618 (949) 916-3800 INFO@CVC-INC.NET WWW.CVC-INC.NET	WARMINGTON RESIDENTIAL 3090 PULLMAN STREET COSTA MESA, CA 92626 (714) 557-5511	**COUNTY OF SAN DIEGO** DEPARTMENT OF PLANNING AND DEVELOPMENT **PRELIMINARY GRADING PLANS** PDS2025-TM-5665, PDS2025-DB-25-005, PDS2025-ER-09-003 APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00 **PRELIMINARY GRADING PLAN**	PROJECT NO. WARM-021 SHEET 3 OF 9

PLAN SET: PDEA
DATE: 10/03/2025
P:\PW\WARM-021\DWG\TENTATIVE DRAWING\TM-25-12SCDWG
BY: HANNA SCHUSTER

SEE SHEET 3





INDEX MAP

AFFORDABLE UNITS

* MODERATE –
LOTS 36, 76, 82

** VERY LOW –
LOTS 11, 15, 18, 21, 28, 31, 48, 73

NOTE:
THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF THE PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE APPROVAL TO PERFORM AND GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.

DRAINAGE NOTES:
- LOTS 72–88, LOT E, AND LOT K SHALL DRAIN TO LOT C (PRIVATE STREET 'A' AND 10TH STREET) THROUGH YARD DRAINS AND APPROVED DRAINAGE DEVICES.
- LOTS 1–48, LOTS 65–71, LOT E, LOT F, LOT G, LOT H, AND LOT I SHALL DRAIN TO LOT A (PRIVATE STREET 'C', PRIVATE STREET 'D', PRIVATE STREET 'E', AND PRIVATE STREET 'F') THROUGH YARD DRAINS AND APPROVED DRAINAGE DEVICES.

1" = 40'
0 20 40 80

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LAND PLANNING & SURVEYING
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COSTA MESA, CA 92626
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COUNTY OF SAN DIEGO
DEPARTMENT OF PLANNING AND DEVELOPMENT

PROJECT NO. WARM-021

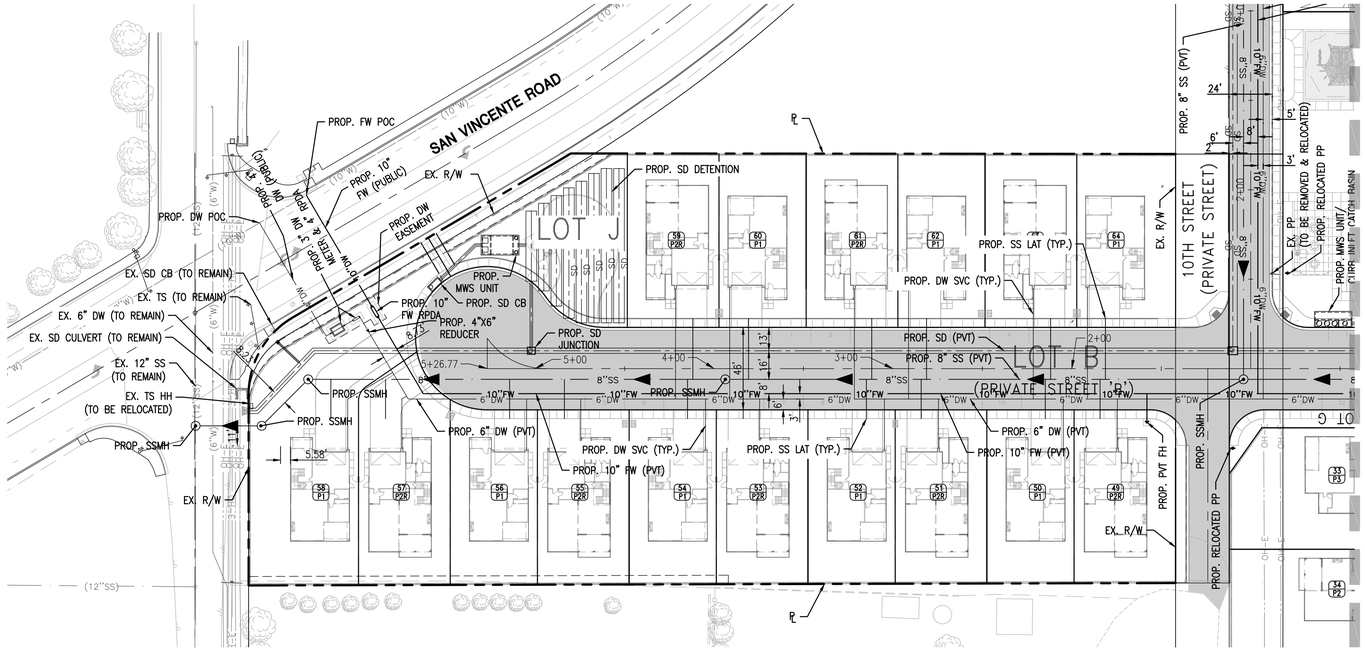
PRELIMINARY GRADING PLANS
PDS2025-TM-5665, PDS2025-DB-25-005, PDS2025-ER-09-003
APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00

PRELIMINARY GRADING PLAN

SHEET 4 OF 9

PLAN SET: PDCA
DATE: 10/02/2026

P:\WARM-021\DWG\SHEETS\PRELIM GRADING\TM-GD-DESIGNED BY: JASON MCMEETERS



SEE SHEET 6

AFFORDABLE UNITS

* MODERATE –
LOTS 36, 76, 82

** VERY LOW –
LOTS 11, 15, 18, 21, 28, 31, 48, 73

1" = 40'

0 20 40 80

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COUNTY OF SAN DIEGO
DEPARTMENT OF PLANNING AND DEVELOPMENT

PRELIMINARY GRADING PLANS
PDS2025-TM-5665, PDS2025-DB-25-005, PDS2025-ER-09-003
APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00

PRELIMINARY UTILITY PLAN

PROJECT NO.
WARM-021

SHEET
5
OF
9

PLAN SET: PDS4
DATE: 10/03/2025
E:\PJ\WARM-021\DWG\SHEETS\PRELIM GRADING\TM-5A-UTIL.DWG
BY: HANNA MCMASTERS

SEE SHEET 5



AFFORDABLE UNITS

* MODERATE –
LOTS 36, 76, 82

** VERY LOW –
LOTS 11, 15, 18, 21, 28, 31, 48, 73

1" = 40'

0 20 40 80

PREPARED BY:	PREPARED FOR:		
C&V CONSULTING, INC. CIVIL ENGINEERING LAND PLANNING & SURVEYING 9830 IRVINE CENTER DRIVE IRVINE, CALIFORNIA 92618 (949) 916-3800 INFO@CVC-INC.NET WWW.CVC-INC.NET	WARMINGTON RESIDENTIAL 3090 PULLMAN STREET COSTA MESA, CA 92626 (714) 557-5511	COUNTY OF SAN DIEGO DEPARTMENT OF PLANNING AND DEVELOPMENT **PRELIMINARY GRADING PLANS** PDS2025-TM-5665, PDS2025-DB-25-005, PDS2025-ER-09-003 APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00 **PRELIMINARY UTILITY PLAN**	PROJECT NO. WARM-021 SHEET 6 OF 9

PLAN SET: PDS#
DATE: 10/07/2026 BY: SARAH MCMASTERS
K:\EVR\WARM-021\TMG\SHEETS\PRELIM GRADING\TM-04-UTILITIES.DWG

PROJECT GENERAL NOTES:

1. FIRE APPARATUS ACCESS ROADS SHALL HAVE AN UNOBSTRUCTED IMPROVED WIDTH OF NOT LESS THAN 24 FEET. EXCEPTION: SINGLE FAMILY RESIDENTIAL DRIVEWAYS SERVING NO MORE THAN TWO SINGLE-FAMILY DWELLINGS SHALL HAVE A MINIMUM OF 16 FEET OF UNOBSTRUCTED IMPROVED WIDTH. ALL FIRE APPARATUS ACCESS ROADS SHALL HAVE AN UNOBSTRUCTED VERTICAL CLEARANCE OF NOT LESS THAN 13 FEET 6 INCHES. (COUNTY FIRE CODE 503.2.1)

2. THE INSIDE TURNING RADIUS OF A FIRE APPARATUS ACCESS ROAD SHALL BE A MINIMUM OF 28 FEET, OR AS APPROVED BY THE FIRE CODE OFFICIAL. (COUNTY FIRE CODE 503.2.4)

3. STRUCTURES SHALL HAVE AN AUTOMATIC FIRE SPRINKLER SYSTEM INSTALLED PER NFPA 13-D STANDARD AND THE COUNTY FIRE CODE. FIRE SPRINKLER SYSTEM PLANS SHALL BE SUBMITTED AND APPROVED BY SAN DIEGO COUNTY FIRE AND THE SYSTEM SHALL BE READY FOR HYDROSTATIC TESTING PRIOR TO FRAMING INSPECTION. (COUNTY FIRE CODE 903.2)

4. STRUCTURES SHALL HAVE AN AUTOMATIC FIRE SPRINKLER SYSTEM INSTALLED PER NFPA 13-D STANDARD AND THE COUNTY FIRE CODE. IF NOT FACTORY INSTALLED, FIRE SPRINKLER SYSTEM PLANS SHALL BE SUBMITTED TO, AND APPROVED BY, THE STATE OF CALIFORNIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT. FACTORY INSTALLED SYSTEMS SHALL BE HYDROSTATICALLY TESTED AT BUILDING FINAL INSPECTION. ON-SITE INSTALLED SYSTEMS SHALL BE HYDROSTATICALLY TESTED BEFORE PIPING IS CONCEALED. (COUNTY FIRE CODE 903.2)

5. APPROVED SIGNS OR OTHER APPROVED NOTICES SHALL BE PROVIDED AND MAINTAINED FOR FIRE APPARATUS ACCESS ROADS TO IDENTIFY SUCH ROADS AND PROHIBIT THE OBSTRUCTION THEREOF. (COUNTY FIRE CODE § 503.3) WHERE THE FIRE CODE OFFICIAL DETERMINES THAT IT IS NECESSARY TO ENSURE ADEQUATE FIRE ACCESS, THE FIRE CODE OFFICIAL MAY DESIGNATE EXISTING ROADWAYS AS FIRE APPARATUS ACCESS ROADS AS PROVIDED BY VEHICLE CODE SECTION 22500. (COUNTY FIRE CODE 503.3.1) ALL NEW PUBLIC ROADS, ALL PRIVATE ROADS WITHIN MAJOR SUBDIVISIONS, AND ALL PRIVATE ROAD EASEMENTS SERVING FOUR OR MORE PARCELS SHALL BE NAMED. ROAD NAME SIGNS SHALL COMPLY WITH COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS DESIGN STANDARD #DS-13. (COUNTY FIRE CODE 505.2)

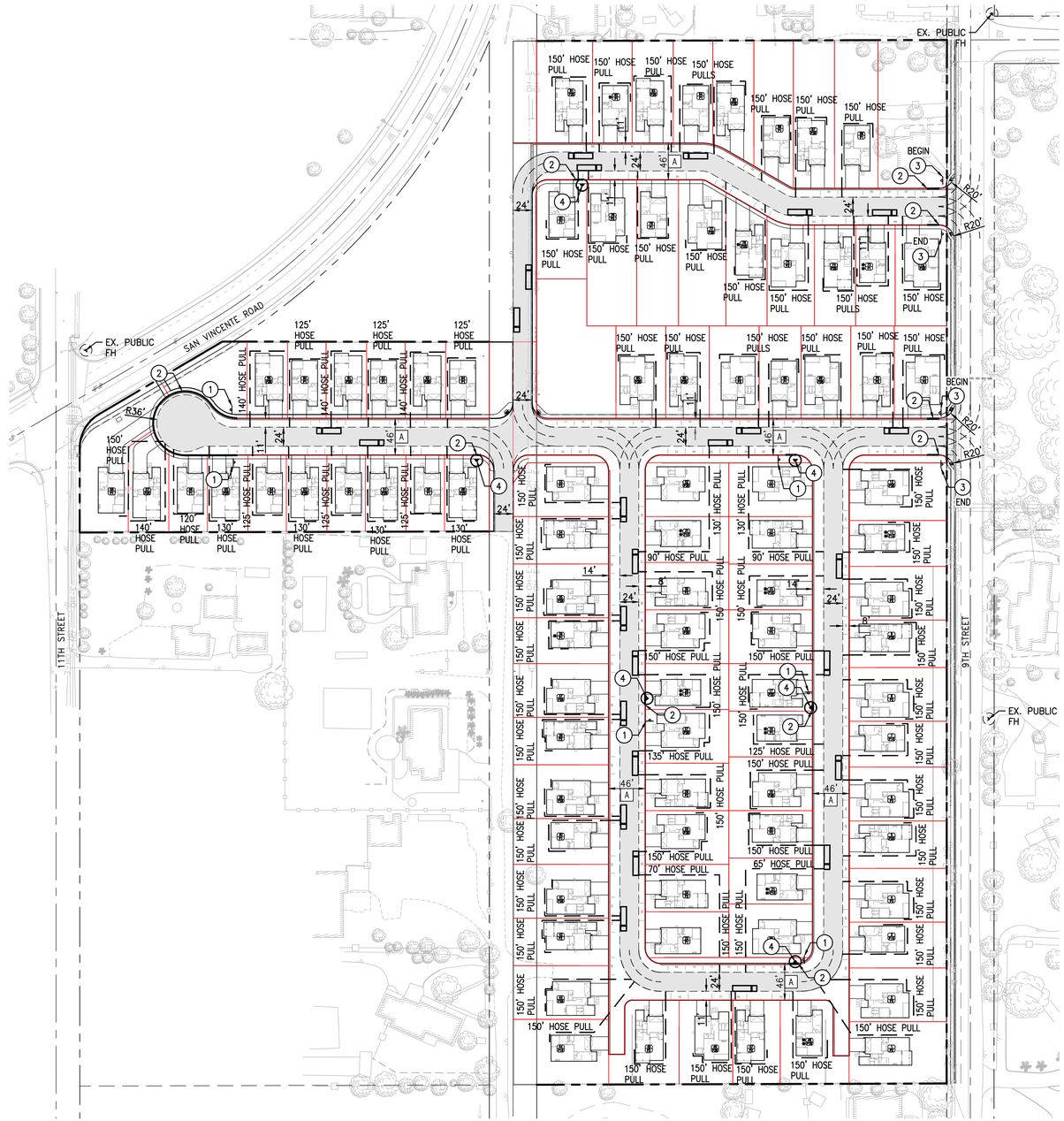
6. AN AUTOMATIC GATE ACROSS A FIRE ACCESS ROADWAY OR DRIVEWAY SHALL BE EQUIPPED WITH AN APPROVED EMERGENCY KEY-OPERATED SWITCH OVERRIDING ALL COMMAND FUNCTIONS AND OPENING THE GATE. FIRE CODE 503.6. (NO ENTRY GATE PROPOSED ON THIS PROJECT.)

7. ALL EASEMENTS WHICH ARE NOT NAMED DIFFERENTLY FROM THE ROADWAY FROM WHICH THEY ORIGINATE SHALL HAVE AN ADDRESS SIGN INSTALLED AND MAINTAINED, LISTING ALL ADDRESS NUMBERS OCCURRING ON THAT EASEMENT, LOCATED WHERE THE EASEMENT INTERSECTS THE NAMED ROADWAY. ADDRESS NUMBERS SHALL BE A MINIMUM OF 4 INCHES IN HEIGHT WITH A ½" STROKE; AND SHALL CONTRAST WITH THE BACKGROUND. (COUNTY FIRE CODE 505.3)

8. APPROVED NUMBERS AND/OR ADDRESSES SHALL BE PLACED ON ALL NEW AND EXISTING BUILDINGS AND AT APPROPRIATE ADDITIONAL LOCATIONS AS TO BE PLAINLY VISIBLE AND LEGIBLE FROM THE STREET OR ROADWAY FRONTING THE PROPERTY FROM EITHER DIRECTION OF APPROACH. ADDRESS NUMBERS SHALL BE A MINIMUM OF 4 INCHES IN HEIGHT WITH A ½" STROKE; AND SHALL CONTRAST WITH THE BACKGROUND. (COUNTY FIRE CODE 505.1)

9. FIRE APPARATUS ACCESS ROADS, INCLUDING PRIVATE RESIDENTIAL DRIVEWAYS, SHALL BE PROVIDED FOR EVERY FACILITY, BUILDING OR PORTION OF A BUILDING HEREAFTER CONSTRUCTED OR MOVED INTO OR WITHIN THE JURISDICTION. THE FIRE APPARATUS ACCESS ROAD SHALL EXTEND TO WITHIN 150 FEET OF ALL PORTIONS OF THE FACILITY AND ALL PORTIONS OF THE EXTERIOR WALLS OF THE FIRST STORY OF THE BUILDING AS MEASURED BY AN APPROVED ROUTE AROUND THE EXTERIOR OF THE BUILDING OR FACILITY. (COUNTY FIRE CODE 503.1.1)

10. ALL GATES OR OTHER STRUCTURES OR DEVICES THAT COULD OBSTRUCT FIRE ACCESS ROADWAYS OR OTHERWISE HINDER EMERGENCY OPERATIONS ARE PROHIBITED UNLESS THEY MEET STANDARDS AND RECEIVE SPECIFIC PLAN APPROVAL FROM THE FIRE CODE OFFICIAL. (COUNTY FIRE CODE 503.6) (NO GATES PROPOSED ON THIS PROJECT).



LEGEND

- EXISTING STREET LIGHT
- PROPOSED FIRE HYDRANT
- EXISTING FIRE HYDRANT
- PROPOSED SIGN
- HOSE PULL
- PROPERTY LINE
- FIRE TRUCK
- LOT NUMBER
- PLAN TYPE
- FIRE LANE

FH	FIRE HYDRANT
PROP.	PROPOSED
EX.	EXISTING
~P	PROPERTY LINE
R/W	RIGHT OF WAY

AFFORDABLE UNITS

* MODERATE –
LOTS 36, 76, 82

** VERY LOW –
LOTS 11, 15, 18, 21, 28, 31, 48, 73

CONSTRUCTION NOTES:

1. INSTALL "FIRE LANE" SIGN PER DETAIL 1 HEREON.
2. FIRE LANE IDENTIFICATION-RED CURBS PER DETAIL 2 HEREON.
3. INSTALL "FIRE LANE" SIGN BEGIN OR END PER DETAIL 3 HEREON.
4. PROPOSED PRIVATE FIRE HYDRANT LOCATION

PROPOSED EASEMENTS

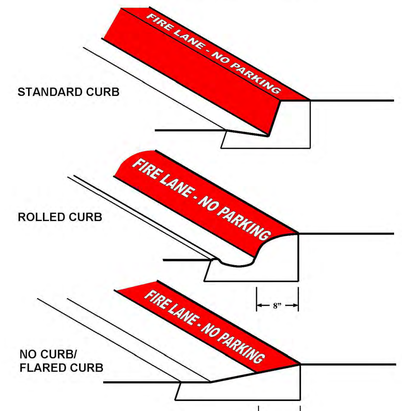
[A] INDICATES AN EASEMENT FOR INGRESS AND EGRESS FOR EMERGENCY AND PUBLIC SECURITY VEHICLE PURPOSES DEDICATED TO THE CITY OF RAMONA.

NOTE:
THE SITE IS WITHIN THE SAN DIEGO COUNTY FIRE PROTECTION DISTRICT.

NOTE:
SPEED BUMPS ARE NOT PROPOSED AS THEY ARE NOT SUPPORTED.

ATTACHMENT 9

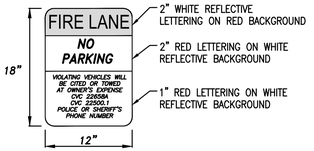
Fire Lane Identification – Red Curbs



1. Fire lane entrance sign(s) shall also be provided per Attachment 10 or 11.
2. Curbs shall be painted OSHA safety red.
3. "FIRE LANE – NO PARKING" shall be painted on top of curb in 3" white lettering at a spacing of 30' on center or portion thereof.

1. CURBS SHALL BE PAINTED RED
2. "FIRE LANE – NO PARKING" SHALL BE PAINTED ON TOP OF CURB IN 3" WHITE LETTERING AT A SPACING OF 30' ON CENTER OR PORTION THEREOF.

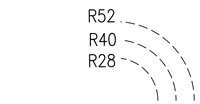
(2) RED CURB PAVEMENT MARKING
NOT TO SCALE



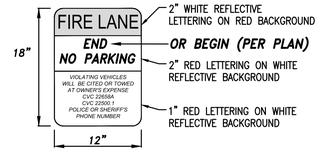
ALL SIGN AND LETTERING DIMENSIONS ARE MINIMUMS.

SIGNS SHALL BE SECURELY MOUNTED FACING THE DIRECTION OF TRAVEL AND CLEARLY VISIBLE TO ONCOMING TRAFFIC ENTERING THE DESIGNATED AREA. SIGNS SHALL BE MADE OF DURABLE MATERIAL.

(1) NO PARKING SIGN



TYPICAL EMERGENCY TURNAROUND RADII



ALL SIGN AND LETTERING DIMENSIONS ARE MINIMUMS.

SIGNS SHALL BE SECURELY MOUNTED FACING THE DIRECTION OF TRAVEL AND CLEARLY VISIBLE TO ONCOMING TRAFFIC ENTERING THE DESIGNATED AREA. SIGNS SHALL BE MADE OF DURABLE MATERIAL.

(3) BEGIN & END NO PARKING SIGN

PREPARED BY:
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PREPARED FOR:
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(714) 557-5511

COUNTY OF SAN DIEGO
DEPARTMENT OF PLANNING AND DEVELOPMENT

PRELIMINARY GRADING PLANS
PDS2025-TM-5665, PDS2025-DB-25-005, PDS2025-ER-09-003
APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00

PRELIMINARY FIRE ACCESS & HYDRANT LOCATION PLAN

PROJECT NO. WARM-021

SHEET 7 OF 9

PLAN SET: PDSA
DATE: 10/02/2026

P:\CVR\WARM-021\DWG\SHEETS\PRELIM GRADING\TM-05-FLANS

BY: DAWN RICHESTER



Slopes Table					
Number	Minimum Slope	Maximum Slope	Area	LOT PERCENTAGE	Color
1	0.00%	15.00%	18.15	98.64%	
2	15.00%	25.00%	0.23	1.25%	
3	25.00%	50.00%	0.02	0.11%	
4	50.00%	100.00%	0.00	0.00%	

1" = 80'

0 40 80 160

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COUNTY OF SAN DIEGO
DEPARTMENT OF PLANNING AND DEVELOPMENT

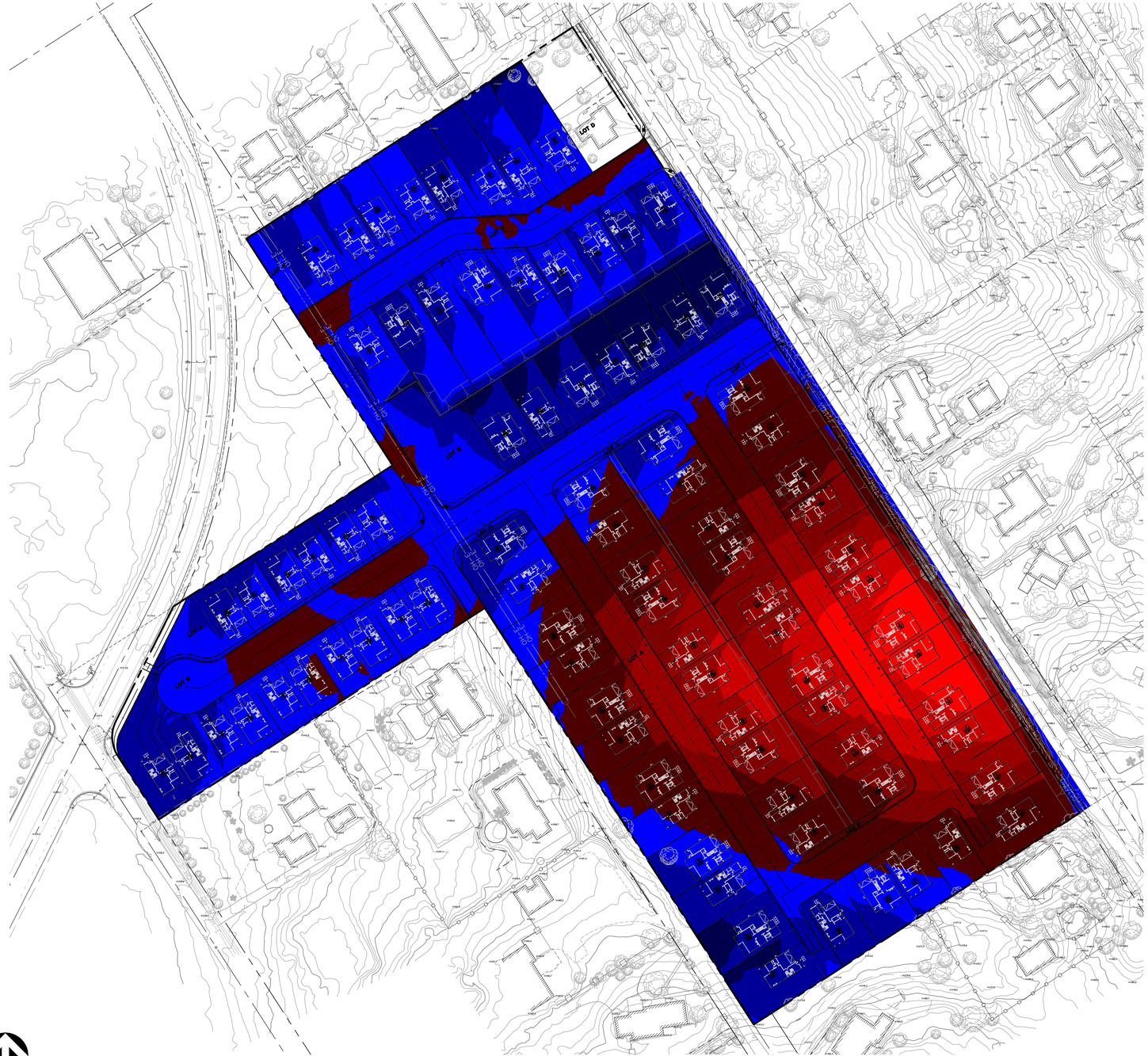
PROJECT NO.
WARM-021

PRELIMINARY GRADING PLANS
PDS2025-TM-5665, PDS2025-DB-25-005, PDS2025-ER-09-003
APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00

SLOPE ANALYSIS PLAN

SHEET
8
OF
9

PLAN SET: PDS4
DATE: 10/07/2026
P:\PLW\WARM-021\DWG\SHEETS\PRELIM GRADING\TM-DB-ER\SLOPE.DWG
BY: SARAH MCMARTINS



Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	−35.000	−30.000	
2	−30.000	−25.000	
3	−25.000	−20.000	
4	−20.000	−15.000	
5	−15.000	−10.000	
6	−10.000	−5.000	
7	−5.000	0.000	
8	0.000	5.000	
9	5.000	10.000	
10	10.000	15.000	

1" = 80'

0 40 80 160

PREPARED BY:

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APN: 284-202-21-00 AND 284-203-08-00 AND 284-244-01-00

CUT/FILL MAP

PROJECT NO. WARM-021

SHEET 9 OF 9

PLAN SET: PDS4
DATE: 10/07/2026

P:\WARM-021\DWG\SHEETS\PRELIM GRADING\TM-07-CUTFILL.DWG
BY: SARAH MCWATTERS

7.0 General Requirements

- Submit this cover page and all required Sub-attachments for all structural BMPs proposed for the project.
- See the BMPDM sections and appendices listed under "BMPDM Design Resources" in the table below for additional explanation of design requirements. Constructed features must fully satisfy the requirements described in these resources, and any other guidance identified by the County.
- PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management. Completion of SWQMP Attachment 8 is also required for these BMPs.
- DMA Exhibits and Construction Plans: DMAs, features, and BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.
- Structural BMP Certification. All structural BMPs documented this attachment and in Attachment 8 must be certified by a registered engineer in Sub-attachment 7.1.
- Structural BMP Verification. Structural BMP installation must be verified by the County at the completion of construction. Applicants must complete an Installation Verification Form (Attachment 10).

Sub-attachments (check all that are completed)	**Requirement**	**BMPDM Design Resources**
☒ **7.1: Preparer's Certification**	Required	• N/A
☒ **7.2: Structural BMP Strategy**	Required	• BMPDM Sections 5.1., 5.3, 5.4, and Chapter 6 • BMPDM Appendix E (pages E-78 through E-210)
☒ **7.3: Structural BMP Checklist(s)**	Required	
☒ **7.4: Stormwater Pollutant Control Worksheet Calculations**	Required	• BMPDM Appendix B
☒ **7.5: Identification and Narrative of Receiving Water and Pollutants of Concern**	Required if flow-thru BMPs are proposed	• N/A

7.1 Engineer of Work Certification for Structural BMPs

Project Name _____

Permit Application Number _____

CERTIFICATION

I hereby declare that I am the Engineer in Responsible Charge of design of structural 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 County of San Diego BMP Design Manual, which is a design manual for compliance with local County of San Diego Watershed Protection Ordinance (Sections 67.801 et seq.) 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 County of San Diego has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual.

I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by County staff is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of structural storm water BMPs for this project, of my responsibilities for their design.

☐ In addition to the structural pollutant control BMPs described in this attachment, this certification applies to the Structural Hydromodification Management BMPs described in Attachment 8 (check if applicable).

