Appendix M

Priority Development Project Stormwater Quality Management Plan for Alexan Escondido

City of Escondido
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Alexan Escondido

855 Brotherton Road
Escondido, CA, 92025

ASSESSOR'S PARCEL NUMBER(S):
236-333-53-00

ENGINEER OF WORK:

Daniel Quinones, PE
C 92310

REGISTERED PROFESSIONAL ENGINEER
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DATE OF SWQMP:
11/09/2023

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SWQMP APPROVED BY:

APPROVAL DATE:

ESCONDIDO
City of Choice

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- Attachment 1b: Form I-8, Categorization of Infiltration Feasibility Condition
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- Attachment 1d: Drainage Management Area (DMA) Exhibit
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Attachment 5: Copy of Plan Sheets Showing Permanent Storm Water BMPs

ACRONYMS

ACP	Alternative Compliance Project
APN	Assessor's Parcel Number
BMP	Best Management Practice
DMA	Drainage Management Area
EOW	Engineer of Work
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
PDP	Priority Development Project
PE	Professional Engineer
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWDM	Storm Water Design Manual
SWQMP	Storm Water Quality Management Plan
USGS	US Geological Survey
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

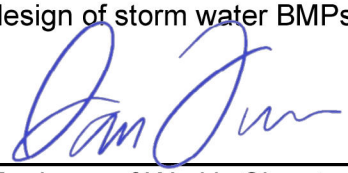
PDP SWQMP PREPARER'S CERTIFICATION PAGE

Project Name: Alexan Escondido
Permit Number: _____

PREPARER'S CERTIFICATION

I hereby declare that I am the Engineer in Responsible Charge of design of storm water best management practices (BMPs) for this project, and that I have exercised responsible charge over the design of the BMPs as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the PDP requirements of the City of Escondido Storm Water Design Manual, which is a design manual for compliance with the City of Escondido Municipal Code (Chapter 22, Article 2) and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100) requirements for storm water management.

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



C 92310, EXP: 6/30/25

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

Daniel Quinones

Print Name

Nasland Engineering

Company

7/20/2023

Date

Engineer's Seal:

Template Date: October 2022
PDP SWQMP

Preparation Date: 10/30/2023

SUBMITTAL RECORD

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

Preliminary Design / Planning / CEQA

Submittal Number	Date	Summary of Changes
1	7/20/2023	Initial Submittal
2	11/09/2023	2nd Submittal
3		
4		

Final Design

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

Plan Changes

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

PROJECT VICINITY MAP

Project Name: Alexan Escondido
Permit Number: _____

Step 1: Project type determination

Site Information Checklist for PDPs	Form I-2a
Project Summary Information	
Project Name	Alexan Escondido
Project Address	855 Brotherton Road Escondido, CA, 92025
Assessor's Parcel Number(s)	236-333-53-00
Permit Number	
Project Watershed (Hydrologic Unit)	Select One: ☐ Carlsbad 904 ☑ San Dieguito 905
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	7.9 Acres (345,139 Square Feet)
Area to be disturbed by the project (Project Area)	7.9 Acres (345,139 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	6.4 Acres (277,732 Square Feet)
Project Proposed Pervious Area (subset of Project Area)	1.5 Acres (67,407 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	

Step 1.1: Storm Water Quality Management Plan requirements

Site Information Checklist for PDPs		Form I-2a
Step	**Answer**	**Progression**
Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, complete Step 1 Project Type Determination Checklist on Pages 3 and 4, and see PDP exemption information below. For further guidance, see Section 1.4 of the Storm Water Design Manual *in its entirety*.	☐ Standard Project	Standard Project requirements apply. **Complete Form I-1.**
	▣ PDP	Standard and PDP requirements apply, including PDP SWQMP. **SWQMP Required.**
	☐ PDP with ACP	If participating in offsite alternative compliance, **complete Step 5.1** (Offsite Alternative Compliance Participation Form) **and an ACP SWQMP.**
	☐ PDP Exemption	**Go to Step 1.2 below.**

Step 1.2: Exemption to PDP definitions

Site Information Checklist for PDPs	Form I-2a
Is the project exempt from PDP definitions based on either of the following: ☐ Projects that are only new or retrofit paved sidewalks, bicycle lanes, or trails that meet the following criteria: (i) Designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas; OR (ii) Designed and constructed to be hydraulically disconnected from paved streets or roads [i.e., runoff from the new improvement does not drain directly onto paved streets or roads]; OR (iii) Designed and constructed with permeable pavements or surfaces in accordance with County of San Diego Green Streets Infrastructure;	If so: Standard Project requirements apply, AND any additional requirements specific to the type of project. City concurrence with the exemption is required. *Provide discussion and list any additional requirements below in this form.*
☐ Projects that are only retrofitting or redeveloping existing paved alleys, streets or roads that are designed and constructed in accordance with the County of San Diego Green Streets Infrastructure;	**PDP Exempt.**
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:	
N/A	

Step 1.3: Confirmation of PDP Determination

Site Information Checklist for PDPs			Form I-2a
The project is (select one): ☐ New Development ■ Redevelopment[1]			
The total proposed newly created or replaced impervious area is: 277,732 ft²			
The project meets the following categories, (a) through (f): [select all that apply]			
Yes ☐	No ☑	(a)	New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☑	No ☐	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☑	No ☐	(c)	New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) code 5812). *Information and an SIC search function are available at www.osha.gov/pls/imis/sicsearch.html.* (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.
Yes ☐	No ☑	(d)	New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). *Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; and any*

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

Site Information Checklist for PDPs			Form I-2a
			other equivalent environmentally sensitive areas which have been identified by the Copermittees. *For projects adjacent to an ESA, but not discharging to an ESA, the 2,500 square foot threshold does not apply as long as the project does not physically disturb the ESA and the ESA is upstream of the project.*
Yes ☐	No ☑	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. *Information and an SIC search function are available at www.osha.gov/pls/imis/sicsearch.html.* (ii) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.
Yes ☑	No ☐	(f)	New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction. Note: See Storm Water Design Manual Section 1.4.2 for additional guidance.

The following is for redevelopment PDPs only:

The area of existing (pre-project) impervious area at the project site is:	A	118,194	ft²
The total proposed newly created or replaced impervious area is:	B	277,732	ft²
Percent impervious surface created or replaced:	(B/A)*100	235	%

The percent impervious surface created or replaced is (select one based on the above calculation):

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

OR

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

Step 2: City of Escondido PDP SWQMP Site Information Checklist

Step 2.1: Description of Existing Site Condition and Drainage Patterns

Site Information Checklist for PDPs	Form I-2a

Current Status of the Site (select all that apply):

- ■ Existing development
- ☐ Previously graded but not built out
- ☐ Demolition completed without new construction
- ☐ Agricultural or other non-impervious use
- ☐ Vacant, undeveloped/natural

Description / Additional Information:

The project site existing conditions consist of the main building of the Bethel Baptist Church and the associated parking on a partially developed lot.

Existing Land Cover Includes (select all that apply and provide each area on site):

- ■ Vegetative Cover 4.9 Acres (215,598 Square Feet)
- ■ Non-Vegetated Pervious Areas 0.3 Acres (11,347 Square Feet)
- ■ Impervious Areas 2.7 Acres (118,194 Square Feet)

Description / Additional Information:

The project site existing conditions consist of the main building of the Bethel Baptist Church and the associated parking on a partially developed lot.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- ☐ NRCS Type A
- ☐ NRCS Type B
- ☐ NRCS Type C
- ■ NRCS Type D

Approximate Depth to Groundwater (GW) (or N/A for no infiltration BMPs):

- ☐ Groundwater Depth < 5 feet
- ☐ 5 feet < Groundwater Depth < 10 feet
- ☐ 10 feet < Groundwater Depth < 20 feet
- ■ Groundwater Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- ■ Watercourses
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☐ None
- ☐ Other

Description / Additional Information:

The project site existing conditions consist of the main building of the Bethel Baptist Church and the associated parking on a partially developed lot.

Step 2.2: Description of Existing Site Drainage Patterns

Site Information Checklist for PDPs	Form I-2a
How is storm water runoff conveyed from the site? At a minimum, this description should answer (1) whether existing drainage conveyance is natural or urban; (2) describe existing constructed storm water conveyance systems, if applicable; and (3) is runoff from offsite conveyed through the site? If so, describe:	
1. Existing drainage conveyance is classified as urban and natural. 2. Off-site runon is conveyed through the site via a natural earthen swale. Run-on enters the site on the northeastern region of the site at a headwall and drains south before exiting along the southern edge through a private wooden fence. There is an existing Curb Inlet along Brotherton Road that collects offsite runoff from the street located just upstream of the headwall. 3. There is no existing storm drain system connecting to the public ROW from the project site 4. Pre-project and post project drainage area is 7.9 acres. The existing runoff discharge locations are shown in the Drainage Study in Appendix A.	

Step 2.3: Description of Proposed Site Development

Site Information Checklist for PDPs	Form I-2a
Project Description / Proposed Land Use and/or Activities:	
The proposed improvements will include several multi-story, multi-family residential apartment buildings with associated parking, improvements and landscaping.	
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):	
The proposed impervious features will include approximately 12 residential building complexes, a Leasing & Amenity building, associated parking, and pedestrian sidewalks.	
List/describe proposed pervious features of the project (e.g., landscape areas):	
The proposed pervious features of the project include landscaped areas, permeable pavement, and biofiltration basins.	
Does the project include grading and changes to site topography? ■ Yes ☐ No Description / Additional Information:	
The project proposes grading of the project site for construction, ADA accessibility, and drainage and compliance.	

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

Change in Land Cover Type Summary

Land Cover Type	Existing (acres or ft^2)	Proposed (acres or ft^2)	Percent Change
Vegetation	415,598	61,547	15%
Pervious (non-vegetated)	11,347	5860	52%
Impervious	118,194	277,732	235%
total	345,139	345,139	Sum Existing must equal Sum Proposed

Step 2.4: Description of Proposed Site Drainage Patterns

Site Information Checklist for PDPs	Form I-2a

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

- ☒ Yes
- ☐ No

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

Describe proposed site drainage patterns:

The site proposes a storm drain system for the roads, walkways and residential structures with area drains, roof drains, curb inlets, Modular Wetland Systems, and Biofiltration Basins that act to serve the project site and discharge into the public storm drain system.
DMA 1 drains to the northwest region of the project and enters a proposed biofiltration basin for required treatment then drains to an underground detention vault for required detention.
DMA 2 drains to the northeast region of the project and enters a proposed MWS for required treatment then drains to an underground detention vault for required detention.
DMA 3 drains to the east region of the project and enters a proposed biofiltration for required treatment then drains to an underground detention vault for required detention.
DMA 4 drains to the southwest region of the project and enters a proposed biofiltration basin for required treatment then drains to an underground detention vault for required detention.
DMA 5 drains to the southwest region of the project and enters a proposed MWS for required treatment then drains to an underground detention vault for required detention.

DMA 6 and 7 are self-mitigating.

Step 2.5: Potential Pollutant Source Areas

Site Information Checklist for PDPs	Form I-2a

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

- [x] On-site storm drain inlets
- [ ] Interior floor drains and elevator shaft sump pumps
- [ ] Interior parking garages
- [ ] Need for future indoor & structural pest control
- [x] Landscape/Outdoor Pesticide Use
- [x] Pools, spas, ponds, decorative fountains, and other water features
- [ ] Food service
- [x] Refuse areas
- [ ] Industrial processes
- [ ] Outdoor storage of equipment or materials
- [ ] Vehicle and Equipment Cleaning
- [ ] Vehicle/Equipment Repair and Maintenance
- [ ] Fuel Dispensing Areas
- [ ] Loading Docks
- [ ] Fire Sprinkler Test Water
- [x] Miscellaneous Drain or Wash Water
- [x] Plazas, sidewalks, and parking lots
- [ ] Large Trash Generating Facilities
- [ ] Animal Facilities
- [ ] Nurseries and Garden Centers
- [ ] Automotive Facilities
- [ ] Other (provide description)

Description / Additional Information:

The project is proposing onsite storm drain inlets that discharge into the biofiltration basins for DMA's 1, 3, and 4. The project is also proposing Modular Wetland Systems for DMA's 2 and 5.

