Appendix K

Storm Water Quality Management Plan

CITY OF SANTEE

PRIORITY DEVELOPMENT PROJECT (PDP)

STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)

FOR

CARLTON OAKS COUNTRY CLUB & RESORT PA-1, PA-2, & PA-3

TM 2019-1 / DR 2019-5

9200 Inwood Drive,
Santee, CA 92071

ASSESSOR'S PARCEL NUMBER(S):
383-071-06, 383-071-09, 383-080-03, 383-071-10, &
383-060-26

ENGINEER OF WORK:

Alisa S. Vialpando, PE 47945

PREPARED FOR:

ALIKA, LLC
9200 Inwood Drive
Santee, CA 92071
949-929-9123

PDP SWQMP PREPARED BY:

Hunsaker & Associates San Diego Inc.
9707 Waples Street
San Diego, CA 92121
(858) 558-4500

DATE OF SWQMP:
05/14/2025

PLANS PREPARED BY:
Alisa S. Vialpando
9707 Waples Street
San Diego, CA 92121
(858) 558-4500

PDP SWQMP Template Date: February 2016
PDP SWQMP Preparation Date: 03/21/2025

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ACRONYMS

APN	Assessor's Parcel Number
BMP	Best Management Practice
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NRCS	Natural Resources Conservation Service
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
SWQMP	Storm Water Quality Management Plan

SWQMP PREPARER'S
CERTIFICATION PAGE

Project Name: CARLTON OAKS COUNTRY CLUB & RESORT PA-1, PA-2, & PA-3
Permit Application Number: TM 2019-1 / DR 2019-5

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 Santee BMP Design Manual, which is a design manual for compliance with local City of Santee and regional MS4 (California Regional Water Quality Control Board San Diego Order No. R9-2015-0100) requirements for storm water management.

I have read and understand that the [City Engineer] has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the [City Engineer] 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.

Alisa S. Vialpando

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

Alisa S. Vialpando

Print Name

Hunsaker & Associates San Diego Inc.

Company

05/14/2025

Date

Engineer's Seal:

PDP SWQMP Template Date: February 2016
PDP SWQMP Preparation Date: 03/21/2025

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SWQMP PROJECT OWNER'S
CERTIFICATION PAGE

Project Name: CARLTON OAKS COUNTRY CLUB & RESORT PA-1, PA-2, & PA-3
Permit Application Number: TM 2019-1 / DR 2019-5

PROJECT OWNER'S CERTIFICATION

This PDP SWQMP has been prepared for ALIKA, LLC by Hunsaker & Associates, San Diego Inc. The PDP SWQMP is intended to comply with the PDP requirements of the City of Santee BMP Design Manual, which is a design manual for compliance with local City of Santee and regional MS4 (California Regional Water Quality Control Board San Diego Order No. R9-2015-0100) requirements for storm water management.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan. Once the undersigned transfers its interests in the property, its successor-in-interest shall bear the aforementioned responsibility to implement the best management practices (BMPs) described within this plan, including ensuring on-going operation and maintenance of structural BMPs. A signed copy of this document shall be available on the subject property into perpetuity.

Project Owner's Signature

John Chen

Print Name

Alika LLC

Company

10-27-2022

Date

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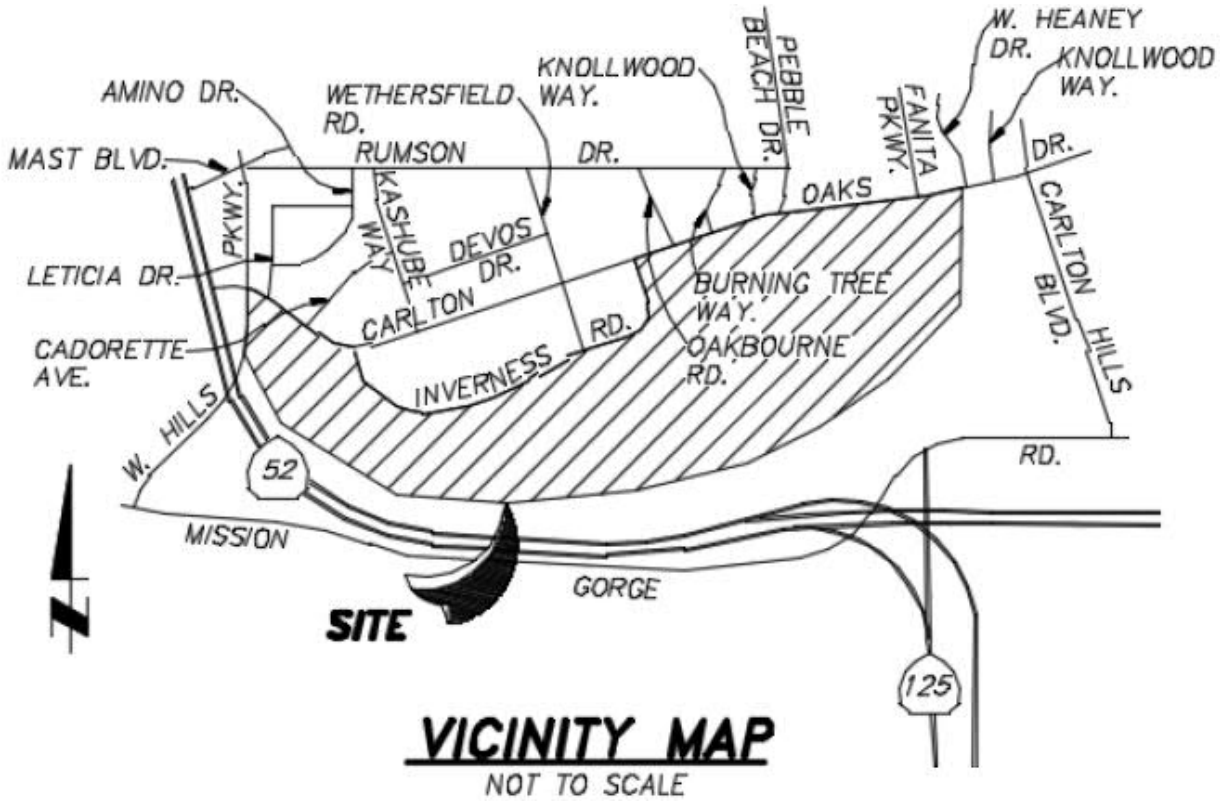
SUBMITTAL RECORD

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

Submittal Number	Date	Project Status	Summary of Changes
4	11/07/2022	☑Preliminary Design / Planning/ CEQA ☐ Final Design	Fourth Submittal-Revised site plan and addressed comments.
5	04-25-2023	☑ Preliminary Design / Planning/ CEQA ☐ Final Design	Fifth Submittal – Revised site plan and addressed comments.
6	02-06-2024	☑ Preliminary Design / Planning/ CEQA ☐ Final Design	Update DMA and associated calculations to reflect changes made to the grading on PA-3.
7	06-18-2024	☑Preliminary Design / Planning/ CEQA ☐ Final Design	Final Submittal - Adding Site Plan and off-Site Improvements Exhibit. Update project description
8	03/21/2025	☑Preliminary Design / Planning/ CEQA ☐ Final Design	A minor increase in the total area of DMA1 (pervious area only) due to the removal of the storm drain from the parcels owned by the City of San Diego.
9	05/14/2025	☑Preliminary Design / Planning/ CEQA ☐ Final Design	Final Submittal.

PROJECT VICINITY MAP

Project Name: CARLTON OAKS COUNTRY CLUB & RESORT PA-1, PA-2, & PA-3
Permit Application Number: TM 2019-1 / DR 2019-5



VICINITY MAP
NOT TO SCALE

Applicability of Permanent, Post-Construction Storm Water BMP Requirements (Storm Water Intake Form for all Development Permit Applications)	Form I-1 Model BMP Design Manual [August 31, 2015]
Project Identification	
Project Name: CARLTON OAKS COUNTRY CLUB & RESORT PA-1, PA-2, & PA-3	
Permit Application Number: TM 2019-1 / DR 2019-5	Date: 03/21/2025
Project Address: 9200 Inwood Drive, Santee, CA 92071	

Determination of Requirements

The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.

Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop". Upon reaching a Stop, do not complete further Steps beyond the Stop.

Refer to BMP Design Manual sections and/or separate forms referenced in each step below.

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the BMP Design Manual for guidance.	☑Yes	Go to Step 2.
	☐ No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, see Section 1.4 of the BMP Design Manual *in its entirety* for guidance, AND complete Form I-2, Project Type Determination.	☐ Standard Project	Stop. Only Standard Project requirements apply, including Standard Project SWQMP.
	☑PDP	Standard and PDP requirements apply, including PDP SWQMP. Go to Step 3.
	☐ Exception to PDP definitions	Stop. Standard Project requirements apply, and any additional requirements specific to the type of project. Provide discussion and list any additional requirements below. Prepare Standard Project SWQMP.

Form I-1 Page 2, Form Template Date: August 31, 2015		
[Step 2 Continued from Page 1] Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		
Step 3 (PDPs only). Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the BMP Design Manual for guidance.	☐ Yes	Consult the [City Engineer] to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	☑No	BMP Design Manual PDP requirements apply. Go to Step 4.
Discussion / justification of prior lawful approval, and identify requirements (*not required if prior lawful approval does not apply*):		
Step 4 (PDPs only). Do hydromodification control requirements apply? See Section 1.6 of the BMP Design Manual for guidance.	☐ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	☑No	Stop. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do <u>not</u> apply: All discharge locations discharge directly to the San Diego River which is a river reach exempt from hydromodification management requirements per regional WMAA exhibit San Diego River Watershed Management Area HU 907.00, 436 mi2 (San Diego River Exempt FID 13084). Energy dissipation will be provided at all discharge locations.		
Step 5 (PDPs subject to hydromodification control requirements only). Does protection of critical coarse sediment yield areas apply based on review of WMAA Potential Critical Coarse Sediment Yield Area Map? See Section 6.2 of the BMP Design Manual for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	☑No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. See form I-3B Stop.

Priority Determination Form	Form I-2 Model BMP Design Manual [August 31, 2015]

Project Information	
Project Name: CARLTON OAKS COUNTRY CLUB & RESORT PA-1, PA-2, & PA-3	
Permit Application Number: TM 2019-1 / DR 2019-5	Date: 03/21/2025
Project Address: 9200 Inwood Drive, Santee, CA 92071	

Project Type Determination: Standard Project or Priority Development Project (PDP)			
The project is (select one): ☑ New Development ☐ Redevelopment			
The total proposed newly created or replaced impervious area is: _1,337,943_ ft^2 (_30.71_) acres			
Is the project in any of the following categories, (a) through (f)?			
Yes ☑	No ☐	(a)	New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☑	No ☐	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☑	No ☐	(c)	New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

Form I-2 Page 2, Form Template Date: August 31, 2015			
Yes ☑	No ☐	(d)	New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). *Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. See BMP Design Manual Section 1.4.2 for additional guidance.*
Yes ☐	No ☑	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. (ii) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.
Yes ☑	No ☐	(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 BMP Design Manual Section 1.4.2 for additional guidance.*

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

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

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

The following is for redevelopment PDPs only: FOR PA-3 ONLY

The area of existing (pre-project) impervious area at the project site is: __34,558__ ft^2 (A)
The total proposed newly created or replaced impervious area is __266,027__ ft^2 (B)
Percent impervious surface created or replaced (B/A)*100: __769__%
The percent impervious surface created or replaced is (select one based on the above calculation):

☐ less than or equal to fifty percent (50%) – only new impervious areas are considered PDP

OR

☑ greater than fifty percent (50%) – the entire project site is a PDP

Site Design Checklist For PDPs	Form I-3B (PDPs) Model BMP Design Manual [August 31, 2015]
Project Summary Information	
Project Name	Carlton Oaks Golf Course, PA-1, PA-2, & PA-3
Project Address	9200 Inwood Drive, Santee, CA 92071
Assessor's Parcel Number(s) (APN(s))	383-060-26, 383-071-06, -09, -10, 383-080-03, -04, 383-221-01, -02, 03, -04, 383-241-08 and 383-242-01
Permit Application Number	TM 2019-1 / DR 2019-5
Project Hydrologic Unit	Select One: ☐ Santa Margarita 902 ☐ San Luis Rey 903 ☐ Carlsbad 904 ☐ San Dieguito 905 ☐ Penasquitos 906 ☑ San Diego 907 ☐ Pueblo San Diego 908 ☐ Sweetwater 909 ☐ Otay 910 ☐ Tijuana 911
Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Lower San Diego – Santee HSA 907.12
Parcel Area * (total area of Assessor's Parcel(s) associated with the project)	_168.3_ Acres (_7,332,925_ Square Feet)
Area to be Disturbed by the Project (Project Area)	_142.95_ Acres (_6,227,024 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	_30.71__ Acres (_1,337,943_ Square Feet)
Project Proposed Pervious Area (subset of Project Area)	_112.24_ Acres (_4,889,081_ Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	

* The off-site improvement areas and the proposed project site (developed and undeveloped) make up the CEQA Study area, totaling approximately 168.3 acres.

Description of Existing Site Condition

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

☐ Previously graded but not built out

☐ Demolition completed without new construction

☑Agricultural or other non-impervious use

☐ Vacant, undeveloped/natural

Description / Additional Information:
There is an existing golf course, clubhouse, restaurant/bar, banquet room, 51-unit hotel, and driving range all serviced by 1 joint parking lot.

Existing Land Cover Includes (select all that apply):
☑Vegetative Cover

☑Non-Vegetated Pervious Areas

☑Impervious Areas

Description / Additional Information:
There is an existing golf course with rolling hills, 3 lakes, and sporadic trees. The San Diego River, Sycamore Creek and Forester Creek run through and adjacent to the golf course.

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):
☐ GW Depth < 5 feet

☑5 feet < GW Depth < 10 feet

☑10 feet < GW Depth < 20 feet

☐ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):
☑Watercourses

☐ Seeps

☐ Springs

☑Wetlands

☐ None

Description / Additional Information:
Watercourses and wetlands include the San Diego River and Forester Creek run adjacent to the golf course. However, although these are existing, all ground has been previously disturbed.

Description of Existing Site Drainage Patterns

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

(1) whether existing drainage conveyance is natural or urban;

(2) Is runoff from offsite conveyed through the site? if yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site;

(3)Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels; and

(4) Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Describe existing site drainage patterns:

The existing Carlton Oaks Country Club and Resort is located in the City of Santee and City of San Diego, northwest of the State Route 52 / 125 interchange. The project site is bounded by the San Diego River and Forester Creek to the south and east, West Hills Parkway to the west, and Carlton Oaks Drive to the north. Most of the project limits are located within FEMA regulatory limits of San Diego River.

The majority of the proposed Residential West (PA-1) is located with the existing floodplain, a small portion of the southwest corner of the proposed Residential North (PA-2) is also located in the existing floodplain, and the proposed Resort Area (PA-3) is located within the existing floodplain and floodway. The project receives runoff from the San Diego River, Sycamore (Santee Lakes) channel, plus several storm drain outfalls from the existing neighborhoods along the Carlton Oaks and Mast Blvd corridors. Runoff from Forester Creek enters at the south-easterly limits of the property.

South Channel: The property includes a vegetated earth berm along the southern and eastern limits, which directs "low flows" from the San Diego River and Forester Creek along the southerly golf course limits. The berm consists of loosely placed soil that was graded per 1995 grading plan G-378, and it is relatively small (compared to the overall river width). The berm ends near the western limits of the golf course, just upstream of West Hills Parkway Bridge (West Hills Parkway crosses over San Diego River southwest of the proposed Residential West PA-1). The existing channel is vegetated with sensitive habitat.

North Channel:Runoff from Sycamore channel (adjacent to the western limits of the Santee Lakes) enters the site near the northeast end of the golf course under the Carlton Oaks Drive bridge. Flows are directed southerly and westerly through the northern limits of the golf course through a variety of golf course water features including streams, water hazards and manufactured ponds. The north channel provides drainage relief for overland flows from the majority of the golf course, and the existing neighborhoods north of the property.

Flows from the south and north channels confluence at the west end of the earth berm, approximately 500' upstream of West Hills Parkway bridge. According to the existing model, during larger storm events, the flood water levels will overtop the berm at one or more locations. Anecdotally, the berm has stood up to large flooding events in the past and has likely been reinforced by natural vegetation growth along the sides. The project does not require or propose any modifications to the existing berm.

Description of Proposed Site Development

Project Description / Proposed Land Use and/or Activities:

Lennar Homes and Carlton Oaks Golf Course, as joint project proponents, are proposing to re-develop the existing Carlton Oaks Country Club into a resort with residential accessory uses (proposed project). An existing clubhouse, restaurant/bar, pro shop, hotel and hotel cottages, and surface parking lot are currently located on the proposed project site and will be demolished as part of the initial project construction.

The proposed project site that will be developed is located on approximately 164.9 acres and would include the redesign of the existing Carlton Oaks Golf Course and the following components: (1)) redesign of the golf course, (2) reconstruction of the clubhouse and pro shop, practice area, and learning center structure; (3) a hotel and associated cottages; (4) residential accessory uses consisting of two residential neighborhoods (Residential West and Residential North) with open space areas; and (5) related on-site infrastructure. Approximately 3.4 acres consist of areas outside of the project site that will be developed with improvements associated with the Project and are located either in the City of San Diego or Santee (Off-site improvement areas). The off-site improvement areas and the proposed project site (developed and undeveloped) make up the CEQA Study area, totaling approximately 168.3 acres. "Site Plan and off-Site Improvements Exhibit" in Attachment 1a" for illustrating the onsite project area and offsite improvements.