C80705 EXP 03/31/2027

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

Dane McDougall

Print Name

C & V Consulting

Company

10/2/2026

Date

Engineer's Seal:



7.2 Structural BMP Strategy

7.2.1 Narrative Strategy (Continue description on subsequent pages as necessary)

Describe the general strategy for structural BMP implementation at the project site. For pollutant control BMPs, your description must address the key points outlined in Section 5.1 of the BMP Design Manual, and the type of BMPs selected. For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

The project site is situated within the San Dieguito Watershed Management Area. Stormwater runoff originating from the development drains directly into an existing headwall at the northern corner of the site near the intersection of San Vicente Road and 11th Street. From this point, flows travel sequentially through Santa Maria Creek, Santa Ysabel Creek, and the San Dieguito River before ultimately discharging into the Pacific Ocean. Because Santa Maria Creek is an earthen channel, the project is subject to hydromodification mitigation requirements. However, according to the *Potential Critical Coarse Sediment Yield Areas Exhibit* dated September 8, 2014, the site does not fall within a designated area of concern. By implementing these proposed drainage improvements, the historic downstream drainage patterns will be preserved, ensuring that downstream facilities are protected from negative impacts.

To effectively manage stormwater, the development is divided into three major Drainage Management Areas (DMAs) comprised of one underground detention system (per DMA) and several subareas dedicated to localized water quality treatment. On-site runoff is collected via a network of curbs and gutters that route the water into catch basins distributed across the property. Low flows entering these catch basins are directed to an adjacent Modular Wetland System (MWS) vault for water quality treatment. Similarly, runoff from private yards is collected by an area drain system—to be fully detailed during final engineering—and routed to a second MWS vault.

Any flows that exceed the water quality flow rate automatically bypass the treatment vaults and empty into a proposed underground detention pipe system. This detention system is sized to provide both peak flow attenuation and hydromodification mitigation. Once these regulatory thresholds are met, the runoff exits the detention pipes through a calibrated orifice structure designed to meter the flows. The controlled discharge then enters a proposed public storm drain that runs through the development, ultimately conveying the treated runoff to an existing headwall located at the northern corner of the property.

Historically, stormwater runoff from 9th Street entered the project site as unmanaged run-on. Under the proposed conditions, this runoff will be managed entirely within the public right-of-way. To handle these flows, reverse parkway drains will be installed intermittently beneath the proposed sidewalk to capture the 9th Street runoff and guide it into a vegetated swale equipped with an underdrain. This system satisfies the water quality regulations to which the 9th Street runoff is strictly subject. Following treatment, the underdrain system delivers the water to a proposed junction structure near the project entrance, ensuring all regulatory standards are fully satisfied prior to connection.

Simultaneously, the existing downstream headwall will be protected in place to maintain its current function as the discharge point for off-site run-on. To seamlessly integrate the site's new drainage network with this existing infrastructure, a new storm drain pipe connection and a concrete apron will be installed at the headwall. This improvement facilitates a controlled discharge into the natural channel while providing necessary erosion protection at the transition point.

The Modular Wetland Biofiltration Vault was selected as the optimal structural BMP for this project because it provides highly efficient water quality treatment within a compact footprint. To supplement this system and satisfy annual runoff retention goals, landscaping areas will be depressed where feasible to encourage incidental infiltration before runoff enters the area drains. Additionally, internal storage within the drainage system will be utilized on a DMA basis to hold water for gradual infiltration into the ground.

The proposed MWS units are proprietary, horizontal flow-through biofiltration vaults that utilize a specialized three-phase treatment train. When stormwater first enters the vault, it passes through a trash rack, filter media, and a settling chamber that collectively capture large debris, trash, and coarse sediment. In the second phase, the runoff moves horizontally through a pre-filter cartridge that targets fine Total Suspended Solids (TSS), heavy metals, nutrients, and bacteria. This pre-filtration chamber is critical because it prevents the downstream planting area from clogging and drastically reduces long-term maintenance needs. Finally, the water flows into the wetland chamber for a third phase of treatment, where a biological combination of physical, chemical, and biological processes provides final polishing. All proposed units will be fully vegetated with appropriate plant species selected during final engineering.

Other BMPs that have higher priority of implementation were considered but deemed infeasible as follows:

- Harvest and Reuse: Due to the dense nature of the site, the available landscaped area was not adequate to utilize this method.
- Infiltration: Groundwater was encountered during borings at approximately 9.5 to 10.5 feet bgs. Per the Soils Report provided by Petra Geosciences dated October 10, 2024, “The site will be graded such that compacted fill will cover the majority of the area and underlain by relatively impermeable granitic bedrock. The compacted fill and granitic bedrock possess little void space. Areas at the site could not be designed for infiltration without increasing risk of geotechnical hazards.” Due to the low infiltration rates, infiltration was deemed infeasible.
- Unlined Biofiltration and Lined Biofiltration: Due to the dense nature of the site, the footprint of an appropriately sized Biofiltration facilities is not available.

7.2.2 Structural BMP Summary Table (Complete for all proposed structural BMPs)

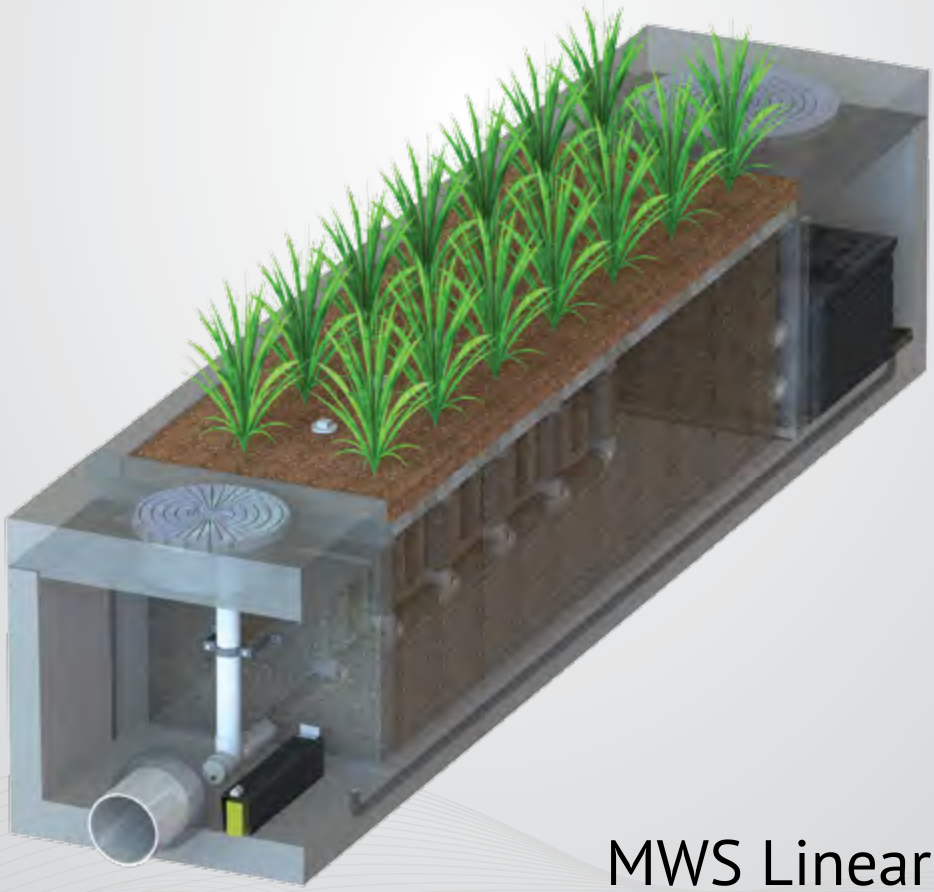
- List and provide the information requested below for all pollutant control and hydromodification management BMPs proposed for the project.
- For each BMP listed, complete the Structural BMP Checklist on the next page. Copy the Checklist as many times as needed.

BMP ID #	DMA #	DMA Area (ft^2)	Structural BMP Type							Permit # and Sheet #
			Harvest and Use	Infiltration	Unlined Biofiltration	Lined Biofiltration	Flow-thru treatment	Hydromodification Management [1]	Other	
MWS Unit #1	1	115869.6	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
MWS Unit #2	2	136778.4	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
MWS Unit #3	3	58370.4	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
MWS Unit #4	4	88426.8	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
MWS Unit #5	5	74923.2	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
MWS Unit #6	6	126324	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
MWS Unit #7	7	106722	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
MWS Unit #8	8	84942	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
MWS Unit #9	9	35283.6	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
MWS Unit #10	10	18730.8	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
Detention P1		523222.31	☐	☒	☐	☐	☐	☐	☒	PDS2025-TM-5654
Detention P2		191894.16	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
Detention P3		115040.97	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
9th Street R/W		19479.04	☐	☐	☐	☐	☐	☐	☒	PDS2025-TM-5654
			☐	☐	☐	☐	☐	☐	☐	
			☐	☐	☐	☐	☐	☐	☐	
			☐	☐	☐	☐	☐	☐	☐	

[1] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

MODULAR WETLANDS™

*Advanced **Stormwater** Biofiltration*



MWS Linear



Contents

1 Introduction

2 Applications

3 Configurations

4 Advantages

5 Operation

6 Orientations | Bypass

7 Performance | Approvals

8 Sizing

9 Installation | Maintenance | Plants

The Urban Impact

For hundreds of years natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as our cities grow and develop, these natural wetlands have perished under countless roads, rooftops, and parking lots.



Plant A Wetland

Without natural wetlands our cities are deprived of water purification, flood control, and land stability. Modular Wetlands and the MWS Linear re-establish nature's presence and rejuvenate water ways in urban areas.





MWS Linear

The Modular Wetland System Linear represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint and higher treatment capacity. While most biofilters use little or no pre-treatment, the MWS Linear incorporates an advanced pre-treatment chamber that includes separation and pre-filter cartridges. In this chamber sediment and hydrocarbons are removed from runoff before it enters the biofiltration chamber, in turn reducing maintenance costs and improving performance.

Applications

The MWS Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



Industrial

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA mandated effluent limits for dissolved metals and other pollutants.



Residential

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



Streets

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.



Parking Lots

Parking lots are designed to maximize space and the MWS Linear's 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



Commercial

Compared to bioretention systems, the MWS Linear can treat far more area in less space - meeting treatment and volume control requirements.



Mixed Use

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications are available on our website: www.ModularWetlands.com/Applications

- Agriculture
- Reuse
- Low Impact Development
- Waste Water





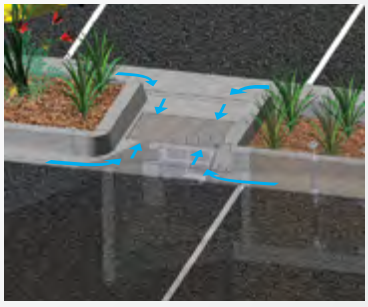
Configurations

The MWS Linear is the preferred biofiltration system of Civil Engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your stormdrain design.



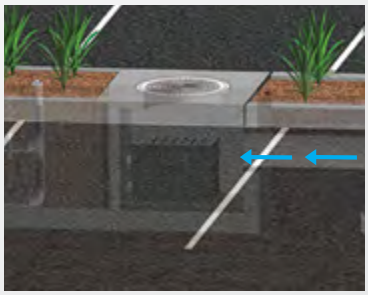
Curb Type

The *Curb Type* configuration accepts sheet flow through a curb opening and is commonly used along road ways and parking lots. It can be used in sump or flow by conditions. Length of curb opening varies based on model and size.



Grate Type

The *Grate Type* configuration offers the same features and benefits as the *Curb Type* but with a grated/drop inlet above the systems pre-treatment chamber. It has the added benefit of allowing for pedestrian access over the inlet. ADA compliant grates are available to assure easy and safe access. The *Grate Type* can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



Vault Type

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pre-treatment chamber, meaning the MWS Linear can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.



Downspout Type

The *Downspout Type* is a variation of the *Vault Type* and is designed to accept a vertical downspout pipe from roof top and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

Advantages & Operation

The MWS Linear is the most efficient and versatile biofiltration system on the market, and the only system with horizontal flow which improves performance, reduces footprint, and minimizes maintenance. Figure-1 and Figure-2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

Featured Advantages

- Horizontal Flow Biofiltration
- Greater Filter Surface Area
- Pre-Treatment Chamber
- Patented Perimeter Void Area
- Flow Control
- No Depressed Planter Area

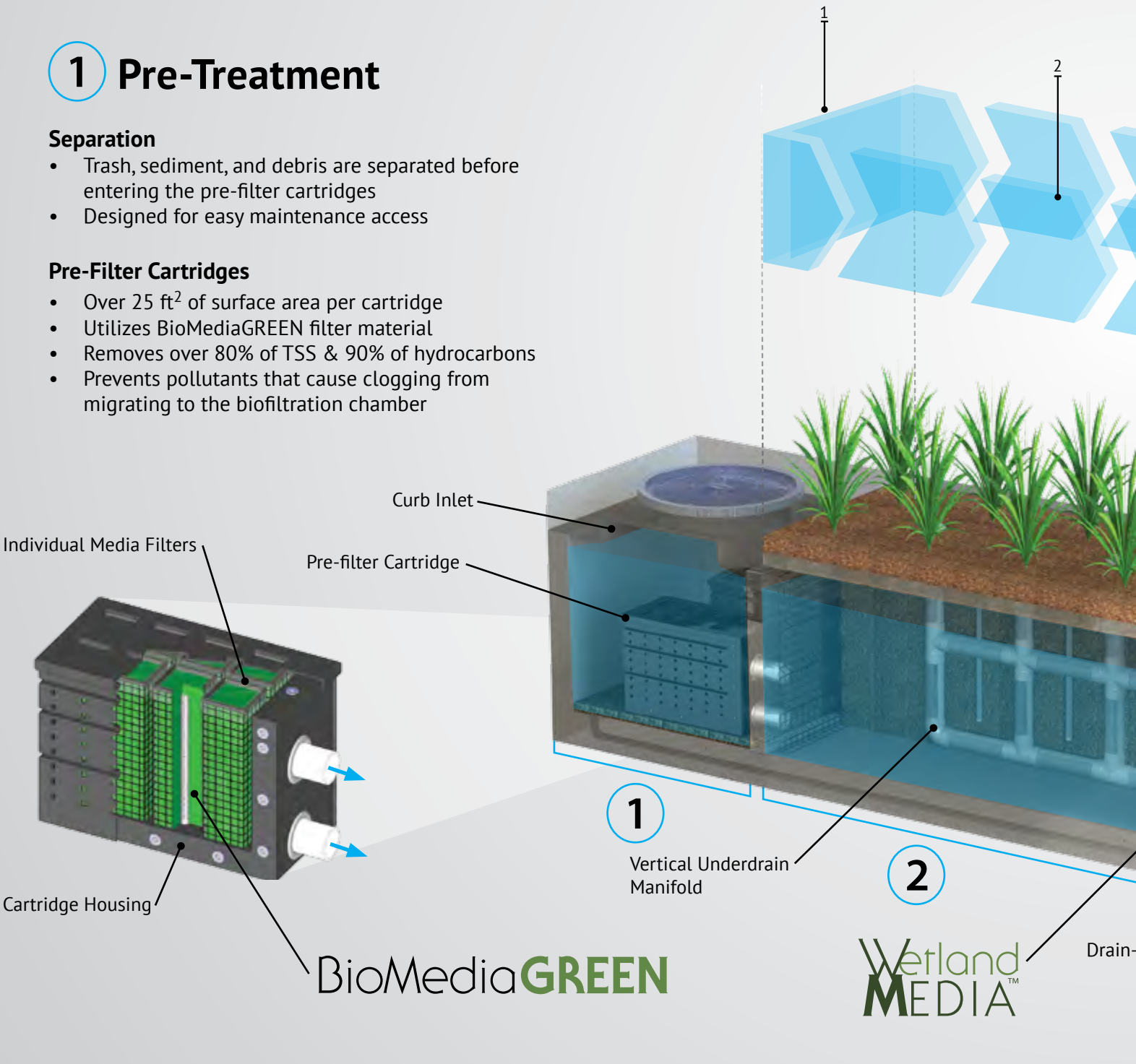
1 Pre-Treatment

Separation

- Trash, sediment, and debris are separated before entering the pre-filter cartridges
- Designed for easy maintenance access

Pre-Filter Cartridges

- Over 25 ft^2 of surface area per cartridge
- Utilizes BioMediaGREEN filter material
- Removes over 80% of TSS & 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



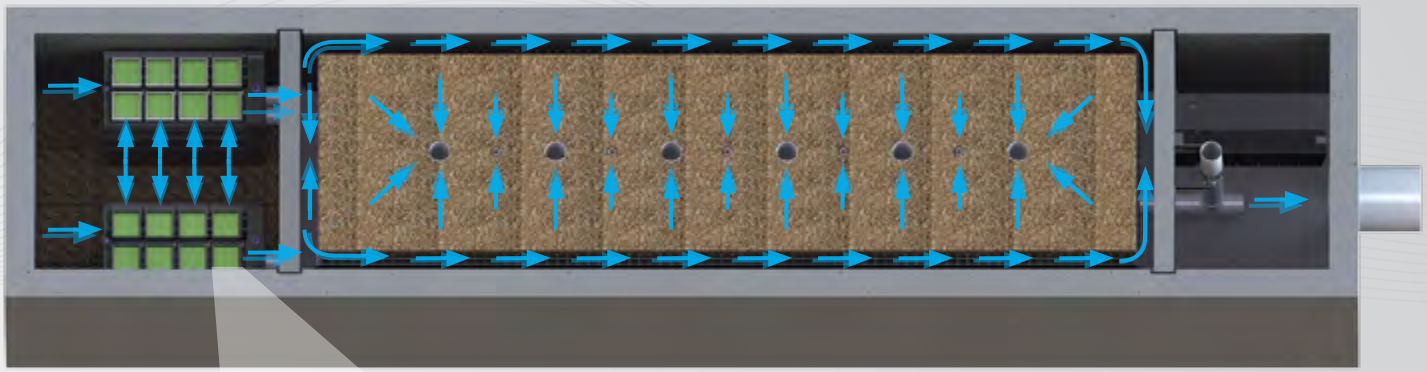


Fig. 2 - Top View

2x to 3x More Surface Area Than Traditional Downward Flow Bioretention Systems.



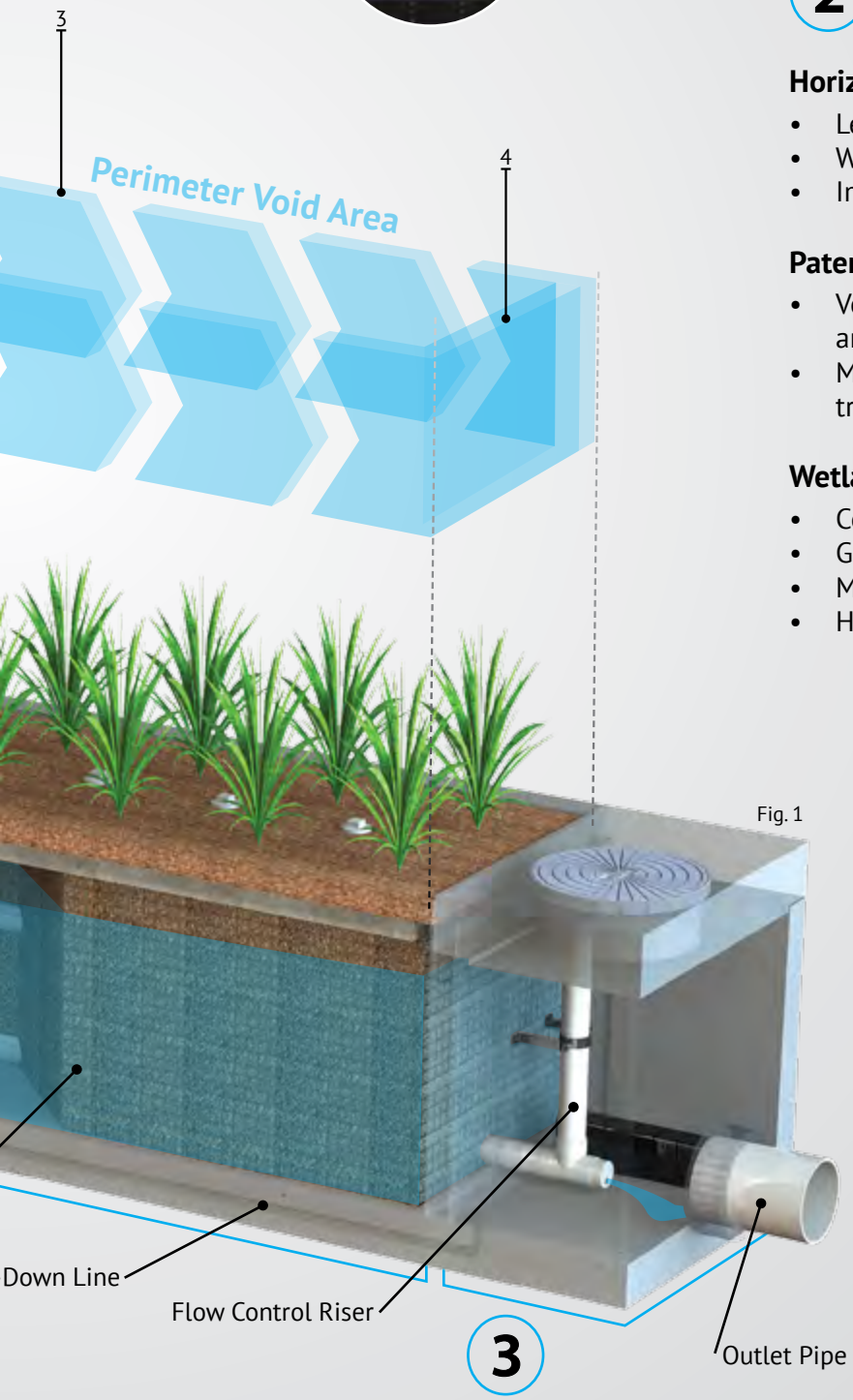


Fig. 1

2 Biofiltration

Horizontal Flow

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

Patented Perimeter Void Area

- Vertically extends void area between the walls and the WetlandMEDIA on all four sides.
- Maximizes surface area of the media for higher treatment capacity

WetlandMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and light weight

3 Discharge

Flow Control

- Orifice plate controls flow of water through WetlandMEDIA to a level lower than the media's capacity.
- Extends the life of the media and improves performance

Drain-Down Filter

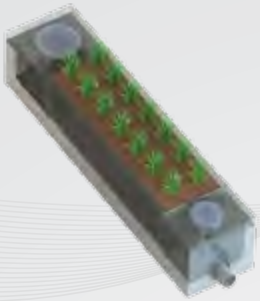
- The Drain-Down is an optional feature that completely drains the pre-treatment chamber
- Water that drains from the pre-treatment chamber between storm events will be treated

Orientations



Side-By-Side

The *Side-By-Side* orientation places the pre-treatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.



End-To-End

The *End-To-End* orientation places the pre-treatment and discharge chambers on opposite ends of the biofiltration chamber therefore minimizing the width of the system to 5 ft (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is bypass must be external.

Bypass

Internal Bypass Weir (Side-by-Side Only)

The *Side-By-Side* orientation places the pre-treatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pre-treatment chamber directly to the discharge chamber.

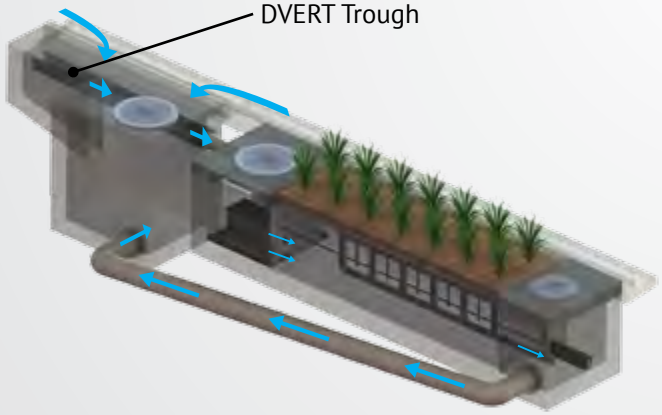
External Diversion Weir Structure

This traditional offline diversion method can be used with the MWS Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

Flow By Design

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT Low Flow Diversion



This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the MWS Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allows the MWS Linear to be installed anywhere space is available.





Performance

The MWS Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country. With it's advanced pre-treatment chamber and innovative horizontal flow biofilter, the system is able to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. With the same biological processes found in natural wetlands, the MWS Linear harnesses natures ability to process, transform, and remove even the most harmful pollutants.

Approvals

The MWS Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation, and perhaps the world.



Washington State DOE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

TSS	Total Phosphorus	Ortho Phosphorus	Nitrogen	Dissolved Zinc	Dissolved Copper	Total Zinc	Total Copper	Motor Oil
85%	64%	67%	45%	66%	38%	69%	50%	95%



DEQ Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear, the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria.



MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center, issued a technical evaluation report noting removal rates up to 84% TSS, 70% Total Phosphorus, 68.5% Total Zinc, and more.



Rhode Island DEM Approved

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% Pathogens, 30% Total Phosphorus for discharges to freshwater systems, and 30% Total Nitrogen for discharges to saltwater or tidal systems.

Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

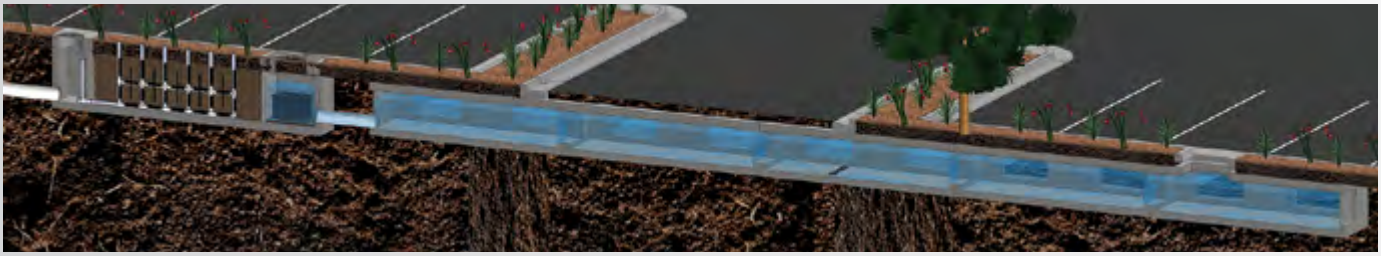


Treatment Flow Sizing Table

Model #	Dimensions	WetlandMedia Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 ft^2	0.052
MWS-L-4-6	4' x 6'	32 ft^2	0.073
MWS-L-4-8	4' x 8'	50 ft^2	0.115
MWS-L-4-13	4' x 13'	63 ft^2	0.144
MWS-L-4-15	4' x 15'	76 ft^2	0.175
MWS-L-4-17	4' x 17'	90 ft^2	0.206
MWS-L-4-19	4' x 19'	103 ft^2	0.237
MWS-L-4-21	4' x 21'	117 ft^2	0.268
MWS-L-8-8	8' x 8'	100 ft^2	0.230
MWS-L-8-12	8' x 12'	151 ft^2	0.346
MWS-L-8-16	8' x 16'	201 ft^2	0.462

Volume Based Sizing

Many states require treatment of a water quality volume and do not offer the option of flow based design. The MWS Linear and its unique horizontal flow makes it the only biofilter that can be used in volume based design installed downstream of ponds, detention basins, and underground storage systems.



Treatment Volume Sizing Table

Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-4	1140	2280
MWS-L-4-6	1600	3200
MWS-L-4-8	2518	5036
MWS-L-4-13	3131	6261
MWS-L-4-15	3811	7623
MWS-L-4-17	4492	8984
MWS-L-4-19	5172	10345
MWS-L-4-21	5853	11706
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145

Installation

The MWS Linear is simple, easy to install, and has a space efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles pre-cast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians are available to supervise installations and provide technical support.



Maintenance

Reduce your maintenance costs, man hours, and materials with the MWS Linear. Unlike other biofiltration systems that provide no pre-treatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pre-treatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pre-treatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pre-treatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long term operation and there is absolutely no need to replace expensive biofiltration media.



Plant Selection

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the MWS Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more "contact time" so that pollutants are more successfully decomposed, volatilized and incorporated into the biomass of The MWS Linear's micro/macro flora and fauna.

A wide range of plants are suitable for use in the MWS Linear, but selections vary by location and climate. View suitable plants by selecting the list relative to your project location's hardy zone.

Please visit www.ModularWetlands.com/Plants for more information and various plant lists.



MWS-LINEAR 2.0 STORMWATER FILTRATION SYSTEM

NATURE AND TECHNOLOGY WORKING TOGETHER IN PERFECT HARMONY.

The need for a new stormwater treatment system is evident. Federal and state requirements on cities and industry to reduce stormwater runoff increase every year as our population explodes. The EPA is now reporting that stormwater runoff represents the nation's number one water quality problem, and is the reason why nearly half of our rivers and lakes are not even clean enough to support fishing or swimming. ***Nearly half.***

MODULAR WETLANDS™

To combat this catastrophe, we turned to the expert in this field: **Nature.** By developing technology that imitates the processes found in nature, we've created the most advanced stormwater filtration system available. Years ahead of current EPA requirements, our clients understand that when they invest in our new technology, they are investing in the future. For all of us.