It is anticipated that the landscaping plans for the project will require outdoor pesticide use as needed.

The project is proposing residential buildings, asphalt parking, permeable parking, PCC pedestrian walkways, and a pool.

It is anticipated that a refuse area will be designated and miscellaneous wash water will be present.

Step 2.6: Identification of Receiving Water and Pollutants of Concern

Site Information Checklist for PDPs	Form I-2a

Describe path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable):

The proposed drainage infrastructure will include a proposed storm drain inlet and RCP to capture run-on into the site to match existing conveyance. The site run-off will be captured and discharge into the run-on RCP. It is presumed that the site convey to the South through before discharging into Felicita Creek and then into Lake Hodges.

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

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
Felicita Creek	Al, TDS, Indicator Bacteria, PCE, TCE	n/a
Lake Hodges	Hg, P, N, Mn, PH, turbidity, color	Hg, P, N, Mn, PH, turbidity, color

Identification of Project Site Pollutants*

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

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

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

Step 2.7: Hydromodification Management Requirements

Site Information Checklist for PDPs	Form I-2a

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

- ■ Yes, hydromodification management requirements for flow control and preservation of critical coarse sediment yield areas are applicable.
- ☐ No, the project will discharge runoff directly to the exempt portion of Escondido Creek as detailed in the Carlsbad Watershed WQIP (May 2018 Update). Direct discharge is defined in section 1.6 of the Escondido Storm Water Design Manual.
- ☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. Refer to HMP Exhibit in Attachment 2.
- ☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. Refer to HMP Exhibit in Attachment 2.

Note: Direct Discharge refers to an uninterrupted hardened conveyance system. Projects claiming the Direct Discharge exemption must satisfy the applicable criteria (energy dissipation, invert elevation, etc.) included in Section 1.6 of the Escondido Storm Water Design Manual.

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

HMP Exemption Exhibit

Attach an HMP Exemption Exhibit that shows direct storm water runoff discharge from the project site to the HMP exempt area. Include project area, applicable underground storm drain line and/or concrete lined channels, outfall information, and exempt waterbody.

Reference applicable drawing number(s).

N/A; the project requires hydromodification

Step 2.7.1: Critical Coarse Sediment Yield Areas

Site Information Checklist for PDPs	Form I-2a

☐ **N/A - This Section only required if hydromodification management requirements apply**

Based on the maps provided within the WMAA, do potential critical coarse sediment yield areas exist within the project drainage boundaries?

☐ Yes

☒ No, no critical coarse sediment yield areas to be protected based on WMAA maps

If yes, have any of the optional analyses presented in Appendix H of the manual been performed?

☐ H.6.1 Site-Specific GLU Analysis

☐ H.7 Downstream Systems Sensitivity to Coarse Sediment

- H.7.1 Depositional Analysis,
- H.7.2 Threshold Channel Analysis, or
- H.7.3 Course Sediment Source Area Verification Analysis

☐ No optional analyses performed, the project will avoid critical coarse sediment yield areas identified based on WMAA maps

If optional analyses were performed, what is the final result?

☐ No critical coarse sediment yield areas to be protected based on verification of GLUs onsite.

☐ Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 8 of the SWQMP.

☐ Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections H.2, H.3, and H.4 as applicable, and the areas are identified on the SWQMP Exhibit.

Discussion / Additional Information:

Step 2.7.2: Flow Control for Post-Project Runoff

Site Information Checklist for PDPs	Form I-2a

☐ **N/A - This Section only required if hydromodification management requirements apply**

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.

POC 1 receives runoff from Detention Vault 1. Detention Vault 1 will detain DMA 1 (which utilizes a Biofiltration Basin) and DMA 2 (which utilizes a Modular Wetland System). POC 2 receives discharge from Detention Vault 2. Detention Vault 2 will detain DMA 3 (which utilizes a Biofiltration Basin). POC 3 receives runoff from Detention Vault 3. Detention Vault 3 combines and detains runoff from DMA 4 (which utilizes a Biofiltration Basin) and DMA 5 (which utilizes a MWS).
POC's 1-3 will discharge into the proposed 12" SD pipe used to separate and convey offsite runoff under the project sitebefore continuing South and eventually draining into Felicita Creek.
DMA 6 will self retain using permeable pavement before discharging onto Felicita Road at POC 4, eventually draining south towards Felicita Creek.
DMA 7 will self retain using permeable pavement before discharging onto Brotherton Road at POC 5, eventually draining south towards Felicita Creek.

Has a geomorphic assessment been performed for the receiving channel(s)?

- ■ No, the low flow threshold is 0.1Q2 (default low flow threshold)
- ☐ Yes, the result is the low flow threshold is 0.1Q2
- ☐ Yes, the result is the low flow threshold is 0.3Q2
- ☐ Yes, the result is the low flow threshold is 0.5Q2

If a geomorphic assessment has been performed, provide title, date, and preparer:

Discussion / Additional Information: (optional)

Select method used to determine low flow threshold:

- ☐ Sizing Factor Method
- ☐ US Geological Survey (USGS) Equation
- ☐ Continuous Simulation Modeling

Step 2.8: Other Site Requirements and Constraints

Site Information Checklist for PDPs	Form I-2a
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.	
Not applicable	
Optional Additional Information or Continuation of Previous Sections As Needed	
This space provided for additional information or continuation of information from previous sections as needed.	

Step 3: Source Control BMP Checklist

Source Control BMP Checklist for PDPs			Form I-2b
All development projects must implement source control BMPs 4.2.1 through 4.2.6 where applicable and feasible. See Chapter 4.2 and Appendix E of the City Storm Water Design Manual for information to implement source control BMPs shown in this checklist. The following checklists serve as guides only. Mark what elements are included in your project. See Storm Water Design Manual Chapter 4 and Appendix E for more information on determining appropriate BMPs for your project. Answer each category below pursuant to the following: • "Yes" means the project will implement the source control BMP as described in Chapter 4.2 and/or Appendix E of the City Storm Water Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification must be provided.			
Source Control Requirement	**Applied?**		
4.2.1 Prevention of Illicit Discharges into the MS4	■ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	■ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	■ N/A
Discussion / justification if 4.2.3 not implemented:			
Outdoor material storage areas not applicable			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	■ N/A
Discussion / justification if 4.2.4 not implemented:			
Materials stored in outdoor areas not applicable			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	■ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.5 not implemented:			

Form I-2b Page 2 of 2			
Source Control Requirement	**Applied?**		
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below):			
■ Onsite storm drain inlets	■ Yes	☐ No	☐ N/A
☐ Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	■ N/A
☐ Interior parking garages	☐ Yes	☐ No	■ N/A
☐ Need for future indoor & structural pest control	☐ Yes	☐ No	■ N/A
■ Landscape/outdoor pesticide use	■ Yes	☐ No	☐ N/A
■ Pools, spas, ponds, decorative fountains, and other water features	■ Yes	☐ No	☐ N/A
☐ Food service	☐ Yes	☐ No	■ N/A
■ Refuse areas	■ Yes	☐ No	☐ N/A
☐ Industrial processes	☐ Yes	☐ No	■ N/A
☐ Outdoor storage of equipment or materials	■ Yes	■ No	☐ N/A
☐ Vehicle and equipment cleaning	■ Yes	☐ No	☐ N/A
☐ Vehicle/equipment repair and maintenance	☐ Yes	☐ No	■ N/A
☐ Fuel dispensing areas	☐ Yes	☐ No	■ N/A
☐ Loading docks	☐ Yes	☐ No	■ N/A
☐ Fire sprinkler test water	☐ Yes	☐ No	■ N/A
☐ Miscellaneous drain or wash water	☐ Yes	☐ No	■ N/A
■ Plazas, sidewalks, and parking lots	■ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.			

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

Step 4: Site Design BMP Checklist

Site Design BMP Checklist for PDPs	Form I-2c

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

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification must be provided.

Site Design Requirement	Applied?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	■ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.1 not implemented:			
The existing natural drainage pathway run-on comes through the site at the northwest corner and shall be conveyed through the proposed development through a 54" rcp storm drain before tying into existing 54" RCP at the southwest corner.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	■ Yes	☐ No	☐ N/A
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	■ No	☐ N/A
1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☐ No	■ N/A
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	■ No	☐ N/A
4.3.2 Conserve Natural Areas, Soils, and Vegetation	☐ Yes	■ No	☐ N/A
Discussion / justification if 4.3.2 not implemented:			
The project proposes to develop the entire site as park of the improvements. Modular Wetland Systems and Biofiltration Basins will be utilized to remove pollutants from run-off.			
4.3.3 Minimize Impervious Area	■ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.3 not implemented:			
4.3.4 Minimize Soil Compaction	■ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented:			

Form I-2c Page 2 of 2			
Site Design Requirement	**Applied?**		
4.3.5 Impervious Area Dispersion	☐ Yes	☐ No	■ N/A
Discussion / justification if 4.3.5 not implemented:			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☐ Yes	☐ No	☐ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5. Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☐ No	☐ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☐ No	☐ N/A
4.3.6 Runoff Collection	■ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.6 not implemented:			
6a-1 Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	■ N/A
6a-2 Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E?	☐ Yes	☐ No	■ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map?	■ Yes	☐ No	☐ N/A
6b-2 Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix E?	☐ Yes	■ No	☐ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species	■ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvesting and Using Precipitation	☐ Yes	■ No	☐ N/A
Discussion / justification if 4.3.8 not implemented:			
Runoff will be treated for pollutants with Biofiltration Basins and Modular Wetland Systems. Hydromodification Requirements to be met with Underground Detention Vaults.			
8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	■ No	☐ N/A
8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	■ No	☐ N/A

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

Step 5: Summary of Structural BMPs

Summary of Structural BMPs	Form I-3

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the local jurisdiction at the completion of construction. This may include requiring the project owner or project owner's representative to certify construction of the structural BMPs (see Section 1.12 of the manual). PDP structural BMPs must be maintained into perpetuity, and the local jurisdiction must confirm the maintenance (see Section 7 of the manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

Description of Structural BMP Strategy

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

Biofiltration Detention Basins and Modular Wetland Systems have been selected for this site for required pollutant control. Undeground Detention Vaults have been selected for required hydromodification flow control. Infiltration is likely unfeasible due to the presence of Type D soil throughout the entire site.
DMA 1 drains to the northwest region of the project and enters a proposed biofiltration basin for required treatment then drains to an underground detention vault for required detention.
DMA 2 drains to the northeast region of the project and enters a proposed MWS for required treatment then drains to an underground detention vault for required detention.
DMA 3 drains to the east region of the project and enters a proposed biofiltration for required treatment then drains to an underground detention vault for required detention.
DMA 4 drains to the southwest region of the project and enters a proposed biofiltration basin for required treatment then drains to an underground detention vault for required detention.
DMA 5 drains to the southwest region of the project and enters a proposed MWS for required treatment then drains to an underground detention vault for required detention.

DMA 6 and 7 are self-mitigating.

(Continue on page 2 as necessary.)