Golf Course Redesign:

The proposed project would redesign the existing 145-acre, 18-hole golf course to provide an improved experience for the users of the Carlton Oaks Country Club and Resort. The redesigned golf course would cover approximately 104 acres, and would provide 18 holes, similar to the existing course. The length of the golf course would be reduced from approximately 7,300 yards to 6,450 yards to provide a more engaging golfing experience. Under the current existing conditions, the golf course has a total of approximately 132 acres of turf irrigation with a 30-year-old block type irrigation system. The new course design would only have approximately 66 acres of turf irrigation (a 50 percent decrease) and would utilize a new modem irrigation system with individual head controls.

The proposed golf course would reshape the existing man-made ponds on the golf course, and the existing maintenance facility in the eastern portion of the project site will remain in its current location. The existing drainage patterns and facilities would be updated within the golf course to improve the flow of drainage, which would reduce the amount of ponding that occurs on the site during rain events. The remaining out-of-play areas around the golf course would be planted with native grasses and smaller shrubs native to the region, which would be selected to require little or no maintenance. There are a number of riparian areas within the project site, providing an environment for native birds, small animals, and aquatic plant and animal species. These areas are planned to be avoided and retained in their current condition.

In addition to the golf course, the Carlton Oaks Golf Course owner would develop several golf amenities including a pro shop, cart barn, and a cart waiting area on the eastern end of the golf

Description of Proposed Site Development

course, northeast of the golf resort, as well as two practice areas. A golf learning center structure would also be developed northeast of the pro shop. A new shared surface parking lot would provide parking spaces for users of the golf course, clubhouse, and hotel.

Carlton Oaks Country Club and Resort Area (PA-3):
The Carlton Oaks Country Club and Resort would consist of approximately 51,926 square feet of golf related resort amenities including 10 cottage-style hotel units, 42-room hotel, a clubhouse with a restaurant, event space, a golf learning center, a cart barn, a pro shop, and a store all located in the eastern portion of the project site. There would also be a golf cart waiting area and a shared, surface parking lot. The hotel and cottage buildings would be constructed as two-story structures. The clubhouse and resort would also provide an outdoor pool and deck area, a patio, and a courtyard.

Residential Development:
The Carlton Oaks Country Club and Resort would include a residential component in the western and northeastern portions of the project site. Residential West (PA-1), in the western portion of the project site, would consist of 86 multi-family detached residential units. Residential North (PA-2) would be located in the northern portion of the project site and would consist of 150 detached multi-family residential units. In addition, six single-family lots would front Carlton Oaks Drive and allow for single-story homes on a minimum of 6,000 square-foot lots. One existing home located at 9225 Inwood Drive has also been included within the project area to allow for minor driveway modifications but no changes to the structure are proposed. The applicant is requesting approval of required easements from the City of San Diego for grading, landscaping, utilities, access, and maintenance.

Access Points:
Access to Residential West would include a private driveway that would require access easements across two parcels owned by the City of San Diego, these parcels cross both City of San Diego and City of Santee jurisdictions. The proposed easements would allow private and emergency access onto the proposed subdivision.

Residential North and the resort would be accessed from Carlton Oaks Drive at the intersection of Burning Tree Way. This access would be approximately 200 feet west of the existing hotel access road (Inwood Drive). Inwood Drive would be closed and replaced with curb and sidewalk. Additionally, six existing driveway aprons along the project frontage would be closed and replaced with curb and landscaping.

Access to the golf course and resort would be provided by a private drive through Residential North from Carlton Oaks Drive southerly via a new bridge across the San Diego River (North Channel).

Description of Proposed Site Development

Also, a 26-foot-wide private emergency access road for the Residential North and resort parcels would be provided through the existing Vista del Verde condominiums located in the northeastern corner of the project site. This emergency access would comply with the requirements of the City of Santee's Fire Code and would be for the proposed project only and would not be open to the public. A new fence with an emergency access gate will be erected between buildings of the existing adjacent condominium complexes. An emergency access roadway will also be provided to PA-1 via an extension of Private Drive "C" westerly to West Hills Parkway. The emergency vehicle access will be 26 feet wide with curb and gutter and AC pavement and base, with grades and horizontal alignment that meet the City's Fire Code.

The project will also include a 26-foot private utility maintenance roadway between PA-1 and PA-2, which will also serve as a pedestrian/golfcart passageway from PA-1 to the resort. The private roadway/pathway will be paved with 26 feet of AC pavement and base with a 2-foot shoulder and will meet the City Fire Code roadway grades and horizontal alignment requirements for firefighting apparatus and vehicles. Gates are located at the west and east limits of the roadway.

Project Trail Segments

A multipurpose, public trail will be provided on the property on the north side of the San Diego River, linking with existing and planned trails to the east and west of the site (Project Trail Segment).

A portion of the Project Trail Segment on the eastern side of the project site will be provided beginning at the entrance of Residential North at Carlton Oaks Drive traversing through the resort and along the southeastern border of the project ending slightly west of the jurisdictional line between the City of Santee and the City of San Diego. This portion of the trail will link to the existing Mast Park West Trail, as well as the future planned trail known as the Carlton Oaks Golf Course Segment.

A portion of the Project Trail Segment on the western side of the project site will be constructed beginning at the Santee jurisdictional line ending at the property line (Station 38+60). This portion of the trail will link to the future planned trail known as the Carlton Oaks Golf Course Segment. Along the Residential West boundary, a graded bench (located within the Carlton Oaks Golf Course Segment) would also be provided within the easement areas that will be granted to the applicant by the City of San Diego as a part of this project.

In addition to the proposed trail alignment currently proposed through Residential North and the County Club and Resort Area, a supplemental trail offer of dedication is shown on the applicant's map should the City request this supplemental trail alignment. The supplemental trail offer of dedication starts from an area east of the Country Club and Resort parking lot to the property line of the Vista del Verde community. If the City of Santee were to request this supplemental segment, the applicant will agree to dedicate the trail alignment and construct this trail at a later date if the City determines that it desires to build this trail in the future.

Description of Proposed Site Development

Grading:

Fill will be placed to raise the Residential West (PA-1) and Residential North (PA-2) out of the floodplain, and the Resort Area (PA-3) above the 100-year flood levels of the floodway. Grades in a portion of the existing golf course, located approximately south of the proposed Resort Area, will be lowered to offset for the fill that is being placed in the residential and resort areas. Residential West (PA-1) is a residential development located at the west end of the existing golf course property, located north of the record floodway. Residential West (PA-1) and Residential North area (PA-2) do not encroach into the Floodway but are located in the existing floodplain. (Both PA-1 and PA-2 make up the Residential Area.)

The golf course will be regraded to enhance flows around the proposed Residential and Resort development areas. The Resort Area (PA-3) will encroach into the existing floodway. The Floodway and Floodplain is proposed to be remapped to reflect that Residential West and North are removed from the floodplain and and the Resort Area is fully removed from both the floodplain and floodway. Both residential areas will continue to remain out of the floodway consistent with the current FEMA mapping.

Stockpiling Sites:

The project will require the import of soil to raise the proposed resort, hotel, and residential development out of the FEMA mapped floodplain. This import of soil will most likely take place over an extended period of time prior to the start of grading. Two temporary disposal sites for the stockpiling of soil are proposed, one in the west and the other in the east.
The western disposal site will be located in the northwestern portion of the project, in the general location of golf course hole number 6; approximately 190,000 cubic yards of soil will be imported. The western import access will be from West Hills Parkway and provided with temporary best management practices (BMPs) for sediment and erosion control. The eastern disposal site will be located within the current golf course driving range, with an import of approximately 143,000 cubic yards. The eastern import access will be from Inwood Drive and provided with temporary BMPs for sediment and erosion control.

To comply with state and federal water quality regulations, a Storm Water Pollution Prevention Plan (SWPPP) will be prepared during the Final Engineering Phase for the project to design and implement the required and effective temporary sediment and erosion control BMPs. This will be in compliance with the 2022 Construction Stormwater General Permit, Order 2022-0057-DWQ, City of Santee requirements as outlined in the City of Santee's Guidelines for Surface Water Pollution Prevention dated June 2015, the City of Santee Jurisdictional Urban Runoff Management Program (JRMP) dated July 2021, the City of San Diego Stormwater Standards dated May 2021, and the City of San Diego Jurisdictional Runoff Management Plan (JRMP) dated January 2024. The site will not be disturbed prior to having a SWPPP with an approved Notice of Intent and an effective waste discharge identification number.

Description of Proposed Site Development

Offsite Improvements

The following offsite improvements would be required as part of the implementation of the proposed project.

1. Emergency Vehicle Access: The project will include the construction of a 26-foot-wide emergency vehicle access roadway, pursuant to the City of Santee Fire Department's requirements. This work would include modifications to existing parking, as well as construction work at an offsite location within the Vista del Verde community in order to construct the emergency vehicle access pathway. The emergency vehicle access roadway will run south from the condominium project onto the golf course property to the developed portion of the resort area. One parking spot that may be lost by such work will also be relocated on the Vista del Verde property subject to the approval of the City of Santee. The project also includes installation of a motorized gate and replacement of the existing chain link fence with a steel tubular fence, on the boundary of the Golf Course property.
2. West Hills Parkway: West Hills Parkway will be widened within the existing right-of-way from Carlton Oaks Drive approximately 700 feet southerly to the existing bridge, in order to provide a dedicated left-turn lane into the project driveway. The roadway will be widened within the existing right-of-way and therefore no additional dedication is required. New striping will include a striped median and increased width for bike lanes. Improvements will also include a new driveway entry for the proposed residential development. Trees are proposed on both sides of West Hills Parkway to provide source control of storm water, limit storm water transport and pollutant conveyance to the collection system, restore predevelopment hydrology to the extent possible, and provide environmentally enhanced roads. Green Street PDP Exempt SWQMP for Carlton Oaks has been prepared per City of San Diego Storm Water Standards\ BMP Design Manual and following the guidance in Appendix J of the Manual. This work falls within the boundaries of City of San Diego and follows their standards. Access into the project has been analyzed for sight-distance, signal warrants and traffic movements by the project engineering team.
3. Extension of a Padre Dam Municipal Water District (PDMWD) Public Water Main: A Padre Dam Municipal Water District public water main will be extended from the end of Carlton Oaks Drive and down West Hills Parkway and into the proposed subdivision to provide a connection to the private water system for Residential West.
4. Access to Residential North and the Resort Area: Residential North and the Resort Area will take access from Carlton Oaks Drive at the intersection of Burning Tree Way. This access point is approximately 200 feet east of the existing hotel access road (Inwood Drive). Inwood Drive will be closed and replaced with curb and sidewalk. Additionally, six existing driveway aprons along the project frontage, will be closed and replaced with curb and landscaping along with other miscellaneous frontage improvements such as overhead power undergrounding and landscaping. Overhead power undergrounding would extend north of Carlton Oaks Drive. Potable and recycled water will be connected to existing main lines in Carlton Oaks Drive and extended into the project.

Description of Proposed Site Development

5. Drainage Improvements: Existing drainage pipes discharge to the golf course at five locations along the north subdivision boundary. All improvements shall be done in a way that will maintain the existing flow and drainage patterns. Each location is described as follows:

A. Existing 42-inch storm drain discharges to the site from a headwall located approximately 15 feet offsite, located within a public easement (City of Santee) on an existing residential lot (Lot 17 of Map 4402). The offsite flows will be picked up onsite by proposed storm drain improvements and discharged into the San Diego River (North Channel).

B. Existing 27-inch storm drain extends onto the project site from an existing residential lot (Lot 14 of Map 5417): This pipe will be extended under the proposed access road to a new headwall and discharge onto the golf course.

C. Existing 18-inch storm drain discharges to the site from a headwall located approximately 15 feet offsite, located within a public easement (City of Santee) on an existing residential lot (Lot 230 of Map 6973): The offsite flows will be picked up onsite by proposed storm drain improvements and discharged onto the golf course.

D. Existing 47"x71" storm drain discharges to the site from a headwall located approximately 20 feet offsite, located within a public easement (City of Santee) on an existing residential lot (Lot 239 of Map 6973). Project proposes to remove the headwall and extend the pipe into the project.

E. An existing 72-inch diameter storm drainpipe discharges to the site from the headwall located approximately immediately offsite at the north property line of Residential West. The existing headwall includes a large concrete energy dissipator and concrete channel. These storm drain facilities are located offsite on existing residential lots (Lots 679 & 680 of Map 7295) and within an existing public easement (City of Santee). The offsite flows will be picked up onsite by proposed storm drain improvements and discharged onto the golf course. The project drainage study includes a hydraulic analysis of the extension of this pipe to ensure that no negative upstream impacts will occur as a result of this project.

6. Sewer Maintenance Hole Improvements: Three existing sewer maintenance holes located offsite within a public easement (Padre Dam Municipal Water District) in the northeast corner of the project within the Vista del Verde condominiums: Engineered sewer manhole liners may be needed in the three manholes between the 8-inch tie-in from the north and the 24-inch tie-in. The need for these liners will be determined in the project design phase. All work will be limited to within the public easement area.

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

Building roofs, private drives and parking areas, walkways, connection to West Hills Drive and Carlton Oaks Drive including street improvements and an emergency connection from Carlton Oaks to access the Resort Area, and golf cart paths.

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

Landscape areas adjacent to the parking lot and private drives, along the property lines, tot lot and recreational area, slopes along street frontage, golf course and manufactured slopes.

Does the project include grading and changes to site topography?

☑Yes

☐ No

Description / Additional Information:

There will be grading throughout the golf course as part of it redevelopment. The activities will also include grading for new roads, building pads, and the access road connecting the development of PA-1 and PA-2.

The project will require the import of soil to raise the proposed resort, hotel, and residential development out of the FEMA mapped floodplain. This import of soil will most likely take place over an extended period of time prior to the start of grading. Two temporary disposal sites for the stockpiling of soil are proposed, one in the west and the other in the east.

The western disposal site will be located in the northwestern portion of the project, in the general location of golf course hole number 6; approximately 190,000 cubic yards of soil will be imported. The western import access will be from West Hills Parkway and provided with temporary best management practices (BMPs) for sediment and erosion control. The eastern disposal site will be located within the current golf course driving range, with an import of approximately 143,000 cubic yards. The eastern import access will be from Inwood Drive and provided with temporary BMPs for sediment and erosion control.

To comply with state and federal water quality regulations, a Storm Water Pollution Prevention Plan (SWPPP) will be prepared during the Final Engineering Phase for the project to design and implement the required and effective temporary sediment and erosion control BMPs. This will be in compliance with the 2022 Construction Stormwater General Permit, Order 2022-0057-DWQ, City of Santee requirements as outlined in the City of Santee's Guidelines for Surface Water Pollution Prevention dated June 2015, the City of Santee Jurisdictional Urban Runoff Management Program (JRMP) dated July 2021, the City of San Diego Stormwater Standards dated May 2021, and the City of San Diego Jurisdictional Runoff Management Plan (JRMP) dated January 2024. The site will not be disturbed prior to having a SWPPP with an approved Notice of Intent and an effective waste discharge identification number.

Description of Proposed Site Drainage Patterns

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

☑Yes
☐ No

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

Describe proposed site drainage patterns::

The existing storm drains will be extended to new energy dissipaters. These drainages will then discharge directly to the San Diego River.

Post development site drainage is directed onsite via overland flow; surface swales, curb and gutter, and/or the private storm drain systems to Modular Wetland biofiltration systems. The Modular Wetland Systems will then discharge to the San Diego River. For discharge, locations and flowrates see Proposed Drainage exhibits provided in the drainage study.

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

☑On-site storm drain inlets

☑Interior floor drains and elevator shaft sump pumps

☑Interior parking garages

☑Need for future indoor & structural pest control

☑Landscape/Outdoor Pesticide Use

☑Pools, spas, ponds, decorative fountains, and other water features

☑Food service

☑Refuse areas

☐ Industrial processes

☑Outdoor storage of equipment or materials

☑Vehicle and Equipment Cleaning

☑Vehicle/Equipment Repair and Maintenance

☑Fuel Dispensing Areas

☐ Loading Docks

☑Fire Sprinkler Test Water

☑Miscellaneous Drain or Wash Water

☑Plazas, sidewalks, and parking lots

Description / Additional Information:

Identification and Narrative of Receiving Water and Pollutants of Concern

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

The primary discharge location is the San Diego River that is tributary to the Pacific Ocean.

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 and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
San Diego River (Lower)	Indicator Bacteria, Benthic Community Effects, Bifenthrin, Chlordane, Chloride, Color, Cyfluthrin, Cypermethrin, Nitrogen, Oxygen, Dissolved, Permethrin, Phosphorus, Pyrethroids, Total Dissolved Solids, Toxicity, Turbidity	Indicator Bacteria
Forester Creek	Indicator bacteria, Benthic Community Effects, Chloride, Nitrogen, Oxygen, Dissolved, Phosphorus, Selenium, Total Dissolved Solids, Turbidity	Indicator bacteria
Pacific Ocean Shoreline, San Diego HU, at the San Diego River outlet, at Dog Beach	Indicator bacteria	Indicator bacteria

Identification of Project Site Pollutants*

*Identification of project site pollutants 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 BMP Design Manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Expected from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment			
Nutrients			
Heavy Metals			
Organic Compounds			
Trash & Debris			

Oxygen Demanding Substances			
Oil & Grease			
Bacteria & Viruses			
Pesticides			

Hydromodification Management Requirements

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

☐ Yes, hydromodification management flow control structural BMPs required.

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

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

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

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

All discharge locations discharge directly to the San Diego River which is a river reach exempt from hydromodification management requirements per regional WMAA exhibit San Diego River Watershed Management Area HU 907.00, 436 mi2 (San Diego River Exempt FID 13084). Energy dissipation will be provided at all discharge locations.