GRATE TYPE



CURB TYPE

MWS-LINEAR TESTED REMOVAL EFFICIENCIES

TSS	Nitrate	Copper	Zinc	Oils & Grease	Bacteria	Turbidity
82% - 98%	74%	>53% - 93%	79% - 81%	84% - 99%	60% - 89%	>90%

Washington State DOE Approved

SIZING

Model #	Dimensions (ft)	WetlandMedia Surface Area (sq ft)	Treatment Flow Rate (cfs)
MWS-L-3-6	3 x 6	34	0.076
MWS-L-4-8	4 x 8	50	0.116
MWS-L-4-13	4 x 13	63	0.144
MWS-L-4-15	4 x 15	76	0.175
MWS-L-4-17	4 x 17	90	0.206
MWS-L-4-19	4 x 19	103	0.236
MWS-L-4-21	4 x 21	117	0.267

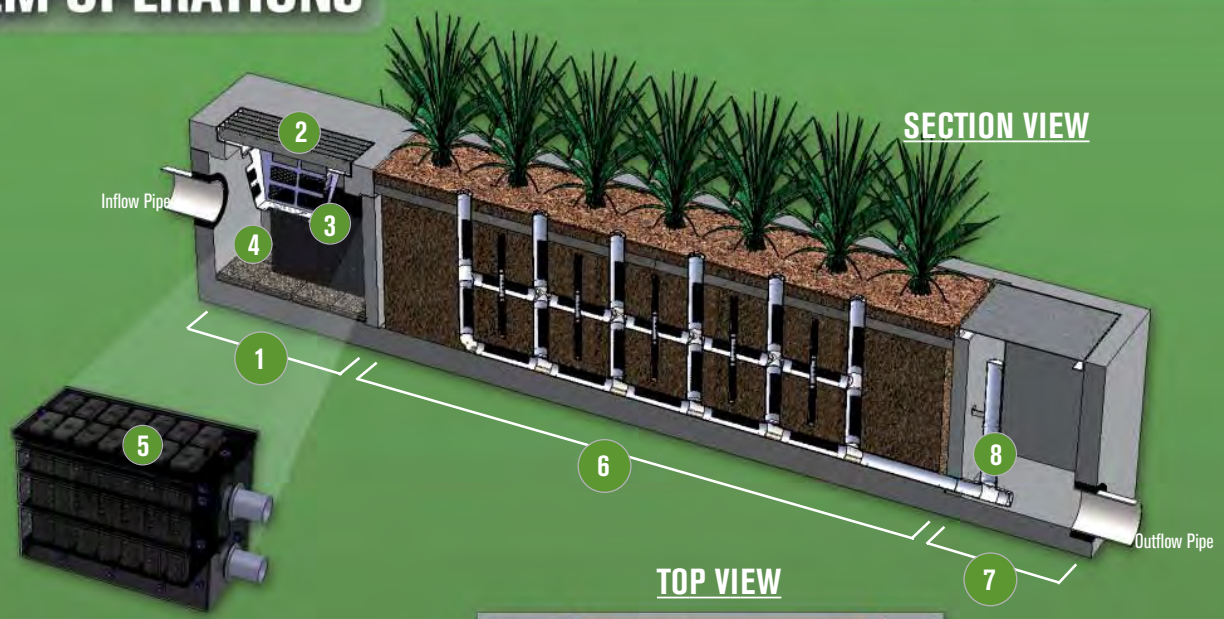
VOLUME SIZING



The Modular Wetland System is the only biofilter that can be installed downstream of detention systems.

T 760.433.7640 E info@modularwetlands.com www.modularwetlands.com

SYSTEM OPERATIONS

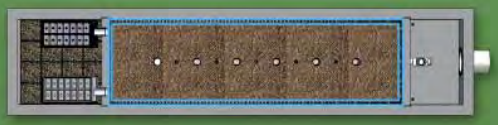


Pre-Filter Cartridge

35 sq ft surface area per cartridge ensures higher effectiveness and lower maintenance requirements.

This pre-filter eliminates maintenance in the Wetland Chamber.

TOP VIEW



Perimeter Wetland Chamber

Pre-filtered runoff entering the wetland chamber flows into a peripheral void area, maximizing the media surface area.

Over 2x to 3x more surface area than traditional downward flow bioretention systems.

INTERNAL HIGH FLOW BYPASS CONFIGURATION AVAILABLE

FEATURES

1. **PRE-TREATMENT CHAMBER**
   Captures incoming runoff and contains the first three stages of treatment.
2. **GRATE TYPE CATCH BASIN INLET**
   A standard 41" x 24" grate type traffic rated catch basin opening directs stormwater into the system.
3. **CATCH BASIN INSERT FILTER**
   Provides the first stage of treatment by capturing trash & litter, gross solids, and sediment.
4. **SETTLING CHAMBER**
   Provides the second stage of treatment by separating out larger suspended solids.
5. **PRE-FILTER CARTRIDGE**
   Provides the third stage of treatment by physically and chemically capturing fine TSS, metals, nutrients, and bacteria.
6. **WETLAND CHAMBER**
   Provides the final stage of treatment through a combination of physical, chemical and biological processes.
7. **DISCHARGE CHAMBER**
   Contains flow control, high flow bypass and optional drain down filter.
8. **MULTI-LEVEL FLOW CONTROL**
   Orifice plates and/or valves are used to control the flow through the treatment stages.

MODULAR WETLANDS

RAINFOREST ALLIANCE CERTIFIED

T 760.433.7640 E info@modularwetlands.com www.modularwetlands.com

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SPECIFICATIONS

MWS – Linear

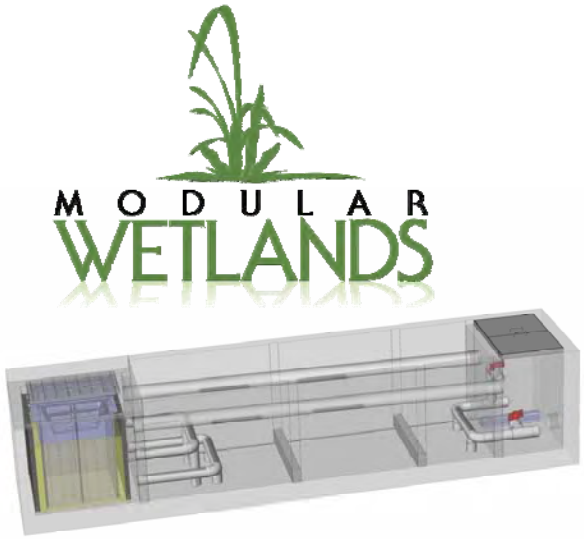
Hybrid Stormwater Filtration System

Modular Wetland Systems, Inc.
P.O. Box 869
Oceanside, CA 92049

www.modularwetlands.com
P 760-433-7640
F 760-433-3179

MWS – Linear

Hybrid Stormwater Filtration System



Save valuable space with small footprint for urban sites.

Improve BMP aesthetics with attractive native and tropical landscape plants.

Reduce lifetime costs with safer and less expensive maintenance

"The MWS – Linear hybrid stormwater treatment system is described as a self contained treatment train. This system utilizes an innovative combination of l treatment processes. Stormwater runoff flows into the system via pipe or curb/grate type catch basin opening. Polluted runoff first encounters a screening device to remove larger pollutants and then enters a hydrodynamic separation chamber which settles out the sediments and larger suspended solids. Next the runoff is treated by a revolutionary filter media, BioMediaGREEN that removes fines and associated pollutants, including bacteria. From there runoff enters of bioretention filter in the form of a subsurface flow vegetated gravel wetland. Within the wetland physical, chemical, and biological mechanisms remove the remaining particulate and dissolved pollutants. The purified runoff leaves the system via the discharge chamber. In the discharge chamber the rate of discharge is controlled by valves set to a desired rate".

Tested Pollutant Removal Efficiencies:

TSS Removal	Dissolved Lead Removal	Dissolved Copper Removal	TPH	E. coli Removal	Turbidity Removal
98%	81%	92%	99%	60.2%	92%

"Nature and Harmony Working Together in Perfect Harmony"

SPECIFICATIONS – MWS- LINEAR

Track Record: The MWS- Linear Hybrid Stormwater Treatment System is manufactured by a company whom is regularly engaged in the engineering design and production of treatment systems for stormwater.

Coverage: The MWS- Linear is designed to treat the water quality volume or water quality flow. For flow based design, high flow bypass is internal, for volume based design, high flow bypass is external and prior to pre-detention system. For offline volume based designs the MWS - Linear has the ability to treat the entire water quality volume when used with pre-storage and properly sized.

Non-Corrosive Materials: The MWS – Linear is designed with non-corrosive materials. All internal piping is SD35 PVC. Catch basin filter components, including mounting hardware, fasteners, support brackets, filtration material, and support frame are constructed of non-corrosive materials (316 stainless steel, and UV protected/marine grade fiberglass). Fasteners are stainless steel. Primary filter mesh is 316 stainless steel welded screens. Filtration basket screens for coarse, medium and fine filtration is ¾" x 1 ¾"expanded, 10 x 10 mesh, and 35 x 35 mesh, respectively. No polypropylene, monofilament netting or fabrics shall be used in this system. Media Protective Panels are constructed of UV protected/marine grade fiberglass. Mounts are constructed of stainless steel. BioMediaGREEN is an inert rock substrate and is non-corrosive. Perimeter filter structure is constructed of lightweight injection molded plastic. Mounting brackets are constructed of SD40 PVC and are mounted with 3/8" diameter stainless steel redheads. Drain down filter cover is constructed of UV protected/marine grade fiberglass and stainless steel hinge and mount.

Weight: Each complete unit weighs approximately 29,000 to 40,000 pounds and requires a boom crane to install. Details of this are provided in the installation section of the MWS-Linear Design Kit.

Transportation: The Modular Wetland System – Linear is designed to be transported on a standard flat bed truck. The unit easily fits on a flat bed truck without the need of special permitting.

Alternative Technology Configurations: The Modular Wetland System – Linear is modular is design. Each module will be up to 22 feet long and 5 feet wide. The system can be made in lengths varying from 13 to 100s of feet long. For lengths longer than 22 feet the system will shipped in modules and assembled on site. The Modular Wetland System – Linear has many alternative configurations. This allows the system to be adapted to many site conditions. Runoff can enter the system through a pipe, and/or a built in curb or grate type opening.

Energy Requirements: The Modular Wetland System – Linear is completely passive and requires no external energy sources.

Buoyancy Issues: Buoyancy is only a an issue when ground water levels rise above the bottom of the Modular Wetland System – Linear's concrete structure. With 8.5 cubic yards of wetland media there is no concern of floatation. As a precaution a footing can also be built into the systems concrete structure.

Durability: The structure of the box will be precast concrete. The concrete will be 28 day compressive strength fc = 5,000 psi. Steel reinforcing will be ASTM A – C857. Structure will support an H20 loading as indicted by AASHTO. The joint between the concrete sections will ship lap and joint sealed with ram-nek. Filter (excluding oil absorbent media) and support structures are of proven durability. The filter and mounting structures are of sufficient strength to support water, sediment, and debris loads when the filter is full, with no slippage, breaking, or tearing. All filters are warranted for a minimum of five (5) years.

Oil Absorbent Media: The MWS – Linear utilizes both physical and biological mechanisms to capture and filter oil and grease. A skimmer and boom system will be positioned on the internal perimeter of the catch basin insert. The primary filtration media, BioMediaGreen, utilized in the perimeter and drain down filters, has excellent hydrocarbon removal abilities. Within the wetland filter biological processes capture and

break down oil and grease. Much of the breakdown and transformation of oil and grease is performed by natural occurring bacteria.

Overflow Protection: The grate and curb type MWS – Linear are designed with an internal bypass consisting of two SD PVC pipes which direct high flows around the perimeter and wetland filter, directly into the discharge chamber. For the volume based vault type configuration, bypass should be located prior to the pre-detention system. For peak flows that exceed internal bypass capacity, external bypass is use.

Filter Bypass: Runoff will bypass filtration (BioMediaGREEN and wetland filter) components of the MWS - Linear. The system will still provide screening and settling during higher flow rates for internally bypassed flows. External bypass will bypass of treatment processes.

Pollutant Removal Efficiency: The MWS - Linear is capable of removing over 90% of the net annual total suspended solids (TSS) load based on a 20-micron particle size. Annual TSS removal efficiency models are based on documented removal efficiency performance from full-scale laboratory tests on BioMediaGreen and quarter-scale laboratory tests on the MWS – Linear flow based system.

POLLUTANT	REMOVAL EFFICIENCY
Trash & Litter	99%
TPH (mg/L)	99%
TSS (mg/L)	98%
E. Coli (MPN/100ml)	60%
Turbidity (NTU)	92%
Dissolved Metals (mg/L)	76%

Sil-Co-Sil 106. Mean particle diameter = 19 microns

Non-Scouring: During heavy storm events the runoff bypasses perimeter and wetland filter components. The system will not re-suspend solids at design flows.

Uniqueness: The Modular Wetland System – Linear is a complete self contained treatment train that incorporates capture, screening, sedimentation, filtration, bioretention, high flow bypass, and flow control into a single modular structure. This system provides four stages of treatment making it the only 4 stage treatment train stormwater filtration system, therefore making it unique to the industry. Other systems do not incorporate all the necessary attributes to make it a complete stormwater management device as with the Modular Wetland System – Linear. Therefore, no equal exists for this system.

Pretreatment & Preconditioning: Since the Modular Wetland System – Linear is a complete capture and treatment train stormwater management system no external pretreatment of preconditioning is necessary.

SPECIFICATIONS – BioMediaGREEN

BioMediaGREEN is a proprietary engineered filter media. Made of a unique combination of the inert naturally occurring material this product is non-combustible and do not pose a fire hazard, stable and non-reactive, and is also biodegradable. It is stable with no known adverse environmental effects.

This product has been tested in long-term carcinogenicity studies [inhalation and intraperitoneal injection (i.p.)] with no significant increase in lung tumors or abdominal tumors. Short-term biopersistent (inhalation and intra-tracheal injection) studies have shown that the products disappear very rapidly from the lung.

In October 2001, IARC classified this product as Group 3, "not classifiable as to its carcinogenicity to humans". The 2001 decision was based on the latest epidemiological studies and animal inhalation studies that show no relation between inhalation exposure and the development of tumors.

The product can typically be disposed of in an ordinary landfill (local regulations may apply). If you are unsure of the regulations, contact your local Public Health Department or the local office of the Environmental Protection Agency (EPA).

Coverage: When properly installed BioMediaGREEN Filter Blocks provide sufficient contact time, at rated flows, of passing contaminate water. The BioMediaGREEN material will capture and retain most pollutants that pass through it. The BioMediaGREEN material is made of a proprietary blend of inert substances. The BioMediaGREEN Filter Blocks can be used in different treatment devices, including but not limited to flume filters, trench drain filters, downspout filters, catch basin inserts, water polishing units, and hydrodynamic separators.

Non-Corrosive Materials: The BioMediaGreen material is made of non-corrosive materials.

Durability: The BioMediaGREEN material has been chosen for its proven durability, with an expected life of 2 plus years. The BioMediaGREEN material is of sufficient strength to support water, sediment, and debris loads when the media is at maximum flow; with no slippage, breaking, or tearing. The BioMediaGREEN material has been tested through rigorous flow and loading conditions.

Oil Absorbent Media: The BioMediaGREEN material has been proven to capture and retain hydrocarbons.

Pollutant Removal Efficiency: The BioMediaGREEN Filter Blocks are designed to capture high levels of Hydrocarbons including but not limited to oils & grease, gasoline, diesel, and PAHs. BioMediaGREEN Filter Blocks have the physical ability to block and filter trash and litter, grass and foliage, sediments, TSS, particulate and dissolved metals, nutrients, and bacteria.

BioMediaGREEN technology is based on a proprietary blend of synthetic inert natural substances aimed at removal of various stormwater pollutants. BioMediaGREEN was created to have a very porous structure capable of selectively removing pollutants while

allowing high flow through rates for water. As pollutants are captured by its structure, BioMediaGREEN captures most pollutants and maintains porosity and filtering capabilities.

Field and laboratory tests have confirmed the BioMediaGREEN capability to capture large percentage of TSS, hydrocarbons, nutrients, and heavy metals. Microbial reduction efficiency will vary depending on colony size, flow rates and site specific conditions.

POLLUTANT	REMOVAL EFFICIENCY
Oil & Grease (mg/L)	90%
TPH (mg/L)	99%
TSS (mg/L)	85%
Turbidity (NTU)	99%
Total Phosphorus (mg/L)	69.6%
Dissolved Metals (mg/L)	75.6%

Sil-Co-Sil 106. Mean particle diameter = 19 microns

Replacement: Removal and replacement of the blocks is simple. Remove blocks from filtration system. Replace with new block of equal size.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

April 2014

GENERAL USE LEVEL DESIGNATION FOR BASIC, ENHANCED, AND PHOSPHORUS TREATMENT

For the

MWS-Linear Modular Wetland

Ecology's Decision:

Based on Modular Wetland Systems, Inc. application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment

    - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

2. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Phosphorus treatment

    - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

3. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment

    - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

4. Ecology approves monitoring for the MWS - Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic

loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:

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

5. These use level designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.

- Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
- Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
- Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
- When inspections are performed, the following findings typically serve as maintenance triggers:
    - Standing water remains in the vault between rain events, or
    - Bypass occurs during storms smaller than the design storm.
    - If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
    - Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below)

6. Discharges from the MWS - Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Modular Wetland Systems, Inc.
Applicant's Address: *PO. Box 869*
Oceanside, CA 92054

Application Documents:

- *Original Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011
- *Quality Assurance Project Plan*: Modular Wetland system – Linear Treatment System performance Monitoring Project, draft, January 2011.
- *Revised Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011
- *Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data, April 2014*
- *Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring, April 2014.*

Applicant's Use Level Request:

General use level designation as a Basic, Enhanced, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/l.

- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of Total Phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 30-percent of dissolved Copper from stormwater with influent concentrations between 0.005 and 0.020 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 60-percent of dissolved Zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/l.

Ecology Recommendations:

- Modular Wetland Systems, Inc. has shown Ecology, through laboratory and field-testing, that the MWS - Linear Modular Wetland Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Total phosphorus, and Enhanced treatment goals.

Findings of Fact:

Laboratory Testing

The MWS-Linear Modular wetland has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system’s influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).

- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Modular Wetland Systems, Inc. should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Modular Wetland Systems, Inc. should use these data to establish required maintenance cycles.
2. Modular Wetland Systems, Inc. should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Modular Wetland Systems, Inc. will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:
Download at http://www.modularwetlands.com/

Contact Information:

Applicant: Greg Kent
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Oceanside, CA 92054
gkent@biocleanenvironmental.net

Applicant website: http://www.modularwetlands.com/

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

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

Revision History

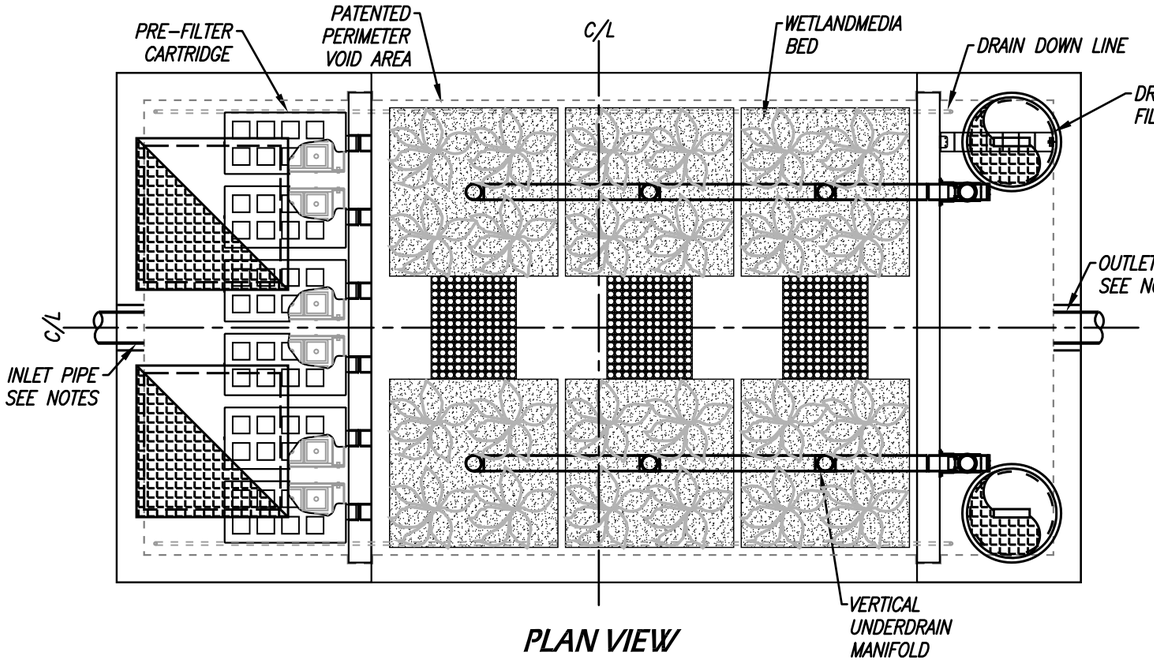
Date	Revision
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment

7.3 Structural BMP Checklist (Complete once for each proposed structural BMP)

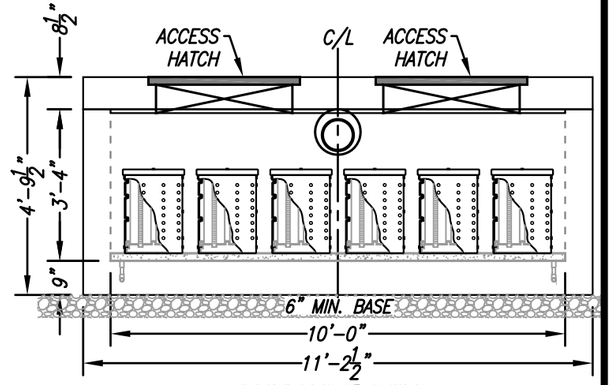
Structural BMP ID # MWS Unit #1	**Permit # and Sheet #** PDS2025-TM-5654
BMP Type	
Infiltration ☐ Infiltration basin (INF-1) ☐ Bioretention (INF-2) ☐ Permeable pavement (INF-3) **Unlined Biofiltration** ☐ Biofiltration with partial retention (PR-1) **Lined Biofiltration** ☐ Biofiltration (BF-1) ☐ Nutrient Sensitive Media Design (BF-2) ☒ Proprietary Biofiltration (BF-3)	**Harvest and Use** ☐ Cistern (HU-1) **Flow-thru Treatment** (describe below) ☐ With prior lawful approval to meet earlier PDP requirements ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2] ☐ With alternative compliance **Hydromodification Management**[3] ☐ Detention pond or vault ☐ **Other** (describe below)
BMP Purpose	
☒ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification	☐ Pre-treatment/forebay for another BMP ☐ Green Street BMP ☐ Other (describe below)
BMP Verification (See BMPDM Section 8.3)	
Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)	
BMP Maintenance Category	Cat. 1 ☐ Cat. 2 ☒ Cat. 3 ☐ Cat. 4 ☐
Final owner of BMP	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe):
Discussion (As needed; Continue on subsequent pages as necessary)	

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	36" X 36"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			14.50
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø2.67"
MAXIMUM PICK WEIGHT (LBS)			TBD
NOTES:			



PLAN VIEW



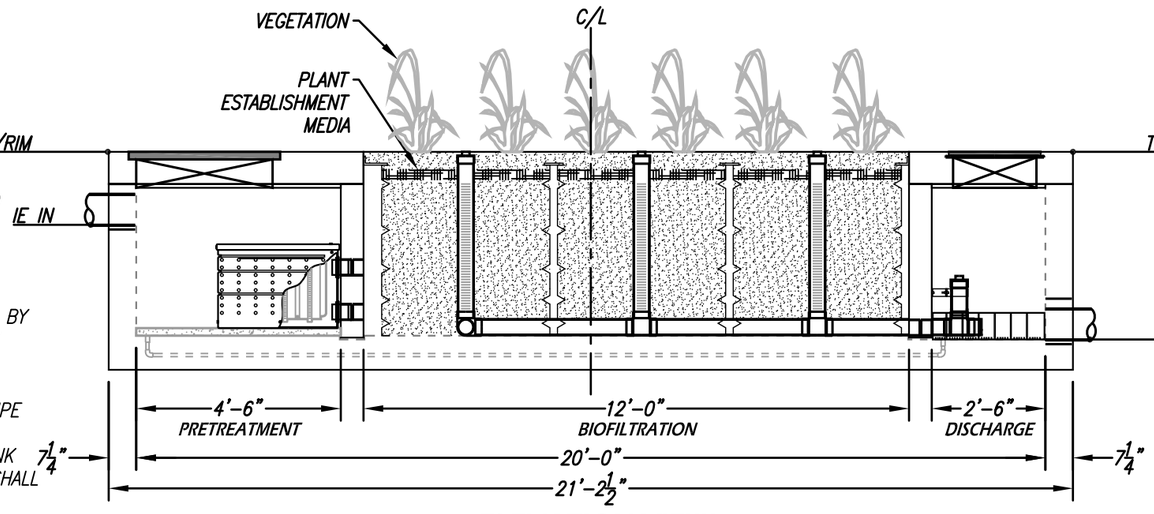
LEFT END VIEW

INSTALLATION NOTES

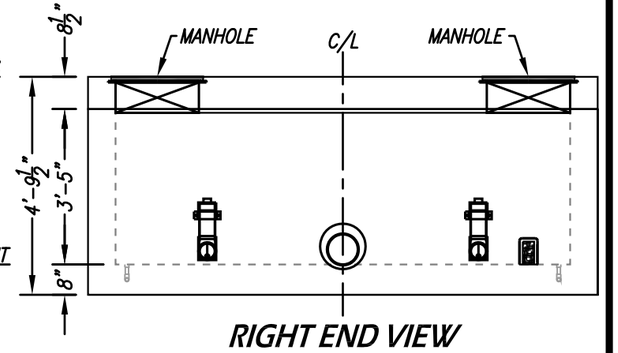
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER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

GENERAL NOTES

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



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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

PROPRIETARY AND CONFIDENTIAL:

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MWS-L-10-20-V

STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

3/20/15/JUSTIN

Structural BMP ID # MWS Unit #2	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☒ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

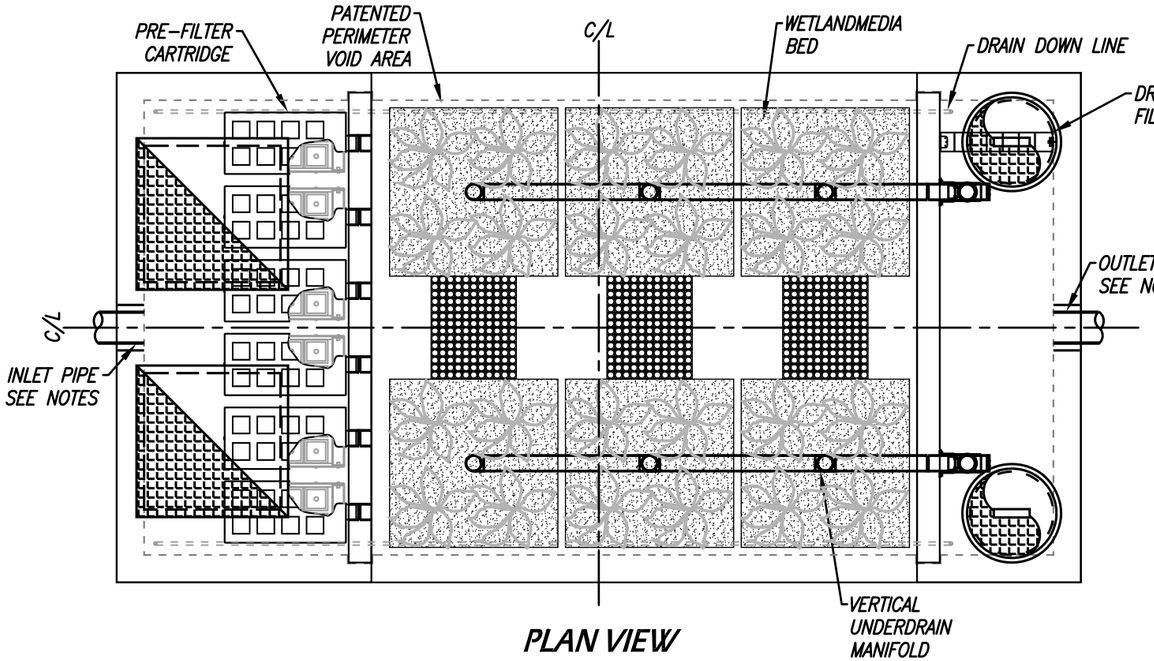
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

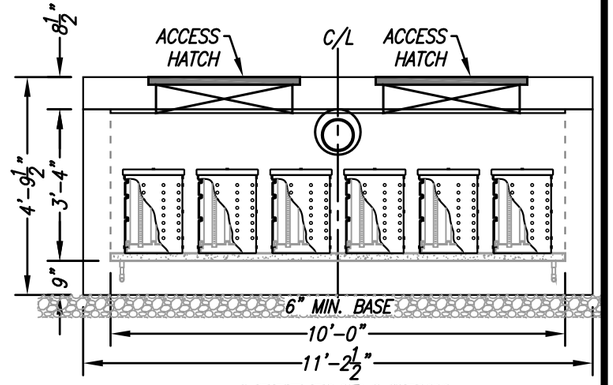
Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	36" X 36"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			14.50
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø2.67"
MAXIMUM PICK WEIGHT (LBS)			TBD
NOTES:			