Form I-3 Page 2 of 3
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)
(Continued from page 1)

Form I-3 Page 3 of 3

Structural BMP Summary Information

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

Structural BMP ID No. BMP 1

Construction Plan Sheet No. BMP Exhibit

Type of structural BMP:

☐Retention by harvest and use (HU-1)
☐Retention by infiltration basin (INF-1)
☐Retention by bioretention (INF-2)
☐Retention by permeable pavement (INF-3)
☐Retention by dry wells (INF-4)
☐Partial retention by biofiltration with partial retention (PR-1)
■Biofiltration (BF-1)
☐Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐Detention pond or vault for hydromodification management
☐Other (describe in discussion section below)

Purpose:

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Daniel Quinones, PE 92310 Nasland Engineering
Who will be the final owner of this BMP?	☐HOA ■Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ■Property Owner ☐City ☐Other (describe)

Discussion (as needed):

Form I-3 Page 3 of 3

Structural BMP Summary Information

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

Structural BMP ID No. BMP 2

Construction Plan Sheet No. BMP Exhibit

Type of structural BMP:

☐Retention by harvest and use (HU-1)
☐Retention by infiltration basin (INF-1)
☐Retention by bioretention (INF-2)
☐Retention by permeable pavement (INF-3)
☐Retention by dry wells (INF-4)
☐Partial retention by biofiltration with partial retention (PR-1)
■Biofiltration (BF-1)
☐Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐Detention pond or vault for hydromodification management
☐Other (describe in discussion section below)

Purpose:

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Daniel Quinones, PE 92310 Nasland Engineering
Who will be the final owner of this BMP?	☐HOA ■Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ■Property Owner ☐City ☐Other (describe)

Discussion (as needed):

DMA 2 drains to area drains north in the northeast region of the project by sheet flow and gutter flow. Run-off enters proposed storm drain towards a proprietary BMP MWS-L-4-4-V for pollutant control and for hydromotification it enters a detention vault. MWS has TAPE approval in California so is used for pollutant control.

Form I-3 Page 3 of 3

Structural BMP Summary Information

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

Structural BMP ID No. BMP 3

Construction Plan Sheet No. BMP Exhibit

Type of structural BMP:

☐Retention by harvest and use (HU-1)
☐Retention by infiltration basin (INF-1)
☐Retention by bioretention (INF-2)
☐Retention by permeable pavement (INF-3)
☐Retention by dry wells (INF-4)
☐Partial retention by biofiltration with partial retention (PR-1)
■Biofiltration (BF-1)
☐Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐Detention pond or vault for hydromodification management
☐Other (describe in discussion section below)

Purpose:

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Daniel Quinones, PE 92310 Nasland Engineering
Who will be the final owner of this BMP?	☐HOA ■Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ■Property Owner ☐City ☐Other (describe)

Discussion (as needed):

Form I-3 Page 3 of 3

Structural BMP Summary Information

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

Structural BMP ID No. BMP 4

Construction Plan Sheet No. BMP Exhibit

Type of structural BMP:

☐Retention by harvest and use (HU-1)
☐Retention by infiltration basin (INF-1)
☐Retention by bioretention (INF-2)
☐Retention by permeable pavement (INF-3)
☐Retention by dry wells (INF-4)
☐Partial retention by biofiltration with partial retention (PR-1)
■Biofiltration (BF-1)
☐Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐Detention pond or vault for hydromodification management
☐Other (describe in discussion section below)

Purpose:

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Daniel Quinones, PE 92310 Nasland Engineering
Who will be the final owner of this BMP?	☐HOA ■Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ■Property Owner ☐City ☐Other (describe)

Discussion (as needed):

Form I-3 Page 3 of 3

Structural BMP Summary Information

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

Structural BMP ID No. BMP 5

Construction Plan Sheet No. BMP Exhibit

Type of structural BMP:

☐Retention by harvest and use (HU-1)
☐Retention by infiltration basin (INF-1)
☐Retention by bioretention (INF-2)
☐Retention by permeable pavement (INF-3)
☐Retention by dry wells (INF-4)
☐Partial retention by biofiltration with partial retention (PR-1)
☐Biofiltration (BF-1)
☐Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐Detention pond or vault for hydromodification management
▣Other (describe in discussion section below)

Purpose:

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Daniel Quinones, PE 92310 Nasland Engineering
Who will be the final owner of this BMP?	☐HOA ▣Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ▣Property Owner ☐City ☐Other (describe)

Discussion (as needed):

DMA 5 drains to area drains south towards the southwest region of the project by sheet flow and gutter flow. Run-off enters proposed storm drain towards a proprietary BMP MWS-L-4-4-V for pollutant control and for hydromotification it enters a detention vault. MWS has TAPE approval in California so is used for pollutant control.

Form I-3 Page 3 of 3

Structural BMP Summary Information

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

Structural BMP ID No. Detention Vault 1

Construction Plan Sheet No. BMP Exhibit

Type of structural BMP:

☐Retention by harvest and use (HU-1)
☐Retention by infiltration basin (INF-1)
☐Retention by bioretention (INF-2)
☐Retention by permeable pavement (INF-3)
☐Retention by dry wells (INF-4)
☐Partial retention by biofiltration with partial retention (PR-1)
☐Biofiltration (BF-1)
☐Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
■Detention pond or vault for hydromodification management
☐Other (describe in discussion section below)

Purpose:

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Daniel Quinones, PE 92310 Nasland Engineering
Who will be the final owner of this BMP?	☐HOA ■Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ■Property Owner ☐City ☐Other (describe)

Discussion (as needed):

Detention Vault 1 combines runoff from BMP 1 & 2.

Form I-3 Page 3 of 3

Structural BMP Summary Information

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

Structural BMP ID No. Detention Vault 2

Construction Plan Sheet No. BMP Exhibit

Type of structural BMP:

☐Retention by harvest and use (HU-1)
☐Retention by infiltration basin (INF-1)
☐Retention by bioretention (INF-2)
☐Retention by permeable pavement (INF-3)
☐Retention by dry wells (INF-4)
☐Partial retention by biofiltration with partial retention (PR-1)
☐Biofiltration (BF-1)
☐Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
■Detention pond or vault for hydromodification management
☐Other (describe in discussion section below)

Purpose:

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Daniel Quinones, PE 92310 Nasland Engineering
Who will be the final owner of this BMP?	☐HOA ■Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ■Property Owner ☐City ☐Other (describe)

Discussion (as needed):

Detention Vault 2 detains runoff from BMP 3.

Form I-3 Page 3 of 3

Structural BMP Summary Information

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

Structural BMP ID No. Detention Vault 3

Construction Plan Sheet No. BMP Exhibit

Type of structural BMP:

☐Retention by harvest and use (HU-1)
☐Retention by infiltration basin (INF-1)
☐Retention by bioretention (INF-2)
☐Retention by permeable pavement (INF-3)
☐Retention by dry wells (INF-4)
☐Partial retention by biofiltration with partial retention (PR-1)
☐Biofiltration (BF-1)
☐Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
■Detention pond or vault for hydromodification management
☐Other (describe in discussion section below)

Purpose:

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 8.2.3.2 of the Storm Water Design Manual)	Daniel Quinones, PE 92310 Nasland Engineering
Who will be the final owner of this BMP?	☐HOA ■Property Owner ☐City ☐Other (describe)
Who will maintain this BMP into perpetuity?	☐HOA ■Property Owner ☐City ☐Other (describe)

Discussion (as needed):

Detention Vault 3 combines runoff from BMP 4 & 5.

ATTACHMENT 1

BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 1a	Storm Water Pollutant Control Worksheet Calculations -Worksheet B.1-DMA Summary (Optional) -Worksheet B.2-1- DCV (Required) -Worksheet B.3-1- H&U Checklist (Required) -Worksheet B.4-1-Simple Sizing Inf. (if applicable) -Worksheet B.5-1-Biofilt. Sizing (Pollutant)(if applicable) -Worksheet B.5-2-Biofilt. Sizing (Volume) (if applicable) -Worksheet B.5-3-Biofilt. Volume Ret. (if applicable) -Worksheet B.5-4-Biofilt. Alt. Min. Footprint(if applicable) -Worksheet B.5-5-Biofilt. w/Upstream Stor. (if applicable) -Worksheet B.5-6-Biofilt. Ret. No Inf. (if applicable) -Worksheet B.5-7-Vol. Ret. Amended Soils (if applicable) -Worksheet B.6-1-Flow-Thru Design Flow (if applicable) -Form I-10-Compact Biofilt. Checklist (if applicable) -Summary Worksheet (optional)	■ Worksheet B.1 (Optional) ■ Worksheet B.2-1 (Required) ■ Worksheet B.3-1 (Required) ☐ Worksheet B.4-1 (if applicable) ■ Worksheet B.5-1 (if applicable) ■ Worksheet B.5-2 (if applicable) ☐ Worksheet B.5-3 (if applicable) ☐ Worksheet B.5-4 (if applicable) ☐ Worksheet B.5-5 (if applicable) ☐ Worksheet B.5-6 (if applicable) ☐ Worksheet B.5-7 (if applicable) ■ Worksheet B.6-1 (if applicable) ■ Form I-10 (if applicable) ☐ Summary Worksheet (optional)
Attachment 1b	-Worksheet C.4-1 (Form I-8A), Categorization of Infiltration Feasibility Condition Based on Geotechnical Conditions -Worksheet C.4-2 (Form I-8B), Categorization of Infiltration Feasibility Condition based on Groundwater and Water Balance Conditions (Required unless the project will use harvest and use BMPs, or an Infiltration Feasibility Condition Letter is submitted) Refer to Appendices C and D of the Storm Water Design Manual to complete Form I-8.	☐Included ☐Not included because the entire project will use harvest and use BMPs ■Not included because an Infiltration Feasibility Condition Letter is submitted
Attachment 1c	Form I-9, Factor of Safety and Design Infiltration Rate Worksheet (Required unless the project will use harvest and use BMPs, or an Infiltration Feasibility Condition Letter is submitted) Refer to Appendices C and D of the Storm Water Design Manual to complete Form I-9.	☐Included ☐Not included because the entire project will use harvest and use BMPs ■Not included because an Infiltration Feasibility Condition Letter is submitted
Attachment 1d	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	■Included
Attachment 1e	Individual Structural BMP DMA Mapbook (Required) -Place each map on 8.5"x11" paper. -Show at a minimum the DMA, Structural BMP, and any existing hydrologic features within the DMA.	☐Included