Critical Coarse Sediment Yield Areas*

*This Section only required if hydromodification management requirements apply

Based on the maps provided within the WMAA, do potential critical coarse sediment yield areas exist within the project drainage boundaries?
N/A- Project is HMP Exempt

☐ Yes

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

If yes, have any of the optional analyses presented in Section 6.2 of the BMP Design Manual been performed?

☐ 6.2.1 Verification of Geomorphic Landscape Units (GLUs) Onsite

☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment

☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite

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

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

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

☐ Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 2.b of the SWQMP.

☐ Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections 6.2.4 and 6.2.5 as applicable, and the areas are identified on the SWQMP Exhibit.

Discussion / Additional Information:

Flow Control for Post-Project Runoff*

*This Section only required if hydromodification management requirements apply

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

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)

Other Site Requirements and Constraints

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

The site is constrained by the existing drainage conditions and storm drain elevations, flood elevations from the San Diego River, Forrester Creek, and Sycamore Creek, and the need to connect to existing roads in order to provide primary access to the site. The golf course is subject to shallow groundwater.

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.

Source Control BMP Checklist for All Development Projects (Standard Projects and Priority Development Projects)	Form I-4 Model BMP Design Manual [August 31, 2015]

Project Identification

Project Name: CARLTON OAKS COUNTRY CLUB & RESORT PA-1, PA-2, & PA-3

Permit Application Number: TM 2019-1 / DR 2019-5

Source Control BMPs

All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the Model BMP Design Manual for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the Model BMP 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 may be provided.

Source Control Requirement	Applied?		
SC-1 Prevention of Illicit Discharges into the MS4	☑Yes	☐ No	☐ N/A
Discussion / justification if SC-1 not implemented:			
SC-2 Storm Drain Stenciling or Signage	☑Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented:			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑Yes	☐ No	☐ N/A
Discussion / justification if SC-3 not implemented:			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑Yes	☐ No	☐ N/A
Discussion / justification if SC-4 not implemented:			

Form I-4 Page 2 of 2, Form Template Date: August 31, 2015			
Source Control Requirement	Applied?		
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented:			
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
☑On-site 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 SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.			

Site Design BMP Checklist for All Development Projects (Standard Projects and Priority Development Projects)	Form I-5 Model BMP Design Manual [August 31, 2015]

Project Identification

Project Name: CARLTON OAKS COUNTRY CLUB & RESORT PA-1, PA-2, & PA-3

Permit Application Number: TM 2019-1 / DR 2019-5

Site Design BMPs

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 Model BMP Design 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 Model BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

Site Design Requirement	Applied?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☑Yes	☐ No	☐ N/A
Discussion / justification if SD-1 not implemented:			
SD-2 Conserve Natural Areas, Soils, and Vegetation	☑Yes	☐ No	☐ N/A
Discussion / justification if SD-2 not implemented:			
SD-3 Minimize Impervious Area	☑Yes	☐ No	☐ N/A
Discussion / justification if SD-3 not implemented:			
SD-4 Minimize Soil Compaction	☑Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented:			
SD-5 Impervious Area Dispersion	☑Yes	☐No	☐ N/A
Discussion / justification if SD-5 not implemented:			

Form I-5 Page 2 of 2, Form Template Date: August 31, 2015			
Site Design Requirement	Applied?		
SD-6 Runoff Collection	☐Yes	☑No	☑N/A
Discussion / justification if SD-6 not implemented:			
SD-7 Landscaping with Native or Drought Tolerant Species	☑Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented:			
SD-8 Harvesting and Using Precipitation	☐ Yes	☑No	☐ N/A
Discussion / justification if SD-8 not implemented: The landscaping will be part of the common areas maintained by the HOA or the Golf Course Operator rather than the individual unit owners. Harvest and Re-use are Not Feasible based upon Worksheet I-7 – there is not sufficient project demand for using rainwater to irrigate the development landscaping (or flush toilets). A portion of the treated runoff may be directed, where feasible, to the water features on the golf course.			

Summary of PDP Structural BMPs	Form I-6 (PDPs) Model BMP Design Manual [August 31, 2015]
Project Identification	
Project Name: CARLTON OAKS COUNTRY CLUB & RESORT PA-1, PA-2, & PA-3	
Permit Application Number: TM 2019-1 / DR 2019-5	
PDP Structural BMPs	
All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s). PDP structural BMPs must be verified by the local jurisdiction at the completion of construction. This may include requiring the project owner or project owner's representative and engineer of record to certify construction of the structural BMPs (see Section 1.12 of the BMP Design Manual). PDP structural BMPs must be maintained into perpetuity, and the local jurisdiction must confirm the maintenance (see Section 7 of the BMP Design 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).	
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 BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate. The project is exempt from Hydromodification Management requirements (discharge to exempt San Diego River reach). Worksheet I-7 indicates that the demand is insufficient to support Harvest & Reuse. Soil type and seasonal high ground water limits the ability for infiltration, and basins within the golf course adjacent to the development areas. Runoff from the site development will be directed to Modular Wetland Systems for treatment to satisfy the requirements for Biofiltration BF-3 (TAPE Certified for GULD pollutant removal effectiveness). • PA-1 (West) is composed of DMA-1 and DMA-2. DMA-1 will be treated with 2-8x20 MWS units while DMA 2 will be treated by 1-8x20 MWS unit. The neighborhood proposes 86 single family homes.	

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

- PA-2 (North): is composed of DMA-3, DMA-4, SD-1A, SD-1B, and SD-1C. The neighborhood proposes 150 new homes and includes the demolition of a few houses adjacent to Carlton Oaks Drive to build 7 new homes. The onsite improvements and construction are part of DMA-3 and 4 and will be treated using 3-8x24 and 2-8x24 MWS units respectively. The work around the existing houses will trigger some work along Carlton Oaks Drive. SD-1A through C are proposed street trees that will be placed along Carlton Oaks Drive to treat new imperviousness associated with the offsite work.
- PA-3 (Country Club & Resort): consists of DMA-5 through 8. DMA-5, 6 and 7 are part of the new development while DMA-8 bounds an existing building. The proposed development will be treated using 1-8x20 MWS unit for DMA-5, 1-8x24 MWS unit for DMA-6, 1-8x12 MWS unit for DMA-7, and 1-4x15 MWS unit for DMA-8.
- The remaining impervious areas are from the all-weather EVA road (20' wide) along the golf course. Runoff is directed as sheet flow to the adjacent golf course turf to provide dispersion.
- The emergency access road for PA-3 will limit an existing parking space and one landscape pocket on Calle del Verde. These two spaces will be replaced with permeable pavers (SD-6B) totaling 516 square feet that do not receive any flow from other areas and can be considered a self-retaining area. A proposed 150 square feet of paved parking space on Calle del Verde is considered de minimis (less than 250 square feet) and drains away from the site.
- Additionally, there will be regrading, resurfacing, and replacing paths of travel within the golf course. These areas meets the criteria to be considered self-retaining and does not need additional structural BMPs.

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

Structural BMP ID No. BF-3-1

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Homeowners Association
Who will maintain this BMP into perpetuity?	Homeowners Association
What is the funding mechanism for maintenance?	Homeowners Association Dues

Structural BMP ID No. BF-3-1

Construction Plan Sheet No. N/A

Discussion (as needed):

Modular Wetland Systems , a proprietary biofiltration BMP (BF-3-1), will be located south of Private Drive 'A'.

The unit has been sized as flow-through facilities using the following methodology:

- Delineate DMA area draining to structural BMP.
- Calculate the runoff coefficient associated with the DMA
- Multiply the Tributary area (acres) by the runoff coefficient found and the San Diego's design intensity (0.20 in/hr).
- Multiply the flow rate obtained by 1.5 (safety factor)
- Choose number and size of units accordingly

2-8x20 MWS units have been sized for this DMA.

The flows discharge to the existing San Diego River.

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

Structural BMP ID No. BF-3-2

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Homeowners Association
Who will maintain this BMP into perpetuity?	Homeowners Association
What is the funding mechanism for maintenance?	Homeowners Association Dues

Structural BMP ID No. BF-3-2

Construction Plan Sheet No. N/A

Discussion (as needed):

Modular Wetland Systems , a proprietary biofiltration BMP (BF-3-2), will be located south of Private Drive 'A'.

The unit has been sized as flow-through facilities using the following methodology:

- Delineate DMA area draining to structural BMP.
- Calculate the runoff coefficient associated with the DMA
- Multiply the Tributary area (acres) by the runoff coefficient found and the San Diego's design intensity (0.20 in/hr).
- Multiply the flow rate obtained by 1.5 (safety factor)
- Choose number and size of units accordingly

1-8x24 MWS units have been sized for this DMA.

The flows discharge to the existing San Diego River.

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

Structural BMP ID No. BF-3-3

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Homeowners Association
Who will maintain this BMP into perpetuity?	Homeowners Association
What is the funding mechanism for maintenance?	Homeowners Association Dues

Structural BMP ID No. BF-3-3

Construction Plan Sheet No. N/A

Discussion (as needed):

Modular Wetland Systems , a proprietary biofiltration BMP (BF-3-3), will be located west of Private Drive 'E' (near the intersection with Private Drive 'F'.)

The unit has been sized as flow-through facilities using the following methodology:

- Delineate DMA area draining to structural BMP.
- Calculate the runoff coefficient associated with the DMA
- Multiply the Tributary area (acres) by the runoff coefficient found and the San Diego's design intensity (0.20 in/hr).
- Multiply the flow rate obtained by 1.5 (safety factor)
- Choose number and size of units accordingly

3-8x24 MWS units have been sized for this DMA.

The flows discharge to the existing San Diego River.

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

Structural BMP ID No. BF-3-4

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Homeowners Association
Who will maintain this BMP into perpetuity?	Homeowners Association
What is the funding mechanism for maintenance?	Homeowners Association Dues

Structural BMP ID No. BF-3-4

Construction Plan Sheet No. N/A

Discussion (as needed):

Modular Wetland Systems , a proprietary biofiltration BMP (BF-3-4), will be located at the easterly corner of the neighborhood

The unit has been sized as flow-through facilities using the following methodology:

- Delineate DMA area draining to structural BMP.
- Calculate the runoff coefficient associated with the DMA
- Multiply the Tributary area (acres) by the runoff coefficient found and the San Diego's design intensity (0.20 in/hr).
- Multiply the flow rate obtained by 1.5 (safety factor)
- Choose number and size of units accordingly

2-8x24 MWS units have been sized for this DMA.

The flows discharge to the existing San Diego River.

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

Structural BMP ID No. BF-3-5

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Country / Resort Owner
Who will maintain this BMP into perpetuity?	Country / Resort Owner
What is the funding mechanism for maintenance?	Country / Resort Revenue

Structural BMP ID No. BF-3-5

Construction Plan Sheet No. N/A

Discussion (as needed):

Modular Wetland Systems , a proprietary biofiltration BMP (BF-3-5), will be located at the north-westerly corner of the DMA-5

The unit has been sized as flow-through facilities using the following methodology:

- Delineate DMA area draining to structural BMP.
- Calculate the runoff coefficient associated with the DMA
- Multiply the Tributary area (acres) by the runoff coefficient found and the San Diego's design intensity (0.20 in/hr).
- Multiply the flow rate obtained by 1.5 (safety factor)
- Choose number and size of units accordingly

1-8x20 MWS units have been sized for this DMA.

The flows discharge to the existing San Diego River.

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

Structural BMP ID No. BF-3-6

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Country / Resort Owner
Who will maintain this BMP into perpetuity?	Country / Resort Owner
What is the funding mechanism for maintenance?	Country / Resort Revenue

Form I-6 Page 14 of 24 (Copy as many as needed) , Form Template Date: August 31, 2015
Structural BMP ID No. BF-3-6
Construction Plan Sheet No. N/A
Discussion (as needed): Modular Wetland Systems , a proprietary biofiltration BMP (BF-3-6), will be located in front of the building in DMA-6. The unit has been sized as flow-through facilities using the following methodology: - Delineate DMA area draining to structural BMP. - Calculate the runoff coefficient associated with the DMA - Multiply the Tributary area (acres) by the runoff coefficient found and the San Diego's design intensity (0.20 in/hr). - Multiply the flow rate obtained by 1.5 (safety factor) - Choose number and size of units accordingly 1-8x24 MWS units have been sized for this DMA. The flows discharge to the existing San Diego River.

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

Structural BMP ID No. BF-3-7

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Country / Resort Owner
Who will maintain this BMP into perpetuity?	Country / Resort Owner
What is the funding mechanism for maintenance?	Country / Resort Revenue

Structural BMP ID No. BF-3-7

Construction Plan Sheet No. N/A

Discussion (as needed):

Modular Wetland Systems , a proprietary biofiltration BMP (BF-3-7), will be located between the parking lot and the road connecting the site to existing Calle del Verde.

The unit has been sized as flow-through facilities using the following methodology:

- Delineate DMA area draining to structural BMP.
- Calculate the runoff coefficient associated with the DMA
- Multiply the Tributary area (acres) by the runoff coefficient found and the San Diego's design intensity (0.20 in/hr).
- Multiply the flow rate obtained by 1.5 (safety factor)
- Choose number and size of units accordingly

1-8x12 MWS units have been sized for this DMA.

The flows discharge to the existing San Diego River.

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

Structural BMP ID No. BF-3-8

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Country / Resort Owner
Who will maintain this BMP into perpetuity?	Country / Resort Owner
What is the funding mechanism for maintenance?	Country / Resort Revenue

Structural BMP ID No. BF-3-8

Construction Plan Sheet No. N/A

Discussion (as needed):

Modular Wetland Systems , a proprietary biofiltration BMP (BF-3-8), will be located at the easterly corner of the neighborhood

The unit has been sized as flow-through facilities using the following methodology:

- Delineate DMA area draining to structural BMP.
- Calculate the runoff coefficient associated with the DMA
- Multiply the Tributary area (acres) by the runoff coefficient found and the San Diego's design intensity (0.20 in/hr).
- Multiply the flow rate obtained by 1.5 (safety factor)
- Choose number and size of units accordingly

1-4x15 MWS units have been sized for this DMA.

The flows discharge to the existing San Diego River.

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

Structural BMP ID No. SD-1A

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Homeowners Association
Who will maintain this BMP into perpetuity?	Homeowners Association
What is the funding mechanism for maintenance?	Homeowners Association Dues

Structural BMP ID No. SD-1A

Construction Plan Sheet No. N/A

Discussion (as needed):

A street tree is being proposed for this area with the following dimensions and design requirements:

- 2-trees with a 10’ diameter canopy
- 36” of soil depth
- 7.0’ by 7.5’ soil boxes

Please see calculations in attachment 1e

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

Structural BMP ID No. SD-1B

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Homeowners Association
Who will maintain this BMP into perpetuity?	Homeowners Association
What is the funding mechanism for maintenance?	Homeowners Association Dues

Structural BMP ID No. SD-1B

Construction Plan Sheet No. N/A

Discussion (as needed):

A street tree is being proposed for this area with the following dimensions and design requirements:

- 3-trees with a 10’ diameter canopy
- 36” of soil depth
- 7.0’ by 7.5’ soil boxes

Please see calculations in attachment 1e

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

Structural BMP ID No. SD-1C

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Homeowners Association
Who will maintain this BMP into perpetuity?	Homeowners Association
What is the funding mechanism for maintenance?	Homeowners Association Dues

Form I-6 Page 24 of 24 (Copy as many as needed) , Form Template Date: August 31, 2015
Structural BMP ID No. SD-1C
Construction Plan Sheet No. N/A
Discussion (as needed): A street tree is being proposed for this area with the following dimensions and design requirements: - 2-trees with a 10’ diameter canopy - 36” of soil depth - 7.0’ by 7.5’ soil boxes Please see calculations in attachment 1e

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

Structural BMP ID No. SD-6B

Construction Plan Sheet No. N/A

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

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

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Hunsaker & Associates San Diego, Inc. Alisa S. Vialpando, PE 9707 Waples Street, San Diego, CA 858-558-4500
Who will be the final owner of this BMP?	Homeowners Association
Who will maintain this BMP into perpetuity?	Homeowners Association
What is the funding mechanism for maintenance?	Homeowners Association Dues

Form I-6 Page 24 of 24 (Copy as many as needed) , Form Template Date: August 31, 2015
Structural BMP ID No. SD-6B
Construction Plan Sheet No. N/A
Discussion (as needed): Site Design BMP- Permeable Pavement (SD-6B) : DMA consists only of Permeable Pavement = 516 sft Ratio of total drainage area to area of permeable pavement is 1:1. Therefore, this area can be considered a self-retaining DMA. Please see calculations in attachment 1e

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	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☑Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☐ Included on DMA Exhibit in Attachment 1a ☑Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1d	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☑Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines	☑Included

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

The DMA Exhibit must identify:

☑Underlying hydrologic soil group

☑Approximate depth to groundwater

☑Existing natural hydrologic features (watercourses, seeps, springs, wetlands)

☐ Critical coarse sediment yield areas to be protected

☑Existing topography and impervious areas

☑Existing and proposed site drainage network and connections to drainage offsite

☑Proposed demolition

☑Proposed grading

☑Proposed impervious features

☑Proposed design features and surface treatments used to minimize imperviousness

☑Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)

☑Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)

☑Structural BMPs (identify location, type of BMP, and size/detail)

ATTACHMENT 1A

SOURCE CONTROL BMPs:

SC-1 PREVENTION OF ILLICIT DISCHARGES TO MS4
SC-2 STORM DRAIN STENCILING OR SIGNAGE
SC-3 PROTECT OUTDOOR MATERIAL STORAGE AREAS
SC-4 PROTECT MATERIALS STORED IN OUTDOOR WORK AREAS
SC-5 PROTECT TRASH STORAGE AREAS
SC-6 ADDITIONAL BMPS BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS
- SC-6A ON-SITE STORM DRAIN INLETS
- SC-6B INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS
- SC-6C INTERIOR PARKING GARAGES
- SC-6D NEED FOR FUTURE INDOOR & STRUCTURAL PEST CONTROL
- SC-6E LANDSCAPE/OUTDOOR PESTICIDE USE
- SC-6F POOLS, SPAS, PONDS, FOUNTAINS, AND OTHER WATER FEATURES
- SC-6G FOOD SERVICE
- SC-6H REFUSE AREAS
- SC-6J OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS
- SC-6K VEHIVLE AND EQUIPMENT CLEANING
- SC-6L VEHICLE/EQUIPMENT REPAIR AND MAINTENANCE
- SC-6M FUEL DISPENSING AREA
- SC-6O FIRE SPRINKLER TEST WATER
- SC-6P MISCELLANEOUS DRAIN OR WASH WATER
- SC-6Q PLAZAS, SIDEWALKS, AND PARKING LOTS

SITE DESIGN BMPs:

SD-1 MAINTAIN NATURAL HYDROLOGIC FEATURES
SD-2 CONSERVE NATURAL AREAS, SOILS, VEGETATION
SD-3 MINIMIZE IMPERVIOUS AREAS
SD-4 MINIMIZE SOIL COMPACTION
SD-5 IMPERVIOUS AREA DISPERSION
SD-6 RUNOFF COLLECTION
SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

UNDERLYING SOIL GROUP : A, B & D
APPROXIMATE DEPTH TO GROUNDWATER > 5'
NO CRITICAL COARSE AREAS REQUIRE PRESERVATION

LEGEND:	SYMBOL:
CEQA STUDY BOUNDARY	
DMA BOUNDARY	
DAYLIGHT	
PROPOSED STORM DRAIN	
EXISTING STORM DRAIN	
HYDROLOGIC SOIL TYPE BOUNDARY	
FLOW LINE	
SUBAREA ACREAGE	00.00 ACRES
DMA ICON	DMA 1
CITY BOUNDARY	
SUBDIVISION BOUNDARY	

LEGEND:	SYMBOL:
IMPERVIOUS - ROOF	
IMPERVIOUS - CONCRETE/APHALT	
PERVIOUS - LANDSCAPE	
PERVIOUS - SAND	
SEMI-PERVIOUS - DG TRAIL	
SELF-MITIGATING AREA	
SELF-RETAINING AREA	
INLET	
HYDROLOGIC SOIL TYPE	D
POINT OF COMPLIANCE	X
STRUCTURAL BMP\ MWS UNIT	

50 0 50 100 150
SCALE 1" = 50'

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DMA MAP
PA-1
CARLTON OAKS
CITY OF SANTEE, CALIFORNIA

MAP 1 OF 5

W.O.# 2167-0228

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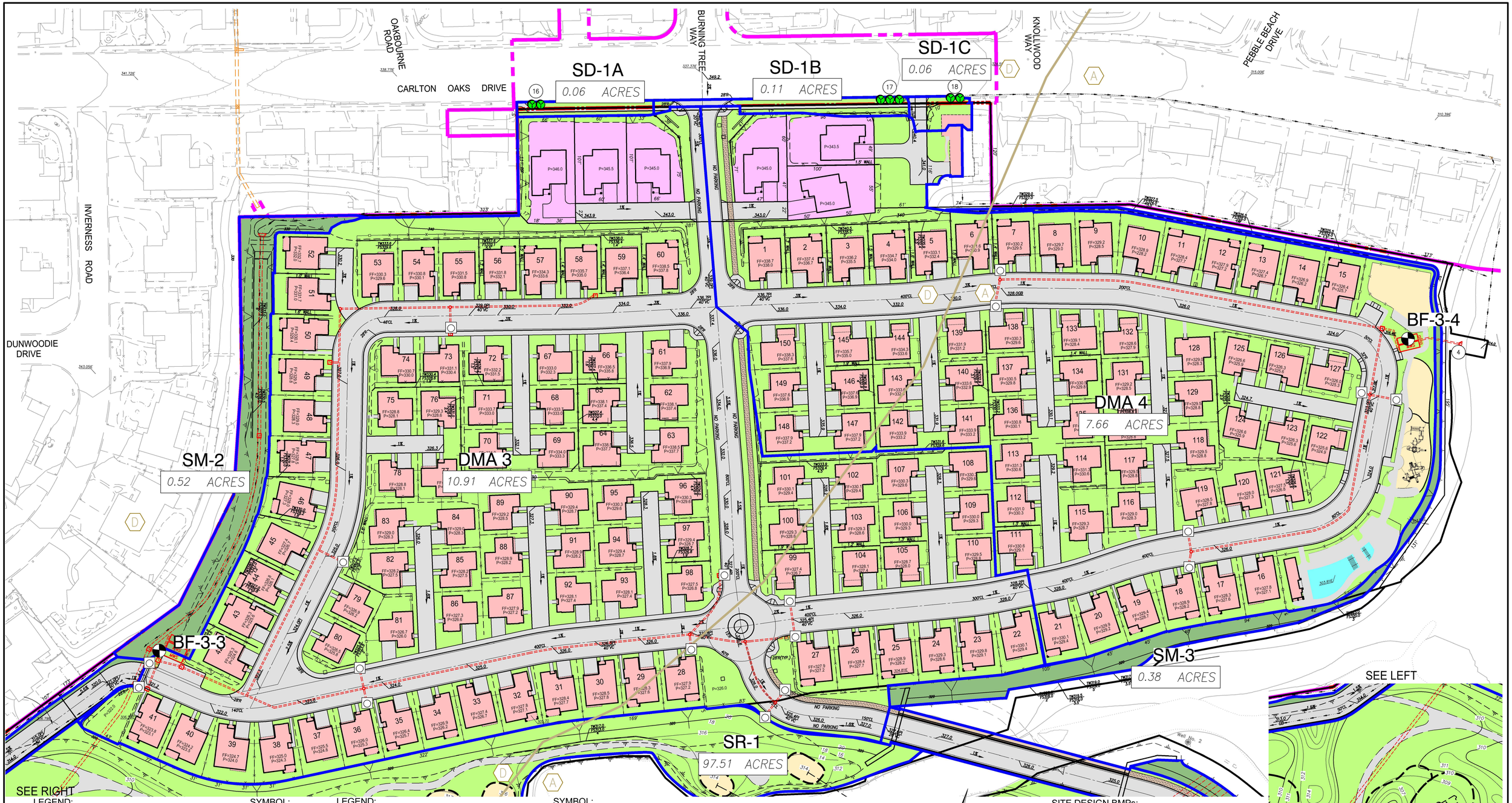

LEGEND:	SYMBOL:
CEQA STUDY BOUNDARY	
DMA BOUNDARY	
DAYLIGHT	
PROPOSED STORM DRAIN	
EXISTING STORM DRAIN	
HYDROLOGIC SOIL TYPE BOUNDARY	
FLOW LINE	
SUBAREA ACREAGE	00.00 ACRES
DMA ICON	DMA 1
CITY BOUNDARY	
SUBDIVISION BOUNDARY	
INLET	

LEGEND:	SYMBOL:
IMPERVIOUS - ROOF	
IMPERVIOUS - CONCRETE/APHALT	
PERVIOUS - LANDSCAPE	
PERVIOUS - SAND	
SEMI-PERVIOUS - DG TRAIL	
SELF-MITIGATING AREA	
GRADED PADS TO BE DEVELOPED (70% IMPERVIOUNESS)	
IMPERVIOUS/POOL(SC-6F)	
HYDROLOGIC SOIL TYPE	D
POINT OF COMPLIANCE	X
STRUCTURAL BMP\ MWS UNIT	
BMP\ TREE WELL	

SOURCE CONTROL BMPs:

- SC-1 PREVENTION OF ILLICIT DISCHARGES TO MS4
- SC-2 STORM DRAIN STENCILING OR SIGNAGE
- SC-3 PROTECT OUTDOOR MATERIAL STORAGE AREAS
- SC-4 PROTECT MATERIALS STORED IN OUTDOOR WORK AREAS
- SC-5 PROTECT TRASH STORAGE AREAS
- SC-6 ADDITIONAL BMPS BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS
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  - SC-6B INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS
  - SC-6C INTERIOR PARKING GARAGES
  - SC-6D NEED FOR FUTURE INDOOR & STRUCTURAL PEST CONTROL
  - SC-6E LANDSCAPE/OUTDOOR PESTICIDE USE
  - SC-6F POOLS, SPAS, PONDS, FOUNTAINS, AND OTHER WATER FEATURES
  - SC-6G FOOD SERVICE
  - SC-6H REFUSE AREA
  - SC-6J OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS
  - SC-6K VEHIVLE AND EQUIPMENT CLEANING
  - SC-6L VEHICLE/EQUIPMENT REPAIR AND MAINTENANCE
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  - SC-6O FIRE SPRINKLER TEST WATER
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UNDERLYING SOIL GROUP : A, B & D
APPROXIMATE DEPTH TO GROUNDWATER > 5'
NO CRITICAL COARSE AREAS REQUIRE PRESERVATION

50 0 50 100 150
SCALE 1" = 50'

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DMA MAP
PA-2
CARLTON OAKS
CITY OF SANTEE, CALIFORNIA

MAP 2 OF 5

W.O.# 2167-0228

SEE BELOW

DMA 8
1.28 ACRES
BF-3-8

DMA 5
2.76 ACRES
BF-3-5

DMA 6
2.74 ACRES
BF-3-6

DMA 7
1.68 ACRES
BF-3-7

SM-4
2.00 ACRES

SEE ABOVE

PRACTICE GREEN

WATER SURFACE BOTTOM 294

SOURCE CONTROL BMPs:

SC-1 PREVENTION OF ILLICIT DISCHARGES TO MS4
SC-2 STORM DRAIN STENCILING OR SIGNAGE
SC-3 PROTECT OUTDOOR MATERIAL STORAGE AREAS
SC-4 PROTECT MATERIALS STORED IN OUTDOOR WORK AREAS
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NO CRITICAL COARSE AREAS REQUIRE PRESERVATION

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LEGEND:	SYMBOL:
IMPERVIOUS - ROOF	
IMPERVIOUS - CONCRETE/APHALT	
PERVIOUS - LANDSCAPE	
PERVIOUS - PERMEABLE PAVEMENT-SD-6B	
PERVIOUS/ LANDSCAPE/ SELF-MITIGATING AREA	
SELF-RETAINING AREA	
INLET	
IMPERVIOUS/POOL(SC-6F)	
HYDROLOGIC SOIL TYPE	D
POINT OF COMPLIANCE	X
PERVIOUS - SAND	
SEMI-PERVIOUS - DG TRAIL	

LEGEND:	SYMBOL:
CEQA STUDY BOUNDARY	
DMA BOUNDARY	
DAYLIGHT	
PROPOSED STORM DRAIN	
EXISTING STORM DRAIN	
HYDROLOGIC SOIL TYPE BOUNDARY	
FLOW LINE	
SUBAREA ACREAGE	00.00 ACRES
DMA ICON	DMA 1
CITY BOUNDARY	
SUBDIVISION BOUNDARY	

SCALE 1" = 50'

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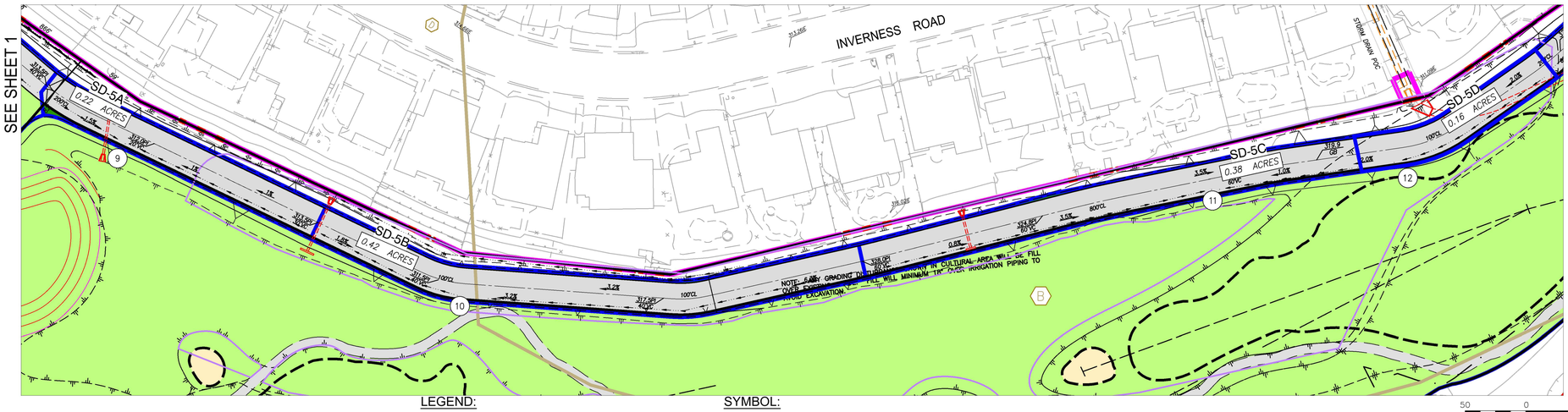
DMA MAP
PA-3
CARLTON OAKS
CITY OF SANTEE, CALIFORNIA

MAP 3 OF 5

W.O.# 2167-0228



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UNDERLYING SOIL GROUP : A, B & D
APPROXIMATE DEPTH TO GROUNDWATER > 5'
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LEGEND:

	SYMBOL:
CEQA STUDY BOUNDARY	
DMA BOUNDARY	
DAYLIGHT	
PROPOSED STORM DRAIN	
EXISTING STORM DRAIN	
FLOW LINE	
SUBAREA ACREAGE	00.00 ACRES
DMA ICON	DMA 1
IMPERVIOUS - ROOF	
IMPERVIOUS - CONCRETE/APHALT	
PERVIOUS - LANDSCAPE	
SEMI-PERVIOUS - DG TRAIL	
PWEVIOUS-SELF-MITIGATING AREA	
PERVIOUS-SAND	
INLET	
HYDROLOGIC SOIL TYPE	D
POINT OF COMPLIANCE	X
STRUCTURAL BMP\ MWS UNIT	
CITY BOUNDARY	
SUBDIVISION BOUNDARY	

DISPERSE IMPERVIOUS AREAS REQUIREMENTS:

SD-5A AN AREA EQUIVALENT TO 0.5:1 OF TOTAL IMPERVIOUS AREA OF AMENDED SOIL IS REQUIRED
-2,509 SF OF AMENDED SOIL PER SD-5 IMPERVIOUS AREA DISPERSION FACT SHEET

SD-5B AN AREA EQUIVALENT TO 1:1 OF TOTAL IMPERVIOUS AREA OF SOIL TYPE B IS REQUIRED
-9,236 SF OF SOIL TYPE B

SD-5C AN AREA EQUIVALENT TO 1:1 OF TOTAL IMPERVIOUS AREA OF SOIL TYPE B IS REQUIRED
-8,383 SF OF SOIL TYPE B

SD-5D AN AREA EQUIVALENT TO 1:1 OF TOTAL IMPERVIOUS AREA OF SOIL TYPE B IS REQUIRED
3,451 SF OF SOIL TYPE B

SD-5E AN AREA EQUIVALENT TO 0.5:1 OF TOTAL IMPERVIOUS AREA OF AMENDED SOIL IS REQUIRED
-6,813 SF OF AMENDED SOIL PER SD-5 IMPERVIOUS AREA DISPERSION FACT SHEET

SD-5F AN AREA EQUIVALENT TO 0.5:1 OF TOTAL IMPERVIOUS AREA OF AMENDED SOIL IS REQUIRED
-4,496 SF OF AMENDED SOIL PER SD-5 IMPERVIOUS AREA DISPERSION FACT SHEET

SD-5G AN AREA EQUIVALENT TO 0.5:1 OF TOTAL IMPERVIOUS AREA OF AMENDED SOIL IS REQUIRED
-5,162 SF OF AMENDED SOIL PER SD-5 IMPERVIOUS AREA DISPERSION FACT SHEET

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DMA MAP
ACCESS ROAD
CARLTON OAKS
CITY OF SANTEE, CALIFORNIA

MAP 4 OF 5

W.O.# 2167-0228

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LEGEND:

SYMBOL:

- PROJECT BOUNDARY
- DMA BOUNDARY
- CITY BOUNDARY
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- FLOW LINE
- SUBAREA ACREAGE — 00.00 ACRES
- DMA ICON — DMA 1
- IMPERVIOUS - ROOF
- IMPERVIOUS - CONCRETE/APHALT
- PERVIOUS - LANDSCAPE
- SEMI-PERVIOUS - DG TRAIL
- SELF-MITIGATING AREA
- SELF-RETAINING AREA
- DE-MINIMIS = 150 SFT
- INLET
- HYDROLOGIC SOIL TYPE — D
- POINT OF COMPLIANCE — X
- STRUCTURAL BMP\ MWS UNIT
- PERVIOUS - PERMEABLE PAVERS
- GRADED PADS TO BE DEVELOPED (70% IMPERVIOUNESS)

SITE DESIGN BMPs:
SD-1 MAINTAIN NATURAL HYDROLOGIC FEATURES
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SD-4 MINIMIZE SOIL COMPACTION
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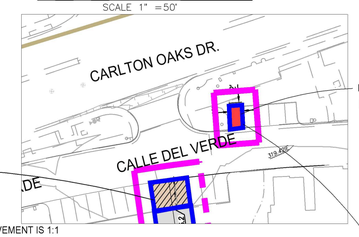
UNDERLYING SOIL GROUP : A, B & D
APPROXIMATE DEPTH TO GROUNDWATER > 5'
NO CRITICAL COARSE AREAS REQUIRE PRESERVATION