PLAN VIEW



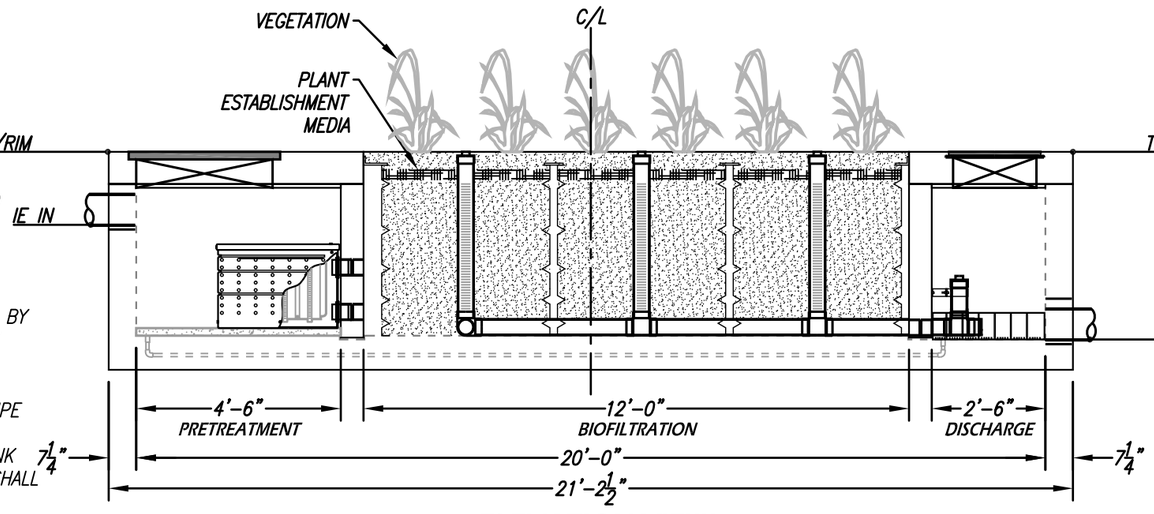
LEFT END VIEW

INSTALLATION NOTES

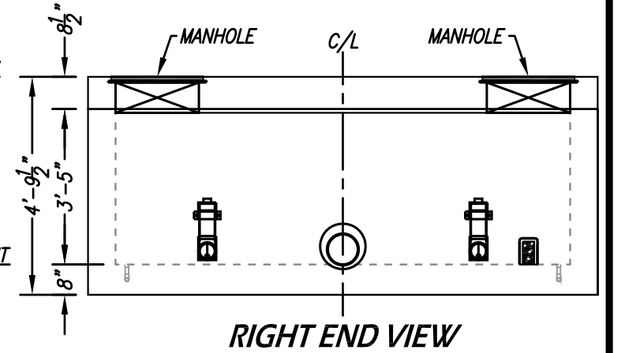
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2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

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



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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MWS-L-10-20-V

STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

3/20/15/JUSTIN

Structural BMP ID # MWS Unit #3	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☒ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

SITE SPECIFIC DATA*	
PROJECT NAME	
PROJECT LOCATION	
STRUCTURE ID	

PERFORMANCE DATA	
TREATMENT VOLUME (CF)	
DRAINDOWN TIME (HR)	
TREATMENT HGL (FT)	
BYPASS FLOW RATE (CFS)	

PROJECT PARAMETERS			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
OUTLET PIPE 1			
RIM ELEVATION			
SURFACE LOADING REQUIREMENT			

FRAME & COVER	PRETREATMENT	BIOFILTRATION	DISCHARGE

WETLANDMEDIA VOLUME (CY)	
MEDIA DELIVERED	
ORIFICE SIZE (DIA)	
MAX PICK WEIGHT (LBS)	

NOTES:

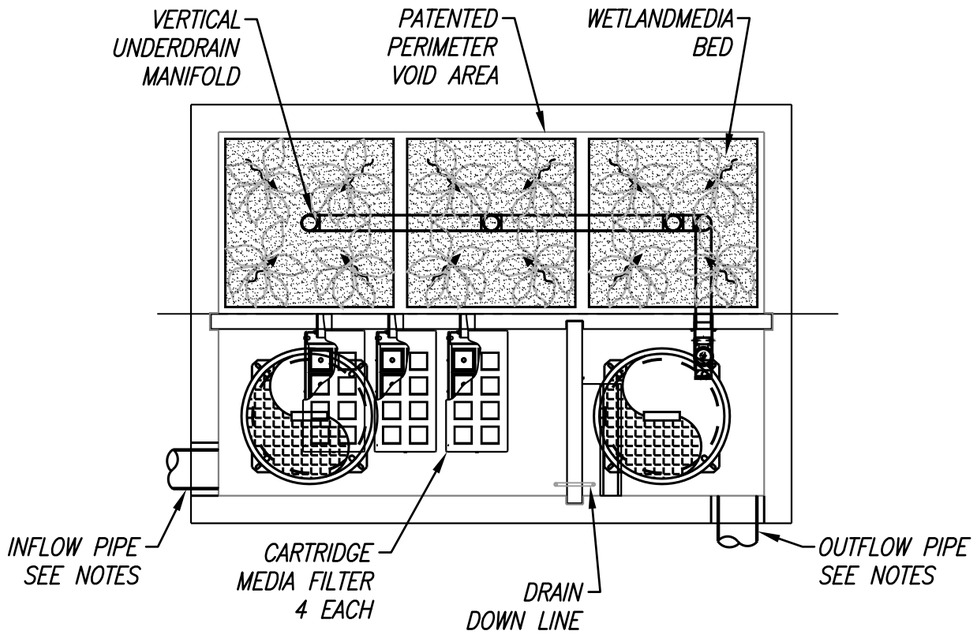
*PER ENGINEER OF RECORD

INSTALLATION NOTES

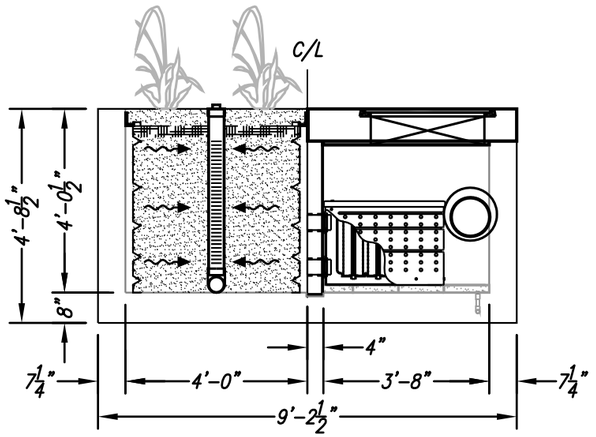
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2. MANUFACTURER RECOMMENDS A MINIMUM 6"LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH).
4. INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR.
5. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
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GENERAL NOTES

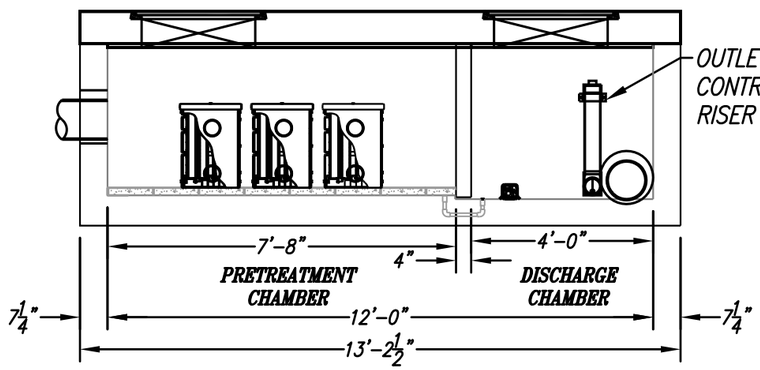
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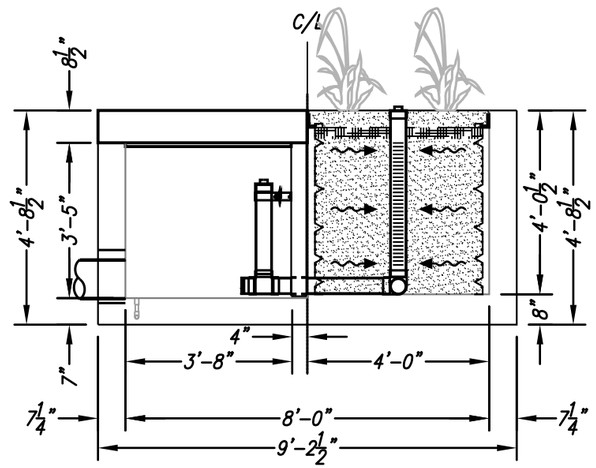
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

MWS UNIT DESIGN DATA	
TREATMENT CAPACITY (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT SURFACE AREA (SF)	105.84
WETLAND LOADING RATE (GPM/MIN)	1.04

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MODULAR WETLANDS

MWS-L-8-12-V

STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

Structural BMP ID # MWS Unit #4	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☒ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

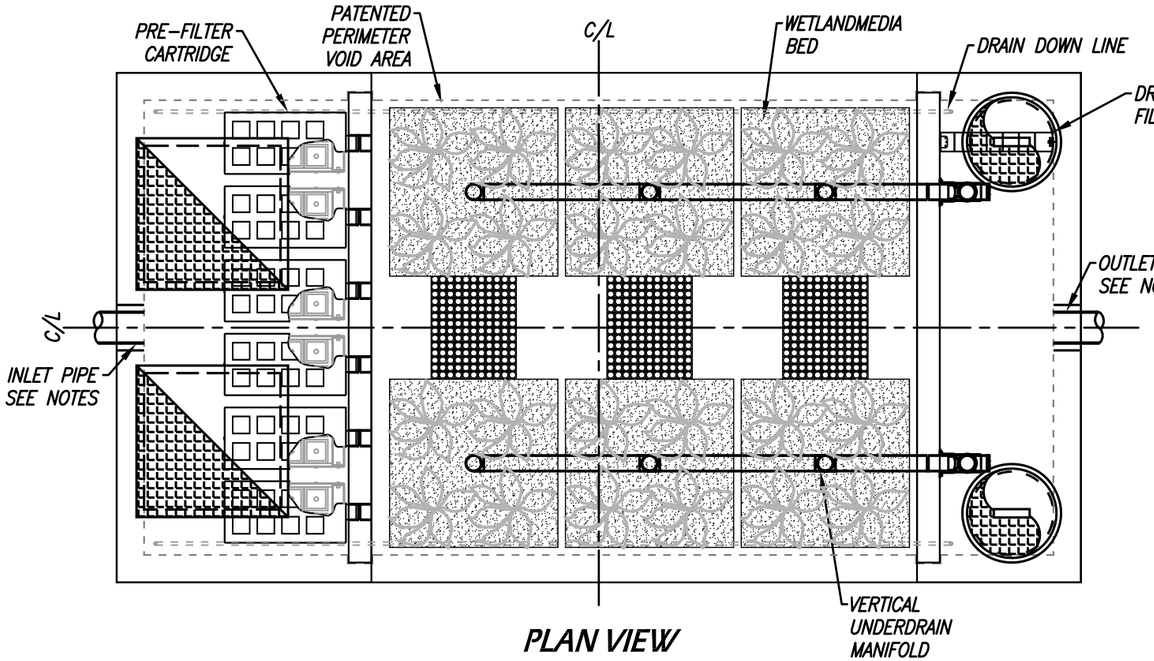
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

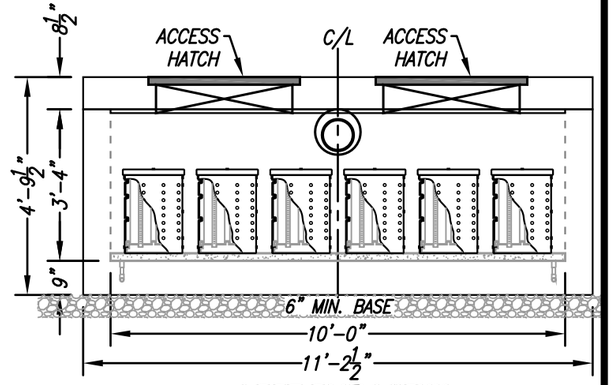
Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	36" X 36"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			14.50
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø2.67"
MAXIMUM PICK WEIGHT (LBS)			TBD
NOTES:			



PLAN VIEW



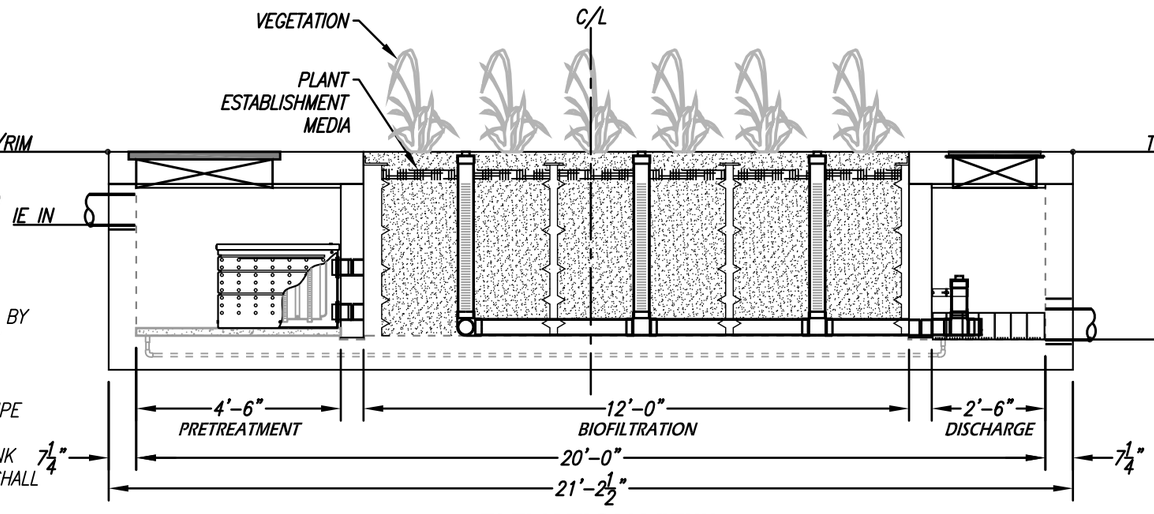
LEFT END VIEW

INSTALLATION NOTES

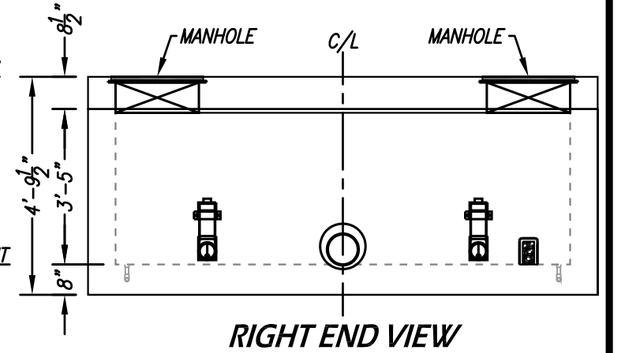
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3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

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ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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MWS-L-10-20-V

STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

3/20/15/JUSTIN

Structural BMP ID # MWS Unit #5	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☒ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

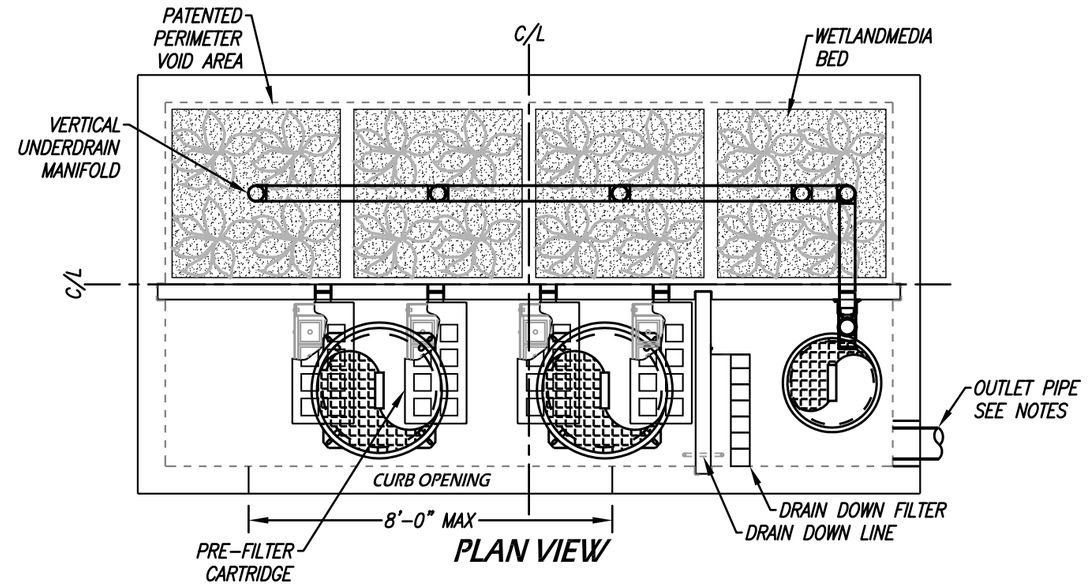
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

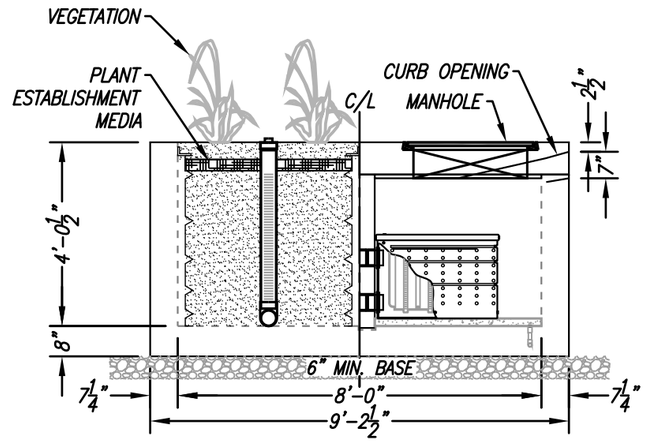
Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

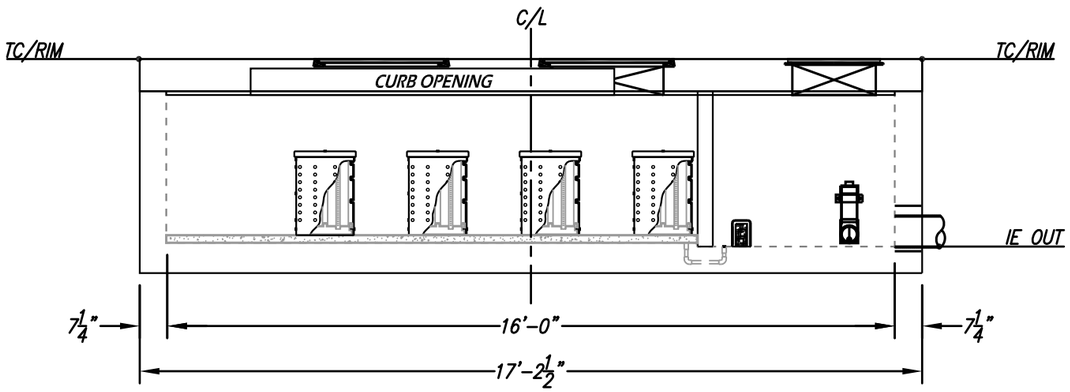
SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			9.50
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø3.07"
MAXIMUM PICK WEIGHT (LBS)			TBD
NOTES:			



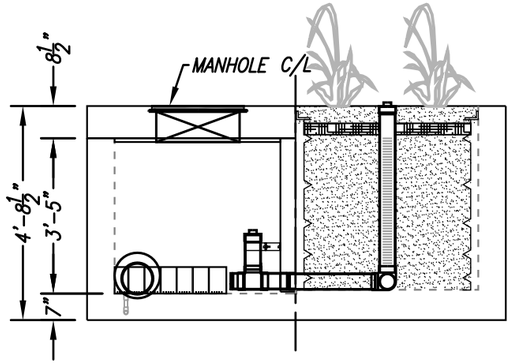
PLAN VIEW



LEFT END VIEW
BIOFILTRATION/PRETREATMENT



ELEVATION VIEW



RIGHT END VIEW
DISCHARGE/BIOFILTRATION

INSTALLATION NOTES

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

GENERAL NOTES

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

TREATMENT FLOW (CFS)	0.462
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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

PROPRIETARY AND CONFIDENTIAL:

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MWS-L-8-16-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

3/11/15/JOHN

Structural BMP ID # MWS Unit #6	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☒ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

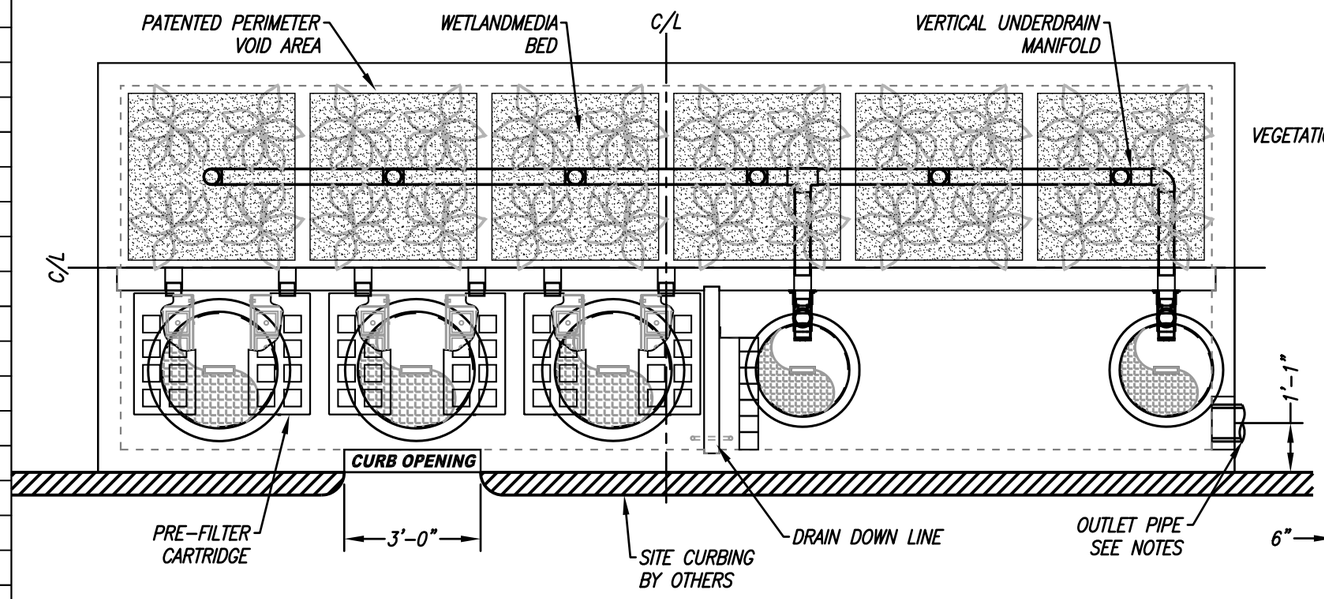
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

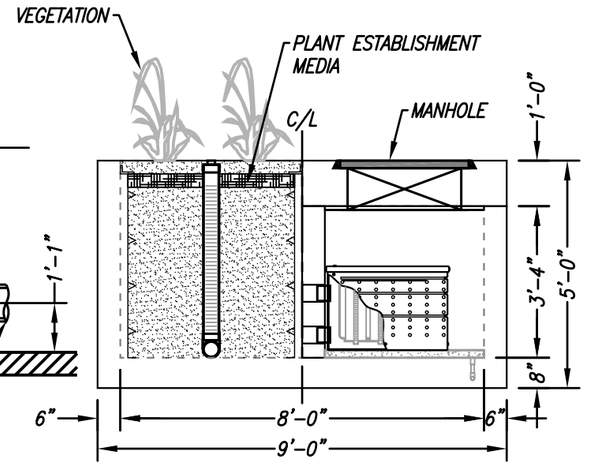
Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

SITE SPECIFIC DATA			
PROJECT NUMBER			
ORDER NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	3 EA ø30"	N/A	2 EA ø24"
WETLANDMEDIA VOLUME (CY)			TBD
ORIFICE SIZE (DIA. INCHES)			TBD
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			



PLAN VIEW



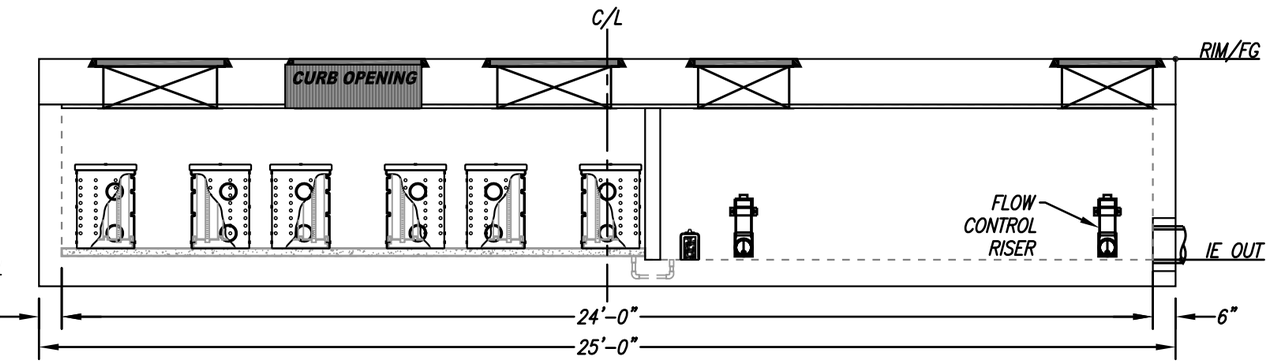
LEFT END VIEW

INSTALLATION NOTES

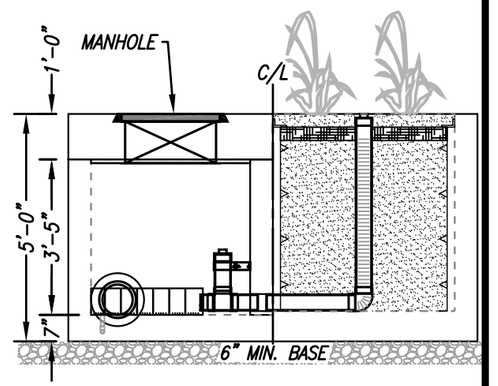
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER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

GENERAL NOTES

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



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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Bio Clean
A Forterra Company

MWS-L-8-24-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

Structural BMP ID # MWS Unit #7	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☒ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

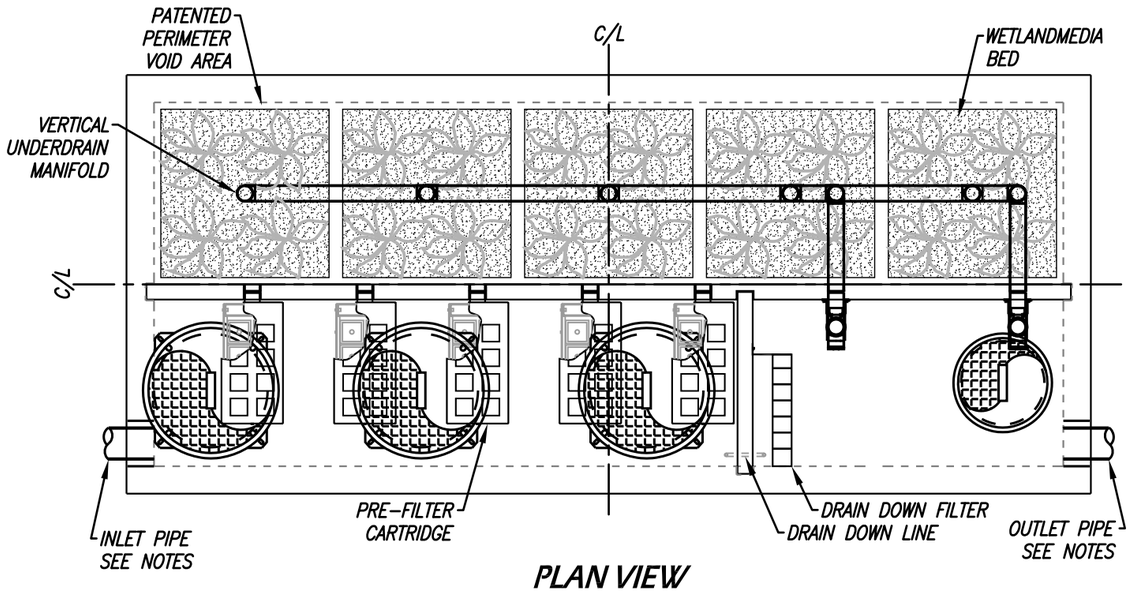
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

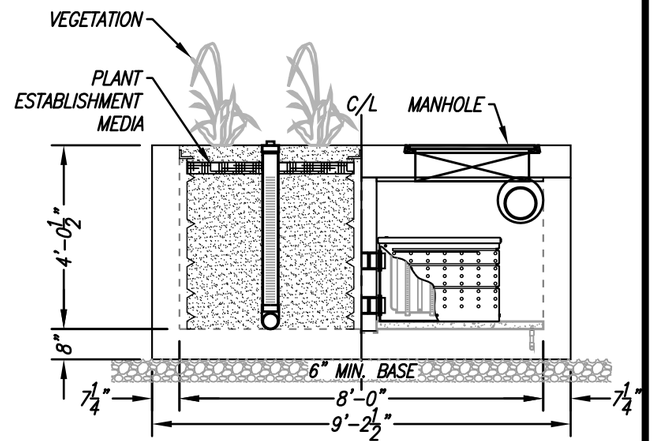
Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