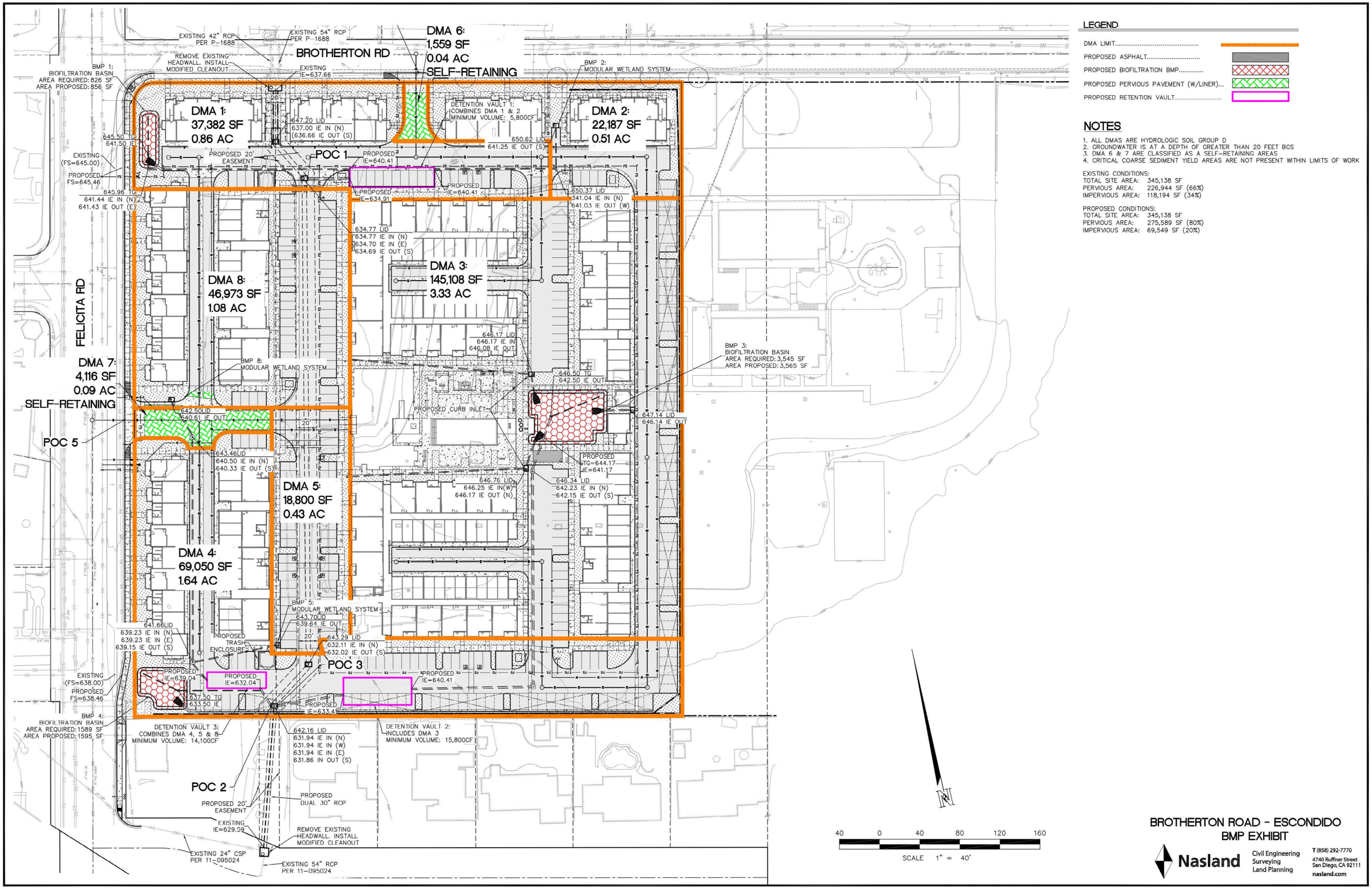
Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

- ☒ Proposed design features and surface treatments used to minimize imperviousness
- ☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- ☒ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Step 3.5)
- ☒ Structural BMPs (identify location, structural BMP ID#, type of BMP, and size/detail)
- ☐ Flow direction arrows
- ☒ Site Design BMPs used for volume reduction credits
- ☒ Existing and proposed site drainage network and connections to drainage offsite
- ☒ Trash Enclosure(s), if available
- ☐ Roof downspouts

Additionally, it is generally best practice (and the City may require) that these additional features listed below be included on the DMA Exhibit:

- ☒ Approximate depth to groundwater
- ☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☒ Critical coarse sediment yield areas to be protected
- ☒ Existing topography and impervious areas
- ☒ Proposed grading
- ☐ Proposed impervious features



LEGEND

- DMA LIMIT.....
- PROPOSED ASPHALT.....
- PROPOSED BIOFILTRATION BMP.....
- PROPOSED PERVIOUS PAVEMENT (W/LINER)...
- PROPOSED RETENTION VAULT.....

NOTES

1. ALL DMAS ARE HYDROLOGIC SOIL GROUP D
2. GROUNDWATER IS AT A DEPTH OF GREATER THAN 20 FEET BGS
3. DMA 6 & 7 ARE CLASSIFIED AS A SELF-RETAINING AREAS
4. CRITICAL COARSE SEDIMENT YIELD AREAS ARE NOT PRESENT WITHIN LIMITS OF WORK

EXISTING CONDITIONS:
TOTAL SITE AREA: 345,138 SF
PERVIOUS AREA: 226,944 SF (66%)
IMPERVIOUS AREA: 118,194 SF (34%)

PROPOSED CONDITIONS:
TOTAL SITE AREA: 345,138 SF
PERVIOUS AREA: 275,589 SF (80%)
IMPERVIOUS AREA: 69,549 SF (20%)

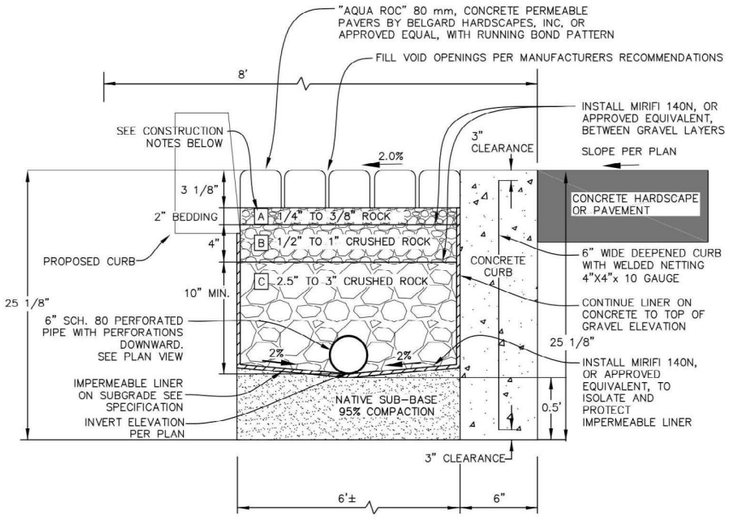
N

40 0 40 80 120 160

SCALE 1" = 40'

BROTHERTON ROAD - ESCONDIDO
BMP EXHIBIT

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Land Planning
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4740 Ruffner Street
San Diego, CA 92111
nasland.com



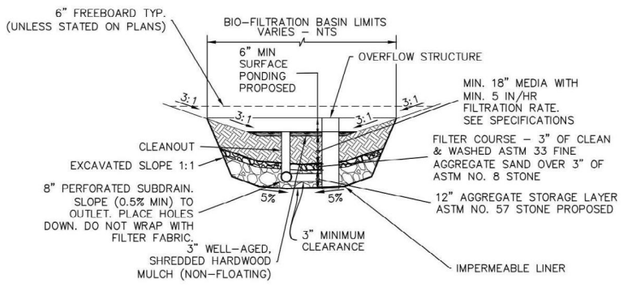
PERVIOUS PAVER TYPICAL SECTION (PVT)

NOT TO SCALE

A BEDDING COURSE: LAYER OF OPEN-GRADED AGGREGATE DIRECTLY BENEATH THE PERMEABLE PAVERS, COMPRISED OF ASTM C-33 #8 AGGREGATE.

B BASE COURSE: LAYER OF OPEN-GRADED AGGREGATE BENEATH THE BEDDING COURSE LAYER, COMPRISED OF ASTM C-33 #5 AGGREGATE.

C SUB-BASE COURSE: LAYER OF OPEN-GRADED AGGREGATE BENEATH THE BASE COURSE LAYER, COMPRISED OF ASTM C-33 #2 AGGREGATE.



NOTE: SEE LANDSCAPE AND IRRIGATION PLANS FOR PLANTING AND SURFACE FEATURES.

BIOFILTRATION BASIN DETAIL (AT GRADE) (PVT.)

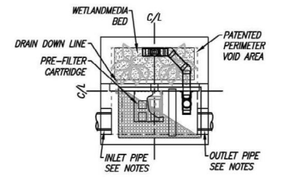
NOT TO SCALE

INSTALLATION NOTES

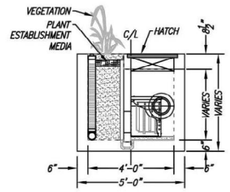
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

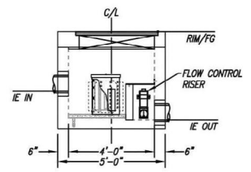
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



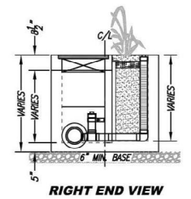
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW

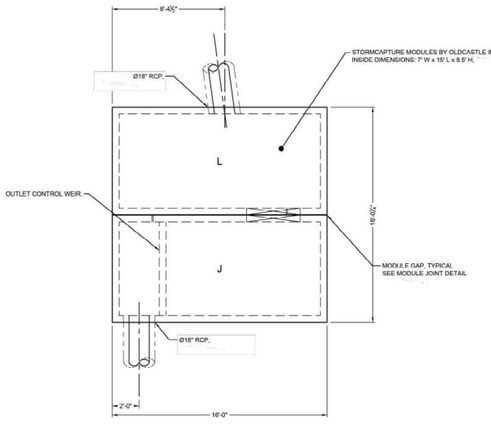


RIGHT END VIEW

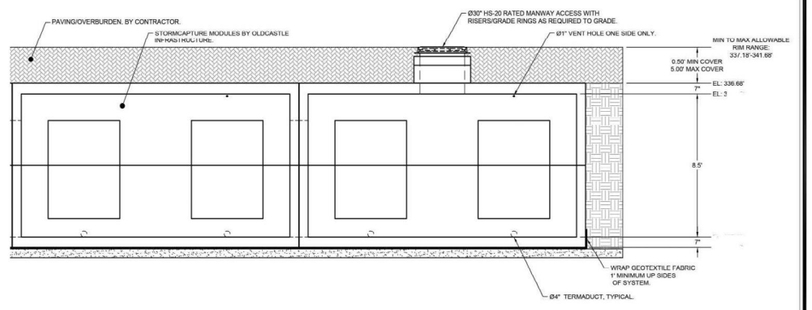
NOTE:
DIMENSIONS IN THIS DETAIL ARE DIAGRAMMATIC FOR PLANNING PURPOSES AND SHALL BE REVISED PER FINAL DESIGN.

MODULAR WETLANDS SYSTEM (PVT.)

NOT TO SCALE



PLAN VIEW



TYPICAL ELEVATION

OLD CASTLE DETENTION VAULT (PVT.)

NOT TO SCALE

NOTE:
DIMENSIONS IN THIS DETAIL ARE DIAGRAMMATIC FOR PLANNING PURPOSES AND SHALL BE REVISED PER FINAL DESIGN.

*NOTE: FOR ADDITIONAL INFORMATION SEE LANDSCAPE PLANS.

18" ENGINEERED SOIL SPEC:

THE ENGINEERED SOIL CONSISTS OF A MIXTURE OF VOLUME WASHED SAND (70-85%), AND VOLUME COMPOST OR ALTERNATIVE ORGANIC AMENDMENT (15-30%) WITH A MINIMUM INFILTRATION RATE OF 5"/HOUR AND ADEQUATE NUTRIENT CONTENT TO MEET PLANT GROWTH REQUIREMENT. CONTRACTOR TO PROVIDE SUBMITTAL OF MATERIAL FOR APPROVAL BEFORE INSTALLATION.