0 50 100 150
SCALE 1" =50'



PEREMABLE PAVEMENT SD-6B
SELF RETAINING AREA= 516 SFT

REPLACE THE EXISTING ONE PARKING SPACE
AND ONE LANDSCAPE POCKET WITH PERMEABLE PAVEMENT.
THIS DMA CONSISTS ONLY OF PERMEABLE PAVEMENT.
RATIO OF TOTAL DRAINAGE AREA TO AREA OF PERMEABLE PAVEMENT IS 1:1

SR-1
97.51 ACRES

SR-2
3.44 ACRES

200 0 200 400 600
SCALE 1"= 200'

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DMA MAP
GOLF COURSE
CARLTON OAKS
CITY OF SANTEE, CALIFORNIA

MAP 5 OF 5

W.O.# 2167-0228

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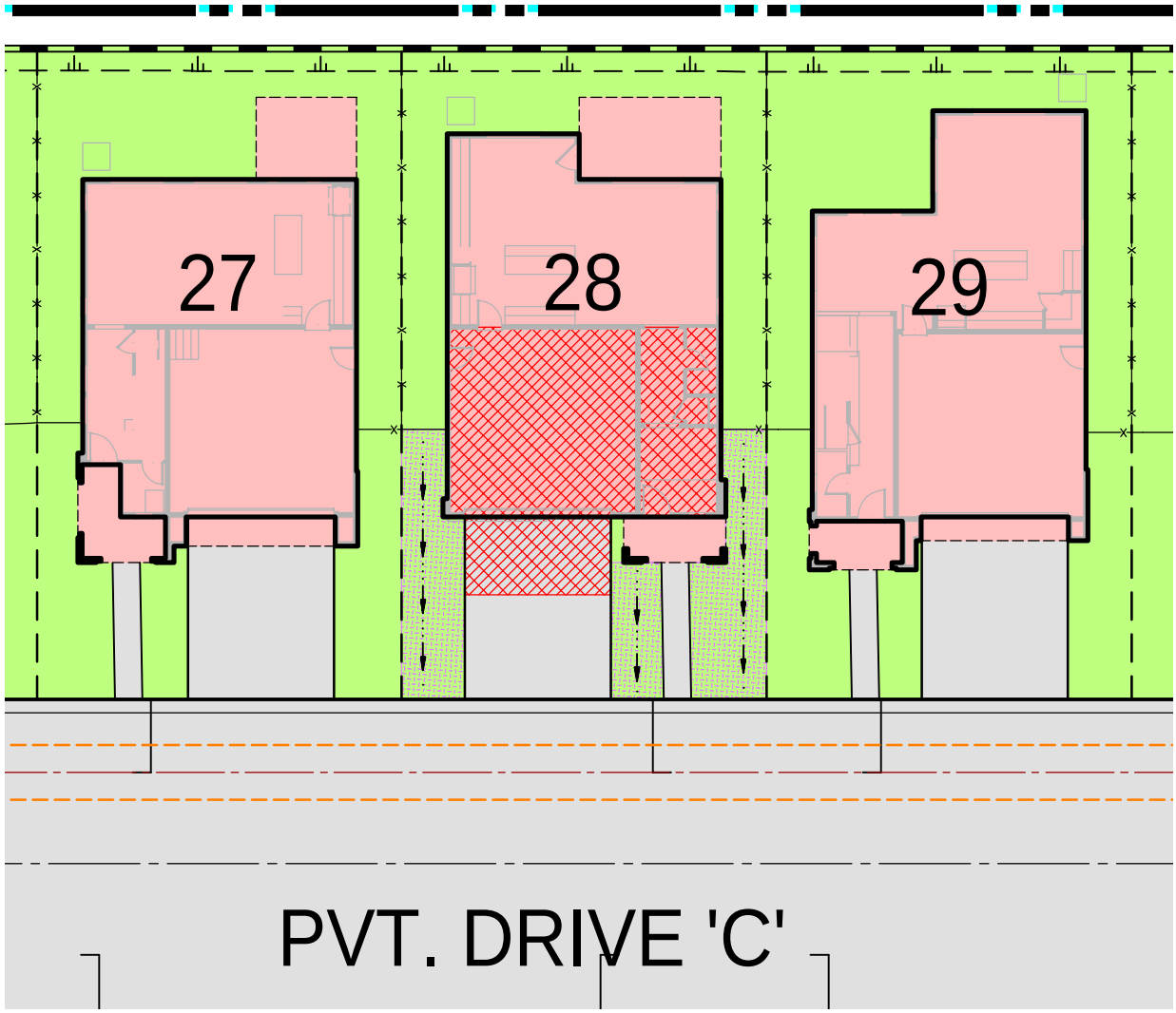

TYPICAL LOT DISPERSION:

IMPERVIOUS - ROAD.....

IMPERVIOUS - CONCRETE/APHALT.....

PERVIOUS - LANDSCAPE.....

DISPERSION AREAS PER SD-5 (760 SFT PER LOT).....

LANDSCAPE PER SD-5 (470 SFT PER LOT) .....

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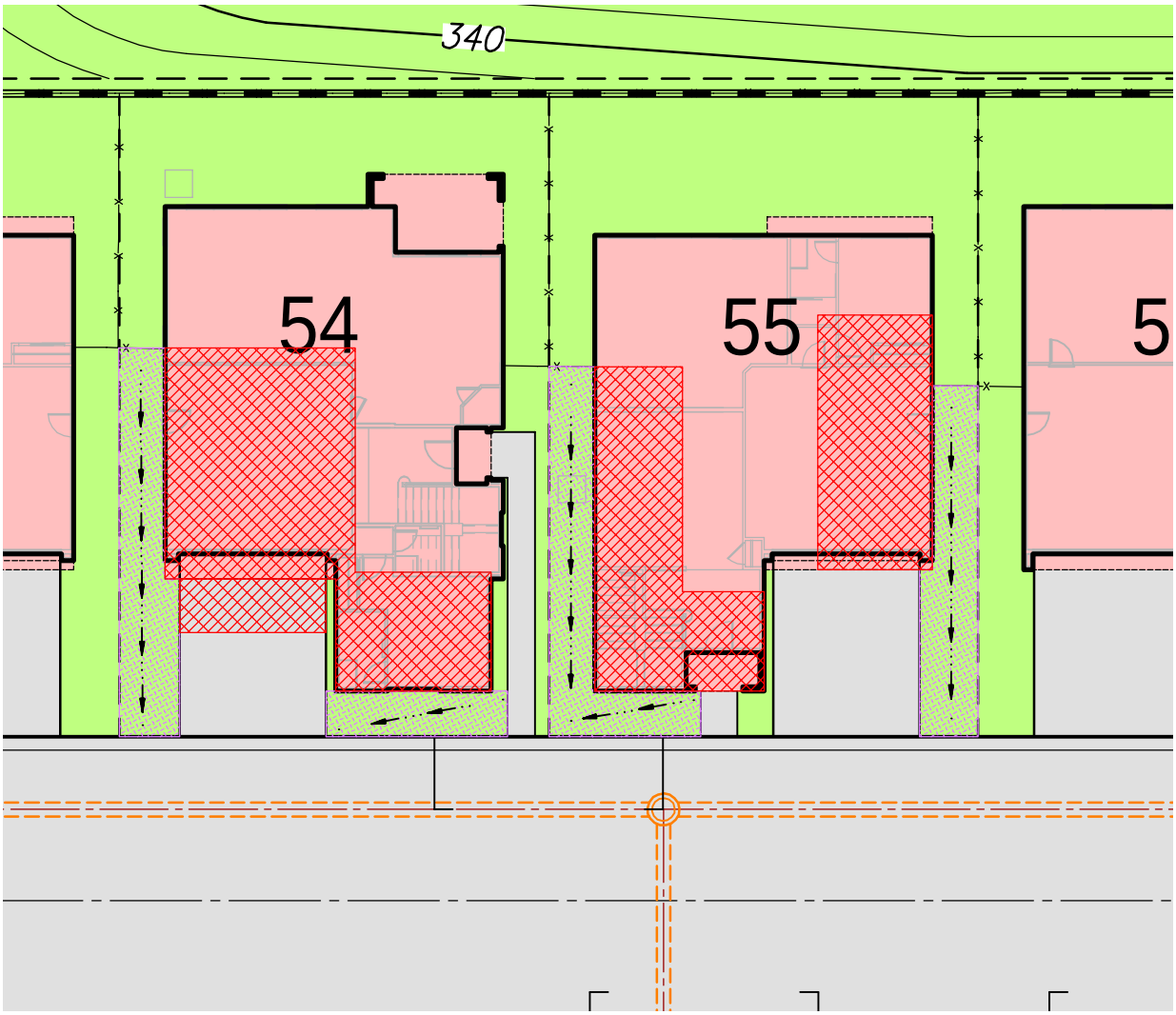
DISPERSION AREA EXHIBIT
FOR PA-1

CARLTON OAKS
CITY OF SATEE,
CALIFORNIA



TYPICAL LOT DISPERSION:

IMPERVIOUS - ROAD.....

IMPERVIOUS - CONCRETE/APHALT.....

PERVIOUS - LANDSCAPE.....

DISPERSION AREAS PER SD-5 (810SFT PER LOT).....

LANDSCAPE PER SD-5 (410 SFT PER LOT) .....

*PLEASE NOTE THAT THE SFT PER LOT IS AN AVERAGE BETWEEN THE TWO LOTS SHOWN ABOVE

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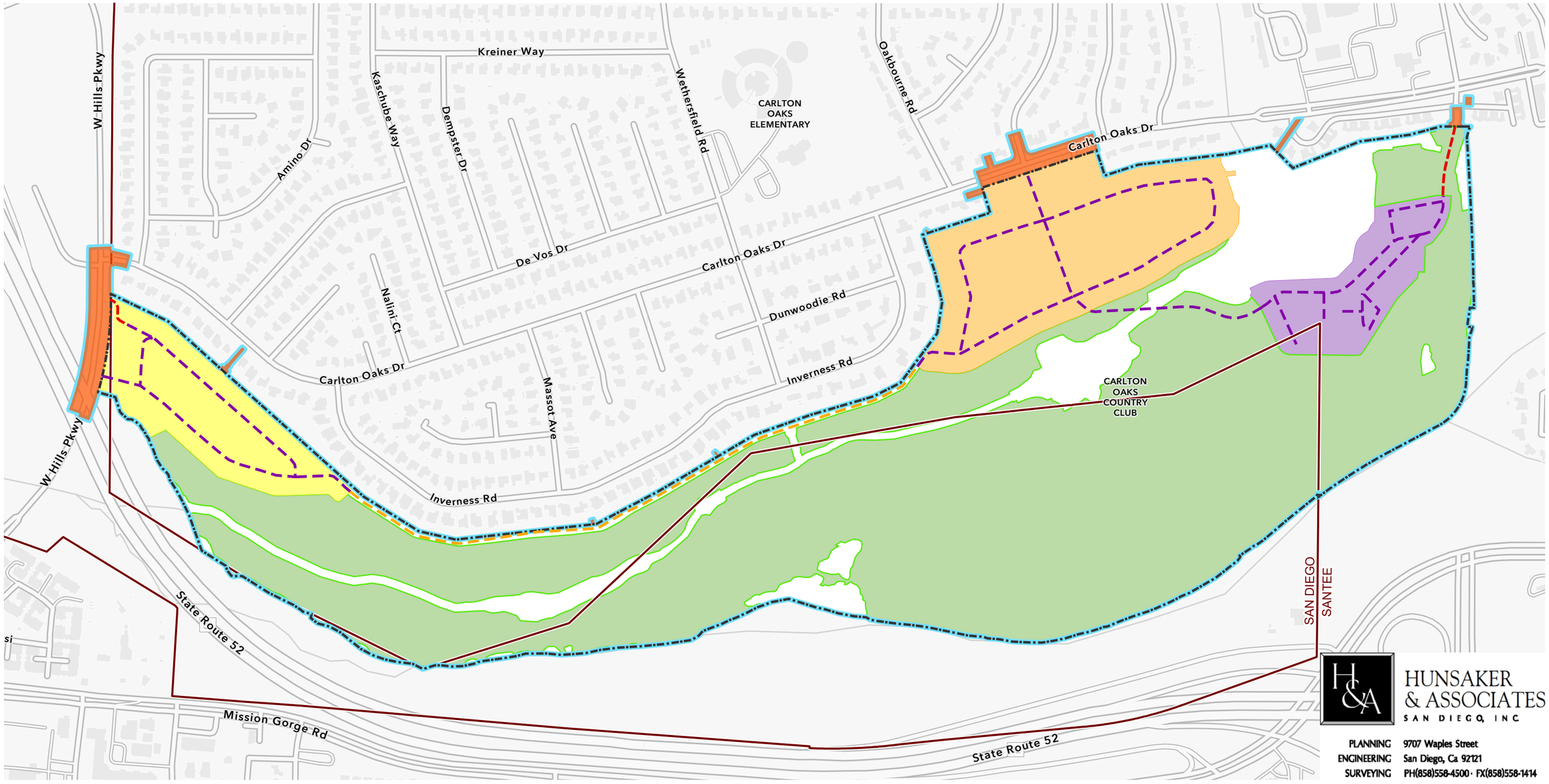
DISPERSION AREA EXHIBIT
FOR PA-2

CARLTON OAKS
CITY OF SATEE,
CALIFORNIA



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- Project Site
- Off-Site Improvements
- CEQA Study Area
- City of Santee/San Diego Municipal Boundary
- Residential North
- Residential West
- Golf Course Redesign
- Hotel and Clubhouse
- Emergency Vehicle Access Only
- Private Utility Maintenance Road
- Residential / Resort Circulation Roadway

SITE PLAN AND OFFSITE IMPROVEMNETS EXHIBIT

CARLTON OAKS COUNTRY CLUB AND RESORT

Source: Site Plan-Hunsaker & Associates (2024) & Graphic-ICF (2024)

N

0 225 450 Feet

1:5,400

ATTACHMENT 1B

Carlton Oaks
DMA CALCULATIONS

Appendix B: Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods

Tabular Summary of DMAs							Worksheet B-1		
DMA Unique Identifier	**Type of Surface**	**Area (square feet)**	**Impervious Area (square feet)**	**% Imp**	**Hydrologic** Soil Group	**Area Weighted Runoff Coefficient**	**Treated by (BMP ID)**	**Proposed Pollutant** Control Type	**Drains to (POC ID)**
DMA 1	ROOF	69,622	69,622	100%	D	0.90	BF-3-1	2 units 8x20 MWS	1
	CONCRETE/ASPHALT	85,417	85,417	100%	D	0.90			
	LANDSCAPE	100,727	0	0%	D	0.10			
DMA 2	ROOF	45,534	45,534	100%	D	0.90	BF-3-2	8x24 MWS	2
	CONCRETE/ASPHALT	52,676	52,676	100%	D	0.90			
	LANDSCAPE	59,212	0	0%	D	0.10			
DMA 3	ROOF	135,212	135,212	100%	D	0.90	BF-3-3	3 units 8x24 MWS	3
	CONCRETE/ASPHALT	173,485	173,485	100%	D	0.90			
	PAD	17,057	11,087	65%	D	0.62			
	LANDSCAPE	149,553	0	0%	D	0.10			
DMA 4	ROOF	91,534	91,534	100%	A	0.90	BF-3-4	2 units 8x24 MWS	4
	CONCRETE/ASPHALT	120,192	120,192	100%	A	0.90			
	POOL	1,893	1,893	100%	A	0.90			
	PAD	19,957	12,972	65%	A	0.62			
	DG OR SIMILAR	4,072	4,072	100%	A	0.90			
	LANDSCAPE	96,168	0	0%	A	0.10			
DMA 5	ROOF	22,599	22,599	100%	D	0.90	BF-3-5	8x20 MWS	5
	CONCRETE/ASPHALT	58,816	58,816	100%	D	0.90			
	POOL	1,357	1,357	100%	D	0.90			
	LANDSCAPE	37,271	0	0%	D	0.10			
DMA 6	ROOF	20,197	20,197	100%	D	0.90	BF-3-6	8x24 MWS	6
	CONCRETE/ASPHALT	84,559	84,559	100%	D	0.90			
	LANDSCAPE	14,727	0	0%	D	0.10			
DMA 7	ROOF	316	316	100%	D	0.90	BF-3-7	8x12 MWS	7
	CONCRETE/ASPHALT	59,042	59,042	100%	D	0.90			
	LANDSCAPE	13,970	0	0%	D	0.10			
DMA 8	ROOF	5,617	5,617	100%	D	0.90	BF-3-8	4x15 MWS	8
	CONCRETE/ASPHALT	18,099	18,099	100%	D	0.90			
	LANDSCAPE	31,902	0	0%	D	0.10			
SD-5A	CONCRETE/ASPHALT	6,523	6,523	100%	D	0.90	SD-5A	Dispersion Area	9
	LANDSCAPE	3,261	0	0%	B	0.10			
SD-5B	CONCRETE/ASPHALT	12,064	12,064	100%	D	0.90	SD-5B	Dispersion Area	10
	LANDSCAPE PER SD-B	6,032	0	0%	D	0.10			
SD-5C	CONCRETE/ASPHALT	10,891	10,891	100%	D	0.90	SD-5C	Dispersion Area	11
	LANDSCAPE PER SD-B	5,446	0	0%	D	0.10			
SD-5D	CONCRETE/ASPHALT	4,575	4,575	100%	D	0.90	SD-5D	Dispersion Area	12
	LANDSCAPE PER SD-B	2,288	0	0%	D	0.10			
SD-5E	CONCRETE/ASPHALT	17,713	17,713	100%	D	0.90	SD-5E	Dispersion Area	13
	LANDSCAPE	8,856	0	0%	B	0.10			
SD-5F	CONCRETE/ASPHALT	11,670	11,670	100%	D	0.90	SD-5F	Dispersion Area	14
	LANDSCAPE	5,835	0	0%	B	0.10			
SD-5G	CONCRETE/ASPHALT	13,507	13,507	100%	D	0.90	SD-5G	Dispersion Area	15
	LANDSCAPE	6,754	0	0%	B	0.10			
SD-1A	CONCRETE/ASPHALT	803	803	100%	D	0.90	SD-1A	Tree Wells	16
	LANDSCAPE	1,880	0	0%	D	0.10			
SD-1B	CONCRETE/ASPHALT	1,695	1,695	100%	D	0.90	SD-1B	Tree Wells	17
	LANDSCAPE	3,199	0	0%	D	0.10			
SD-1C	ROOF	511	511	100%	D	0.90	SD-1C	Tree Wells	18
	CONCRETE/ASPHALT	880	880	100%	D	0.90			
	LANDSCAPE	1,015	0	0%	D	0.10			
SD-6B	PERMEABLE PAVEMENT	516	0	0%	D	0.30	SD-6B	Peremable Pavement- Self Retaining Area	NA
SM-1	Natural (D Soil)	11,920	0	0%	D	0.30	N/A	Self Mitigating Area	1
SM-2	Natural (D Soil)	22,576	0	0%	D	0.30	N/A	Self Mitigating Area	3
SM-3	Natural (D Soil)	16,603	0	0%	D	0.30	N/A	Self Mitigating Area	4
SM-4	Natural (D Soil)	87,294	0	0%	D	0.30	N/A	Self Mitigating Area	5,6 & 7
SR-1	CONCRETE/ASPHALT	207,905	207,905	100%	D	0.90	N/A	Self Retaining Area	N/A
	SAND OR SIMILAR	124,351	0	0%	D	0.10			
	LANDSCAPE	3,915,098	0	0%	D	0.10			
DE MINIMIS AREA	CONCRETE/ASPHALT	150	150	100%	D	0.90	N/A	DE MINIMIS AREA	N/A
SR-2	POND	149,672	0	0%	D	0.90	N/A	Self Retaining Area	N/A
Total Disturbed Area =		6,227,024	1,337,943						

Note: The total disturbed area and proposed/replaced impervious area do not include the existing (or resurfaced) on-site impervious area that will be treated but not disturbed.