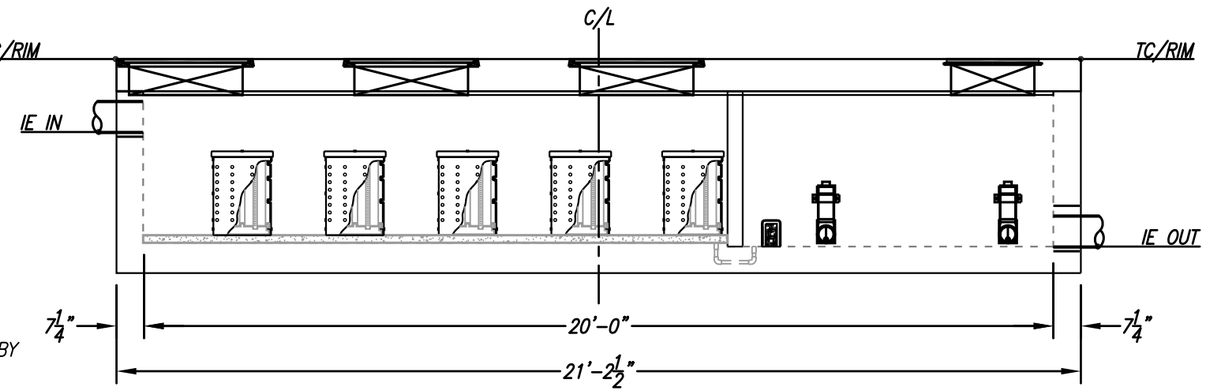
SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			11.85
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø2.43"
MAXIMUM PICK WEIGHT (LBS)			TBD
NOTES:			



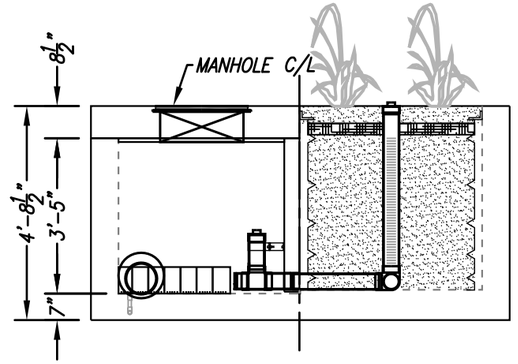
PLAN VIEW



LEFT END VIEW
BIOFILTRATION/PRETREATMENT



ELEVATION VIEW



RIGHT END VIEW
DISCHARGE/BIOFILTRATION

INSTALLATION NOTES

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GENERAL NOTES

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TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

6/2/15/JOHN

Structural BMP ID # MWS Unit #8	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☒ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

SITE SPECIFIC DATA*	
PROJECT NAME	
PROJECT LOCATION	
STRUCTURE ID	

PERFORMANCE DATA	
TREATMENT VOLUME (CF)	
DRAINDOWN TIME (HR)	
TREATMENT HGL (FT)	
BYPASS FLOW RATE (CFS)	

PROJECT PARAMETERS			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
OUTLET PIPE 1			
RIM ELEVATION			
SURFACE LOADING REQUIREMENT			

FRAME & COVER	PRETREATMENT	BIOFILTRATION	DISCHARGE

WETLANDMEDIA VOLUME (CY)	
MEDIA DELIVERED	
ORIFICE SIZE (DIA)	
MAX PICK WEIGHT (LBS)	

NOTES:

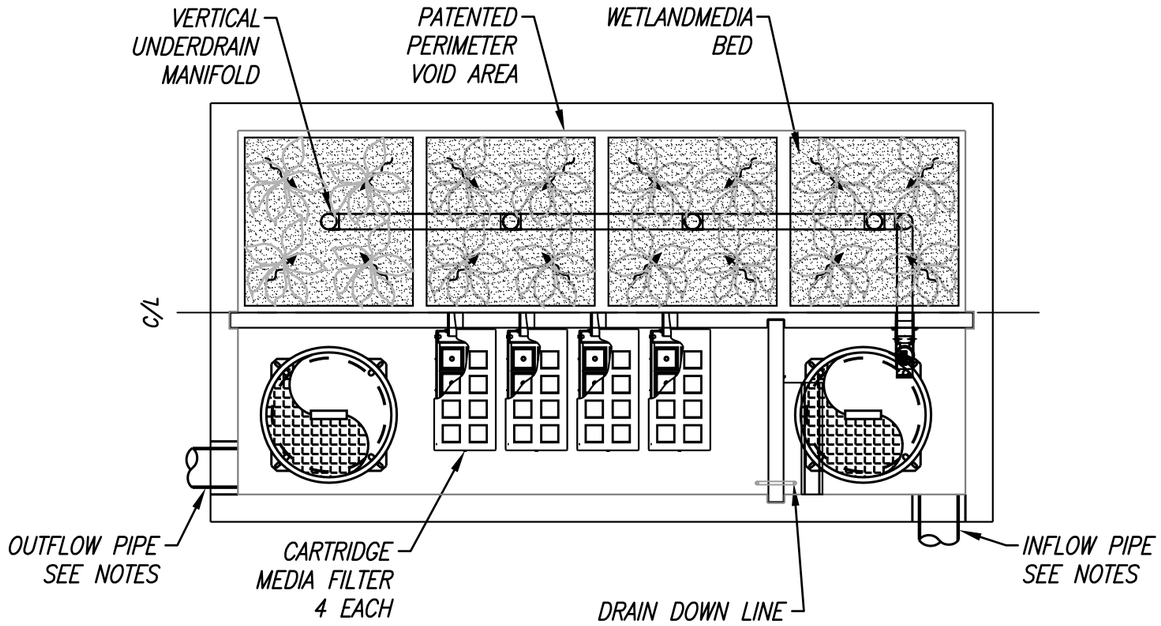
*PER ENGINEER OF RECORD

INSTALLATION NOTES

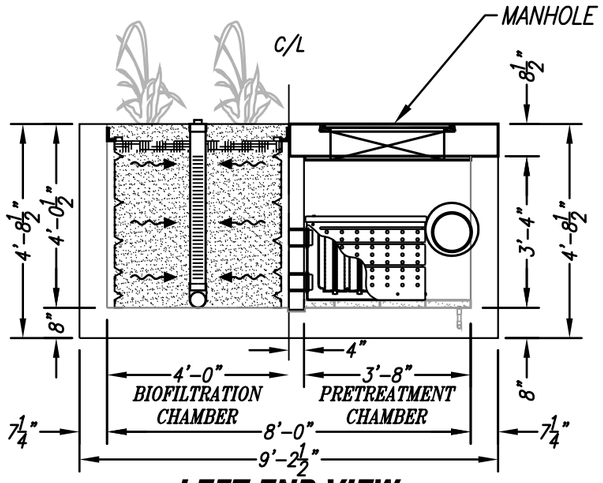
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GENERAL NOTES

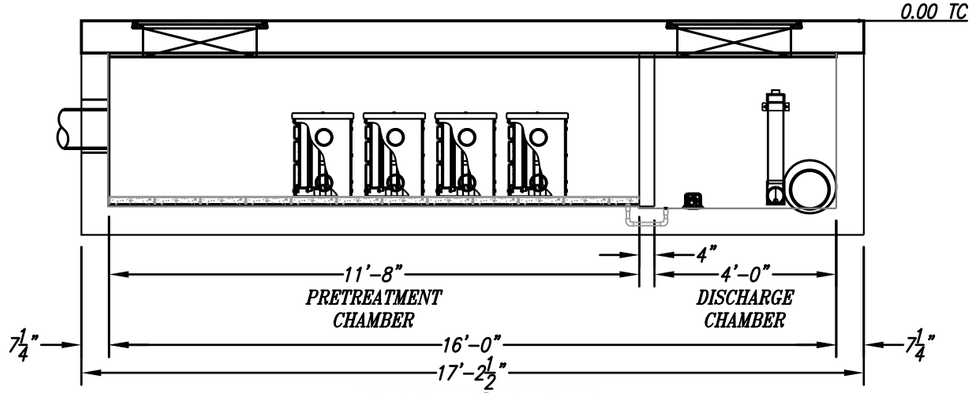
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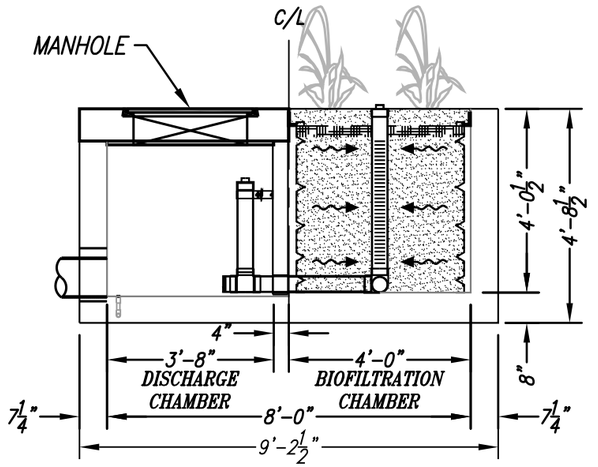
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

MWS UNIT DESIGN DATA	
TREATMENT CAPACITY (CFS)	0.462
OPERATING HEAD (FT)	3.4
PRETREATMENT SURFACE AREA (SF)	141.12
WETLAND LOADING RATE (GPM/MIN)	1.03

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MODULAR WETLANDS

MWS-L-8-16-V

STORMWATER BIOFILTRATION SYSTEM

STANDARD DETAIL

Structural BMP ID # MWS Unit #9	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☒ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

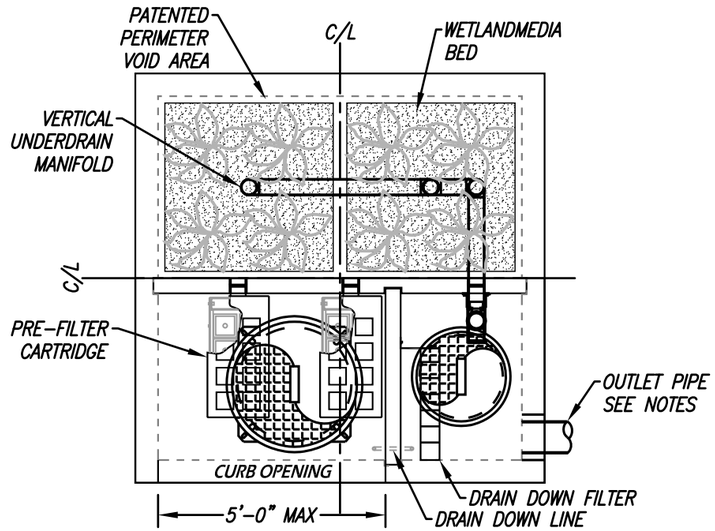
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

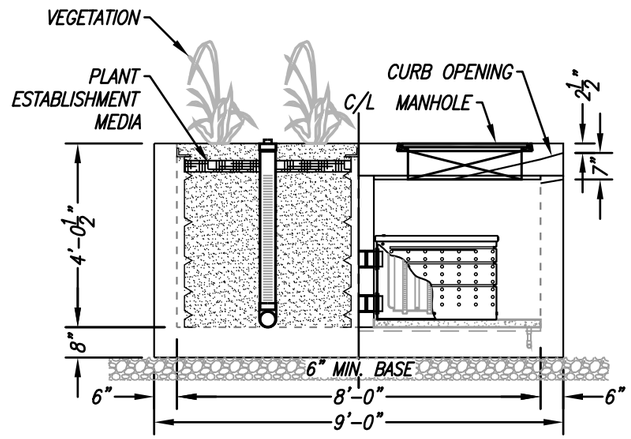
Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

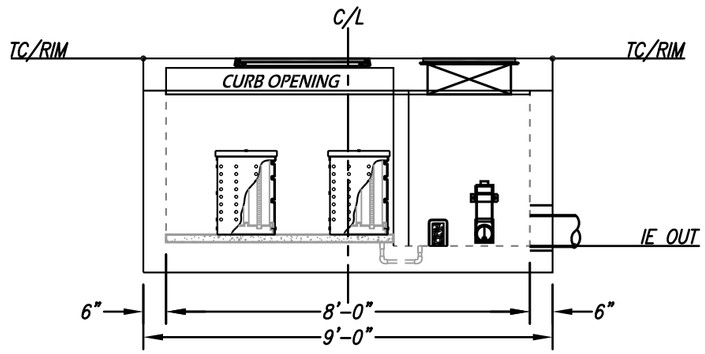
SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			4.84
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø2.16"
MAXIMUM PICK WEIGHT (LBS)			TBD
NOTES:			



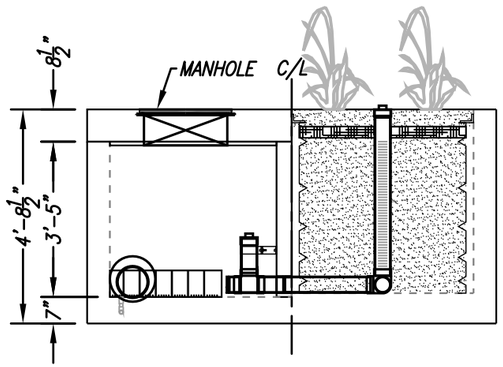
PLAN VIEW



LEFT END VIEW
BIOFILTRATION/PRETREATMENT



ELEVATION VIEW



RIGHT END VIEW
DISCHARGE/BIOFILTRATION

INSTALLATION NOTES

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

GENERAL NOTES

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

TREATMENT FLOW (CFS)	0.230
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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MWS-L-8-8-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

Structural BMP ID # MWS Unit #10	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☒ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

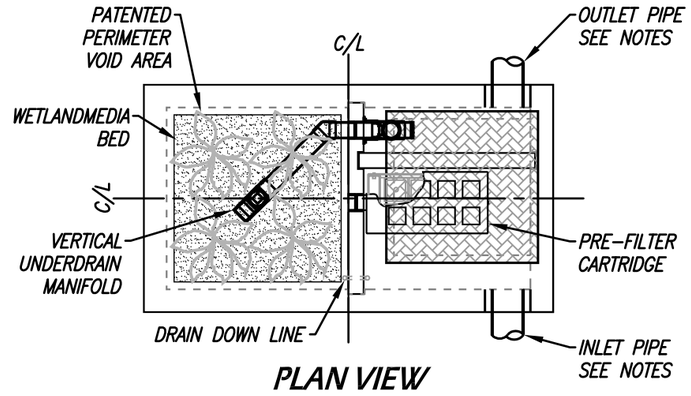
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

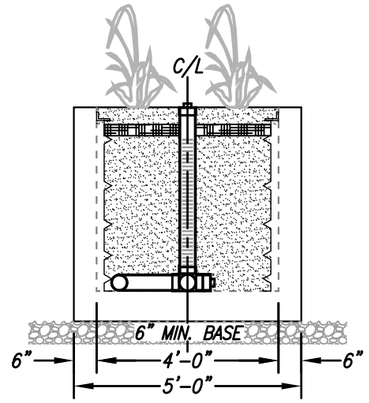
Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

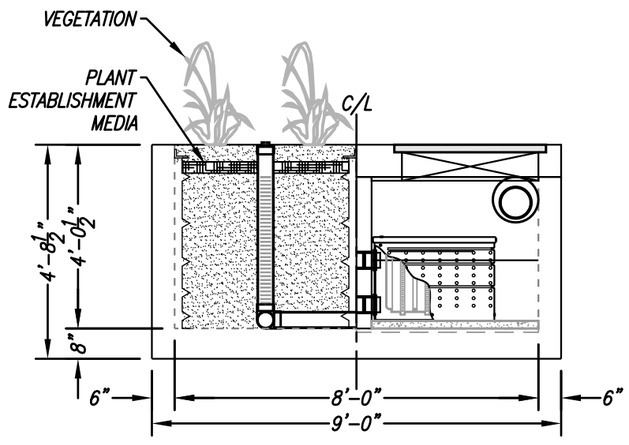
SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	36" X 36"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			2.03
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø1.53"
MAXIMUM PICK WEIGHT (LBS)			15000
NOTES:			



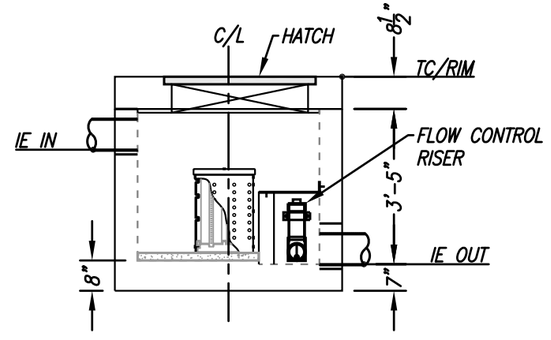
PLAN VIEW



LEFT END VIEW
BIOFILTRATION



ELEVATION VIEW



RIGHT END VIEW
PRETREATMENT/DISCHARGE

INSTALLATION NOTES

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GENERAL NOTES

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TREATMENT FLOW (CFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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MWS-L-4-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

Structural BMP ID # Detention P1	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☒ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☒ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # Detention P2	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☒ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☒ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # Detention P3	**Permit # and Sheet #** PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☒ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☒ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID #	9th Street R/W	**Permit # and Sheet #**	PDS2025-TM-5654

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below) Vegetated Swale

BMP Purpose
- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☒ Green Street BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Warmington Residential Matthew Esquivel MEsquivel@warmingtongroup.com

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1	Cat. 2	Cat. 3	Cat. 4
	☐	☒	☐	☐
Final owner of BMP	☐ HOA	☐ Property Owner	☒ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

Runoff within the 9th Street R/W will enter reverse parkway drains and be conveyed into a proposed vegetated swale behind the public sidewalk and be treated for water quality.

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

7.4 Storm Water Pollutant Control Worksheet Calculations

- Use this page as a cover sheet for the submittal of any required worksheets below.
- Complete the checklist to identify which BMPDM Appendix B (Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods) worksheets are included with this attachment.
- See BMPDM Appendix B for an explanation of the applicability of individual worksheets and detailed guidance on their completion.

Worksheet	Requirement
☒ Worksheet B.1 Calculation of Design Capture Volume (DCV)	Required
☒ Worksheet B.2 Retention Requirements	Required
☐ Worksheet B.3 BMP Performance	Required
☐ Worksheet B.4 Major Maintenance Intervals for Reduced-sized BMPs	If applicable
☒ Other worksheets	As required

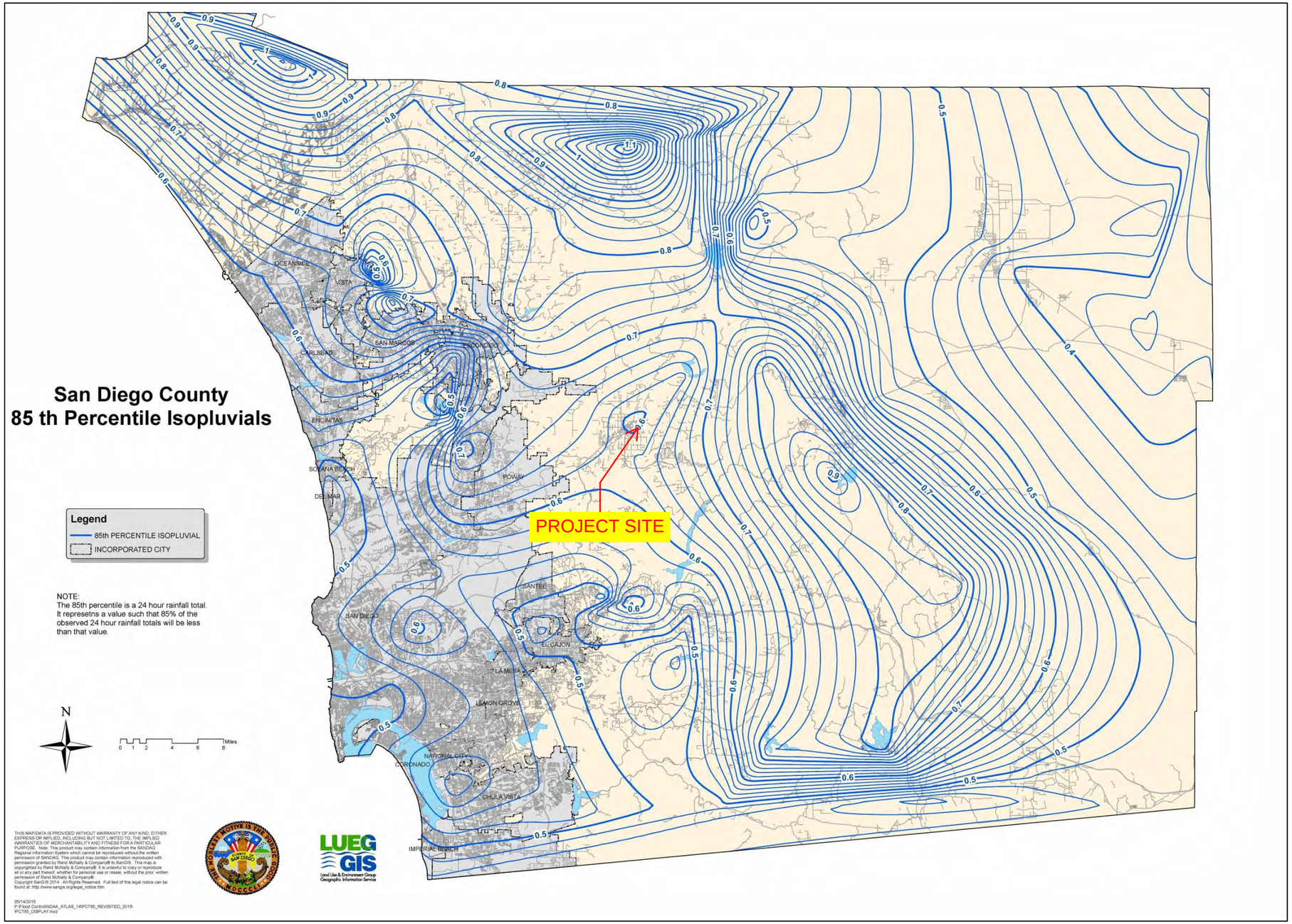


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA 1	DMA 2	DMA 3	DMA 4	DMA 5	DMA 6	DMA 7	DMA 8	DMA 9	DMA 10	unitless
	2	85th Percentile 24-hr Storm Depth	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	115,870	136,778	58,370	88,427	74,923	126,324	106,722	84,942	35,284	18,731	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Initial Runoff Factor Calculation	22	Total Tributary Area	115,870	136,778	58,370	88,427	74,923	126,324	106,722	84,942	35,284	18,731	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	26	Initial Design Capture Volume	5,214	6,155	2,627	3,979	3,372	5,685	4,802	3,822	1,588	843	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	32	Design Capture Volume After Dispersion Techniques	5,214	6,155	2,627	3,979	3,372	5,685	4,802	3,822	1,588	843	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	36	Final Effective Tributary Area	104,283	123,100	52,533	79,584	67,431	113,692	96,050	76,448	31,756	16,858	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	5,214	6,155	2,627	3,979	3,372	5,685	4,802	3,822	1,588	843	cubic-feet

No Warning Messages

Table D.2-3: Determination of Safety Factor

Consideration		Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
Suitability Assessment (A)	Infiltration Testing Method	0.25	Refer to Table D.2-4	0.75
	Soil Texture Class	0.25		0.5
	Soil Variability	0.25		0.5
	Depth to Groundwater/Obstruction	0.25		0.5
	Suitability Assessment Safety Factor, $S_A = \Sigma p$			**2.25**
Design (B)	Pretreatment	0.50	Refer to Table D.2-4	1.0
	Resiliency	0.25		0.75
	Compaction	0.25		0.75
	Design Safety Factor, $S_B = \Sigma p$			**2.5**
Safety Factor, $S = S_A \times S_B$ (Must be always greater than or equal to 2)				**5.63**

The geotechnical engineer should reference Table D.2-4 below in order to determine appropriate factor values for use in the table above. The values in the table below are subjective in nature and the geotechnical engineer may use professional discretion in how the points are assigned.

Table D.2-4: Guidance for Determining Individual Factor Values

Consideration	High Concern (3 points)	Medium Concern (2 points)	Low Concern (1 point)
Infiltration Testing Method	Any	At least 2 tests of any kind within 50' of BMP.	At least 4 tests within BMP footprint, OR Large/Small Scale Pilot Infiltration Testing over at least 5% of BMP footprint.
Soil Texture Class	Unknown, Silty, or Clayey	Loamy	Granular/Slightly Loamy
Soil Variability	Unknown or High	Moderately Homogeneous	Significantly Homogeneous
Depth to Groundwater/ Obstruction	<5' below BMP	5-15' below BMP	>15' below BMP
Pretreatment	None/Minimal	Provides good pretreatment OR does not receive significant runoff from unpaved areas	Provides excellent pretreatment OR only receives runoff from rooftops and road surfaces.
Resiliency	None/Minimal	Includes underdrain/backup drainage that ensures ponding draws down in <96 hours	Includes underdrain/backup drainage AND supports easy restoration of impacted infiltration rates.
Compaction	Moderate Likelihood	Low Likelihood	Very Low Likelihood

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Basic Analysis	1	Drainage Basin ID or Name	DMA 1	DMA 2	DMA 3	DMA 4	DMA 5	DMA 6	DMA 7	DMA 8	DMA 9	DMA 10	unitless
	2	85th Percentile Rainfall Depth	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	inches
	3	Predominant NRCS Soil Type Within BMP Location	C	C	C	C	C	C	C	C	C	C	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	unitless
	5	Nature of Restriction	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	percentage
	12	Fraction of DCV Requiring Retention	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	ratio
	13	Required Retention Volume	104	123	53	80	67	114	96	76	32	17	cubic-feet

No Warning Messages

Front Yard landscaped areas are proposed to be depressed 0.75 inches below the adjacent sidewalk to provide retention area.
Required retention area will be achieved for the site as a whole as some DMAs have substatially smaller area available. Proposed retention areas are shown on the DMA Exhibit in Attachment 2.

Volume Calculation:

DMA Area	1	2	3	4	5	6	7	8	9	10
Required Retention Volume (cft)	104	123	53	80	67	114	96	76	32	17
Depth (ft)	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625
Required area (sft)	1664	1968	848	1280	1072	1824	1536	1216	512	272
Provided area	1910	859	0	1139.29	2346	4369	3909	2405	784	300

DMA 1

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	5,214	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	5,214	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$		cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	2.66	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.4788	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.4788=0.7182 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 2

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	6,155	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$		cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	3.14	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.5652	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.5652=0.8478 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 3

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	2,627	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	2,627	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.34	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.2412	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.2412=0.3618 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 4

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	3,979	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	3,979	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	2.03	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.3654	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.3654=0.5481 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 5

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	3,372	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	3,372	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.72	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.3096	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.3096=0.4644 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 6

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	5,685	cubic-feet
2	DCV retained	$DCV_{retained}$		cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$		cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	5,685	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	2.9	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.522	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.522=0.783 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 7

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	4,802	cubic-feet
2	DCV retained	$DCV_{retained}$		cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$		cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	4,802	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	2.45	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.441	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.441=0.662 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 8

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	3,822	cubic-feet
2	DCV retained	$DCV_{retained}$		cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$		cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	3,822	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.95	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.351	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.351=0.5265 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 9

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	1,588	cubic-feet
2	DCV retained	$DCV_{retained}$		cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$		cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	1,588	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.81	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.1458	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.1458=0.2187 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 10

B.6.3 Sizing Flow-Thru Treatment Control BMPs:

Flow-thru treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of every storm event. The required flow-thru treatment rate should be adjusted for the portion of the DCV already retained or biofiltered onsite as described in Worksheet B.6-1. The following hydrologic method shall be used to calculate the flow rate to be filtered or treated:

$$Q = C \times i \times A$$

Where:

Q = Design flow rate in cubic feet per second

C = Runoff factor, area-weighted estimate using Table B.1-1.

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) which includes the total area draining to the BMP, including any offsite or onsite areas that comingle with project runoff and drain to the BMP. Refer to Section 3.3.3 for additional guidance. Street projects consult Section 1.4.3.

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	843	cubic-feet
2	DCV retained	$DCV_{retained}$		cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	843	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.43	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.0774	cfs

Biofiltration BMPs = 1.5xQ = 1.5x0.0774=0.1161 cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

Table D.1-1: Considerations for Geotechnical Analysis of Infiltration Restrictions

Restriction Element		Is Element Applicable? (Yes/No)
Mandatory Considerations	BMP is within 100' of Contaminated Soils	
	BMP is within 100' of Industrial Activities Lacking Source Control	
	BMP is within 100' of Well/Groundwater Basin	
	BMP is within 50' of Septic Tanks/Leach Fields	
	BMP is within 10' of Structures/Tanks/Walls	
	BMP is within 10' of Sewer Utilities	
	BMP is within 10' of Groundwater Table	
	BMP is within Hydric Soils	
	BMP is within Highly Liquefiable Soils and has Connectivity to Structures	
	BMP is within 1.5 Times the Height of Adjacent Steep Slopes (≥25%)	
	County Staff has Assigned "Restricted" Infiltration Category	
Optional Considerations	BMP is within Predominantly Type D Soil	
	BMP is within 10' of Property Line	
	BMP is within Fill Depths of ≥5' (Existing or Proposed)	
	BMP is within 10' of Underground Utilities	
	BMP is within 250' of Ephemeral Stream	
	Other (Provide detailed geotechnical support)	see below
Result	Based on examination of the best available information, I have **not identified any restrictions** above.	☐ **Unrestricted**
	Based on examination of the best available information, I have **identified one or more restrictions** above.	☒ **Restricted**

The site will be graded such that compacted fill will cover the majority of the area and underlain by relatively impermeable granitic bedrock. The compacted fill and granitic bedrock possess little void space and therefore the infiltration rate is considered to be less than 0.5 inches per hour. Areas at the site could not be designed for infiltration without increasing risk of geotechnical hazards.

Based on Appendix C.3 screening, the site is not known to be in an area of groundwater contamination and/or soil pollution. Groundwater is present in portions of the site within 9.5 feet below existing ground surface and may possess potential water balance issues.