BROTHERTON ROAD - ESCONDIDO
BMP EXHIBIT CONCEPT 2

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Land Planning
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4740 Ruffner Street
San Diego, CA 92111
nasland.com

Project Name: Alexan Excondido

Tabular Summary of DMAs							Worksheet B-1		
DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	DCV (cubic feet)	Treated By (BMP ID)	Pollutant Control Type	Drains to (POC ID)
DMA 1	0.86	0.68	80%	D	0.74	1308	BMP-1	BF-1	POC 1
DMA 2	0.51	0.37	77%	D	0.72	759	BMP-2	FT-5	POC 1
DMA 3	3.33	2.97	89%	D	0.82	5612	BMP-3	BF-1	POC 2
DMA 4	1.64	1.26	86%	D	0.79	2516	BMP-4	BF-1	POC 3
DMA 5	0.43	0.40	93%	D	0.84	750	BMP-5	FT-5	POC 3
DMA 6	0.04	0	0%	D	N/A	N/A	Self-Retaining	INF-3	POC 4
DMA 7	0.09	0	0%	D	N/A	N/A	Self-Retaining	INF-3	POC 5
DMA 8	1.08	0.93	86%	D	0.79	1778	BMP-8	FT-5	POC 2
Summary of DMA Information (Must match project description and SWQMP Narrative)									
No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp		Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs
7	7.93	6.74	81%		0.78	12723	7.80		5

Where: DMA = Drainage Management Area; Imp = Imperviousness; HSG = Hydrologic Soil Group; DCV= Design Capture Volume; BMP = Best Management Practice; POC = Point of Compliance; ID = identifier; No. = Number

Worksheet B.3-1. Harvest and Use Feasibility Checklist (Form I-7)

Harvest and Use Feasibility Checklist	Worksksheet B.3-1
1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season? ☐ Toilet and urinal flushing ☒ Landscape irrigation ☐ Other:_____	
2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2. pending landscaping	
3. Calculate the DCV using worksheet B-2.1. pending landscaping	

3a. Is the 36-hour demand greater than or equal to the DCV?	3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV?	3c. Is the 36-hour demand less than 0.25DCV?
Yes / No ⇨ ⇩	Yes / No ⇨ ⇩	Yes ⇩
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	Harvest and use is considered to be infeasible.

Note: 36-hour demand calculations are for feasibility analysis only. Once feasibility analysis is complete the applicant may be allowed to use a different drawdown time provided they meet the 80% annual capture standard (refer to B.4.2) and 96-hour vector control drawdown requirement.

ESCONDIDO City of Choice	**Project Name**	Alexan Escondido	
	BMP ID	BMP 1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	37,382	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.74	
3	85th percentile 24-hour rainfall depth	0.57	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1308	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	24	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	16.8	inches
15	Total Depth Treated [Line 13 + Line 14]	46.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	1961	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	503	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	981	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	700	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	826	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	826	sq. ft.
23	Provided BMP Footprint	856	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

ESCONDIDO City of Choice	**Project Name**	Alexan Escondido	
	BMP ID	BMP 1	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	37,382	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.74	
3	85th percentile 24-hour rainfall depth	0.57	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1308	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	30	cu. ft.

BMP-2

Worksheet B.2-1. BMP Design Capture Volume

Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.57	inches
2	Area tributary to BMP (s)	A=	0.51	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.72	unitless
4	Tree well volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	759	cubic-feet

BMP-2

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

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	759	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)	$DCV_{flow-thru}$	759	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=	0.51	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.72	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.073	cfs
10	***For Proprietary Biofiltration Only:*** *Q_{Bio}=1.5 x Q*	*Q_{Bio}=*	0.11	*cfs*

ESCONDIDO City of Choice	**Project Name**	Alexan Escondido	
	BMP ID	BMP 3	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	145,108	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.81	
3	85th percentile 24-hour rainfall depth	0.57	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	5612	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	24	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	16.8	inches
15	Total Depth Treated [Line 13 + Line 14]	46.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	8418	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	2159	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	4209	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	3007	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	3545	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	3545	sq. ft.
23	Provided BMP Footprint	3565	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

ESCONDIDO City of Choice	**Project Name**	Alexan Escondido	
	BMP ID	BMP 3	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	145,108	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.81	
3	85th percentile 24-hour rainfall depth	0.57	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	5612	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	129	cu. ft.

ESCONDIDO City of Choice	**Project Name**	Alexan Escondido	
	BMP ID	BMP 4	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	69,050	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.77	
3	85th percentile 24-hour rainfall depth	0.57	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2516	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	24	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	16.8	inches
15	Total Depth Treated [Line 13 + Line 14]	46.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	3773	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	968	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	1887	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	1348	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	1589	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	1589	sq. ft.
23	Provided BMP Footprint	1595	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

ESCONDIDO City of Choice	**Project Name**	Alexan Escondido	
	BMP ID	BMP 4	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	69,050	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.77	
3	85^{th} percentile 24-hour rainfall depth	0.57	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2516	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	58	cu. ft.

BMP-5

Worksheet B.2-1. BMP Design Capture Volume

Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.57	inches
2	Area tributary to BMP (s)	A=	0.43	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.84	unitless
4	Tree well volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	750	cubic-feet

BMP-5

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

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	750	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)	$DCV_{flow-thru}$	750	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=	0.79	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.07	cfs
10	***For Proprietary Biofiltration Only:*** *Q_{Bio}=1.5 x Q*	*Q_{Bio}=*	0.11	*cfs*

BMP-8

Worksheet B.2-1. BMP Design Capture Volume

Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.57	inches
2	Area tributary to BMP (s)	A=	1.08	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.80	unitless
4	Tree well volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	1778	cubic-feet

BMP-8

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

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	1778	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)	$DCV_{flow-thru}$	1778	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=	1.08	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.80	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.17	cfs
10	***For Proprietary Biofiltration Only:*** *Q_{Bio}=1.5 x Q*	*Q_{Bio}=*	0.26	*cfs*

Form I-10: Compact (high rate) Biofiltration BMP Checklist

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA and the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I- 8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	☐ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	☐ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5- 2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	☑ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Worksheet B.5-6 for each DMA is attached in SWQMP to show compliance with retention requirement

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☑ Meets Flow Based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	☐ Meets Volume Based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	☐ Does not Meet either	**Stop**. Compact biofiltration BMP is not allowed.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 2:
Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

Runoff flow rate is calculated per methods outlined in Appendix F.2.2 and B.6.3. Worksheet B.6-1 has been included in the SWQMP and is consistent with manufacturers sizing.

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	☐ Yes, through other third-party documentation.	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	☐ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:
Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

See attached TAPE certification for the MWS Linear Modular Wetland.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 5: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	☐ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 5: Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process.		
Per manufacturer specifications, the MWS supports vegetation. A copy of the brochure is included with SWQMP. Selected plant types will comply with Appendix E.26.		

Criteria	Answer	Progression
Criteria 6: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	☑ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	☐ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 6: Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).		
Attached TAPE certification specifies qualifying hydraulic loading capabilities.		

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	☑ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	☐ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	☐ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

The maintenance guidelines for the MWS system are included for the owner to maintain the BMP in accordance with the manufacturers recommendations

Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 1: Biofiltration Criteria Checklist (Appendix F)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	☐ Yes ☐ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

WASHINGTON STATE DEPARTMENT OF ECOLOGY

July 2017

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 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. The applicant tested the MWS – Linear Modular Wetland Stormwater Treatment System with an external bypass weir. This weir limited the depth of water flowing through the media, and therefore the active treatment area, to below the root zone of the plants. This GULD applies to MWS – Linear Modular Wetland Stormwater Treatment Systems whether plants are included in the final product or not.
5. 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: Zach Kent
BioClean A Forterra Company.
398 Vi9a El Centro
Oceanside, CA 92058
zach.kent@forterrabp.com

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
December 2015	Updated GULD to document the acceptance of MWS-Linear Modular Wetland installations with or without the inclusion of plants
July 2017	Revised Manufacturer Contact Information (name, address, and email)

Section [_____]
Modular Subsurface Flow Wetland System

PART 1 – GENERAL

01.01.00 Purpose
The purpose of this specification is to establish generally acceptable criteria for Modular Subsurface Flow Wetland Systems used for biofiltration of stormwater runoff including dry weather flows and other contaminated water sources. It is intended to serve as a guide to producers, distributors, architects, engineers, contractors, plumbers, installers, inspectors, agencies and users; to promote understanding regarding materials, manufacture and installation; and to provide for identification of devices complying with this specification.

01.02.00 Description
Modular Subsurface Flow Wetland Systems (MSFWS) are used for filtration of stormwater runoff including dry weather flows. The MSFWS is a pre-engineered biofiltration system composed of a pretreatment chamber containing filtration cartridges, a horizontal flow biofiltration chamber with a peripheral void area and a centralized and vertically extending underdrain, the biofiltration chamber containing a sorptive media mix which does not contain any organic material and a layer of plant establishment media, and a discharge chamber containing an orifice control structure. Treated water flows horizontally in series through the pretreatment chamber cartridges, biofiltration chamber and orifice control structure.

01.03.00 Manufacturer
The manufacturer of the MSFWS shall be one that is regularly engaged in the engineering design and production of systems developed for the treatment of stormwater runoff for at least (10) years, and which have a history of successful production, acceptable to the engineer of work. In accordance with the drawings, the MSFWS(s) shall be a filter device Manufactured by Bio Clean A Forterra Company, or assigned distributors or licensees. Bio Clean A Forterra Company, can be reached at:

Headquarters:
Bio Clean A Forterra Company
398 Via El Centro
Oceanside, CA 92058
Phone: (760) 433-7640
Fax: (760) 433-3176
www.biocleanenvironmental.com

01.04.00 Submittals

01.04.01 Shop drawings are to be submitted with each order to the contractor and consulting engineer.

01.04.02 Shop drawings are to detail the MSFWS and all components required and the sequence for installation, including:

- System configuration with primary dimensions
- Interior components
- Any accessory equipment called out on shop drawings

01.04.03 Inspection and maintenance documentation submitted upon request.

01.05.00 Work Included

01.05.01 Specification requirements for installation of MSFWS.

01.05.02 Manufacturer to supply components of the MSFWS(s):

- Pretreatment chamber components (pre-assembled)
- Concrete Structure(s)
- Biofiltration chamber components (pre-assembled)
- Flow control discharge structure (pre-assembled)

01.06.00 Reference Standards

ASTM C 29	Standard Test Method for Unit Weight and Voids in Aggregate
ASTM C 88	C 88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C131	C 131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregates by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	C 136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 330	C 330 Standard Specification for Lightweight Aggregate for Structural Concrete
ASTM D 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft.-lbf/ft3 (600 kN-m/m3)
ASTM D 1621	10 Standard Test Method for Compressive Properties Of Rigid Cellular Plastics
ASTM D 1777	ASTM D1777 - 96(2007) Standard Test Method for Thickness of Textile Materials
ASTM D 4716	Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
ASTM A 615	Standard Specifications for Deformed and Plan Carbon-Steel Bars for Concrete Reinforcement
ASTM A 706	Standard Specifications for Deformed and Plan Low-Alloy Steel Bars for Concrete Reinforcement
AASHTO T 99-01	Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in) Drop
AASHTO T 104	Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
AASHTO T 260	Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials.
AASHTO T 288	Standard Method of Test for Determining Minimum Laboratory Soil Resistivity
AASHTO T 289	Standard Method of Test for Determining ph of Soil for Use in Corrosion Testing
AASHTO T 291	Standard Method of Test for Determining Water Soluble Chloride Ion Content in Soil
AASHTO T 290	T 290 Standard Method of Test for Determining Water Soluble Sulfate Ion Content in Soil

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PART 2 – COMPONENTS

The Modular Subsurface Flow Wetland Systems (MSFWS) and all of its components shall be self-contained within a concrete structure constructed of concrete with a minimum 28 day compressive strength of 5,000 psi, with reinforcing per ASTM A 615 or ASTM A 706, Grade 60, and supports and H20 loading as indicated by AASHTO. Each Chamber shall have appropriate access hatches for easy maintenance and sized to allow removal of all internal components without disassembly. All water transfer system components shall conform with the following;

- Filter netting shall be 100% Polyester with a number 16 sieve size, and strength tested per ASTM D 3787.
- Drainage cells shall be manufactured of lightweight injection-molded plastic and have a minimum compressive strength test of 6,000 psi and a void area along the surface making contact with the filter media of 75% or greater. The cells shall be at least 2" in thickness and allow water to freely flow in all four directions.