ATTACHMENT 1C

Harvest and Use Feasibility Checklist	Form I-7

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?

- ☑ Toilet and urinal flushing
- ☐ Landscape irrigation
- ☐ Other:_____

2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.

PA-1 & PA-2 : 243 residential unit x 2.5 resident per unit X 9.3 gals per resident a day = 5,650 gal/day = 755 cft/ day.
=> 755 X 1.5= 1,132 cft over 36 hr
PA-3: 52 rooms X 2 people / room x 9.3 gals per person a day= 967.2 gal/day = 129 cft/ day
=> 129 x 1.5 = 193.5 cft over 36 hours
Total = 1,132 +193.5 = 1,325 cft

3. Calculate the DCV using worksheet B-2.1.

DCV = 45,382 (cubic feet)

0.25 DCV= 11,345 cft

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.

Is harvest and use feasible based on further evaluation?

- ☐ Yes, refer to Appendix E to select and size harvest and use BMPs.
- ☑ No, select alternate BMPs.

ATTACHMENT 1D

Categorization of Infiltration Feasibility Condition	Form I-8

Part 1 - Full Infiltration Feasibility Screening Criteria

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

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

Provide basis:

Per the Geotechnical investigation performed by Geocon on February 4th, 2022, "Due to the shallow groundwater, full or partial infiltration is considered infeasible and liners and subdrains should be incorporated into the design and construction of the planned storm water devices"

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

2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	☐	☒

Provide basis:

Per the Geotechnical investigation performed by Geocon on February 4th, 2022, "Due to the shallow groundwater, full or partial infiltration is considered infeasible and liners and subdrains should be incorporated into the design and construction of the planned storm water devices"

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

Form I-8 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	☐	☒
Provide basis: Per the Geotechnical investigation performed by Geocon on February 4th, 2022, "Due to the shallow groundwater, full or partial infiltration is considered infeasible and liners and subdrains should be incorporated into the design and construction of the planned storm water devices" Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	☐	☒
Provide basis: Per the Geotechnical investigation performed by Geocon on February 4th, 2022, "Due to the shallow groundwater, full or partial infiltration is considered infeasible and liners and subdrains should be incorporated into the design and construction of the planned storm water devices" Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result *	If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		☒

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

Form I-8 Page 3 of 4

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

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

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

Provide basis:

Per the Geotechnical investigation performed by Geocon on February 4th, 2022, "Due to the shallow groundwater, full or partial infiltration is considered infeasible and liners and subdrains should be incorporated into the design and construction of the planned storm water devices"

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

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

Provide basis:

Per the Geotechnical investigation performed by Geocon on February 4th, 2022, "Due to the shallow groundwater, full or partial infiltration is considered infeasible and liners and subdrains should be incorporated into the design and construction of the planned storm water devices"

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Form I-8 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	☐	☒
Provide basis: Per the Geotechnical investigation performed by Geocon on February 4th, 2022, "Due to the shallow groundwater, full or partial infiltration is considered infeasible and liners and subdrains should be incorporated into the design and construction of the planned storm water devices" Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	**Can infiltration be allowed without violating downstream water rights**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	☐	☒
Provide basis: Per the Geotechnical investigation performed by Geocon on February 4th, 2022, "Due to the shallow groundwater, full or partial infiltration is considered infeasible and liners and subdrains should be incorporated into the design and construction of the planned storm water devices" Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**	☒ **No Infiltration**	

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

ATTACHMENT 1E

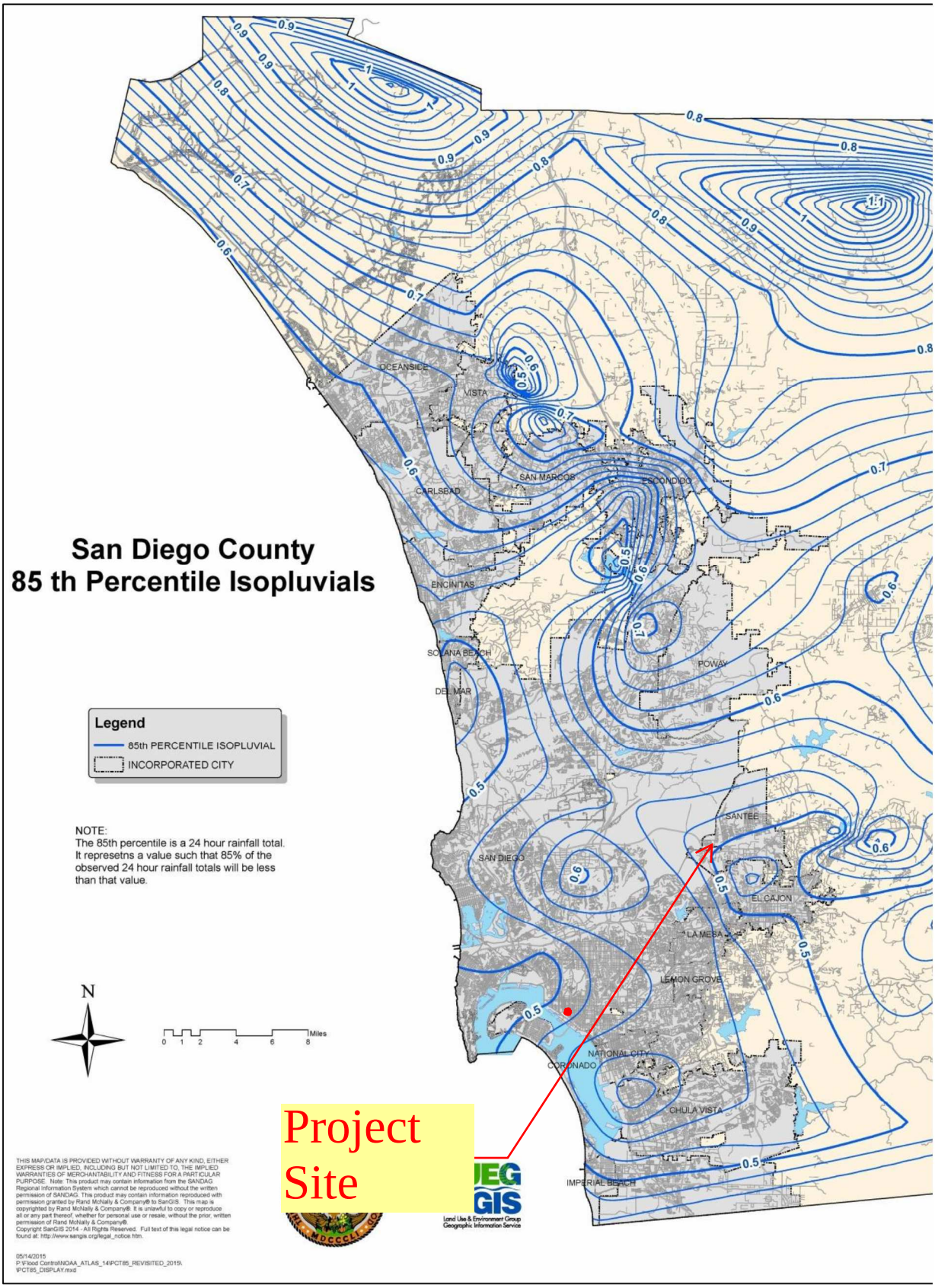


Figure B.1-1: 85th Percentile 2

Carlton Oaks
DMA CALCULATIONS

Summary of DMA Information (Must match Project description and SWQMP narrative)										
No. of DMAs	**Total DMA Area (acres)**	**Total Impervious Area (acres)**	**%** Impervious	**Area Weighted Runoff Coefficient**	**Design Intensity (in/hr)**	**Safe Factor**	**Design Flow Rate (cfs)**	**Proposed Pollutant Control Type**	**No. of POCs**	**Provided Flow Rate Treatment (CFS)**
DMA 1	5.87	3.56	60.62%	0.58	0.20	1.5	1.039	2 units 8x20 MWS	1	1.154
DMA 2	3.61	2.25	62.39%	0.60	0.20	1.5	0.655	8x24 MWS	2	0.693
DMA 3	10.91	7.34	67.28%	0.64	0.20	1.5	2.107	3 units 8x24 MWS (3.5' deep)	3	2.139
DMA 4	7.66	5.30	69.10%	0.65	0.20	1.5	1.513	2 units 8x24 MWS (3.75' deep)	4	1.528
DMA 5	2.76	1.90	68.95%	0.65	0.20	1.5	0.543	8x20 MWS	5	0.577
DMA 6	2.74	2.40	87.67%	0.80	0.20	1.5	0.665	8x24 MWS	6	0.693
DMA 7	1.68	1.36	80.95%	0.75	0.20	1.5	0.381	8x12 MWS (3.8' deep)	7	0.387
DMA 8	1.28	0.54	42.64%	0.44	0.20	1.5	0.170	4x15 MWS	8	0.175
SD-5A	0.22	0.15	66.67%	0.63	0.20	1.5	0.043	Dispersion Area	9	0.043
SD-5B	0.42	0.28	66.67%	0.63	0.20	1.5	0.080	Dispersion Area	10	0.080
SD-5C	0.38	0.25	66.67%	0.63	0.20	1.5	0.072	Dispersion Area	11	0.072
SD-5D	0.16	0.11	66.67%	0.63	0.20	1.5	0.030	Dispersion Area	12	0.030
SD-5E	0.61	0.41	66.67%	0.63	0.20	1.5	0.117	Dispersion Area	13	0.117
SD-5F	0.40	0.27	66.67%	0.63	0.20	1.5	0.077	Dispersion Area	14	0.077
SD-5G	0.47	0.31	66.67%	0.63	0.20	1.5	0.089	Dispersion Area	15	0.089
SD-1A	0.06	0.02	29.95%	0.34	0.20	1.5	0.006	Tree Wells	16	0.006
SD-1B	0.11	0.04	34.64%	0.38	0.20	1.5	0.013	Tree Wells	17	0.013
SD-1C	0.06	0.03	57.80%	0.56	0.20	1.5	0.009	Tree Wells	18	0.009
SD-6B	0.0118	0.00	0.00%	0.30	N/A	N/A	N/A	Peremable Pavement- Self Retaining Area	N/A	N/A
SM-1	0.27	0.00	0.00%	0.30	N/A	N/A	N/A	Self Mitigating Area	1	N/A
SM-2	0.52	0.00	0.00%	0.30	N/A	N/A	N/A	Self Mitigating Area	3	N/A
SM-3	0.38	0.00	0.00%	0.30	N/A	N/A	N/A	Self Mitigating Area	4	N/A
SM-4	2.00	0.00	0.00%	0.30	N/A	N/A	N/A	Self Mitigating Area	5,6 & 7	N/A
SR-1	97.51	4.77	4.89%	0.14	N/A	N/A	N/A	Self Retaining Area	N/A	N/A
DE MINIMIS AREA	0.0034	0.0034	100.00%	0.90	N/A	N/A	N/A	DE MINIMIS AREA	N/A	N/A
SR-2	3.44	0.00	0.00%	0.90	N/A	N/A	N/A	Self Retaining Area	N/A	N/A
∑ =	142.95	30.71	21.49%					*3.4' deep unless otherwise noted (standard unit depth)		

Note: The total disturbed area and proposed/replaced impervious area do not include the existing (or resurfaced) on-site impervious area that will be treated but not disturbed.

MWS Linear 2.0 HGL Sizing Calculations

MWS MODEL SIZE	WETLAND PERMITER LENGTH	LOADING RATE GPM/SF	HGL HEIGHT																													
			SHALLOW MODELS																				STANDARD HEIGHT MODEL	HIGH CAPACITY MODELS									
			1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.65	3.70	3.75	3.80	3.85	3.90	3.95
MWS-L-4-4	6.70	1.0	0.022	0.023	0.025	0.026	0.028	0.029	0.031	0.032	0.034	0.035	0.037	0.038	0.040	0.042	0.043	0.045	0.046	0.048	0.049	0.051	0.052	0.054	0.055	0.056	0.057	0.058	0.058	0.059	0.060	0.061
MWS-L-3-6	10.06	1.0	0.032	0.035	0.037	0.039	0.042	0.044	0.046	0.048	0.051	0.053	0.055	0.058	0.060	0.062	0.065	0.067	0.069	0.072	0.074	0.076	0.078	0.081	0.083	0.084	0.085	0.087	0.088	0.089	0.090	0.091
MWS-L-4-6	9.30	1.0	0.030	0.032	0.034	0.036	0.038	0.041	0.043	0.045	0.047	0.049	0.051	0.053	0.055	0.058	0.060	0.062	0.064	0.066	0.068	0.070	0.073	0.075	0.077	0.078	0.079	0.080	0.081	0.082	0.083	0.084
MWS-L-4-8	14.80	1.0	0.048	0.051	0.054	0.058	0.061	0.065	0.068	0.071	0.075	0.078	0.082	0.085	0.088	0.092	0.095	0.099	0.102	0.105	0.109	0.112	0.115	0.119	0.122	0.124	0.126	0.127	0.129	0.131	0.132	0.134
MWS-L-4-13	18.40	1.0	0.059	0.063	0.068	0.072	0.076	0.080	0.084	0.089	0.093	0.097	0.101	0.106	0.110	0.114	0.118	0.122	0.127	0.131	0.135	0.139	0.144	0.148	0.152	0.154	0.156	0.158	0.160	0.163	0.165	0.167
MWS-L-4-15	22.40	1.0	0.072	0.077	0.082	0.087	0.093	0.098	0.103	0.108	0.113	0.118	0.123	0.129	0.134	0.139	0.144	0.149	0.154	0.159	0.165	0.170	0.175	0.180	0.185	0.188	0.190	0.193	0.195	0.198	0.200	0.203
MWS-L-4-17	26.40	1.0	0.085	0.091	0.097	0.103	0.109	0.115	0.121	0.127	0.133	0.139	0.145	0.151	0.158	0.164	0.170	0.176	0.182	0.188	0.194	0.200	0.206	0.212	0.218	0.221	0.224	0.227	0.230	0.233	0.236	0.239
MWS-L-4-19	30.40	1.0	0.098	0.105	0.112	0.119	0.126	0.133	0.140	0.147	0.153	0.160	0.167	0.174	0.181	0.188	0.195	0.202	0.209	0.216	0.223	0.230	0.237	0.244	0.251	0.255	0.258	0.262	0.265	0.269	0.272	0.276
MWS-L-4-21	34.40	1.0	0.111	0.118	0.126	0.134	0.142	0.150	0.158	0.166	0.174	0.182	0.189	0.197	0.205	0.213	0.221	0.229	0.237	0.245	0.253	0.261	0.268	0.276	0.284	0.288	0.292	0.296	0.300	0.304	0.308	0.312
MWS-L-6-8	18.80	1.0	0.060	0.065	0.069	0.073	0.078	0.082	0.086	0.091	0.095	0.099	0.104	0.108	0.112	0.116	0.121	0.125	0.129	0.134	0.138	0.142	0.147	0.151	0.155	0.157	0.160	0.162	0.164	0.166	0.168	0.170
MWS-L-8-8	29.60	1.0	0.095	0.102	0.109	0.115	0.122	0.129	0.136	0.143	0.149	0.156	0.163	0.170	0.177	0.183	0.190	0.197	0.204	0.211	0.217	0.224	0.231	0.238	0.245	0.248	0.251	0.255	0.258	0.262	0.265	0.268
MWS-L-8-12	44.40	1.0	0.143	0.153	0.163	0.173	0.183	0.194	0.204	0.214	0.224	0.234	0.245	0.255	0.265	0.275	0.285	0.296	0.306	0.316	0.326	0.336	0.346	0.357	0.367	0.372	0.377	0.382	0.387	0.392	0.397	0.402
MWS-L-8-16	59.20	1.0	0.190	0.204	0.217	0.231	0.245	0.258	0.272	0.285	0.299	0.312	0.326	0.340	0.353	0.367	0.380	0.394	0.408	0.421	0.435	0.448	0.462	0.476	0.489	0.496	0.503	0.509	0.516	0.523	0.530	0.537
MWS-L-8-20	74.00	1.0	0.238	0.255	0.272	0.289	0.306	0.323	0.340	0.357	0.374	0.391	0.408	0.425	0.442	0.459	0.476	0.493	0.509	0.526	0.543	0.560	0.577	0.594	0.611	0.620	0.628	0.637	0.645	0.654	0.662	0.671
MWS-L-10-20 or MWS-L-8-24	88.80	1.0	0.285	0.306	0.326	0.346	0.367	0.387	0.408	0.428	0.448	0.469	0.489	0.509	0.530	0.550	0.571	0.591	0.611	0.632	0.652	0.673	0.693	0.713	0.734	0.744	0.754	0.764	0.774	0.785	0.795	0.805
4'x'4 media cage	14.80	1.0	0.048	0.051	0.054	0.058	0.061	0.065	0.068	0.071	0.075	0.078	0.082	0.085	0.088	0.092	0.095	0.099	0.102	0.105	0.109	0.112	0.115	0.119	0.122	0.124						