8.0 General Requirements

- Completion of this attachment is required for all PDPs subject to hydromodification management requirements (see PDP SWQMP Form Table 5). Do not submit this attachment if exempt from Hydromodification Management requirements. Document the PDP exemption in Attachment 9.
- Submit this cover page and all required Sub-attachments for all structural hydromodification management BMPs proposed for the project.
- Constructed features must fully satisfy the requirements described in applicable BMPDM sections and appendices, and any other guidance identified by the County.
- DMA Exhibits and Construction Plans: DMAs, features, and BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.
- Structural BMP Certification. All structural hydromodification management BMPs documented this attachment must be certified by a registered engineer in Attachment 7, Sub-attachment 7.1.
- Structural BMP Verification. BMP installation must be verified by the County at the completion of construction. Applicants must complete an Installation Verification Form (Attachment 10).

Sub-attachments (check all that are completed)
☒ **8.1: Flow Control Facility Design** (required)[1] Submit using ☒ the Sub-attachment 8.1 cover sheet provided, or ☐ as a separate stand-alone document labeled Sub-attachment 8.1.
☒ **8.2: Hydromodification Management Points of Compliance** (required) Complete the table provided in Sub-attachment 8.2.
8.3: Geomorphic Assessment of Receiving Channels 1. Has a geomorphic assessment been performed for the receiving channel(s)? ☒ No, the low flow threshold is 0.1Q2 (default low flow threshold)
☐ Yes (provide the information below): Low flow threshold: ☐ 0.1Q2 ☐ 0.3Q2 ☐ 0.5Q2
Title: Date: Preparer:
Submit using ☐ the Sub-attachment 8.3 cover sheet provided, or ☐ as a separate stand-alone document labeled Sub-attachment 8.3.
8.4: Vector Control Plan (required if BMPs will not drain in less than 96 hours) ☐ Included with this attachment ☒ Not required

[1] Including Structural BMP Drawdown Calculations and Overflow Design Summary. See BMPDM Chapter 6 and Appendix G for additional design guidance.

8.1 Flow Control Facility Design

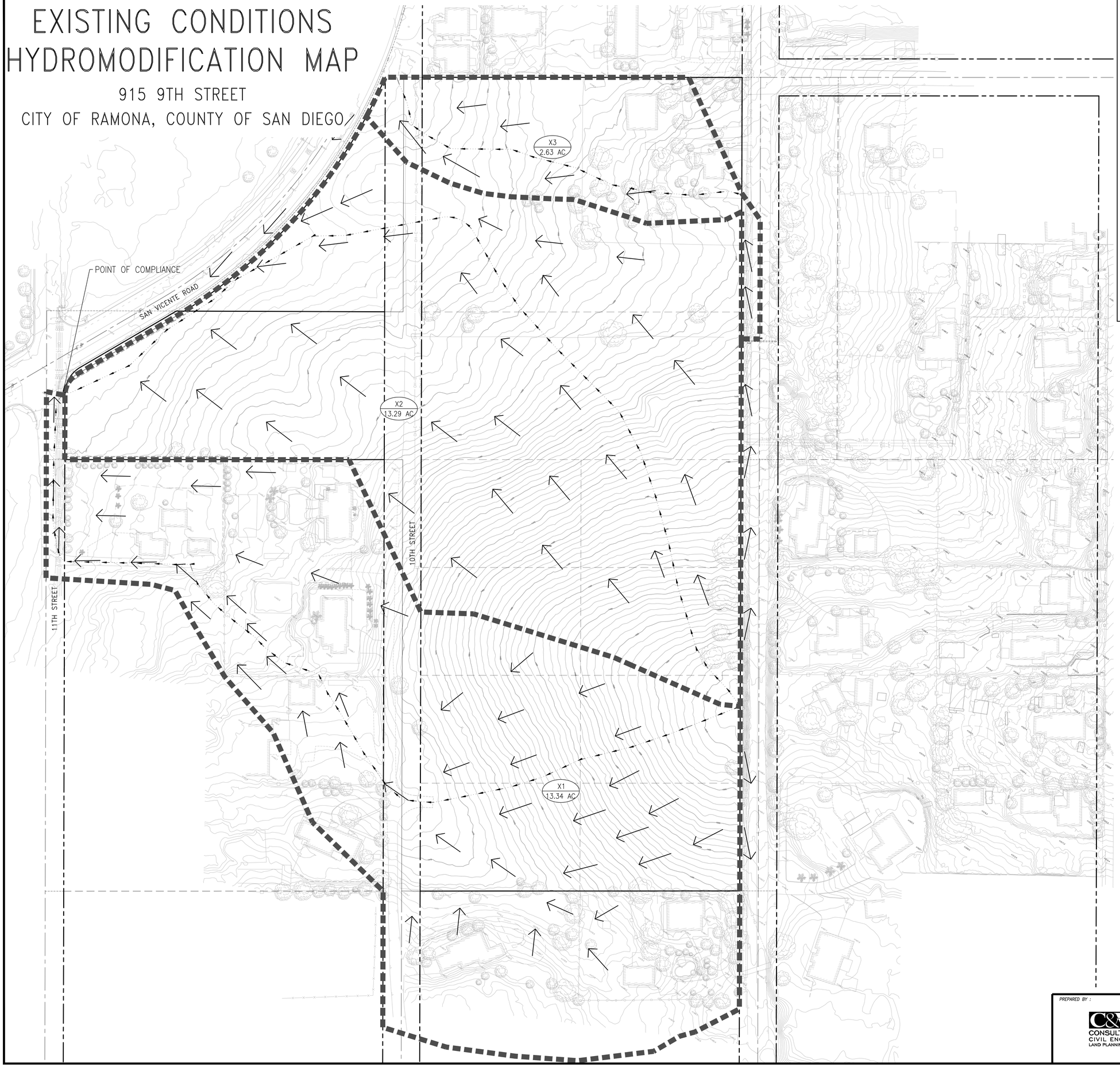
Insert Flow Control Facility Design behind this cover page or submit as a separate stand-alone document labeled Sub-attachment 8.1.

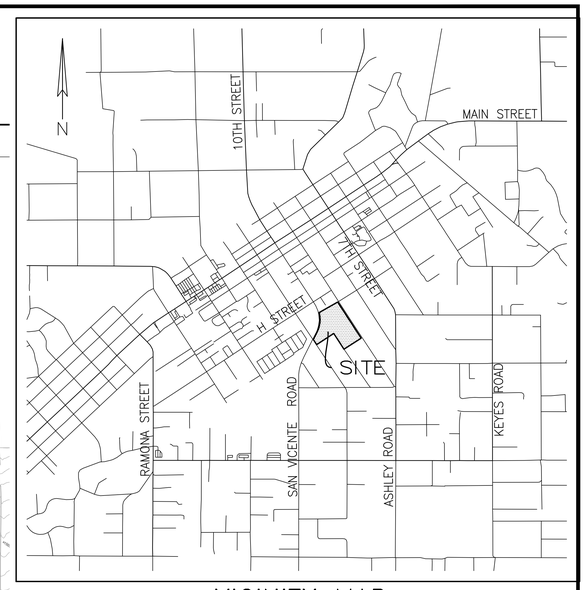
Proposed detention system will be sized to mitigate for the Q2 to Q10 pre development flow rates. Runoff will be collected onsite, treated by a proprietary biofiltration system, and stored in the underground detention system. Discharge from the system will be metered by an orifice

EXISTING CONDITIONS HYDROMODIFICATION MAP

915 9TH STREET

CITY OF RAMONA, COUNTY OF SAN DIEGO





VICINITY MAP

N.T.S.

LEGEND:

- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
- EXISTING RIGHT-OF-WAY/ SITE BOUNDARY
- FLOW DIRECTION
- FLOW LINE
- PERVIOUS AREA
- XX — DRAINAGE AREA ID
- X.XX AC — DRAINAGE AREA IN ACRES

1" = 50'

0 25 50 100

PREPARED BY :

C&V CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING

9830 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618
(949) 916-3800
INFO@CVC-INC.NET
WWW.CVC-INC.NET

EXISTING CONDITIONS HYDROMODIFICATION MAP

915 9TH STREET
RAMONA, CA

SHEET 1 OF 1

SCALE: 1"=40' | DRAWN BY: sm | CHECKED BY: --

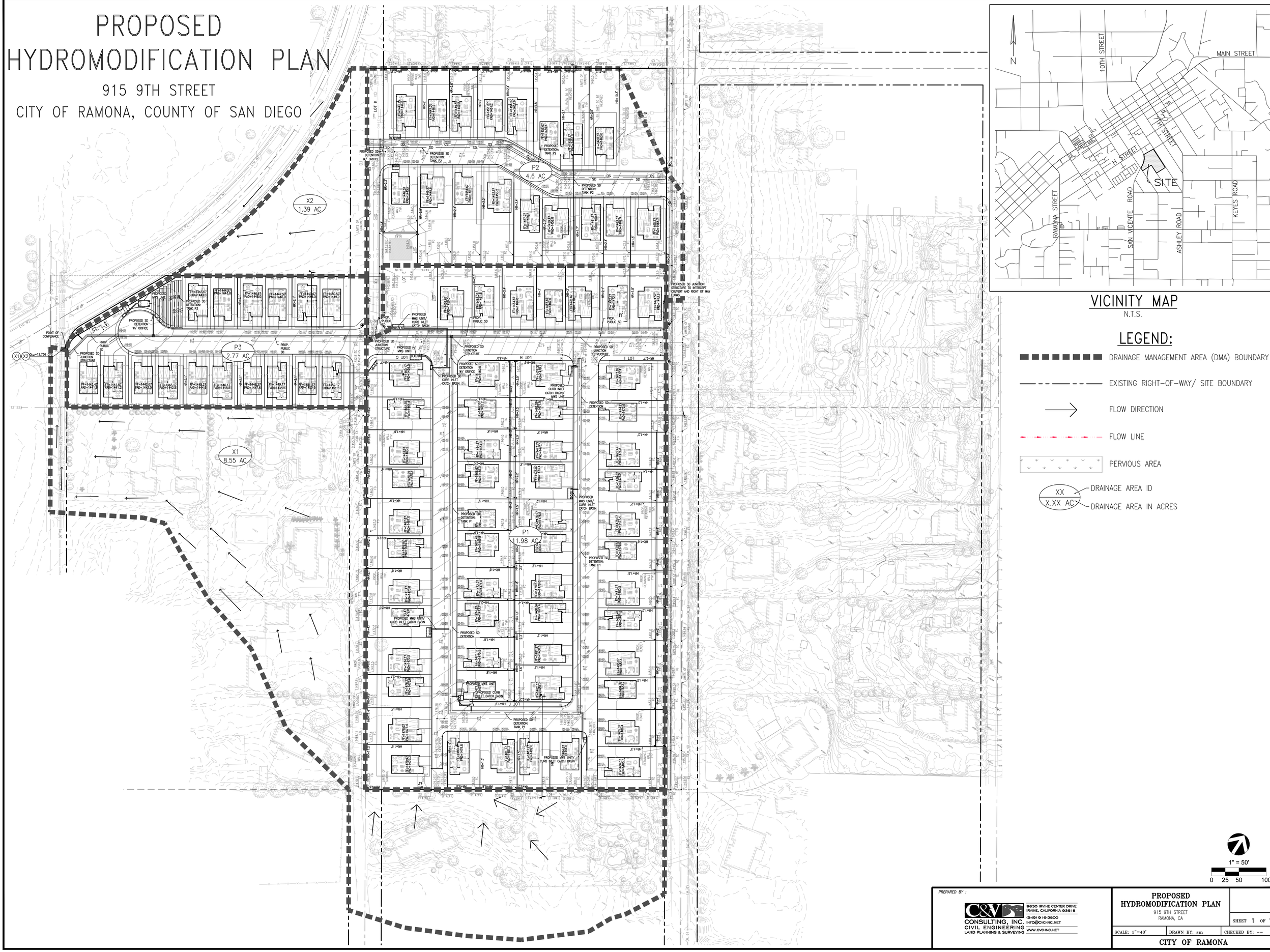
CITY OF RAMONA

DATE: 10/7/2020

PROPOSED HYDROMODIFICATION PLAN

915 9TH STREET

CITY OF RAMONA, COUNTY OF SAN DIEGO



VICINITY MAP

N.T.S.

LEGEND:

- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
- EXISTING RIGHT-OF-WAY/ SITE BOUNDARY
- FLOW DIRECTION
- FLOW LINE
- PERVIOUS AREA
- XX — DRAINAGE AREA ID
- X.XX AC — DRAINAGE AREA IN ACRES

1" = 50'

0 25 50 100

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PROPOSED HYDROMODIFICATION PLAN

915 9TH STREET
RAMONA, CA

SHEET 1 OF 1

SCALE: 1"=40' | DRAWN BY: sm | CHECKED BY: --

CITY OF RAMONA

DATE: 10/7/2015

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	WARM 31
Site Name:	WARM-021
Site Address:	915 9th Street
City:	Ramona
Report Date:	7/29/2026
Gage:	RAMONA
Data Start:	10/01/1963
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2021/06/28

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

X1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Moderate	13.34
Pervious Total	13.34
Impervious Land Use	acre
Impervious Total	0
Basin Total	13.34

Element Flows To:

Surface	Interflow	Groundwater

X2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Moderate	13.29
Pervious Total	13.29
Impervious Land Use	acre
Impervious Total	0
Basin Total	13.29

Element Flows To:

Surface	Interflow	Groundwater

X4

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Moderate	8.56
Pervious Total	8.56
Impervious Land Use	acre
Impervious Total	0
Basin Total	8.56

Element Flows To:

Surface	Interflow	Groundwater

X3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Moderate	2.63
Pervious Total	2.63
Impervious Land Use	acre
Impervious Total	0
Basin Total	2.63

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

X1

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Moderate	8.55
Pervious Total	8.55
Impervious Land Use	acre
Impervious Total	0
Basin Total	8.55

Element Flows To:

Surface	Interflow	Groundwater

X2

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Moderate	1.36
Pervious Total	1.36
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.36

Element Flows To:

Surface	Interflow	Groundwater

X4

Bypass:	Yes
GroundWater:	No

Pervious Land Use	acre
C,NatVeg,Moderate	8.13
Pervious Total	8.13

Impervious Land Use	acre
IMPERVIOUS-MOD	0.43
Impervious Total	0.43
Basin Total	8.56

Element Flows To:

Surface	Interflow	Groundwater

P1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C,NatVeg,Moderate	8.39
Pervious Total	8.39

Impervious Land Use	acre
IMPERVIOUS-MOD	3.59
Impervious Total	3.59
Basin Total	11.98

Element Flows To:

Surface	Interflow	Groundwater
Tank P1	Tank P1	

P2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C,NatVeg,Moderate	3.22
Pervious Total	3.22

Impervious Land Use	acre
IMPERVIOUS-MOD	1.38
Impervious Total	1.38
Basin Total	4.6

Element Flows To:

Surface	Interflow	Groundwater
Tank P2	Tank P2	

P3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C,NatVeg,Moderate	1.939
Pervious Total	1.939

Impervious Land Use	acre
IMPERVIOUS-MOD	0.831
Impervious Total	0.831
Basin Total	2.77

Element Flows To:

Surface	Interflow	Groundwater
Tank P3	Tank P3	

Routing Elements
Predeveloped Routing

Mitigated Routing

Tank P1

Dimensions
Depth: 6 ft.
Tank Type: Circular
Diameter: 6 ft.
Length: 782.242462450776 ft.
Discharge Structure
Riser Height: 5 ft.
Riser Diameter: 54 in.
Notch Type: Rectangular
Notch Width: 3.910 ft.
Notch Height: 0.157 ft.
Orifice 1 Diameter: 1 in. Elevation:0 ft.
Orifice 2 Diameter: 2 in. Elevation:2.5 ft.
Element Flows To:
Outlet 1 Outlet 2

Tank Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000	0.000	0.000	0.000
0.0667	0.022	0.001	0.007	0.000
0.1333	0.031	0.002	0.009	0.000
0.2000	0.038	0.005	0.012	0.000
0.2667	0.044	0.008	0.014	0.000
0.3333	0.049	0.011	0.015	0.000
0.4000	0.053	0.014	0.017	0.000
0.4667	0.057	0.018	0.018	0.000
0.5333	0.061	0.022	0.019	0.000
0.6000	0.064	0.026	0.021	0.000
0.6667	0.067	0.030	0.022	0.000
0.7333	0.070	0.035	0.023	0.000
0.8000	0.073	0.040	0.024	0.000
0.8667	0.075	0.045	0.025	0.000
0.9333	0.078	0.050	0.026	0.000
1.0000	0.080	0.055	0.027	0.000
1.0667	0.082	0.061	0.028	0.000
1.1333	0.084	0.066	0.028	0.000
1.2000	0.086	0.072	0.029	0.000
1.2667	0.087	0.078	0.030	0.000
1.3333	0.089	0.084	0.031	0.000
1.4000	0.091	0.090	0.032	0.000
1.4667	0.092	0.096	0.032	0.000
1.5333	0.094	0.102	0.033	0.000
1.6000	0.095	0.108	0.034	0.000
1.6667	0.096	0.115	0.035	0.000
1.7333	0.097	0.121	0.035	0.000
1.8000	0.098	0.128	0.036	0.000
1.8667	0.099	0.134	0.037	0.000
1.9333	0.100	0.141	0.037	0.000
2.0000	0.101	0.148	0.038	0.000
2.0667	0.102	0.155	0.039	0.000
2.1333	0.103	0.161	0.039	0.000
2.2000	0.103	0.168	0.040	0.000

2.2667	0.104	0.175	0.040	0.000
2.3333	0.105	0.182	0.041	0.000
2.4000	0.105	0.189	0.042	0.000
2.4667	0.106	0.196	0.042	0.000
2.5333	0.106	0.203	0.063	0.000
2.6000	0.106	0.210	0.078	0.000
2.6667	0.107	0.218	0.088	0.000
2.7333	0.107	0.225	0.097	0.000
2.8000	0.107	0.232	0.104	0.000
2.8667	0.107	0.239	0.111	0.000
2.9333	0.107	0.246	0.117	0.000
3.0000	0.107	0.253	0.123	0.000
3.0667	0.107	0.261	0.129	0.000
3.1333	0.107	0.268	0.134	0.000
3.2000	0.107	0.275	0.139	0.000
3.2667	0.107	0.282	0.144	0.000
3.3333	0.107	0.289	0.148	0.000
3.4000	0.106	0.296	0.153	0.000
3.4667	0.106	0.304	0.157	0.000
3.5333	0.106	0.311	0.161	0.000
3.6000	0.105	0.318	0.165	0.000
3.6667	0.105	0.325	0.169	0.000
3.7333	0.104	0.332	0.173	0.000
3.8000	0.103	0.339	0.176	0.000
3.8667	0.103	0.345	0.180	0.000
3.9333	0.102	0.352	0.183	0.000
4.0000	0.101	0.359	0.187	0.000
4.0667	0.100	0.366	0.190	0.000
4.1333	0.099	0.373	0.193	0.000
4.2000	0.098	0.379	0.197	0.000
4.2667	0.097	0.386	0.200	0.000
4.3333	0.096	0.392	0.203	0.000
4.4000	0.095	0.399	0.206	0.000
4.4667	0.094	0.405	0.209	0.000
4.5333	0.092	0.411	0.212	0.000
4.6000	0.091	0.417	0.215	0.000
4.6667	0.089	0.423	0.218	0.000
4.7333	0.087	0.429	0.221	0.000
4.8000	0.086	0.435	0.224	0.000
4.8667	0.084	0.441	0.275	0.000
4.9333	0.082	0.446	0.585	0.000
5.0000	0.080	0.452	1.045	0.000
5.0667	0.078	0.457	1.870	0.000
5.1333	0.075	0.462	3.374	0.000
5.2000	0.073	0.467	5.320	0.000
5.2667	0.070	0.472	7.619	0.000
5.3333	0.067	0.476	10.22	0.000
5.4000	0.064	0.481	13.08	0.000
5.4667	0.061	0.485	16.18	0.000
5.5333	0.057	0.489	19.48	0.000
5.6000	0.053	0.493	22.96	0.000
5.6667	0.049	0.496	26.58	0.000
5.7333	0.044	0.499	30.33	0.000
5.8000	0.038	0.502	34.18	0.000
5.8667	0.031	0.504	38.09	0.000
5.9333	0.022	0.506	42.05	0.000
6.0000	0.000	0.507	46.01	0.000
6.0667	0.000	0.000	49.96	0.000

Tank P2

Dimensions

Depth:	6 ft.	
Tank Type:	Circular	
Diameter:	6 ft.	
Length:	520 ft.	
Discharge Structure		
Riser Height:	5 ft.	
Riser Diameter:	54 in.	
Notch Type:	Rectangular	
Notch Width:	3.870 ft.	
Notch Height:	1.173 ft.	
Orifice 1 Diameter:	1 in.	Elevation:0 ft.
Orifice 2 Diameter:	2 in.	Elevation:2.5 ft.

Element Flows To:

Outlet 1 Outlet 2

Tank Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000000	0.000000	0.000	0.000
0.0667	0.015016	0.000669	0.007	0.000
0.1333	0.021116	0.001885	0.009	0.000
0.2000	0.025714	0.003452	0.012	0.000
0.2667	0.029521	0.005297	0.014	0.000
0.3333	0.032813	0.007377	0.015	0.000
0.4000	0.035733	0.009664	0.017	0.000
0.4667	0.038366	0.012135	0.018	0.000
0.5333	0.040767	0.014774	0.019	0.000
0.6000	0.042975	0.017566	0.021	0.000
0.6667	0.045019	0.020500	0.022	0.000
0.7333	0.046921	0.023566	0.023	0.000
0.8000	0.048696	0.026754	0.024	0.000
0.8667	0.050358	0.030056	0.025	0.000
0.9333	0.051919	0.033466	0.026	0.000
1.0000	0.053386	0.036976	0.027	0.000
1.0667	0.054768	0.040582	0.028	0.000
1.1333	0.056071	0.044277	0.028	0.000
1.2000	0.057300	0.048057	0.029	0.000
1.2667	0.058460	0.051916	0.030	0.000
1.3333	0.059555	0.055850	0.031	0.000
1.4000	0.060588	0.059855	0.032	0.000
1.4667	0.061563	0.063927	0.032	0.000
1.5333	0.062482	0.068062	0.033	0.000
1.6000	0.063348	0.072257	0.034	0.000
1.6667	0.064162	0.076507	0.035	0.000
1.7333	0.064928	0.080811	0.035	0.000
1.8000	0.065646	0.085163	0.036	0.000
1.8667	0.066318	0.089562	0.037	0.000
1.9333	0.066945	0.094005	0.037	0.000
2.0000	0.067529	0.098487	0.038	0.000
2.0667	0.068071	0.103008	0.039	0.000
2.1333	0.068571	0.107563	0.039	0.000
2.2000	0.069032	0.112150	0.040	0.000
2.2667	0.069452	0.116766	0.040	0.000
2.3333	0.069834	0.121409	0.041	0.000

2.4000	0.070178	0.126076	0.042	0.000
2.4667	0.070484	0.130765	0.042	0.000
2.5333	0.070753	0.135473	0.063	0.000
2.6000	0.070986	0.140198	0.078	0.000
2.6667	0.071182	0.144937	0.088	0.000
2.7333	0.071342	0.149688	0.097	0.000
2.8000	0.071466	0.154449	0.104	0.000
2.8667	0.071555	0.159216	0.111	0.000
2.9333	0.071608	0.163989	0.117	0.000
3.0000	0.071625	0.168763	0.123	0.000
3.0667	0.071608	0.173538	0.129	0.000
3.1333	0.071555	0.178310	0.134	0.000
3.2000	0.071466	0.183078	0.139	0.000
3.2667	0.071342	0.187838	0.144	0.000
3.3333	0.071182	0.192589	0.148	0.000
3.4000	0.070986	0.197328	0.153	0.000
3.4667	0.070753	0.202053	0.157	0.000
3.5333	0.070484	0.206761	0.161	0.000
3.6000	0.070178	0.211450	0.165	0.000
3.6667	0.069834	0.216118	0.169	0.000
3.7333	0.069452	0.220761	0.173	0.000
3.8000	0.069032	0.225377	0.176	0.000
3.8667	0.068571	0.229964	0.280	0.000
3.9333	0.068071	0.234519	0.628	0.000
4.0000	0.067529	0.239039	1.111	0.000
4.0667	0.066945	0.243522	1.699	0.000
4.1333	0.066318	0.247964	2.375	0.000
4.2000	0.065646	0.252363	3.128	0.000
4.2667	0.064928	0.256716	3.953	0.000
4.3333	0.064162	0.261019	4.841	0.000
4.4000	0.063348	0.265270	5.791	0.000
4.4667	0.062482	0.269464	6.797	0.000
4.5333	0.061563	0.273600	7.857	0.000
4.6000	0.060588	0.277672	8.968	0.000
4.6667	0.059555	0.281677	10.12	0.000
4.7333	0.058460	0.285611	11.33	0.000
4.8000	0.057300	0.289470	12.58	0.000
4.8667	0.056071	0.293249	13.88	0.000
4.9333	0.054768	0.296945	15.21	0.000
5.0000	0.053386	0.300550	16.59	0.000
5.0667	0.051919	0.304061	17.42	0.000
5.1333	0.050358	0.307471	18.92	0.000
5.2000	0.048696	0.310773	20.87	0.000
5.2667	0.046921	0.313961	23.17	0.000
5.3333	0.045019	0.317026	25.77	0.000
5.4000	0.042975	0.319960	28.63	0.000
5.4667	0.040767	0.322753	31.73	0.000
5.5333	0.038366	0.325392	35.03	0.000
5.6000	0.035733	0.327863	38.51	0.000
5.6667	0.032813	0.330150	42.14	0.000
5.7333	0.029521	0.332230	45.88	0.000
5.8000	0.025714	0.334074	49.73	0.000
5.8667	0.021116	0.335641	53.64	0.000
5.9333	0.015016	0.336858	57.60	0.000
6.0000	0.000000	0.337526	61.56	0.000
6.0667	0.000000	0.000000	65.51	0.000

Tank P3

Dimensions

Depth:	6 ft.	
Tank Type:	Circular	
Diameter:	6 ft.	
Length:	500 ft.	
Discharge Structure		
Riser Height:	5 ft.	
Riser Diameter:	54 in.	
Notch Type:	Rectangular	
Notch Width:	4.000 ft.	
Notch Height:	0.500 ft.	
Orifice 1 Diameter:	1 in.	Elevation:0 ft.
Orifice 2 Diameter:	2 in.	Elevation:2.5 ft.