02.01.00 Pretreatment Chamber Components

02.01.01 Filter Cartridges shall operate at a loading rate not to exceed 3 gallons per minute per square foot surface area.

02.01.02 Drain Down System shall include a pervious floor that allows water to drain into the underdrain pipe that is connected to the discharge chamber.

02.02.00 Biofiltration Chamber Components

02.02.01 Media shall consist of ceramic material produced by expanding and vitrifying select material in a rotary kiln. Media must be produced to meet the requirements of ASTM C330, ASTM C331, and AASHTO M195. Aggregates must have a minimum 24-hour water absorption of 10.5% mass. Media shall not contain any organic material. Flow through media shall be horizontal from the outer perimeter of the chamber toward the centralized and vertically extending underdrain. The retention time in the media shall be at least 3 minutes. Downward flow filters are not acceptable alternatives. The thickness of the media shall be at least 19" from influent end to effluent end. The loading rate on the media shall not exceed 1.1 gallons per minute per square foot surface area. Media must be contained within structure that spaces the surface of the media at least 2" from all vertically extending walls of the concrete structure.

02.02.02 Planting shall be native, drought tolerant species recommend by manufacturer and/or landscape architect.

02.02.03 Plant Support Media shall be made of a 3" thick moisture retention cell that is inert and contains no chemicals or fertilizers, is not made of organic material and has an internal void percentage of 80%.

02.03.00 Discharge Chamber

The discharge device shall house a flow control orifice plate that restricts flows greater than designed treatment flow rate. All piping components shall be made of a high-density polyethylene. The discharge chamber shall also contain a drain down filter if specified on the drawing.

PART 3 – PERFORMANCE

03.01.00 General

03.01.01 Function - The MSFWS has no moving internal components and functions based on gravity flow, unless otherwise specified. The MSFWS is composed of a pretreatment chamber, a biofiltration chamber and a discharge chamber. The pretreatment device houses cartridge media filters, which consist of filter media housed in a perforated enclosure. The untreated runoff flows into the system via subsurface piping and or surface inlet. Water entering the system is forced through the filter cartridge enclosures by gravity flow. Then the flow contacts the filter media. The flow through the media is horizontal toward the center of each individual media filter. In the center of the media shall be a round slotted PVC pipe of no greater than 1.5" in diameter. The slotted PVC pipe shall extend downward into the water transfer cavity of the cartridge. The slotted PVC pipe shall be threaded on the bottom to connect to the water transfer cavity. After pollutants have been removed by the filter media the water discharges the pretreatment chamber and flows into the water transfer system and is conveyed to the biofiltration chamber. Once runoff has been filtered by the biofiltration chamber it is collected by the vertical underdrain and conveyed to a discharge chamber equipped with a flow control orifice plate. Finally the treated flow exits the system.

03.01.02 Pollutants - The MSFWS will remove and retain debris, sediments, TSS, dissolved and particulate metals and nutrients including nitrogen and phosphorus species, bacteria, BOD, oxygen demanding substances, organic compounds and hydrocarbons entering the filter during frequent storm events and continuous dry weather flows.

03.01.03 Treatment Flow Rate and Bypass - The MSFWS operates in-line. The MSFWS will treat 100% of the required water quality treatment flow based on a minimum filtration capacities listed in section 03.02.00. The size of the system must match those provided on the drawing to ensure proper performance and hydraulic residence time.

03.02.00 Minimum Treatment Capabilities

System must be capable of treating flows to the specified treatment flow rate on the drawings. The flow rate shall be controlled by an orifice.

PART 4 - EXECUTION

04.01.00 General

The installation of the MSFWS shall conform to all applicable national, state, state highway, municipal and local specifications.

04.02.00 Installation

The Contractor shall furnish all labor, equipment, materials and incidentals required to install the (MSFWS) device(s) and appurtenances in accordance with the drawings and these specifications.

04.02.01 Grading and Excavation site shall be properly surveyed by a registered professional surveyor, and clearly marked with excavation limits and elevations. After site is marked it is the responsibility of the contractor to contact local utility companies and/or DigAlert to check for underground utilities. All grading permits shall be approved by governing agencies before commencement of grading and excavation. Soil conditions shall be tested in accordance with the governing

agencies requirements. All earth removed shall be transported, disposed, stored, and handled per governing agencies standards. It is the responsibility of the contractor to install and maintain proper erosion control measures during grading and excavation operations.

04.02.02 Compaction – All soil shall be compacted per registered professional soils engineer's recommendations prior to installation of MSFWS components. Compaction shall be to 95% of Standard Proctor or 90% of Modified Proctor.

04.02.03 Backfill shall be placed according to a registered professional soils engineer's recommendations, and with a minimum of 6" of gravel under all concrete structures.

04.02.04 Concrete Structures – After backfill has been inspected by the governing agency and approved the concrete structures shall be lifted and placed in proper position per plans.

04.02.05 Subsurface Flow Wetland Media shall be carefully loaded into area so not to damage the Wetland Liner or Water Transfer Systems. The entire wetland area shall be filled to a level 9 inches below finished surface.

04.02.06 Planting layer shall be installed per manufacturer's drawings and consist of a minimum 3" grow enhancement media that ensures greater than 95% plant survival rate, and 6" of wetland media. Planting shall consist of native plants recommended by manufacturer and/or landscape architect. Planting shall be drip irrigated for at least the first 3 months to insure long term plant growth. No chemical herbicides, pesticides, or fertilizers shall be used in the planting or care and maintenance of the planted area.

04.03.00 Shipping, Storage and Handling

04.03.01 Shipping – MSFWS shall be shipped to the contractor's address or job site, and is the responsibility of the contractor to offload the unit(s) and place in the exact site of installation.

04.03.02 Storage and Handling– The contractor shall exercise care in the storage and handling of the MSFWS and all components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be born by the contractor. The MSFWS(s) and all components shall always be stored indoors and transported inside the original shipping container until the unit(s) are ready to be installed. The MSFWS shall always be handled with care and lifted according to OSHA and NIOSA lifting recommendations and/or contractor's workplace safety professional recommendations.

04.04.00 Maintenance and Inspection

04.04.01 Inspection – After installation, the contractor shall demonstrate that the MSFWS has been properly installed at the correct location(s), elevations, and with appropriate components. All components associated with the MSFWS and its installation shall be subject to inspection by the engineer at the place of installation. In addition, the contractor shall demonstrate that the MSFWS has been installed per the manufacturer's specifications and recommendations. All components shall be inspected by a qualified person once a year and results of inspection shall be kept in an inspection log.

04.04.02 Maintenance – The manufacturer recommends cleaning and debris removal maintenance of once a year and replacement of the Cartridge Filters as needed. The maintenance shall be performed by someone qualified. A Maintenance Manual is available upon request from the manufacturer. The manual has detailed information regarding the maintenance of the MSFWS. A

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Maintenance/Inspection record shall be kept by the maintenance operator. The record shall include any maintenance activities preformed, amount and description of debris collected, and the condition of the filter.

04.04.03 Material Disposal - All debris, trash, organics, and sediments captured by the MSFWS shall be transported and disposed of at an approved facility for disposal in accordance with local and state requirements. Please refer to state and local regulations for the proper disposal of toxic and non-toxic material.

PART 5 – QUALITY ASSURANCE

05.01.00 Warranty

The Manufacturer shall guarantee the MSFWS against all manufacturing defects in materials and workmanship for a period of (1) year from the date of delivery to the customer. The manufacturer shall be notified of repair or replacement issues in writing within the warranty period. The MSFWS is limited to recommended application for which it was designed.

05.02.00 Performance Certification

The MSFWS manufacturer shall submit to the Engineer of Record a "Manufacturer's Performance Certificate" certifying the MSFWS is capable of achieving the specified removal efficiency for suspended solids, phosphorous and dissolved metals.

[End of This Section]

ATTACHMENT 2

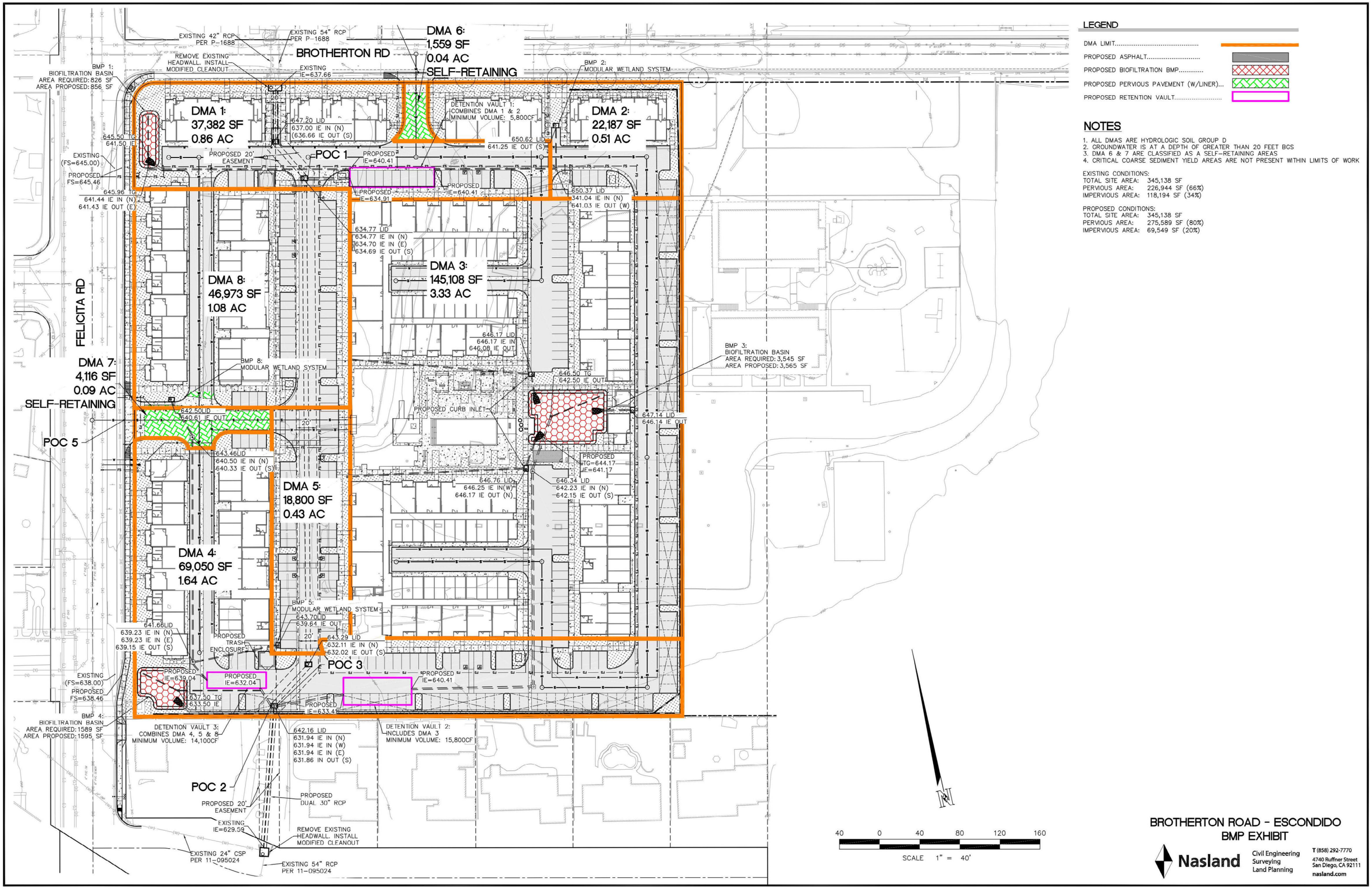
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

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

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 2a	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the Storm Water Design Manual	▣Included ☐Submitted as separate stand-alone document
Attachment 2b	Hydromodification Management Exhibit (Required)	▣Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2c	Management of Critical Coarse Sediment Yield Areas See Section 6.2 and Appendix H of the Storm Water Design Manual.	▣Exhibit depicting onsite and/or upstream sources of critical coarse sediment as mapped in the WMAA AND, ☐Demonstration that the project effectively avoids and bypasses sources of mapped critical coarse sediment OR, ☐Demonstration that the downstream system is not sensitive to preservation of Coarse Sediment Supply (Form I-11). ☐Demonstration that project does not generate a net impact on the receiving water.
Attachment 2d	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the Storm Water Design Manual.	▣Not performed ☐Included ☐Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐Included ▣Not required because BMPs will drain in less than 96 hours



LEGEND

- DMA LIMIT.....
- PROPOSED ASPHALT.....
- PROPOSED BIOFILTRATION BMP.....
- PROPOSED PERVIOUS PAVEMENT (W/LINER)...
- PROPOSED RETENTION VAULT.....