Appendix B: Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods

DMA 1: Design Capture Volume			Worksheet B-2.1	
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	5.87	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and	C=	0.58	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	6,234	cubic-feet

DMA2: Design Capture Volume			Worksheet B-2.1	
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	3.61	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 a	C=	0.60	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	3,930	cubic-feet

DMA 3: Design Capture Volume			Worksheet B-2.1	
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	10.91	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 a	C=	0.64	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	12,640	cubic-feet

DMA 4: Design Capture Volume			Worksheet B-2.1	
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	7.66	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 a	C=	0.65	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	9,080	cubic-feet

DMA 5: Design Capture Volume			Worksheet B-2.1	
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	2.76	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 a	C=	0.65	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	3,259	cubic-feet

DMA6: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	2.74	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1	C=	0.80	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	3,990	cubic-feet

DMA 7: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	1.68	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1	C=	0.75	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	2,284	cubic-feet

DMA 8: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	1.28	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1	C=	0.44	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	1,022	cubic-feet

DMA SD-1A to C: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	0.23	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1	C=	0.41	unitless
4	Street trees volume reduction	TCV=	280.0	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	-109	cubic-feet

DMA Access Road Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	2.65	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1	C=	0.63	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	3,046	cubic-feet

	SD-6B Offsite Permeable Pavement Design Capture Volume		Worksheet B-2.1	
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.50	inches
2	Area tributary to BMP (s)	A=	0.01	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1	C=	0.30	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	6.45	cubic-feet

Permeable Pavers Area (SFT)= 516

Total drainage area (SFT) to the permeable Pavement = 516

Ratio Pvaers/DMA= 1.00 =<1.5:1

Slope is 1.5% less than 5%

Provided storage depth under subdrain is 1 in> Required 85th Perecntial depth is 0.5 in.

Required depth of aggregate storage under subdrain (ft)

DCV / (Pavers Area × Storage Layer Porosity)= 6.45/(516 X0.4)= 0.0313 ft =0.4 in

provided depth of aggregate storage under subdrain 1" (minimum depth under subdrain per GS-4-02 SD Design Standard)

where:

516 sft is the aggregate area (under pavers)

0.4 in\in is the porosity of storage

Preliminary paver sections should be supported by at least 9-inches of Class II base . However, the pavement sections should be re-evaluated during construction and could change based on the R-Values of the subgrade materials within the paver areas.

Project Name	Carlton Oaks		
BMP ID	PA-1 (DMA-1 and DMA-2)		
Sizing Method for Volume Retention	**Worksheet B.5-2**		
1	Area draining to the BMP	**413187.54**	**sq. ft.**
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	**0.59**	
3	85th percentile 24-hour rainfall depth	**0.50**	**inches**
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	**10163**	**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]	**234**	**cu. ft.**

MWS-L-8-20 UNIT		
A	MEDIA SURFACE AREA (SFT)	80
B	MEDIA THICKNESS (FT)	0.68
C	FIELD CAPACITY	0.48
D	WELTING POINT	0.1
E	NUMBER OF UNITS	3
VOLUME RETAINED (CFT) = A*E*B*(C-D)		62.02

Project Name	Carlton Oaks
BMP ID	PA-1 (DMA-1 and DMA-2)

Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	413187.54	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.59	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	243917	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	7318	sq. ft.
5	Biofiltration BMP Footprint	0	sq. ft.

Landscape Area (must be identified on DS-3247)							
		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)		7520				
7	Impervious area draining to the landscape area (sq. ft.)		12160				
8	Impervious to Pervious Area ratio [Line 7/Line 6]		1.62	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		7520	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	7520	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	7520	sq. ft.

Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	1.03	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	234	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-7.01	cu. ft.

Site Design BMP				
	Identification	Site Design Type	Credit	
16	1	3 8-20 MWS Units	62.02	cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		62.016	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

16 LOTS ARE BEING USED FOR DISPERSION AREAS PER "DISPERSION AREA EXHIBIT"

Project Name	Carlton Oaks	
BMP ID	PA-2 (DMA-3 and DMA-4)	
Sizing Method for Volume Retention	**Worksheet B.5-2**	

1	Area draining to the BMP	**809123.71**	**sq. ft.**
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	**0.64**	
3	85^{th} percentile 24-hour rainfall depth	**0.50**	**inches**
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	**21720**	**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% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	**0.023**	
10	Target volume retention [Line 9 x Line 4]	**500**	**cu. ft.**

MWS-L-8-24 UNIT		
A	MEDIA SURFACE AREA (SFT)	96
B	MEDIA THICKNESS (FT)	0.68
C	FIELD CAPACITY	0.48
D	WELTING POINT	0.1
E	NUMBER OF UNITS	5
VOLUME RETAINED (CFT) = A*E*B*(C-D)		124.03

Project Name	Carlton Oaks
BMP ID	PA-2 (DMA-3 and DMA-4)

Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	**809123.71**	**sq. ft.**
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	**0.64**	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	**521270**	**sq. ft.**
4	Required area for Evapotranspiration [Line 3 x 0.03]	**15638**	**sq. ft.**
5	Biofiltration BMP Footprint	**0**	**sq. ft.**

Landscape Area (must be identified on DS-3247)							
		Identification	**1**	**2**	**3**	**4**	**5**
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)		15580				
7	Impervious area draining to the landscape area (sq. ft.)		30780				
8	Impervious to Pervious Area ratio [Line 7/Line 6]		**1.98**	**0.00**	**0.00**	**0.00**	**0.00**
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		**15580**	**0**	**0**	**0**	**0**
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				**15580**		**sq. ft.**
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				**15580**		**sq. ft.**

Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	No, Proceed to Line 13	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	**1**	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	**500**	**cu. ft.**
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	**0.00**	**cu. ft.**

Site Design BMP				
	Identification	**Site Design Type**	**Credit**	
16	**1**	5 8-24 MWS Units	**124.03**	**cu. ft.**
	2			**cu. ft.**
	3			**cu. ft.**
	4			**cu. ft.**
	5			**cu. ft.**
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		**124.032**	**cu. ft.**
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

38 LOTS ARE BEING USED FOR DISPERSION AREAS PER "DISPERSION AREA EXHIBIT"

Project Name	Carlton Oaks	
BMP ID	PA-3 (DMA-5 to DMA-8)	
Sizing Method for Volume Retention	**Worksheet B.5-2**	
1	Area draining to the BMP	**368472.64**	**sq. ft.**
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	**0.69**	
3	85th percentile 24-hour rainfall depth	**0.50**	**inches**
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	**10555**	**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	**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]	**243**	**cu. ft.**

MWS-L-8-20 UNIT		
A	MEDIA SURFACE AREA (SFT)	80
B	MEDIA THICKNESS (FT)	0.68
C	FIELD CAPACITY	0.48
D	WELTING POINT	0.1
E	NUMBER OF UNITS	1
VOLUME RETAINED (CFT) = A*E*B*(C-D)		20.67
MWS-L-8-24 UNIT		
A	MEDIA SURFACE AREA (SFT)	96
B	MEDIA THICKNESS (FT)	0.68
C	FIELD CAPACITY	0.48
D	WELTING POINT	0.1
E	NUMBER OF UNITS	1
VOLUME RETAINED (CFT) = A*E*B*(C-D)		24.81
MWS-L-8-12 UNIT		
A	MEDIA SURFACE AREA (SFT)	48
B	MEDIA THICKNESS (FT)	0.68
C	FIELD CAPACITY	0.48
D	WELTING POINT	0.1
E	NUMBER OF UNITS	1
VOLUME RETAINED (CFT) = A*E*B*(C-D)		12.40
MWS-L-4-15 UNIT		
A	MEDIA SURFACE AREA (SFT)	30
B	MEDIA THICKNESS (FT)	0.68
C	FIELD CAPACITY	0.48
D	WELTING POINT	0.1
E	NUMBER OF UNITS	1
VOLUME RETAINED (CFT) = A*E*B*(C-D)		7.75

Project Name	Carlton Oaks
BMP ID	PA-3 (DMA-5 to DMA-8)

Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	368472.64	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	253329	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	7600	sq. ft.
5	Biofiltration BMP Footprint	0	sq. ft.

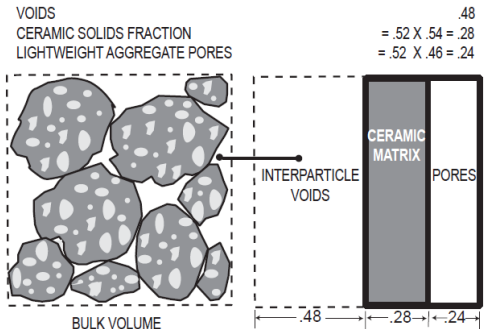
Landscape Area (must be identified on DS-3247)							
		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				0		sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				0		sq. ft.

Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	No, Proceed to Line 13	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	0	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	243	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	242.7738068	cu. ft.

Site Design BMP				
	Identification	Site Design Type	Credit	
16	1	1 8-20 MWS Unit	20.67	cu. ft.
	2	1 8-24 MWS Unit	24.81	cu. ft.
	3	1 8-12 MWS Unit	12.40	cu. ft.
	4	1 4-15 MWS Unit	7.75	cu. ft.
	5	Dispersion Credits from PA-1 and PA-2	193.02	cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		258.65	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

CALCULATION SHEET FOR EVAPOTRANSPIRATION INSIDE THE MODULAR WETLAND SYSTEM LINEAR

The Modular Wetland System Linear is a biofiltration system utilizing a highly porous bioretention media bed capable of maximizing pollutant removal and reducing volume through evapotranspiration. The media used in the system, known as WetlandMedia, is composed of a non-organic material mix which has a large percentage of interparticle and internal pore space:



Porosity:

- Interparticle Void Percentage = 0.48
- Internal Pore Space (inside particles) = 0.24
- Total Void Space Percentage = 0.72

Benefits:

- Physically Inert
- Greater Surface Area & Porosity
- Excellent Hydraulic Conductivity
- Reduced Weight
- Employs Ion Exchange
- Absorbs High Levels of Moisture for Better Plant Propagation
- Lightweight
- Contains various oxides for removal of dissolved pollutants

Calculating Evapotranspiration:

Several studies have been performed to calculate the amount of evapotranspiration from the biofiltration system. It has been found that it is a function of the moisture holding capacity of the material and it's relation to the "welting point". Much of this work has been done by Geosyntec. In 2016, the City of San Diego released the new "Storm Water Standards Manual" and "Part 1: BMP Design

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Manual – Appendices". The manual and appendices was prepared by Geosyntec Consultants and Michael Baker International.

Page G-23 of the above referenced manual provides the following method of calculating the amount of evapotranspiration that can occur within the soil layer of biofiltration systems:

> *This process layer is typically composed of an amended soil or compost mix. Water that infiltrates into this component is stored in the soil void space and is available for evapotranspiration via plant roots or can percolate into the storage layer below. The following parameters are used:*
>
> - *Thickness: This parameter represents the depth of the amended soil layer.*
> - *Porosity: Ratio of pore space volume to soil volume.*
> - *Field Capacity: Pore water volume ratio after the soil has been drained.*
> - *Wilting Point: Pore water volume ratio after the soil has been dried.*
> - *Conductivity: This represents the saturated hydraulic conductivity.*
> - *Conductivity Slope: Rate at which conductivity decreases with decreasing soil moisture content.*
> - *Suction Head: This represents the capillary tension of water in the soil.*
> - *Porosity, conductivity and suction head values as a function of soil texture were included in Table G.1-5. The flow of water through partially saturated soil is less than under fully saturated conditions. The SWMM program accounts for this reduced hydraulic conductivity to predict the rate at which infiltrated water moves through a layer of unsaturated soil when modeling groundwater or LID controls. The conductivity slope is a dimensionless curve-fitting parameter that relates the partially saturated hydraulic conductivity to the soil moisture content.*

The Modular Wetland System Linear has the following parameters related to evapotranspiration as described above:

- Thickness: 20"
- Porosity (interparticle + internal): 0.72
- Field Capacity: 0.24 (50% of interparticle void space at 0.48 due to capillary tension + 100% of internal void space at 0.24 = (50% x 0.48) + (100% x 0.24)): 0.48
- Welting Point: 0.1 (standard from Manual based on field research done by Geosyntec)
- Conductivity: > 395 in/hr

The following diagram taken from the San Diego Manual illustrates soil saturation, field capacity and permanent wilting point:

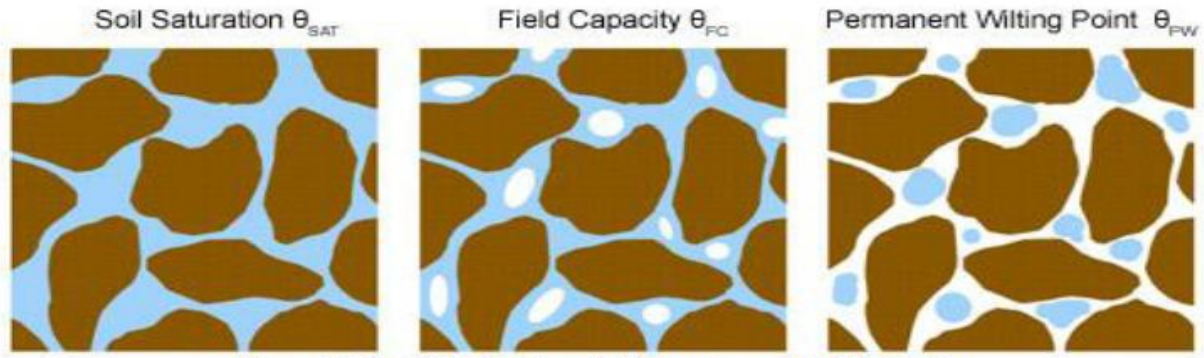

Figure G.1-4: Soil saturation, field capacity, and wilting point

The following worksheet can be used to calculate the amount of volume reduction provided through the process of evapotranspiration in the Modular Wetland System Linear:

Sizing Method of Evapotranspiration Losses in Biofiltration BMPs			
Project Name			
Model #			
Media Volume Calculations			
1	Media bed width	0	ft
2	Media bed length	0	ft
3	Media bed height	0	ft
4	Total media volume [Line 1 x 2 x 3]	0	cu ft
Evapotranspiration Calculations			
5	Porosity	0.72	
6	Field Capacity	0.48	
7	Welting Point	0.1	
8	Water Storage Capacity [Line 4 x Line 5]	0.0	cu ft
9	Field Capacity - Welting Point [Line 6 - Line 7]	0.38	
10	Total Evapotranspiration [Line 4 x Line 9]	0.0	cu ft

This worksheet and supporting data can be used and can be included in your technical report. If you have any questions please call us at 760-433-7640 or email us at info@modularwetlands.com

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WASHINGTON STATE DEPARTMENT OF ECOLOGY

August 2021

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS) ENHANCED AND PHOSPHORUS TREATMENT

For

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, Phosphorus, and Enhanced treatment
    - Sized at a hydraulic loading rate of:
        - 1 gallon per minute (gpm) per square foot (sq ft) of Wetland Cell Surface Area
        - Prefilter box (approved at either 22 inches or 33 inches tall)
            - 3.0 gpm/sq ft of prefilter box surface area for moderate pollutant loading rates (low to medium density residential basins).
            - 2.1 gpm/sq ft of prefilter box surface area for high pollutant loading rates (commercial and industrial basins).
2. 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 water quality treatment design 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 water quality treatment design 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 treatment design flow rate is the full 2-year release rate of the detention facility.

3. These use level designations have no expiration date but may be amended or revoked 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) MSW – 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 stormwater treatment technology.
    - 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 the 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 fo 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:	5796 Armada Drive, Suite 250 Carlsbad, CA 92008

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 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 60-percent of dissolved zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/L.

Ecology's Recommendations:

- Modular Wetland System, 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, Phosphorus, and Enhanced treatment goals.