Element Flows To:

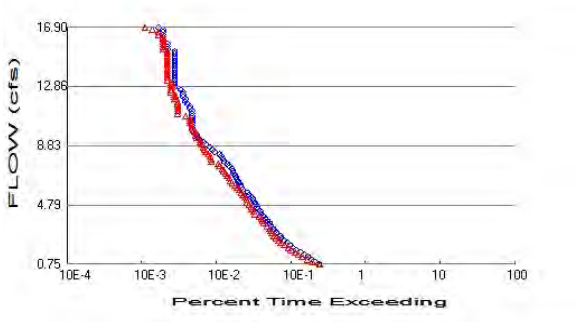
Outlet 1 Outlet 2

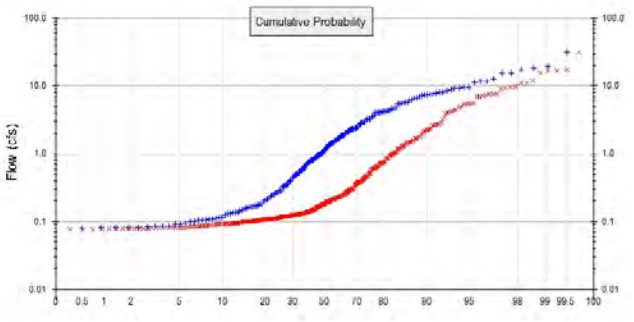
Tank Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000000	0.000000	0.000	0.000
0.0667	0.014438	0.000643	0.007	0.000
0.1333	0.020304	0.001813	0.009	0.000
0.2000	0.024725	0.003319	0.012	0.000
0.2667	0.028386	0.005093	0.014	0.000
0.3333	0.031551	0.007093	0.015	0.000
0.4000	0.034359	0.009292	0.017	0.000
0.4667	0.036890	0.011668	0.018	0.000
0.5333	0.039199	0.014206	0.019	0.000
0.6000	0.041322	0.016891	0.021	0.000
0.6667	0.043288	0.019712	0.022	0.000
0.7333	0.045116	0.022659	0.023	0.000
0.8000	0.046823	0.025725	0.024	0.000
0.8667	0.048421	0.028900	0.025	0.000
0.9333	0.049922	0.032179	0.026	0.000
1.0000	0.051333	0.035554	0.027	0.000
1.0667	0.052662	0.039021	0.028	0.000
1.1333	0.053915	0.042574	0.028	0.000
1.2000	0.055096	0.046208	0.029	0.000
1.2667	0.056212	0.049919	0.030	0.000
1.3333	0.057264	0.053702	0.031	0.000
1.4000	0.058258	0.057553	0.032	0.000
1.4667	0.059195	0.061468	0.032	0.000
1.5333	0.060079	0.065444	0.033	0.000
1.6000	0.060911	0.069478	0.034	0.000
1.6667	0.061695	0.073565	0.035	0.000
1.7333	0.062431	0.077702	0.035	0.000
1.8000	0.063121	0.081888	0.036	0.000
1.8667	0.063767	0.086118	0.037	0.000
1.9333	0.064370	0.090389	0.037	0.000
2.0000	0.064932	0.094699	0.038	0.000
2.0667	0.065453	0.099046	0.039	0.000
2.1333	0.065934	0.103425	0.039	0.000
2.2000	0.066377	0.107836	0.040	0.000
2.2667	0.066781	0.112275	0.040	0.000
2.3333	0.067148	0.116739	0.041	0.000

2.4000	0.067479	0.121227	0.042	0.000
2.4667	0.067773	0.125736	0.042	0.000
2.5333	0.068032	0.130263	0.063	0.000
2.6000	0.068256	0.134806	0.078	0.000
2.6667	0.068444	0.139363	0.088	0.000
2.7333	0.068598	0.143931	0.097	0.000
2.8000	0.068717	0.148508	0.104	0.000
2.8667	0.068802	0.153093	0.111	0.000
2.9333	0.068854	0.157681	0.117	0.000
3.0000	0.068871	0.162272	0.123	0.000
3.0667	0.068854	0.166863	0.129	0.000
3.1333	0.068802	0.171452	0.134	0.000
3.2000	0.068717	0.176036	0.139	0.000
3.2667	0.068598	0.180614	0.144	0.000
3.3333	0.068444	0.185182	0.148	0.000
3.4000	0.068256	0.189739	0.153	0.000
3.4667	0.068032	0.194282	0.157	0.000
3.5333	0.067773	0.198809	0.161	0.000
3.6000	0.067479	0.203317	0.165	0.000
3.6667	0.067148	0.207805	0.169	0.000
3.7333	0.066781	0.212270	0.173	0.000
3.8000	0.066377	0.216709	0.176	0.000
3.8667	0.065934	0.221119	0.180	0.000
3.9333	0.065453	0.225499	0.183	0.000
4.0000	0.064932	0.229845	0.187	0.000
4.0667	0.064370	0.234156	0.190	0.000
4.1333	0.063767	0.238427	0.193	0.000
4.2000	0.063121	0.242657	0.197	0.000
4.2667	0.062431	0.246842	0.200	0.000
4.3333	0.061695	0.250980	0.203	0.000
4.4000	0.060911	0.255067	0.206	0.000
4.4667	0.060079	0.259100	0.209	0.000
4.5333	0.059195	0.263077	0.293	0.000
4.6000	0.058258	0.266992	0.636	0.000
4.6667	0.057264	0.270843	1.124	0.000
4.7333	0.056212	0.274626	1.722	0.000
4.8000	0.055096	0.278337	2.412	0.000
4.8667	0.053915	0.281971	3.184	0.000
4.9333	0.052662	0.285524	4.029	0.000
5.0000	0.051333	0.288990	4.941	0.000
5.0667	0.049922	0.292366	5.766	0.000
5.1333	0.048421	0.295645	7.270	0.000
5.2000	0.046823	0.298820	9.216	0.000
5.2667	0.045116	0.301885	11.51	0.000
5.3333	0.043288	0.304833	14.11	0.000
5.4000	0.041322	0.307654	16.98	0.000
5.4667	0.039199	0.310339	20.08	0.000
5.5333	0.036890	0.312876	23.38	0.000
5.6000	0.034359	0.315253	26.85	0.000
5.6667	0.031551	0.317452	30.48	0.000
5.7333	0.028386	0.319452	34.23	0.000
5.8000	0.024725	0.321225	38.07	0.000
5.8667	0.020304	0.322732	41.99	0.000
5.9333	0.014438	0.323902	45.94	0.000
6.0000	0.000000	0.324545	49.91	0.000
6.0667	0.000000	0.000000	53.86	0.000

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 37.82
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 31.589
Total Impervious Area: 6.231

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	7.508835
5 year	11.66373
10 year	16.89986
25 year	21.806348

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	5.424731
5 year	10.422844
10 year	16.354376
25 year	20.174281

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.7509	863	887	102	Pass
0.9140	766	698	91	Pass
1.0771	675	602	89	Pass
1.2402	609	516	84	Pass
1.4034	544	452	83	Pass
1.5665	488	412	84	Pass
1.7296	429	364	84	Pass
1.8927	385	332	86	Pass
2.0559	350	295	84	Pass
2.2190	319	266	83	Pass
2.3821	288	247	85	Pass
2.5452	272	230	84	Pass
2.7083	259	214	82	Pass
2.8715	233	203	87	Pass
3.0346	222	196	88	Pass
3.1977	210	188	89	Pass
3.3608	195	173	88	Pass
3.5239	189	155	82	Pass
3.6871	176	150	85	Pass
3.8502	164	145	88	Pass
4.0133	157	135	85	Pass
4.1764	147	120	81	Pass
4.3395	140	115	82	Pass
4.5027	131	109	83	Pass
4.6658	126	106	84	Pass
4.8289	122	99	81	Pass
4.9920	119	93	78	Pass
5.1551	113	92	81	Pass
5.3183	106	87	82	Pass
5.4814	98	82	83	Pass
5.6445	94	78	82	Pass
5.8076	81	73	90	Pass
5.9708	79	69	87	Pass
6.1339	77	65	84	Pass
6.2970	73	59	80	Pass
6.4601	70	56	80	Pass
6.6232	67	54	80	Pass
6.7864	65	50	76	Pass
6.9495	62	48	77	Pass
7.1126	60	45	75	Pass
7.2757	58	43	74	Pass
7.4388	54	40	74	Pass
7.6020	51	38	74	Pass
7.7651	46	31	67	Pass
7.9282	44	31	70	Pass
8.0913	42	30	71	Pass
8.2544	40	28	70	Pass
8.4176	34	26	76	Pass
8.5807	32	25	78	Pass
8.7438	30	24	80	Pass
8.9069	26	23	88	Pass
9.0701	24	22	91	Pass
9.2332	22	22	100	Pass

9.3963	20	20	100	Pass
9.5594	20	19	95	Pass
9.7225	18	19	105	Pass
9.8857	17	18	105	Pass
10.0488	17	17	100	Pass
10.2119	17	17	100	Pass
10.3750	17	16	94	Pass
10.5381	17	16	94	Pass
10.7013	17	16	94	Pass
10.8644	17	14	82	Pass
11.0275	17	11	64	Pass
11.1906	17	11	64	Pass
11.3537	16	11	68	Pass
11.5169	16	11	68	Pass
11.6800	15	11	73	Pass
11.8431	14	11	78	Pass
12.0062	14	10	71	Pass
12.1694	13	10	76	Pass
12.3325	13	10	76	Pass
12.4956	13	9	69	Pass
12.6587	12	9	75	Pass
12.8218	10	9	90	Pass
12.9850	10	9	90	Pass
13.1481	10	9	90	Pass
13.3112	10	8	80	Pass
13.4743	10	8	80	Pass
13.6374	10	8	80	Pass
13.8006	10	8	80	Pass
13.9637	10	8	80	Pass
14.1268	10	8	80	Pass
14.2899	10	8	80	Pass
14.4530	10	8	80	Pass
14.6162	10	8	80	Pass
14.7793	10	8	80	Pass
14.9424	10	8	80	Pass
15.1055	10	8	80	Pass
15.2687	10	8	80	Pass
15.4318	8	7	87	Pass
15.5949	8	7	87	Pass
15.7580	8	7	87	Pass
15.9211	7	7	100	Pass
16.0843	7	7	100	Pass
16.2474	7	7	100	Pass
16.4105	7	6	85	Pass
16.5736	7	6	85	Pass
16.7367	7	5	71	Pass
16.8999	6	4	66	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1963 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   WARM 31.wdm
MESSU       25   PreWARM 31.MES
            27   PreWARM 31.L61
            28   PreWARM 31.L62
            30   POCWARM 311.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      20
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        X1                          MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                         User  t-series Engl Metr ***
                                      in  out           ***
   20      C,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   20         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   20         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   20         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   20             0       3.5     0.033        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   20              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   20             0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   20             0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
X1***
PERLND  20                       13.34     COPY   501     12
PERLND  20                       13.34     COPY   501     13
X2***
PERLND  20                       13.29     COPY   501     12
PERLND  20                       13.29     COPY   501     13
X4***
PERLND  20                        8.56     COPY   501     12
PERLND  20                        8.56     COPY   501     13
X3***
PERLND  20                        2.63     COPY   501     12
PERLND  20                        2.63     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                 ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
```

```
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1963 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   WARM 31.wdm
MESSU       25   MitWARM 31.MES
            27   MitWARM 31.L61
            28   MitWARM 31.L62
            30   POCWARM 311.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      20
      IMPLND       2
      RCHRES       1
      RCHRES       2
      RCHRES       3
      COPY         1
      COPY       501
      COPY       601
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Tank P1                    MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  601         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out            ***
   20      C,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   20         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   20         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   20         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   20              0       3.5     0.033        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   20               0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   20              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   20              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
P1***
PERLND  20                       8.39     RCHRES   1      2
PERLND  20                       8.39     RCHRES   1      3
IMPLND   2                       3.59     RCHRES   1      5
P2***
PERLND  20                       3.22     RCHRES   2      2
PERLND  20                       3.22     RCHRES   2      3
IMPLND   2                       1.38     RCHRES   2      5
P3***
PERLND  20                      1.939     RCHRES   3      2
PERLND  20                      1.939     RCHRES   3      3
IMPLND   2                      0.831     RCHRES   3      5
X1***
PERLND  20                       8.55     COPY   501     12
PERLND  20                       8.55     COPY   601     12
PERLND  20                       8.55     COPY   501     13
PERLND  20                       8.55     COPY   601     13
X2***
PERLND  20                       1.36     COPY   501     12
PERLND  20                       1.36     COPY   601     12
PERLND  20                       1.36     COPY   501     13
PERLND  20                       1.36     COPY   601     13
X4***
PERLND  20                       8.13     COPY   501     12
PERLND  20                       8.13     COPY   601     12
PERLND  20                       8.13     COPY   501     13
PERLND  20                       8.13     COPY   601     13
IMPLND   2                       0.43     COPY   501     15
IMPLND   2                       0.43     COPY   601     15

******Routing******
PERLND  20                       8.39     COPY     1     12
IMPLND   2                       3.59     COPY     1     15
PERLND  20                       8.39     COPY     1     13
PERLND  20                       3.22     COPY     1     12
IMPLND   2                       1.38     COPY     1     15
PERLND  20                       3.22     COPY     1     13
PERLND  20                      1.939     COPY     1     12
IMPLND   2                      0.831     COPY     1     15
PERLND  20                      1.939     COPY     1     13
RCHRES   1                          1     COPY   501     16
```

```
RCHRES   2                          1     COPY   501     16
RCHRES   3                          1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                       in  out                              ***
    1     Tank P1                1    1    1    1   28    0    1
    2     Tank  P2               1    1    1    1   28    0    1
    3     Tank  P3               1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
          FG FG FG FG  possible  exit  *** possible  exit      possible  exit
           *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1      0  1  0  0    4  0  0  0  0      0  0  0  0  0       2  2  2  2  2
    2      0  1  0  0    4  0  0  0  0      0  0  0  0  0       2  2  2  2  2
    3      0  1  0  0    4  0  0  0  0      0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.15       0.0       0.0       0.5       0.0
    2             2       0.1       0.0       0.0       0.5       0.0
    3             3      0.09       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES
```

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE   1
   91   4
     Depth   Area   Volume Outflow1 Velocity Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)   (Minutes)***
  0.000000 0.000000 0.000000 0.000000
  0.066667 0.022588 0.001006 0.007007
  0.133333 0.031765 0.002836 0.009909
  0.200000 0.038682 0.005193 0.012136
  0.266667 0.044409 0.007968 0.014013
  0.333333 0.049361 0.011097 0.015667
  0.400000 0.053754 0.014537 0.017163
  0.466667 0.057714 0.018255 0.018538
  0.533333 0.061326 0.022224 0.019818
  0.600000 0.064648 0.026425 0.021020
  0.666667 0.067723 0.030839 0.022157
  0.733333 0.070583 0.035450 0.023239
  0.800000 0.073254 0.040246 0.024272
  0.866667 0.075755 0.045213 0.025263
  0.933333 0.078102 0.050343 0.026217
  1.000000 0.080310 0.055624 0.027137
  1.066667 0.082389 0.061048 0.028027
  1.133333 0.084349 0.066607 0.028889
  1.200000 0.086198 0.072292 0.029727
  1.266667 0.087942 0.078097 0.030541
  1.333333 0.089589 0.084015 0.031335
  1.400000 0.091144 0.090040 0.032109
  1.466667 0.092610 0.096166 0.032864
  1.533333 0.093993 0.102387 0.033603
  1.600000 0.095295 0.108697 0.034326
  1.666667 0.096520 0.115091 0.035033
  1.733333 0.097672 0.121564 0.035727
  1.800000 0.098752 0.128112 0.036408
  1.866667 0.099762 0.134730 0.037076
  1.933333 0.100706 0.141412 0.037732
  2.000000 0.101585 0.148156 0.038377
  2.066667 0.102400 0.154956 0.039012
  2.133333 0.103153 0.161808 0.039636
  2.200000 0.103845 0.168708 0.040250
  2.266667 0.104478 0.175652 0.040856
  2.333333 0.105053 0.182637 0.041452
  2.400000 0.105570 0.189658 0.042040
  2.466667 0.106031 0.196712 0.042620
  2.533333 0.106435 0.203794 0.063010
  2.600000 0.106785 0.210902 0.078082
  2.666667 0.107080 0.218031 0.088628
  2.733333 0.107320 0.225178 0.097298
  2.800000 0.107507 0.232339 0.104862
  2.866667 0.107640 0.239511 0.111675
  2.933333 0.107720 0.246690 0.117932
  3.000000 0.107747 0.253873 0.123757
  3.066667 0.107720 0.261055 0.129233
  3.133333 0.107640 0.268234 0.134420
  3.200000 0.107507 0.275406 0.139361
  3.266667 0.107320 0.282567 0.144090
  3.333333 0.107080 0.289714 0.148634
  3.400000 0.106785 0.296843 0.153015
  3.466667 0.106435 0.303951 0.157249
  3.533333 0.106031 0.311034 0.161351
  3.600000 0.105570 0.318087 0.165334
  3.666667 0.105053 0.325108 0.169207
  3.733333 0.104478 0.332093 0.172981
  3.800000 0.103845 0.339037 0.176662
  3.866667 0.103153 0.345938 0.180258
  3.933333 0.102400 0.352790 0.183774
  4.000000 0.101585 0.359590 0.187216
  4.066667 0.100706 0.366333 0.190589
  4.133333 0.099762 0.373016 0.193896

```
4.200000  0.098752  0.379633  0.197142
4.266667  0.097672  0.386181  0.200330
4.333333  0.096520  0.392654  0.203463
4.400000  0.095295  0.399049  0.206545
4.466667  0.093993  0.405359  0.209577
4.533333  0.092610  0.411579  0.212562
4.600000  0.091144  0.417705  0.215502
4.666667  0.089589  0.423730  0.218399
4.733333  0.087942  0.429648  0.221256
4.800000  0.086198  0.435453  0.224074
4.866667  0.084349  0.441139  0.275576
4.933333  0.082389  0.446697  0.585665
5.000000  0.080310  0.452121  1.045659
5.066667  0.078102  0.457402  1.870424
5.133333  0.075755  0.462532  3.374755
5.200000  0.073254  0.467500  5.320083
5.266667  0.070583  0.472295  7.619861
5.333333  0.067723  0.476907  10.22171
5.400000  0.064648  0.481320  13.08721
5.466667  0.061326  0.485521  16.18457
5.533333  0.057714  0.489491  19.48524
5.600000  0.053754  0.493208  22.96211
5.666667  0.049361  0.496648  26.58856
5.733333  0.044409  0.499777  30.33788
5.800000  0.038682  0.502552  34.18302
5.866667  0.031765  0.504909  38.09653
5.933333  0.022588  0.506739  42.05054
6.000000  0.001000  0.507745  46.01693
END FTABLE  1
FTABLE      2
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.000000  0.000000  0.000000
0.066667  0.015016  0.000669  0.007007
0.133333  0.021116  0.001885  0.009909
0.200000  0.025714  0.003452  0.012136
0.266667  0.029521  0.005297  0.014013
0.333333  0.032813  0.007377  0.015667
0.400000  0.035733  0.009664  0.017163
0.466667  0.038366  0.012135  0.018538
0.533333  0.040767  0.014774  0.019818
0.600000  0.042975  0.017566  0.021020
0.666667  0.045019  0.020500  0.022157
0.733333  0.046921  0.023566  0.023239
0.800000  0.048696  0.026754  0.024272
0.866667  0.050358  0.030056  0.025263
0.933333  0.051919  0.033466  0.026217
1.000000  0.053386  0.036976  0.027137
1.066667  0.054768  0.040582  0.028027
1.133333  0.056071  0.044277  0.028889
1.200000  0.057300  0.048057  0.029727
1.266667  0.058460  0.051916  0.030541
1.333333  0.059555  0.055850  0.031335
1.400000  0.060588  0.059855  0.032109
1.466667  0.061563  0.063927  0.032864
1.533333  0.062482  0.068062  0.033603
1.600000  0.063348  0.072257  0.034326
1.666667  0.064162  0.076507  0.035033
1.733333  0.064928  0.080811  0.035727
1.800000  0.065646  0.085163  0.036408
1.866667  0.066318  0.089562  0.037076
1.933333  0.066945  0.094005  0.037732
2.000000  0.067529  0.098487  0.038377
2.066667  0.068071  0.103008  0.039012
2.133333  0.068571  0.107563  0.039636
2.200000  0.069032  0.112150  0.040250
2.266667  0.069452  0.116766  0.040856
2.333333  0.069834  0.121409  0.041452
2.400000  0.070178  0.126076  0.042040
```

```
2.466667  0.070484  0.130765  0.042620
2.533333  0.070753  0.135473  0.063010
2.600000  0.070986  0.140198  0.078082
2.666667  0.071182  0.144937  0.088628
2.733333  0.071342  0.149688  0.097298
2.800000  0.071466  0.154449  0.104862
2.866667  0.071555  0.159216  0.111675
2.933333  0.071608  0.163989  0.117932
3.000000  0.071625  0.168763  0.123757
3.066667  0.071608  0.173538  0.129233
3.133333  0.071555  0.178310  0.134420
3.200000  0.071466  0.183078  0.139361
3.266667  0.071342  0.187838  0.144090
3.333333  0.071182  0.192589  0.148634
3.400000  0.070986  0.197328  0.153015
3.466667  0.070753  0.202053  0.157249
3.533333  0.070484  0.206761  0.161351
3.600000  0.070178  0.211450  0.165334
3.666667  0.069834  0.216118  0.169207
3.733333  0.069452  0.220761  0.172981
3.800000  0.069032  0.225377  0.176662
3.866667  0.068571  0.229964  0.280767
3.933333  0.068071  0.234519  0.628488
4.000000  0.067529  0.239039  1.111803
4.066667  0.066945  0.243522  1.699436
4.133333  0.066318  0.247964  2.375249
4.200000  0.065646  0.252363  3.128890
4.266667  0.064928  0.256716  3.952983
4.333333  0.064162  0.261019  4.841926
4.400000  0.063348  0.265270  5.791271
4.466667  0.062482  0.269464  6.797381
4.533333  0.061563  0.273600  7.857206
4.600000  0.060588  0.277672  8.968139
4.666667  0.059555  0.281677  10.12792
4.733333  0.058460  0.285611  11.33457
4.800000  0.057300  0.289470  12.58633
4.866667  0.056071  0.293249  13.88161
4.933333  0.054768  0.296945  15.21901
5.000000  0.053386  0.300550  16.59723
5.066667  0.051919  0.304061  17.42200
5.133333  0.050358  0.307471  18.92633
5.200000  0.048696  0.310773  20.87166
5.266667  0.046921  0.313961  23.17144
5.333333  0.045019  0.317026  25.77328
5.400000  0.042975  0.319960  28.63878
5.466667  0.040767  0.322753  31.73615
5.533333  0.038366  0.325392  35.03682
5.600000  0.035733  0.327863  38.51369
5.666667  0.032813  0.330150  42.14013
5.733333  0.029521  0.332230  45.88945
5.800000  0.025714  0.334074  49.73460
5.866667  0.021116  0.335641  53.64811
5.933333  0.015016  0.336858  57.60211
6.000000  0.001000  0.337526  61.56850
END FTABLE  2
FTABLE      3
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.000000  0.000000  0.000000
0.066667  0.014438  0.000643  0.007007
0.133333  0.020304  0.001813  0.009909
0.200000  0.024725  0.003319  0.012136
0.266667  0.028386  0.005093  0.014013
0.333333  0.031551  0.007093  0.015667
0.400000  0.034359  0.009292  0.017163
0.466667  0.036890  0.011668  0.018538
0.533333  0.039199  0.014206  0.019818
0.600000  0.041322  0.016891  0.021020
0.666667  0.043288  0.019712  0.022157
```

0.733333	0.045116	0.022659	0.023239
0.800000	0.046823	0.025725	0.024272
0.866667	0.048421	0.028900	0.025263
0.933333	0.049922	0.032179	0.026217
1.000000	0.051333	0.035554	0.027137
1.066667	0.052662	0.039021	0.028027
1.133333	0.053915	0.042574	0.028889
1.200000	0.055096	0.046208	0.029727
1.266667	0.056212	0.049919	0.030541
1.333333	0.057264	0.053702	0.031335
1.400000	0.058258	0.057553	0.032109
1.466667	0.059195	0.061468	0.032864
1.533333	0.060079	0.065444	0.033603
1.600000	0.060911	0.069478	0.034326
1.666667	0.061695	0.073565	0.035033
1.733333	0.062431	0.077702	0.035727
1.800000	0.063121	0.081888	0.036408
1.866667	0.063767	0.086118	0.037076
1.933333	0.064370	0.090389	0.037732
2.000000	0.064932	0.094699	0.038377
2.066667	0.065453	0.099046	0.039012
2.133333	0.065934	0.103425	0.039636
2.200000	0.066377	0.107836	0.040250
2.266667	0.066781	0.112275	0.040856
2.333333	0.067148	0.116739	0.041452
2.400000	0.067479	0.121227	0.042040
2.466667	0.067773	0.125736	0.042620
2.533333	0.068032	0.130263	0.063010
2.600000	0.068256	0.134806	0.078082
2.666667	0.068444	0.139363	0.088628
2.733333	0.068598	0.143931	0.097298
2.800000	0.068717	0.148508	0.104862
2.866667	0.068802	0.153093	0.111675
2.933333	0.068854	0.157681	0.117932
3.000000	0.068871	0.162272	0.123757
3.066667	0.068854	0.166863	0.129233
3.133333	0.068802	0.171452	0.134420
3.200000	0.068717	0.176036	0.139361
3.266667	0.068598	0.180614	0.144090
3.333333	0.068444	0.185182	0.148634
3.400000	0.068256	0.189739	0.153015
3.466667	0.068032	0.194282	0.157249
3.533333	0.067773	0.198809	0.161351
3.600000	0.067479	0.203317	0.165334
3.666667	0.067148	0.207805	0.169207
3.733333	0.066781	0.212270	0.172981
3.800000	0.066377	0.216709	0.176662
3.866667	0.065934	0.221119	0.180258
3.933333	0.065453	0.225499	0.183774
4.000000	0.064932	0.229845	0.187216
4.066667	0.064370	0.234156	0.190589
4.133333	0.063767	0.238427	0.193896
4.200000	0.063121	0.242657	0.197142
4.266667	0.062431	0.246842	0.200330
4.333333	0.061695	0.250980	0.203463
4.400000	0.060911	0.255067	0.206545
4.466667	0.060079	0.259100	0.209577
4.533333	0.059195	0.263077	0.293625
4.600000	0.058258	0.266992	0.636717
4.666667	0.057264	0.270843	1.124711
4.733333	0.056212	0.274626	1.722563
4.800000	0.055096	0.278337	2.412773
4.866667	0.053915	0.281971	3.184263
4.933333	0.052662	0.285524	4.029194
5.000000	0.051333	0.288990	4.941639
5.066667	0.049922	0.292366	5.766404
5.133333	0.048421	0.295645	7.270735
5.200000	0.046823	0.298820	9.216063
5.266667	0.045116	0.301885	11.51584
5.333333	0.043288	0.304833	14.11769

```
  5.400000  0.041322  0.307654  16.98319
  5.466667  0.039199  0.310339  20.08055
  5.533333  0.036890  0.312876  23.38122
  5.600000  0.034359  0.315253  26.85809
  5.666667  0.031551  0.317452  30.48454
  5.733333  0.028386  0.319452  34.23386
  5.800000  0.024725  0.321225  38.07900
  5.866667  0.020304  0.322732  41.99251
  5.933333  0.014438  0.323902  45.94652
  6.000000  0.001000  0.324545  49.91291
  END FTABLE  3
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1             PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1             IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1             PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1             IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
COPY   601 OUTPUT MEAN   1 1     12.1      WDM    901 FLOW     ENGL      REPL
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
RCHRES   2 HYDR   RO     1 1        1      WDM   1008 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1009 STAG     ENGL      REPL
RCHRES   3 HYDR   RO     1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1        1      WDM   1011 STAG     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK
```

```
END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

Legal Notice

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8.2 Hydromodification Management Points of Compliance

- List and describe all points of compliance (POCs) for flow control for hydromodification management.
- For each POC, provide a POC identification name or number, and a receiving channel identification name or number correlating to the project's HMP Exhibit (see Attachment 2).

POC name or #	Channel name or #	POC Description
POC #1		Headwall at north corner of the site

9.0 General Requirements

- Complete the table below to indicate which compliance pathway was selected in PDP SWQMP Table 6. Include the corresponding sub-attachment with your SWQMP submittal. Other sub-attachments do not need to be included.
- See the BMPDM sections and appendices listed under "BMPDM Design Resources" for additional explanation of design requirements. Constructed features must fully satisfy the requirements described in these resources, and any other guidance identified by the County.
- DMA Exhibits and Construction Plans: CCSYAs and applicable BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.

Sub-attachments	BMPDM Design Resources
☐ **9.1: Documentation of Hydromodification Management Exemption**[1]	Section 1.6
☐ **9.2: Watershed Management Area Analysis (WMAA) Mapping**[1]	Appendix H.1.1.2
☒ **9.3: Resource Protection Ordinance (RPO) Methods**	Appendix H.1.1.1
☐ **9.4: No Net Impact Analysis**	Appendix H.4

[1] The San Diego County Regional comprehensive WMAA mapping data can be found on the Project Clean Water website here: http://www.projectcleanwater.org/download/wmaa_attc_data/

9.1 Documentation of Hydromodification Management Exemption (BMPDM Section 1.6)

- If the PDP is exempt from hydromodification management requirements (see Table 4 Part A.1 of the PDP SWQMP), use this Sub-attachment to document the exemption.
- Select the type of exemption below that applies and provide an explanation of the selection, including maps or other applicable documentation. Additional documentation may be requested by County staff.

Exemption Type per BMPDM Figure 1-2 (select one)

☐ a. The proposed project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ b. The proposed 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.

☐ c. The proposed project will discharge runoff directly to an area identified by the County as appropriate for an exemption by the WMAA for the watershed in which the project resides[2].

Explanation (add or attach pages as necessary)

Project is not exempt from Hydromodification Management

[2] This option must include an analysis of the project using the methodology presented in Attachment E of the Regional Watershed Management Area Analysis.

San Dieguito Watershed Management Area
HU 905.00, 346 mi2

Legend

- Watershed Boundaries
- Municipal Boundaries
- Regional WMAA Streams
- Exempt Bodies: Water Storage Reservoirs, Lakes, Enclosed Embayments, Pacific Ocean, Buena Vista Lagoon
- Exempt River Reaches: Reaches of San Luis Rey River, San Dieguito River, San Diego River, Forester Creek, Sweetwater River, Otay River
- Exempt Conveyance Systems: Existing underground storm drains or conveyance channels whose bed and bank are concrete-lined, discharging directly to exempt water bodies, exempt rivers, or localized areas of Agua Hedionda Lagoon and Batiquitos Lagoon

PROJECT SITE

Key Map (Not to Scale)

Aerial Imagery Source: DigitalGlobe, 06/2012

0 3.75 7.5 15 Miles

NORTH

Receiving Waters and Conveyance Systems Exempt from Hydromodification Management Requirements

Exhibit Date: Sept. 8, 2014

Geosyntec consultants | RICK Engineering Company

9.2 Watershed Management Area Analysis (WMAA) Mapping (BMPDM Appendix H.1.1.2)

Watershed Management Area Analysis (WMAA) mapping is a simple way to screen projects to determine the presence of onsite or offsite upstream Potential Critical Coarse Sediment Yield Areas (PCCSYAs). The San Diego County Regional WMAA mapping data can be found on the Project Clean Water website here: http://www.projectcleanwater.org/download/wmaa_attc_data/ .[3]

- Based on the WMAA map and the proposed project design, demonstrate below that both of the following conditions apply to the PDP:

  (a) Less than 5% of PCCSYAs will be impacted (built on or obstructed) by the PDP, and

  (b) All upstream offsite PCCYSAs will be bypassed (see BMPDM Appendix H.3).

A. Mapping Results -- At a minimum, show: (1) the project footprint, (2) areas of proposed development, (3) impacted onsite PCCSYAs, (4) offsite tributary areas[4], and (5) bypass of upstream offsite PCCSYAs.

PROJECT IS NOT LOCATED IN POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREA

[3] Applicants may refine initial mapping results using options identified in BMPDM Appendix H.1.2.

[4] Tributary areas must be shown to demonstrate that upstream offsite PCCSYAs do not exist. If bypassing these areas, only the bypass should be shown.

B. Explanation -- Provide documentation as needed to demonstrate that (1) impacts to PCCSYAs are below 5%, and (2) upstream offsite PCCYSAs are effectively bypassed. Add pages as necessary.

PROJECT IS NOT LOCATED IN POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREA. SEE MAP

9.3 Resource Protection Ordinance (RPO) Methods (BMPDM Appendix H.1.1.1)

- Either of two Resource Protection Ordinance (RPO) methods may also be used to demonstrate compliance with CCSYA requirements. Select either option and document the selection below:

  ☐ **RPO Scenario 1: PDP is subject to and in compliance with RPO requirements**[5]

  - **Select** if the project requires one or more discretionary permits;
  - **Demonstrate** that onsite AND upstream offsite CCSYAs will be avoided and/or bypassed.