NOTES

1. ALL DMAS ARE HYDROLOGIC SOIL GROUP D
2. GROUNDWATER IS AT A DEPTH OF GREATER THAN 20 FEET BGS
3. DMA 6 & 7 ARE CLASSIFIED AS A SELF-RETAINING AREAS
4. CRITICAL COARSE SEDIMENT YIELD AREAS ARE NOT PRESENT WITHIN LIMITS OF WORK

EXISTING CONDITIONS:
TOTAL SITE AREA: 345,138 SF
PERVIOUS AREA: 226,944 SF (66%)
IMPERVIOUS AREA: 118,194 SF (34%)

PROPOSED CONDITIONS:
TOTAL SITE AREA: 345,138 SF
PERVIOUS AREA: 275,589 SF (80%)
IMPERVIOUS AREA: 69,549 SF (20%)

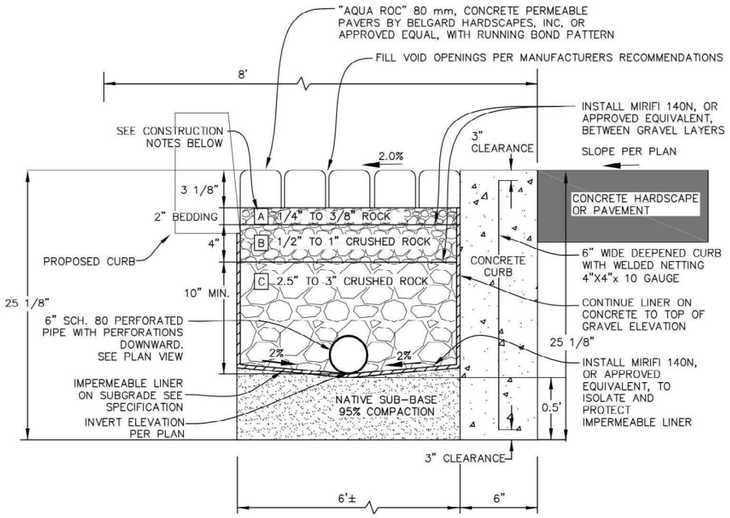
N

40 0 40 80 120 160

SCALE 1" = 40'

BROTHERTON ROAD - ESCONDIDO
BMP EXHIBIT

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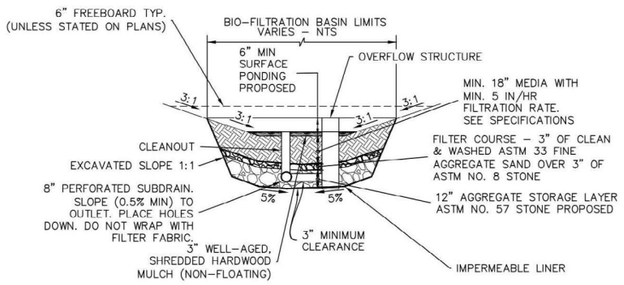
PERVIOUS PAVER TYPICAL SECTION (PVT)

NOT TO SCALE

A BEDDING COURSE: LAYER OF OPEN-GRADED AGGREGATE DIRECTLY BENEATH THE PERMEABLE PAVERS, COMPRISED OF ASTM C-33 #8 AGGREGATE.

B BASE COURSE: LAYER OF OPEN-GRADED AGGREGATE BENEATH THE BEDDING COURSE LAYER, COMPRISED OF ASTM C-33 #5 AGGREGATE.

C SUB-BASE COURSE: LAYER OF OPEN-GRADED AGGREGATE BENEATH THE BASE COURSE LAYER, COMPRISED OF ASTM C-33 #2 AGGREGATE.



NOTE: SEE LANDSCAPE AND IRRIGATION PLANS FOR PLANTING AND SURFACE FEATURES.

BIOFILTRATION BASIN DETAIL (AT GRADE) (PVT.)

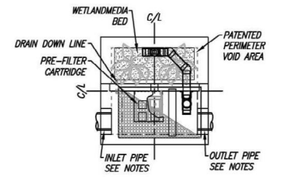
NOT TO SCALE

INSTALLATION NOTES

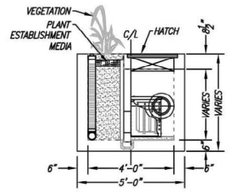
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

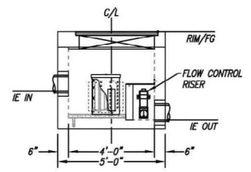
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



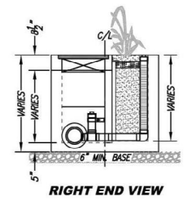
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW

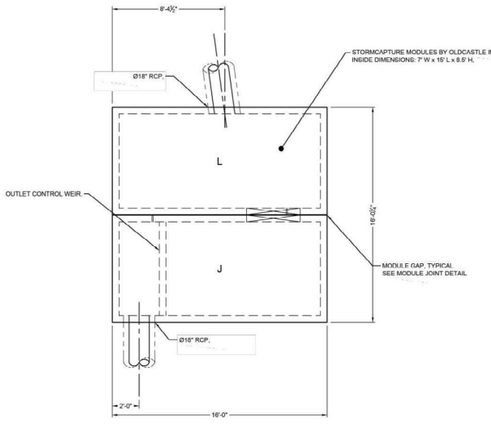


RIGHT END VIEW

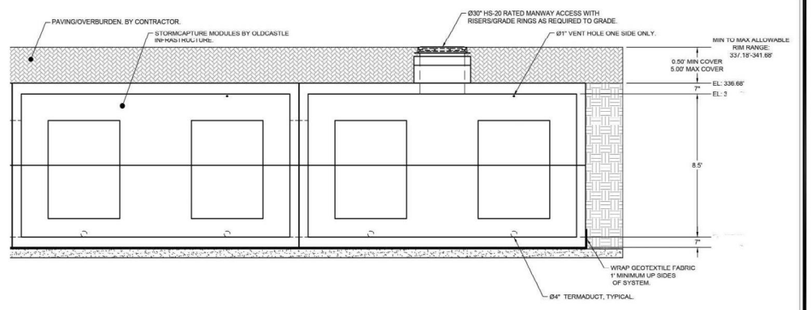
NOTE:
DIMENSIONS IN THIS DETAIL ARE DIAGRAMMATIC FOR PLANNING PURPOSES AND SHALL BE REVISED PER FINAL DESIGN.

MODULAR WETLANDS SYSTEM (PVT.)

NOT TO SCALE



PLAN VIEW



TYPICAL ELEVATION

OLD CASTLE DETENTION VAULT (PVT.)

NOT TO SCALE

NOTE:
DIMENSIONS IN THIS DETAIL ARE DIAGRAMMATIC FOR PLANNING PURPOSES AND SHALL BE REVISED PER FINAL DESIGN.

*NOTE: FOR ADDITIONAL INFORMATION SEE LANDSCAPE PLANS.

18" ENGINEERED SOIL SPEC:

THE ENGINEERED SOIL CONSISTS OF A MIXTURE OF VOLUME WASHED SAND (70-85%), AND VOLUME COMPOST OR ALTERNATIVE ORGANIC AMENDMENT (15-30%) WITH A MINIMUM INFILTRATION RATE OF 5"/HOUR AND ADEQUATE NUTRIENT CONTENT TO MEET PLANT GROWTH REQUIREMENT. CONTRACTOR TO PROVIDE SUBMITTAL OF MATERIAL FOR APPROVAL BEFORE INSTALLATION.

BROTHERTON ROAD - ESCONDIDO
BMP EXHIBIT CONCEPT 2

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4740 Ruffner Street
San Diego, CA 92111
nasland.com

BMP Sizing Spreadsheet V3.1			
Project Name:	Alexan Escondido	Hydrologic Unit:	0
Project Applicant:	Maple Multi-Family Land CA, LP	Rain Gauge:	Oceanside
Jurisdiction:	City of Escondido	Total Project Area:	345,097
Parcel (APN):	236-333-41, 263-333-53	Low Flow Threshold:	0.1Q2
BMP Name:	Detention Vault 1	BMP Type:	Cistern
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	NA

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Volume	Volume (CF)
imp paving	46,848	D	Flat	Concrete	1.0	0.12	5622
pervious	12,721	D	Flat	Landscape	0.1	0.12	153
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	59,569					Minimum BMP Size	5774
						Proposed BMP Size*	5800

* Assumes standard configuration

Standard Cistern Depth (Overflow Elevation)	3.5	ft
Provided Cistern Depth (Overflow Elevation)	5.5	ft
Minimum Required Cistern Footprint)	1050	CF

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manu

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, May 2018. For questions or concerns please contact the jurisdiction in which your project is located.

BMP Sizing Spreadsheet V3.1			
Project Name:	Alexan Escondido	Hydrologic Unit:	0
Project Applicant:	Maple Multi-Family Land CA, LP	Rain Gauge:	Oceanside
Jurisdiction:	City of Escondido	Total Project Area:	345,097
Parcel (APN):	236-333-41, 263-333-53	Low Flow Threshold:	0.1Q2
BMP Name	Detention Vault 1	BMP Type:	Cistern

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
imp paving	Oceanside	D	Flat	0.571	1.075	0.061	**0.72**
pervious	Oceanside	D	Flat	0.571	0.292	0.017	**0.20**

5.50	**0.078**	**0.92**	**1.08**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

Provide Hand Calc.	**0.150**	**1.77**	**1.500**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	Provide Hand Calculation

Detention Vault 1

BMP Minimum Volume	5800	ft^3
Orifice Sizing		
Orifice Volume =	5800	ft^3
Time to Drain =	86400	s (24hrs)
Min. Discharge Rate =	**0.0671**	cfs
height, h =	5.5	ft
gravity =	32.174	ft/s^2
√(2gh) =	**18.81**	ft/s
Orifice Coeficient, Cd =	**0.65**	
Minimum Area of Orifice =	**0.791**	**in^2**
=	**0.502**	**in**
Radius used =	0.75	in

Orifice Discharge Rate

Area of orifice =	1.767	in^2
Orifice Coeficient, Cd =	0.65	
√(2gh) =	18.81	ft/s
Discharge, Q =	**0.150**	**cfs**
Drainage Time =	**10.74**	**hrs**

BMP Sizing Spreadsheet V3.1			
Project Name:	Alexan Escondido	Hydrologic Unit:	0
Project Applicant:	Maple Multi-Family Land CA, LP	Rain Gauge:	Oceanside
Jurisdiction:	City of Escondido	Total Project Area:	345,097
Parcel (APN):	236-333-41, 263-333-53	Low Flow Threshold:	0.1Q2
BMP Name:	Detention Vault 2	BMP Type:	Cistern
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	NA

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Volume	Volume (CF)
imp paving	129,553	D	Flat	Concrete	1.0	0.12	15546
pervious	15,555	D	Flat	Landscape	0.1	0.12	187
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	145,108					Minimum BMP Size	15733
						Proposed BMP Size*	15800

* Assumes standard configuration

Standard Cistern Depth (Overflow Elevation)	3.5	ft
Provided Cistern Depth (Overflow Elevation)	7.0	ft
Minimum Required Cistern Footprint)	2248	CF

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manu

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, May 2018. For questions or concerns please contact the jurisdiction in which your project is located.