Findings of Fact:

<u>Laboratory Testing</u>

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
5796 Armada Drive, Suite 250
Carlsbad, CA 92008
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) 870-0983
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)
December 2019	Revised Manufacturer Contact Address
July 2021	Added additional prefilter sized at 33 inches
August 2021	Changed “Prefilter” to “Prefilter box”

Flow-thru Design Flows (BF-3-1)		Worksheet B.6-1		
1	DCV	DCV	6234	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	6234	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=	5.87	acres
8	Area-weighted runoff factor (estimate using Appx B.2)	C=	0.58	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.693	cfs
10	Design Flow Rate (Appx F.2.2, BMP Manual) = 1.5Q	Q=	1.039	cfs

Flow-thru Design Flows (BF-3-2)		Worksheet B.6-1		
1	DCV	DCV	3930	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	3930	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	3.61	acres
8	Area-weighted runoff factor (estimate using Appx B.2)	C=	0.60	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.437	cfs
10	Design Flow Rate (Appx F.2.2, BMP Manual) = 1.5Q	Q=	0.655	cfs

Flow-thru Design Flows (BF-3-3)		Worksheet B.6-1		
1	DCV	DCV	12640	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow\text{-}thru}$	12640	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=	10.91	acres
8	Area-weighted runoff factor (estimate using Appx B.2)	C=	0.64	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	1.404	cfs
10	Design Flow Rate (Appx F.2.2, BMP Manual) = 1.5Q	Q=	2.107	cfs

Flow-thru Design Flows (BF-3-4)		Worksheet B.6-1		
1	DCV	DCV	9080	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)	$DCV_{flow-thru}$	9080	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=	7.66	acres
8	Area-weighted runoff factor (estimate using Appx B.2)	C=	0.65	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	1.009	cfs
10	Design Flow Rate (Appx F.2.2, BMP Manual) = 1.5Q	Q=	1.513	cfs

Flow-thru Design Flows (BF-3-5)		Worksheet B.6-1		
1	DCV	DCV	3259	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)	$DCV_{flow-thru}$	3259	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	2.76	acres
8	Area-weighted runoff factor (estimate using Appx B.2)	C=	0.65	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.362	cfs
10	Design Flow Rate (Appx F.2.2, BMP Manual) = 1.5Q	Q=	0.543	cfs

Flow-thru Design Flows (BF-3-6)		Worksheet B.6-1		
1	DCV	DCV	3990	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)	$DCV_{flow-thru}$	3990	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	2.74	acres
8	Area-weighted runoff factor (estimate using Appx B.2)	C=	0.80	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.443	cfs
10	Design Flow Rate (Appx F.2.2, BMP Manual) = 1.5Q	Q=	0.665	cfs

Flow-thru Design Flows (BF-3-7)		Worksheet B.6-1		
1	DCV	DCV	2284	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)	$DCV_{flow-thru}$	2284	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=	1.68	acres
8	Area-weighted runoff factor (estimate using Appx B.2)	C=	0.75	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.254	cfs
10	Design Flow Rate (Appx F.2.2, BMP Manual) = 1.5Q	Q=	0.381	cfs

Flow-thru Design Flows (BF-3-8)		Worksheet B.6-1		
1	DCV	DCV	1022	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)	$DCV_{flow-thru}$	1022	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=	1.28	acres
8	Area-weighted runoff factor (estimate using Appx B.2)	C=	0.44	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.114	cfs
10	Design Flow Rate (Appx F.2.2, BMP Manual) = 1.5Q	Q=	0.170	cfs

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)														
Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	SD-5A	SD-5B	SD-5C	SD-5D	SD-5E	SD-5F	SD-5G	SD-1A	SD-1B	SD-1C	unitless
	2	85th Percentile 24-hr Storm Depth	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	inches
	3	Is Hydromodification Control Applicable?	No	No	No	No	No	No	No	No	No	No	yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)								803	1,695	1,391	sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)								1,880	3,199	1,015	sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	yes/no
	12	Does Tributary Incorporate Tree Wells?	No	No	No	No	No	No	No	Yes	Yes	Yes	yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)	6,523	12,064	10,891	4,575	17,713	11,670	13,507				sq-ft
	14	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	15	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)	3,261	6,032	5,446	2,288	8,856	5,835	6,754				sq-ft
	16	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	17	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft
	18	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft
	19	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Initial Runoff Factor Calculation	22	Total Tributary Area	9,784	18,096	16,337	6,863	26,569	17,505	20,261	2,683	4,894	2,406	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.51	0.65	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.48	0.51	0.65	unitless
	26	Initial Design Capture Volume	257	475	429	180	697	460	532	54	104	65	cubic-feet
Dispersion Area Adjustment & Rain Barrel Adjustment	27	Total Impervious Area Dispersed to Pervious Surface	6,523	12,064	10,891	4,575	17,713	11,670	13,507	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	3,261	6,032	5,446	2,288	8,856	5,835	6,754	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area for DCV Reduction	2.00	2.00	2.00	2.00	2.00	2.00	2.00	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.51	0.65	unitless
	32	Design Capture Volume After Dispersion Techniques	0	0	0	0	0	0	0	54	104	65	cubic-feet
	33	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	34	Final Adjusted Runoff Factor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.51	0.65	unitless
	35	Final Effective Tributary Area	0	0	0	0	0	0	0	1,288	2,496	1,564	sq-ft
	36	Initial Design Capture Volume Retained by Dispersion Area and Rain Barrel(s)	257	475	429	180	697	460	532	0	0	0	cubic-feet
	37	Remaining Design Capture Volume Tributary to Tree Well(s)	0	0	0	0	0	0	0	54	104	65	cubic-feet

No Warning Messages

SSD-BMP Automated Worksheet I-2: Step 2. Dispersion Area Validation (V1.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Dispersion Area Inputs	1	Drainage Basin ID or Name	SD-5A	SD-5B	SD-5C	SD-5D	SD-5E	SD-5F	SD-5G	-	-	-	unitless
	2	Final Design Capture Volume (DCV)	0	0	0	0	0	0	0	-	-	-	cubic-feet
	3	Is Hydromodification Control Applicable?	No	No	No	No	No	No	No	-	-	-	yes/no
	4	Total Impervious Area Dispersed to Pervious Surface	6,523	12,064	10,891	4,575	17,713	11,670	13,507	-	-	-	sq-ft
	5	Total Engineered Pervious Surface and/or Natural Soil Dispersion Area (Does Not Include Semi-Pervious Surfaces Serving as Dispersion Area)	3,261	6,032	5,446	2,288	8,856	5,835	6,754	-	-	-	sq-ft
	6	Ratio of Dispersed Impervious Area to Total Engineered Pervious Surface and/or Natural Soil Dispersion Area	2.00	2.00	2.00	2.00	2.00	2.00	2.00	-	-	-	unitless
	7	Dispersion Area Length (Length of Sheet Flow Across Dispersion Area)	10	10	10	10	10	10	10				feet
	8	Dispersion Area Slope	5.0	5.0	5.0	5.0	5.0	5.0	5.0				%
	9	Thickness of Amended Soil	0	0	0	0	0	0	0				inches
	10	How is Flow Dispersed Across Width of Dispersion Area (definitions below*)?	Curb Cuts	Curb Cuts	Curb Cuts	Curb Cuts	Curb Cuts	Curb Cuts	Curb Cuts				unitless
Results	11	Is DCV Requirement Fully Satisfied by Dispersion Area?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	yes/no
	12	Is Hydromodification Control Requirement Satisfied by Dispersion Area?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	-	-	yes/no
	13	Are Dispersion Area Length, Slope, and Thickness of Amended Soil (when applicable) Adequate?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	yes/no

No Warning Messages

Notes:

*How is Flow Dispersed Across Width of Pervious Dispersion Area?

Sheet Flow: Flow arrives as sheet flow across the width of the adjacent impervious area

Spreader(s): Flow is discharged from flow spreader(s) across the width of the pervious area

Roof Drains: Discharge from roof drains distributed across the width of the pervious area

Curb Cuts: Discharge from curb cuts distributed across the width of the pervious area

Other: Other (Describe in PDP SWQMP)

SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Tree Well Inputs	1	Drainage Basin ID or Name	-	-	-	-	-	-	-	SD-1A	SD-1B	SD-1C	unitless
	2	Design Capture Volume Tributary to BMP	-	-	-	-	-	-	-	54	104	65	cubic-feet
	3	Is Hydromodification Control Applicable?	-	-	-	-	-	-	-	No	No	No	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location								D	D	D	unitless
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table Note: Numbers shown in list are Tree Species Mature Canopy Diameters								10' - California Mountain Lilac	10' - California Mountain Lilac	10' - California Mountain Lilac	unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**								36	36	36	inches
	7	Number of Identical* Tree Wells Proposed for this DMA								2	3	2	trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree								7.0	7.0	7.0	feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree								7.5	7.5	7.5	feet
Tree Data	10	Botanical Name of Tree Species	-	-	-	-	-	-	-	Ceanothus 'Ray Hartman'	Ceanothus 'Ray Hartman'	Ceanothus 'Ray Hartman'	unitless
	11	Tree Species Mature Height per SD-A	-	-	-	-	-	-	-	30	30	30	feet
	12	Tree Species Mature Canopy Diameter per SD-A	-	-	-	-	-	-	-	10	10	10	feet
	13	Minimum Soil Volume Required In Tree Well (2 Cubic Feet Per Square Foot of Mature Tree Canopy Projection Area)	-	-	-	-	-	-	-	157	157	157	cubic-feet
	14	Credit Volume Per Tree	-	-	-	-	-	-	-	40	40	40	cubic-feet
Tree Well Sizing Calculations	15	DCV Multiplier To Meet Flow Control Requirements	-	-	-	-	-	-	-	n/a	n/a	n/a	unitless
	16	Required Retention Volume (RRV) To Meet Flow Control Requirements	-	-	-	-	-	-	-	n/a	n/a	n/a	cubic-feet
	17	Number of Trees Required	-	-	-	-	-	-	-	2	3	2	trees
	18	Total Area of Tree Well Soil Required for Each Tree	-	-	-	-	-	-	-	52	52	52	sq-ft
	19	Approximate Required Width of Tree Well Soil Area for Each Tree	-	-	-	-	-	-	-	8	8	8	feet
	20	Approximate Required Length of Tree Well Soil Area for Each Tree	-	-	-	-	-	-	-	8	8	8	feet
	21	Number of Trees Proposed for this DMA	-	-	-	-	-	-	-	2	3	2	trees
	22	Total Area of Tree Well Soil Proposed for Each Tree	-	-	-	-	-	-	-	53	53	53	sq-ft
	23	Minimum Spacing Between Multiple Trees To Meet Soil Area Requirements (when applicable)***	-	-	-	-	-	-	-	10.0	10.0	10.0	feet
Results	24	Are Tree Well Soil Installation Requirements Met?	-	-	-	-	-	-	-	Yes	Yes	Yes	yes/no
	25	Is Remaining DCV Requirement Fully Satisfied by Tree Well(s)?	-	-	-	-	-	-	-	Yes	Yes	Yes	yes/no
	26	Is Hydromodification Control Requirement Satisfied by Tree Well(s)?	-	-	-	-	-	-	-	n/a	n/a	n/a	yes/no

No Warning Messages

Notes:

*If using more than one mature canopy diameter within the same DMA, only the smallest mature canopy diameter should be entered. Alternatively, if more than one mature canopy diameter is proposed and/or the dimensions of multiple tree well installations will vary, separate DMAs may be delineated.

**If the actual proposed installation depth is not available in the table of standard depths, select the next lower depth.

***Tree Canopy or Agency Requirements May Also Influence the Minimum Spacing of Trees.

SUMMARY OF RETENTION CREDITS						
AREA OF ANALYSIS	REQUIRED VOLUME TO BE RETAINED		PROVIDED VOLUME RETENTION CREDITS		DIFFERENCE (PROVIDED-REQUIRED)	
PA-1	234	CU-FT	302.40	CU-FT	68.65	CU-FT
PA-2	500	CU-FT	624.03	CU-FT	124.48	CU-FT
PA-3	243	CU-FT	65.63	CU-FT	-177.14	CU-FT
Total	976	CU-FT	992	CU-FT	15.98	CU-FT

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	Hydromodification Management Exhibit (Required)	☐ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☐ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☐ Not performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the BMP Design Manual	☐ 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

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:

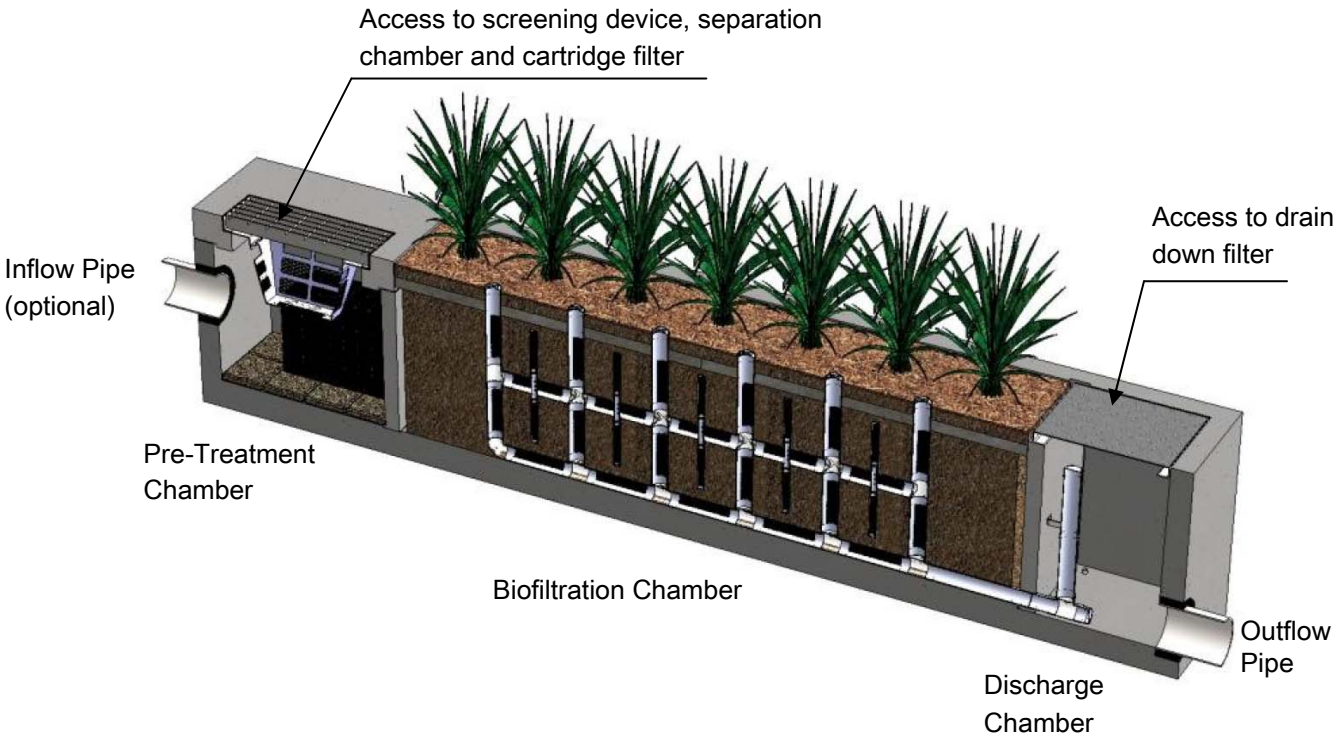
Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☑Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3b	Draft Maintenance Agreement (when applicable)	□ Included □ Not Applicable

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.

Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes:

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176

SD-1
Tree Wells

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

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

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

Normal Expected Maintenance

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

Non-Standard Maintenance or BMP Failure

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

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

Other Special Considerations

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

SD-1
Tree Wells

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

References

American Mosquito Control Association.
http://www.mosquito.org/
County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html
San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet SD-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

SD-1
Tree Wells

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

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

SD-1
Tree Wells

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

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

Operation and maintenance tasks for permeable pavement

Task	Frequency	Indicator maintenance is needed	Maintenance notes
Catchment inspection	Weekly or biweekly during routine property maintenance	Sediment accumulation on adjacent impervious surfaces or in voids/joints of permeable pavement	Stabilize any exposed soil and remove any accumulated sediment. Adjacent pervious areas might need to be graded to drain away from the pavement.
Miscellaneous upkeep	Weekly or biweekly during routine property maintenance	Trash, leaves, weeds, or other debris accumulated on permeable pavement surface	Immediately remove debris to prevent migration into permeable pavement voids. Identify source of debris and remedy problem to avoid future deposition.
Preventative vacuum/regenerative air street sweeping	Twice a year in higher sediment areas	N/A	Pavement should be swept with a vacuum power or regenerative air street sweeper at least twice per year to maintain infiltration rates.
Replace fill materials	As needed	For paver systems, whenever void space between joints becomes apparent, or after vacuum sweeping	Replace bedding fill material to keep fill level with the paver surface.
Restorative vacuum/regenerative air street sweeping	As needed	Surface infiltration test indicates poor performance or water is ponding on pavement surface during rainfall	Pavement should be swept with a vacuum power or regenerative air street sweeper to restore infiltration rates.

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

☐ Preliminary Design / Planning / CEQA level submittal:

Attachment 3a must identify:

☑Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual

Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

☐ Final Design level submittal:

Attachment 3a must identify:

- ☐ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP 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 private entity operation and maintenance, Attachment 3b shall include a draft maintenance agreement in the local jurisdiction's standard format (PDP applicant to contact the [City Engineer] to obtain the current maintenance agreement forms).

ATTACHMENT 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

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 Form I-6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by the [City Engineer]
- ☐ 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 shall be provided. Photocopies of general brochures are not acceptable.