  ☒ **RPO Scenario 2: PDP is entirely exempt/not subject to RPO requirements**[6]

  - **Select** if the project does not require discretionary permits;
  - **Demonstrate** that all upstream offsite CCSYAs will be bypassed[7].

A. Mapping Results -- At a minimum, show as applicable: (1) the project footprint, (2) areas of proposed development, (3) locations of onsite and upstream offsite CCSYAs, and (4) bypass of all identified CCSYAs.
Regional Critical Coarse Sediment Yield Area Map Provided

[5] RPO applicability is normally confirmed during discretionary review. Check with your project manager if you're not sure of your status.
[6] Does not include PDPs utilizing exemption(s) via RPO Section 86.604(e)(2)(cc) or 86.604(e)(3).
[7] This scenario does not impose requirements for onsite CCSYAs.

REACH ID	NAME
1	Santa Margarita River
2	San Luis Rey River
3	Buena Vista Creek
4	Agua Hedionda Creek
5	San Marcos Creek
6	Encinitas Creek
7	Cottonwood Creek (Carlsbad WMA)
8	Escondido Creek
9	San Dieguito Creek - Reach 1
10	San Dieguito Creek - Reach 2
11	Lusardi Creek
12	Los Penasquitos / Poway Creek
13	Rattlesnake Creek
14	Carroll Canyon Creek
15	Rose Creek
16	San Diego River
17	Sycamore Creek
18	Woodglen Vista Creek
19	San Vicente Creek
20	Forester Creek
21	Chollas Creek
22	Sweetwater River - Reach 1
23	Sweetwater River - Reach 2
24	Otay River
25	Jamul / Dulzura Creek
26	Tijuana River
27	Cottonwood Creek (Tijuana WMA)

PROJECT SITE

Legend

- Regional WMAA Streams
- Watershed Boundaries
- Municipal Boundaries
- Rivers & Streams
- Potential Critical Coarse Sediment Yield Areas

Aerial Imagery Source: DigitalGlobe, 06/2012

Miles 0 5 10 15

Potential Critical Coarse Sediment Yield Areas

Regional San Diego County Watersheds

Exhibit Date: Sept. 8, 2014

Geosyntec consultants

RICK ENGINEERING COMPANY

B. Explanation -- Provide documentation as needed to demonstrate that (1) onsite CCSYAs are avoided and bypassed [if applicable], and (2) upstream offsite CCYSAs are effectively bypassed. Add pages as necessary.

PROJECT IS NOT LOCATED IN POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREA. SEE MAP

9.4 No Net Impact Analysis (BMPDM Appendix H.4)

- When impacts to CCSYAs cannot be avoided or effectively bypassed, applicants must demonstrate that their project generates no net impact to the receiving water per the performance metrics identified in BMPDM Appendix H.4.
- Use the space below to document that the PDP will generate no net impact to any receiving water.

No Net Impact Analysis (add or attach pages as necessary)
NOT APPLICABLE

To Be Completed during Final Engineering

County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 10: BMP Installation Verification for PDPs

This form must be accepted by the County prior to the release of construction permits or granting of occupancy for applicable portions of a Priority Development Project (PDP). Its purpose is to provide documentation of the final installation of permanent Best Management Practices (BMPs) used to satisfy the Structural Performance Standards for the development project.

PART 1: PROJECT INFORMATION

A. Project Summary Information	
Project Name: Ramona 9th Street TM	***APN(s):*** 284-203-08-00
Record ID(s) - grading/improvement/building permit number(s): PDS2025-TM-5665, PDS2025-DB-25-005	***Project Watershed*** (Hydrologic Unit, Area, & Subarea Name w/ ID):
Project Address: 915 9th Street Ramona, Ca 92065	
B. Owner Information	
Owner Name: Warmington Residential	***Email:*** mesquivel@warmingtongroup.com
Address: 3090 Pullman Street Costa Mesa, Ca 92626	***Phone #:***

PART 2: PREPARER'S CERTIFICATION

By signing, I certify I have inspected the BMP(s) listed in Part 4 of this Attachment and confirm all elements have been constructed in accordance with the approved plans (permit plans & SWQMP) AND all applicable regulations (County Ordinance, BMP Design Manual, and NPDES MS4 Permit). I understand the County reserves the right to inspect the listed BMPs to verify compliance with the approved plans and regulations. If it is determined the BMPs were not constructed to plan or code, corrective actions shall be necessary before permits can be closed.

Preparer's Information	[SEAL]
Preparer's Name: Dane McDougall	
Email: dmcdougall@cvc-inc.net	
Phone #: 949.916.3800	
Preparer's Signature:	
Date:	
Note: Structural BMPs must be certified by a licensed professional engineer	

PART 3: COUNTY ACCEPTANCE

COUNTY – OFFICIAL USE ONLY		
County Inspector Approval: BMPs listed in **Part 4** have been inspected by the County.		
Inspector Name:		***Dept-Div: DPW-PDCI PDS-Bldg DGS DPR*** *(circle one)*
Inspector Signature:		***Date:***
DPW Watershed Protection Program (WPP) Acceptance: BMPs listed in **Part 4** are hereby accepted into County inventory.		
Date Received:	***WPP Reviewer:***	
WPP Reviewer's Signature:		***Date Accepted:***
Notes:		
Project Record ID:	**INTAKE ID#**	**ACCEPTANCE ID#**
New Development / Redevelopment	Residential / Commercial / Industrial	

PART 4: BMP INVENTORY INFORMATION

Use this table to document the Structural BMPs (S-BMPs) and Significant Site Design BMPs (SSD-BMPs) seeking Acceptance within the PDP SWQMP.

- In **Part A** list all Structural BMPs (both Pollutant Control and Hydromodification) by DMA.
- In **Part B** list all Significant Site Design BMPs by DMA.
- The information provided for each BMP in the table must match the SWQMP, construction plans, maintenance agreements, and other relevant project documentation.

DMA #	BMP Information			Maintenance Category (1, 2, 3, or 4)	Maintenance Agreement Recorded DOC #	Construction Plan Sheet #	Landscape Plan Sheet #
	Quantity	Description/Type of Structural BMP	BMP ID #				
A. Structural BMPs (S-BMPs)							
1	1	Proprietary flow thru Biolfiltration Vault	MWS #1	2			
2	1	Proprietary flow thru Biolfiltration Vault	MWS #2	2			
3	1	Proprietary flow thru Biolfiltration Vault	MWS #3	2			
4	1	Proprietary flow thru Biolfiltration Vault	MWS #4				
5	1	Proprietary flow thru Biolfiltration Vault	MWS #5				
6	1	Proprietary flow thru Biolfiltration Vault	MWS #6				
7	1	Proprietary flow thru Biolfiltration Vault	MWS #7				
8	1	Proprietary flow thru Biolfiltration Vault	MWS #8				
9	1	Proprietary flow thru Biolfiltration Vault	MWS #9				
10	1	Proprietary flow thru Biolfiltration Vault	MWS #10				
Add rows as needed. Click into the last column in the row below this, then press TAB to add a new row.							

County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 10: BMP Installation Verification for PDPs

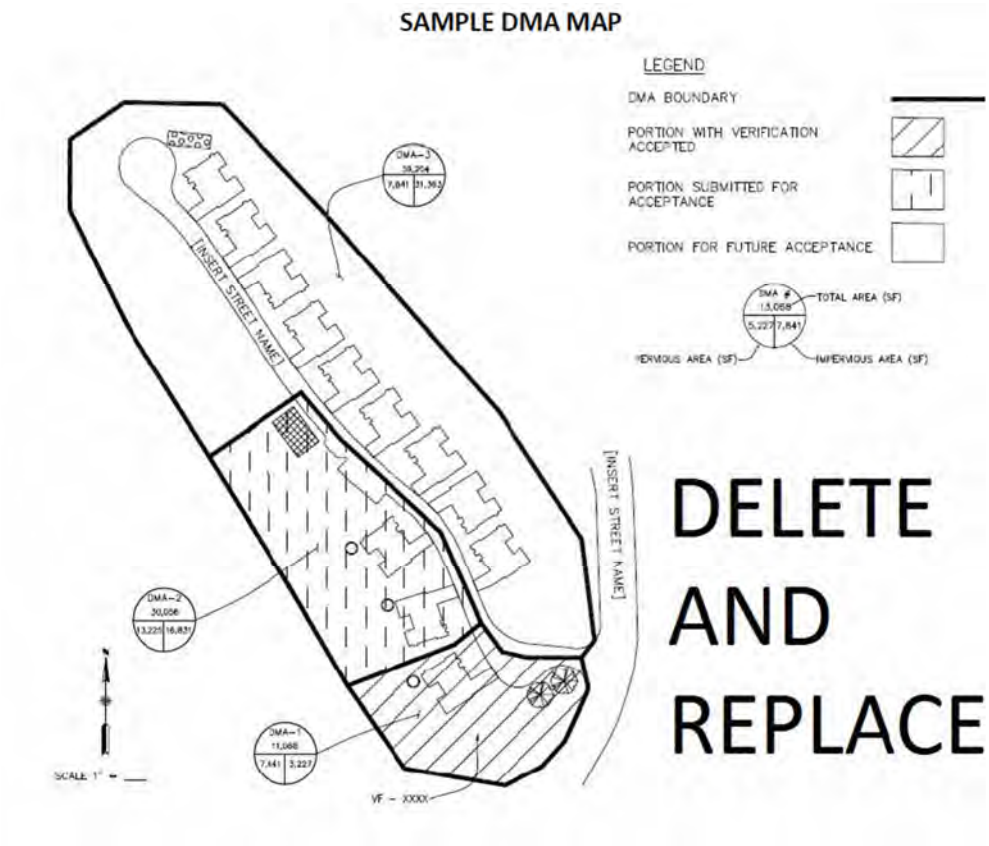
**** THIS PAGE IS FOR PARTIAL VERIFICATIONS ONLY ****

If final grade release or granting of occupancy is being requested for only a portion of the Priority Development Project (PDP) SWQMP, please list ALL DMAs and BMPs in the table below. Provide Acceptance Date and ID if applicable. All DMAs that are not self-mitigating or de minimis must have at least one S-BMP or SSD-BMP.

DMA & BMP Information - Include **ALL** Structural BMPs and Significant Site Design BMPs for the entire project				
DMA #	**APN or Lot #**	**BMP ID # / Type**	**Acceptance Status** (Previous, Current, Future)	**Acceptance ID#** (e.g. 20/21-001)

DMA & BMP MAP

Please attach a mark-up of the DMA map from the approved SWQMP that clearly shows:
(1) all BMPs & DMAs for the project site, (2) all DMAs or lots that were previously accepted, and
(3) the DMA(s) you are requesting for approval with this submittal.



Attachment 13: Green Streets PDP Exempt Form

This form must accompany applications for projects proposing Green Street Surfaces and elect to meet the Green Street Performance Standard. Refer to Section 1.4.3 and Appendix K of the County BMP Design Manual for additional guidance.

Project Description

Describe project intent, existing/proposed drainage patterns, net increase in impervious area, and green street performance strategies.

If the project consists entirely of "routine maintenance" activities as outlined in Table 1-2 of the County BMP Design Manual (i.e. road resurfacing, utility trenching, etc), clearly state so and provide a thorough description of these activities. Routine maintenance projects are not required to complete the rest of this SWQMP form.

The project proposes the construction of eighty-five (85) detached single family residential units with open space areas that will incorporate landscaping to the maximum extent feasible. Parcels 1 and 4 will be accessible via two (2) driveways each off of 9th Street and 10th Street and Parcel 2 will be accessible via one driveway off of 10th Street. It is being proposed that along the project frontage, the halfwidth right of way of 10th Street will be vacated and water quality requirements will be met onsite. Proposed improvements along 9th Street include half width repaving and new curb and gutter, new sidewalk, and a new parkway along the project frontage. As the proposed improvements for this section will solely exist in the right of way and are for transportation purposes, only the added impervious area is subject to water quality treatment requirements and the improvements are exempt from hydromodification mitigation. The proposed improvements consist of 39531.08 sft of added impervious area. Runoff from this area will be conveyed via curb and gutter into reverse parkway drains that will route runoff under the proposed sidewalk and into the parkway which will consist of a vegetated swale. The sidewalk is also proposed to slope towards the swale. The swale will be 5 feet wide, allowing 4 inches of ponding, 18 inches of soil media, 12 inches of gravel and a 6-inch underdrain. The underdrain will be connected to the proposed public storm drain that runs through the site. These flows will not comingle with onsite flows.

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	9th Street										unitless
	2	85th Percentile 24-hr Storm Depth	0.60										inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	13,463										sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Initial Runoff Factor Calculation	22	Total Tributary Area	13,463	0	0	0	0	0	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	606	0	0	0	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	606	0	0	0	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	12,117	0	0	0	0	0	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	606	0	0	0	0	0	0	0	0	0	cubic-feet

No Warning Messages

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Basic Analysis	1	Drainage Basin ID or Name	9th Street	-	-	-	-	-	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.60	-	-	-	-	-	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	C										unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted										unitless
	5	Nature of Restriction	Groundwater										unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No										yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes										yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.025										in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	-	-	-	-	-	-	-	-	-	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	4.5%	-	-	-	-	-	-	-	-	-	percentage
	12	Fraction of DCV Requiring Retention	0.02	-	-	-	-	-	-	-	-	-	ratio
	13	Required Retention Volume	12	-	-	-	-	-	-	-	-	-	cubic-feet

No Warning Messages

See vegetated swale detail on the DMA Exhibit. Underdrain is placed 3-inches above the bottom of the media layer to allow for required retention volume to infiltrate into soils below

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	1	Drainage Basin ID or Name	9th Street	-	-	-	-	-	-	-	-	-	sq-ft
	2	Design Infiltration Rate Recommended	0.000	-	-	-	-	-	-	-	-	-	in/hr
	3	Design Capture Volume Tributary to BMP	606	-	-	-	-	-	-	-	-	-	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated										unitless
	5	Is BMP Impermeably Lined or Unlined?	Lined										unitless
	6	Does BMP Have an Underdrain?	Underdrain										unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard										unitless
	8	Provided Surface Area	3,533										sq-ft
	9	Provided Surface Ponding Depth	4										inches
	10	Provided Soil Media Thickness	18										inches
	11	Provided Gravel Thickness (Total Thickness)	12										inches
	12	Underdrain Offset	3										inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	6.00										inches
	14	Specialized Soil Media Filtration Rate											in/hr
	15	Specialized Soil Media Pore Space for Retention											unitless
	16	Specialized Soil Media Pore Space for Biofiltration											unitless
	17	Specialized Gravel Media Pore Space											unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	19	Ponding Pore Space Available for Retention	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless
	20	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
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	120	0	0	0	0	0	0	0	0	0	hours
	26	Efficacy of Retention Processes	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	460	0	0	0	0	0	0	0	0	0	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	146	0	0	0	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	1.4442	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	17.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	31	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
	32	Soil Media Filtration Rate to be used for Sizing	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	35	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
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	37	Effective Depth of Biofiltration Storage	11.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	38	Drawdown Time for Surface Ponding	1	0	0	0	0	0	0	0	0	0	hours
	39	Drawdown Time for Effective Biofiltration Depth	2	0	0	0	0	0	0	0	0	0	hours
	40	Total Depth Biofiltered	41.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	219	0	0	0	0	0	0	0	0	0	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	219	0	0	0	0	0	0	0	0	0	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	110	0	0	0	0	0	0	0	0	0	cubic-feet
	44	Option 2 - Provided Storage Volume	110	0	0	0	0	0	0	0	0	0	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	-	-	-	-	-	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

No Warning Messages

Table K.2-1 : Green Street Performance Standard Calculations

Item			Value	Description
Required Treatment Volume	1	Land Use of Net Impervious Area	Transportation	20' TRAVEL LANE, CURB AND GUTTER, 5' WIDE SIDEWALK, AND 5' WIDE PARKWAY
	2	Total Net Impervious Area [12]	13,643.14 ft^2	*Per project drawings.*
	3	85th Percentile Rainfall Depth	0.6 in.	*Determine per BMPDM Appendix B.1.*
	4	Runoff Coefficient	0.90	*Value of 0.90 applies to new impervious areas.*
	5	Required Treatment Volume	614 ft^3	*(Line 2 x Line 3 x Line 4) / 12*
Provided Treatment Volume	6	Land Use of Treated Area[13]	Transportation	*Per project drawings.*
	7	Land Use Factor[14]	1.0	*Determine per Note 5 below.*
	8	Conventional Treatment Volume[15]	0 t^3	*Determine per Note 6 below.*
	9	Alternative Treatment Volume		*Determine per supplemental applicant calculations.*
	10	Final Treatment Volume	ft^3	*Line 7 x (Line 8 + Line 9)*
Result	11	Is Project Green Street Compliant?		*Compliant if Line 10 ≥ Line 5. Otherwise, non-compliant.*
	12	Optional Credit		*(Line 7 x Line 8) – Line 5*

[12] The Net Increase in Impervious Area should **not** reflect any work occurring within existing impervious areas.

[13] Classify drainage area into following land use types (may use more than one) agriculture, commercial, education, industrial, multi-family residential, orchard, rural residential, single family residential, transportation, open space.

[14] If Land Uses from Lines 1 and 6 match, use a value of 1.0. Otherwise, refer to Regional Water Quality Equivalency Guidance for determination of appropriate Land Use Factor.

[15] Conventional Treatment Volume may be determined by subtracting the project's total "Deficit of Effectively Treated Stormwater" from the project's total Design Capture Volume. These values can be found in Version 2.0 of the County of San Diego Automated Control Worksheet on Line 48 of the BMP Performance Tab and Line 26 of the DCV Tab respectively.

E.17 FT-1 Vegetated Swales



MS4 Permit Category
Flow-thru Treatment Control

Manual Category
Flow-thru Treatment Control

Applicable Performance Standard
Pollutant Control

Primary Benefits
Treatment
Volume Reduction (Incidental)
Peak Flow Attenuation

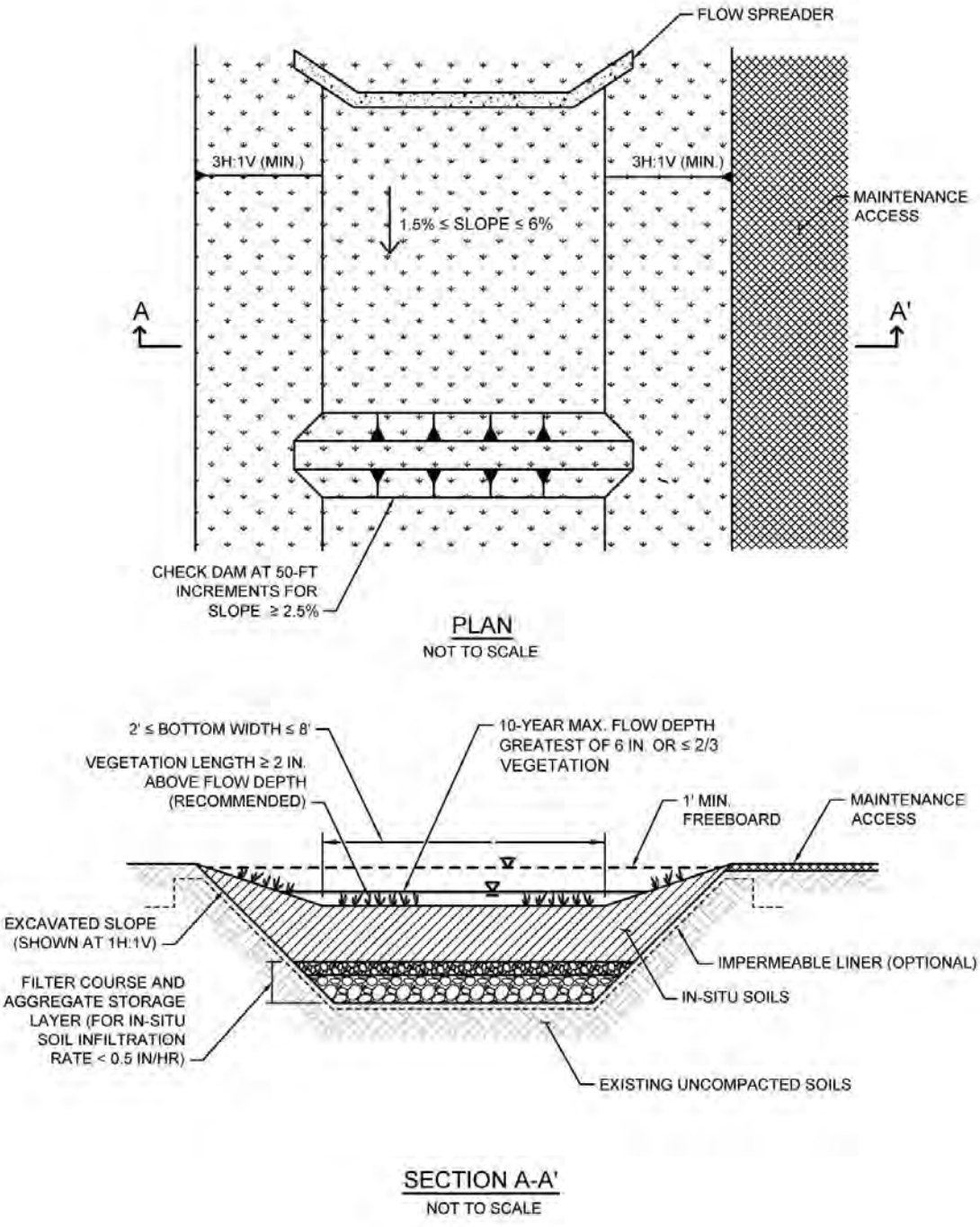
Location: Eastlake Business Center, Chula Vista, California; Photo Credit: Eric Mosolgo

Description

Vegetated swales are shallow, open channels that are designed to remove storm water pollutants by physically straining/filtering runoff through vegetation in the channel. Swales can be used in place of traditional curbs and gutters and are well-suited for use in linear transportation corridors to provide both conveyance and treatment via filtration. An effectively designed vegetated swale achieves uniform sheet flow through densely vegetated areas. When soil conditions allow, infiltration and volume reduction are enhanced by adding a gravel drainage layer underneath the swale. Vegetated swales with a subsurface media layer can provide enhanced infiltration, water retention, and pollutant-removal capabilities. Pollutant removal effectiveness can also be maximized by increasing the hydraulic residence time of water in swale using weirs or check dams.

Typical vegetated swale components include:

- Inflow distribution mechanisms (e.g., flow spreader)
- Surface flow
- Vegetated surface layer
- Check dams (if required)
- Optional aggregate storage layer with underdrain(s)



Typical plan and Section view of a Vegetated Swale BMP

Design Adaptations for Project Goals

Site design BMP to reduce runoff volumes and storm peaks. Swales without underdrains are an alternative to lined channels and pipes and can provide volume reduction through infiltration. Swales can also reduce the peak runoff discharge rate by increasing the time of concentration of the site and decreasing runoff volumes and velocities.

Flow-thru treatment BMP for storm water pollutant control. The system is lined or un-lined to provide incidental infiltration with an underdrain and designed to provide pollutant removal through settling and filtration in the channel vegetation (usually grasses). This configuration is considered to provide flow-thru treatment via horizontal surface flow through the swale. Sizing for flow-thru treatment control is based on the surface flow rate through the swale that meets water quality treatment performance objectives.

Design Criteria and Considerations

Vegetated swales must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of County staff if it is determined to be appropriate:

	Siting and Design	*Intent/Rationale*
☐	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, and liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
☐	An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration or lateral flows should not be allowed.	Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
☐	Contributing tributary area ≤ 2 acres.	Higher ratios increase the potential for clogging but may be acceptable for relatively clean tributary areas.
☐	Longitudinal slope is ≥ 1.5% and ≤ 6%.	Flatter swales facilitate increased water quality treatment while minimum slopes prevent ponding.
☐	For site design goal, in-situ soil infiltration rate ≥ 0.5 in/hr (if < 0.5 in/hr, an underdrain is required and design goal is for pollutant control only).	Well-drained soils provide volume reduction and treatment. An underdrain should only be provided when soil infiltration rates are low or per geotechnical or groundwater concerns.

	Siting and Design	***Intent/Rationale***
Surface Flow		
☐	Maximum flow depth is ≤ 6 inches or ≤ $^2/_3$ the vegetation length, whichever is greater. Ideally, flow depth will be ≥ 2 inches below shortest plant species.	Flow depth must fall within the height range of the vegetation for effective water quality treatment via filtering.
	A minimum of 1 foot of freeboard is provided.	Freeboard minimizes risk of uncontrolled surface discharge.
☐	Cross sectional shape is trapezoidal or parabolic with side slopes ≥ 3H:1V.	Gentler side slopes are safer, less prone to erosion, able to establish vegetation more quickly and easier to maintain.
☐	Bottom width is ≥ 2 feet and ≤ 8 feet.	A minimum of 2 feet minimizes erosion. A maximum of 8 feet prevents channel braiding.
☐	Minimum hydraulic residence time ≥ 10 minutes.	Longer hydraulic residence time increases pollutant removal.
☐	Swale is designed to safely convey the 10-yr storm event unless a flow splitter is included to allow only the water quality event.	Planning for larger storm events lessens the risk of property damage due to flooding.
☐	Flow velocity is ≤ 1 ft/s for water quality event. Flow velocity for 10-yr storm event is ≤ 3 ft/s.	Lower flow velocities provide increased pollutant removal via filtration and minimize erosion.
Vegetated Surface Layer (amendment with media is Optional)		
☐	Soil is amended with 2 inches of media mixed into the top 6 inches of in-situ soils, as needed, to promote plant growth (optional). For enhanced pollutant control, 2 feet of media can be used in place of in-situ soils. Media meets either of these two media specifications: City of San Diego Storm Water Standards Appendix F, February 2016; Or County of San Diego Low Impact Development Handbook, June 2014: Appendix G -Bioretention Soil Specification.	Amended soils aid in plant establishment and growth. Media replacement for in-situ soils can improve water quality treatment and site design volume reduction.

Siting and Design		*Intent/Rationale*
Vegetated Surface Layer (amendment with media is Optional)		
☐	Vegetation is appropriately selected low-growing, erosion-resistant plant species that effectively bind the soil, thrive under site-specific climatic conditions and require little or no irrigation.	Plants suited to the climate and expected flow conditions are more likely to survive.
Check Dams		
☐	Check dams are provided at 50-foot increments for slopes ≥ 2.5%.	Check dams prevent erosion and increase the hydraulic residence time by lowering flow velocities and providing ponding opportunities.
Filter Course Layer (For Underdrain Design)		
☐	A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used.	Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade. Filter fabric is more likely to clog.
☐	Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog the facility and impede infiltration.
☐	Filter course calculations assessing suitability for particle migration prevention have been completed.	Gradation relationship between layers can evaluate factors (e.g., bridging, permeability, and uniformity) to determine if particle sizing is appropriate or if an intermediate layer is needed.
Aggregate Storage Layer (For Underdrain Design)		
☐	The depth of aggregate provided (12-inch typical) and storage layer configuration is adequate for providing conveyance for underdrain flows to the outlet structure.	Proper storage layer configuration and underdrain placement will minimize facility drawdown time.
☐	Aggregate used for the aggregate storage layer is washed and free of fines.	Washing aggregate will help eliminate fines that could clog aggregate storage layer void spaces or underdrain.
Inflow and Underdrain Structures		
☐	Inflow and underdrains are accessible for inspection and maintenance.	Maintenance will prevent clogging and ensure proper operation of the flow control structures.

Siting and Design		*Intent/Rationale*
Inflow and Underdrain Structures		
☐	Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer.	A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked.
☐	Minimum underdrain diameter is 6 inches.	Smaller diameter underdrains are prone to clogging.
☐	Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.
☐	An underdrain cleanout with a minimum 6-inch diameter and lockable cap is placed every 250 to 300 feet as required based on underdrain length.	Properly spaced cleanouts will facilitate underdrain maintenance.

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where vegetated swales can be used in the site design to replace traditional curb and gutter facilities and provide volume reduction through infiltration.

Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only

To design vegetated swales for storm water pollutant control only, the following steps should be taken:

1. Verify that siting and design criteria have been met, including bottom width and longitudinal and side slope requirements.
2. Calculate the design flow rate per Appendix B based on expected site design runoff for tributary areas.
3. Use the sizing worksheet to determine flow-thru treatment sizing of the vegetated swale and if flow velocity, flow depth, and hydraulic residence time meet required criteria. Swale configuration should be adjusted as necessary to meet design requirements.

Maintenance Overview

Normal Expected Maintenance. Vegetated swales require routine maintenance to: remove accumulated materials such as sediment, trash, and debris; maintain vegetation health; and maintain integrity of side slopes, channel bottom, inlets, energy dissipaters, weirs or check dams, and outlets to

ensure runoff will be conveyed as uniform flow throughout the swale (i.e., flow will spread uniformly across the width of the swale as it is conveyed from upstream to downstream).

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 deposited materials or overgrowth of vegetation within the swale blocking drainage conveyance or blocking an outlet structure, or localized erosion issues that cause channelization and prevent uniform flow throughout the swale. The specific cause of the drainage issue must be determined and corrected. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.
- Sediment, trash, or debris accumulation blocking drainage becomes a chronic issue observed at every inspection. 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.
- 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 County reviewer shall be contacted prior to any additional repairs or reconstruction.

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Summary of Standard Inspection and Maintenance

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	Inspection and Maintenance Frequency
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to vegetation.	• Inspect monthly. If accumulated materials are observed blocking drainage, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintain when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintain when needed.
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintain when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP following a storm event	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, loosening or replacing top soil to allow for better infiltration, or minor re-grading for proper drainage. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
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, the County reviewer 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. • Maintain when needed.