BMP Sizing Spreadsheet V3.1			
Project Name:	Alexan Escondido	Hydrologic Unit:	0
Project Applicant:	Maple Multi-Family Land CA, LP	Rain Gauge:	Oceanside
Jurisdiction:	City of Escondido	Total Project Area:	345,097
Parcel (APN):	236-333-41, 263-333-53	Low Flow Threshold:	0.1Q2
BMP Name	Detention Vault 2	BMP Type:	Cistern

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
imp paving	Oceanside	D	Flat	0.571	2.974	0.170	**1.77**
pervious	Oceanside	D	Flat	0.571	0.357	0.020	**0.21**

7.00	**0.190**	**1.98**	**1.59**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

Provide Hand Calc.	**0.169**	**1.77**	**1.500**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	Provide Hand Calculation

Detention Vault 2

BMP Minimum Volume	15800	ft^3
Orifice Sizing		
Orifice Volume =	15800	ft^3
Time to Drain =	86400	s (24hrs)
Min. Discharge Rate =	**0.1829**	cfs
height, h =	7	ft
gravity =	32.174	ft/s^2
√(2gh) =	**21.22**	ft/s
Orifice Coeficient, Cd =	**0.65**	
Minimum Area of Orifice =	**1.909**	**in^2**
=	**0.779**	**in**
Radius used =	0.75	in
Orifice Discharge Rate		
Area of orifice =	1.767	in^2
Orifice Coeficient, Cd =	0.65	
√(2gh) =	21.22	ft/s
Discharge, Q =	**0.169**	**cfs**
Drainage Time =	**25.92**	**hrs**

BMP Sizing Spreadsheet V3.1			
Project Name:	Alexan Escondido	Hydrologic Unit:	0
Project Applicant:	Maple Multi-Family Land CA, LP	Rain Gauge:	Oceanside
Jurisdiction:	City of Escondido	Total Project Area:	345,097
Parcel (APN):	236-333-41, 263-333-53	Low Flow Threshold:	0.1Q2
BMP Name:	Detention Vault 3	BMP Type:	Cistern
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	NA

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Volume	Volume (CF)
imp paving	115,490	D	Flat	Concrete	1.0	0.12	13859
pervious	19,333	D	Flat	Landscape	0.1	0.12	232
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	134,823					Minimum BMP Size	14091
						Proposed BMP Size*	14100

* Assumes standard configuration

Standard Cistern Depth (Overflow Elevation)	3.5	ft
Provided Cistern Depth (Overflow Elevation)	7.0	ft
Minimum Required Cistern Footprint)	2013	CF

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manu

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, May 2018. For questions or concerns please contact the jurisdiction in which your project is located.

BMP Sizing Spreadsheet V3.1			
Project Name:	Alexan Escondido	Hydrologic Unit:	0
Project Applicant:	Maple Multi-Family Land CA, LP	Rain Gauge:	Oceanside
Jurisdiction:	City of Escondido	Total Project Area:	345,097
Parcel (APN):	236-333-41, 263-333-53	Low Flow Threshold:	0.1Q2
BMP Name	Detention Vault 3	BMP Type:	Cistern

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
imp paving	Oceanside	D	Flat	0.571	2.651	0.151	**1.58**
pervious	Oceanside	D	Flat	0.571	0.444	0.025	**0.26**

7.00	**0.177**	**1.84**	**1.53**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

Provide Hand Calc.	**0.118**	**1.23**	**1.250**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	Provide Hand Calculation

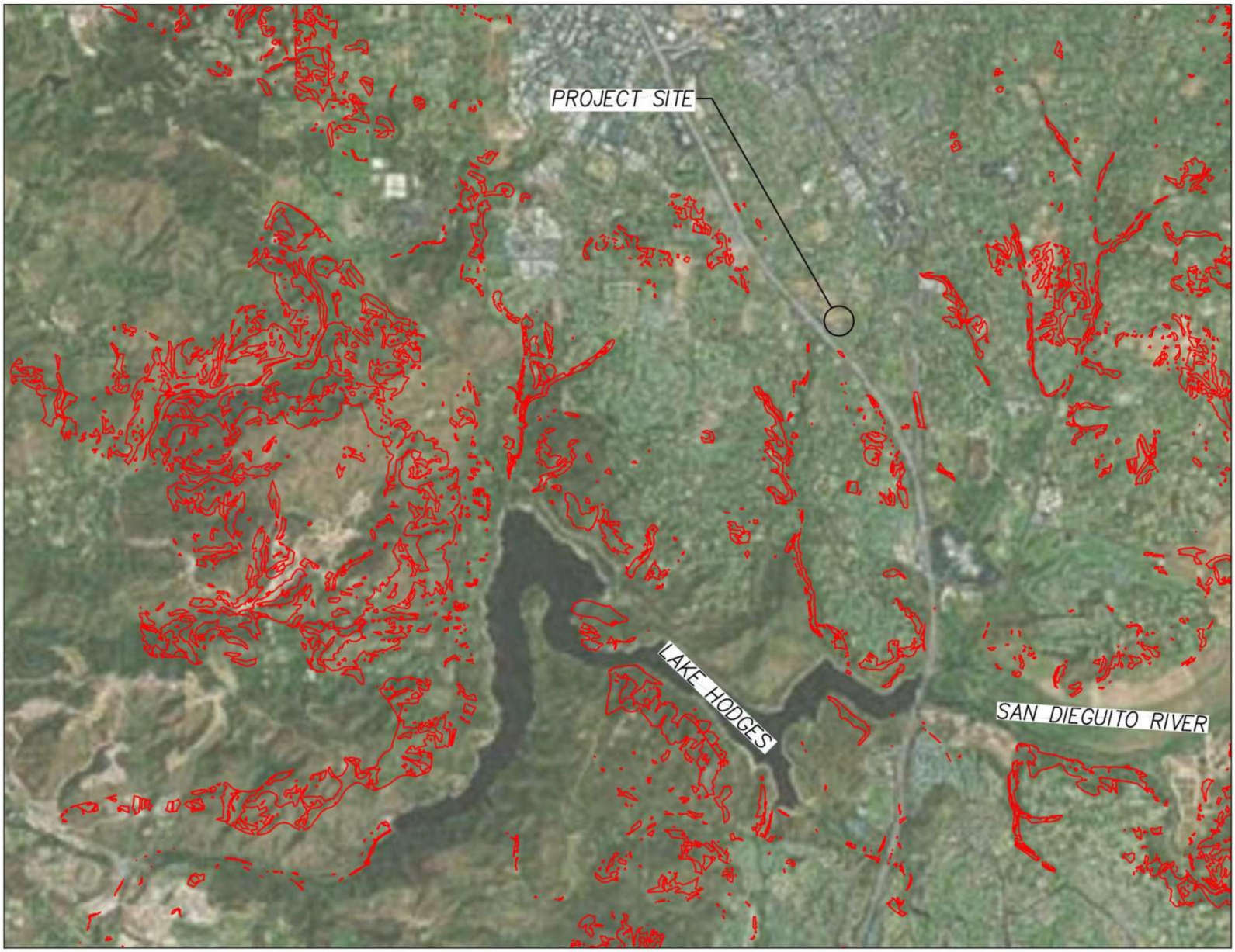
Detention Vault 3

BMP Minimum Volume	14100	ft^3
Orifice Sizing		
Orifice Volume =	14100	ft^3
Time to Drain =	86400	s (24hrs)
Min. Discharge Rate =	**0.1632**	cfs
height, h =	7	ft
gravity =	32.174	ft/s^2
√(2gh) =	**21.22**	ft/s
Orifice Coeficient, Cd =	**0.65**	
Minimum Area of Orifice =	**1.703**	**in^2**
=	**0.736**	**in**
Radius used =	0.63	in

Orifice Discharge Rate

Area of orifice =	1.227	in^2
Orifice Coeficient, Cd =	0.65	
√(2gh) =	21.22	ft/s
Discharge, Q =	**0.118**	**cfs**
Drainage Time =	**33.31**	**hrs**

ATTACHMENT 2C



POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS

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

The Hydromodification Management Exhibit must identify:

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

ATTACHMENT 3

Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Indicate which Items are Included behind this cover sheet:

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

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

Attachment 3a must identify:

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

Attachment 3b: For all Structural BMPs, Attachment 3b must include a draft maintenance agreement in the City's standard format (PDP applicant to contact City staff to obtain the current maintenance agreement forms or download from City's website).

ATTACHMENT 4

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

This is the cover sheet for Attachment 4.

City of Escondido Storm Water Structural BMP Verification Form Page 1 of 3	
Project Summary Information	
Project Name	Alexan Escondido
Permit Number (e.g., grading/improvement plan number)	
Project Address	855 Brotherton Road, Escondido, CA, 92025
Assessor's Parcel Number(s) (APN(s))	236-333-53-00
Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	San Dieguito 905
Maintenance Notification / Agreement No.	
Responsible Party for Construction Phase	
Developer's Name	
Address	
Email Address	
Phone Number	
Engineer of Work	
Engineer's Phone Number	
Responsible Party for Ongoing Maintenance	
Owner's Name(s)*	
Address	
Email Address	
Phone Number	
*Note: If a corporation or LLC, provide information for principal partner or Agent for Service of Process. If an HOA, provide information for the Board or property manager at time of project closeout.	

City of Escondido Storm Water Structural BMP Verification Form Page 2 of 3				
Stormwater Structural Pollutant Control & Hydromodification Control BMPs* (List all from SWQMP)				
Description/Type of Structural BMP	**Plan Sheet #**	**Structural BMP ID#**	**Maintenance Agreement Recorded Doc #**	**Revisions**
Biofiltration Basin		BMP 1		
Modular Wetland System		BMP 2		
Biofiltration Basin		BMP 3		
Biofiltration Basin		BMP 4		
Modular Wetland System		BMP 5		
Detention Vault		Detention Vault 1		
Detention Vault		Detention Vault 2		
Detention Vault		Detention Vault 3		
Modular Wetland System		BMP 8		
*All Priority Development Projects (PDPs) require a Structural BMP				

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

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

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

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

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

Please sign your name and seal.

Professional Engineer's Printed Name: _____

Professional Engineer's Signed Name: _____

Date: _____

[SEAL]

ATTACHMENT 5

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

This is the cover sheet for Attachment 5.

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

The plans must identify:

- ☐ Structural BMP(s) with ID numbers matching Step 5 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by City staff
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☐ All BMPs must be fully dimensioned on the plans
- ☐ When proprietary BMPs are used, site-specific cross section with outflow, inflow, and model number must be provided. Photocopies of general brochures are not acceptable.
- ☐ Include all source control and site design measures described in Steps 3 and 4 of the SWQMP. Can be included as a separate exhibit as necessary.

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