Project Number(s): PC P24-0164 LD _____ GP _____

PRIORITY DEVELOPMENT PROJECT

STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)
FOR

Waxwing Drive Subdivision
552 W Bobier Drive
Vista, CA 92083

PREPARED FOR:

SWS Engineering, Inc.
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
(760) 744-0011
michael@sws-engr.com

March 17, 2025

NOTE: This Priority Development Project SWQMP Template and Instructions are offered as a tool to assist users in complying with RWQCB Order No. R9-2015-0001 (Permit), and is not intended to warrant or guarantee Permit compliance, which is the independent and sole responsibility of the user. This template is subject to revision without notice, at any time.

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ENGINEER OF WORK CERTIFICATION STATEMENT

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 Vista BMP Design Manual, which is a design manual for compliance with local City and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region 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.

SWQMP PREPARED BY:
Michael D. Schweitzer
SWS Engineering, Inc.
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
(760) 744-0011
michael@sws-engr.com
R.C.E 59658
Exp. 12/31/2025

[INSERT STAMP IN SPACE BELOW]

R.C.E. 59658 Exp: 12/31/2026
Signature, PE License Number & Expiration Date

Michael D. Schweitzer
Print Name

3/17/2025
Date

PROJECT OWNER CERTIFICATION STATEMENT

Owners Certification

This PDP SWQMP has been prepared for Michael D. Schweitzer by SWS Engineering, Inc.. The PDP SWQMP is intended to comply with the PDP requirements of the City of Vista BMP Design Manual, which is a design manual for compliance with local City and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region 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.

OWNER DETAILS:
Michael D. Schweitzer
SWS Engineering, Inc.
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
(760) 744-0011
michael@sws-engr.com

Project Owner's Signature

Michael D. Schweitzer
Print Name

3/17/2025
Date

CITY OF VISTA STAFF REVIEW

Reviewed and Approved:	
City Staff Signature:	Date:

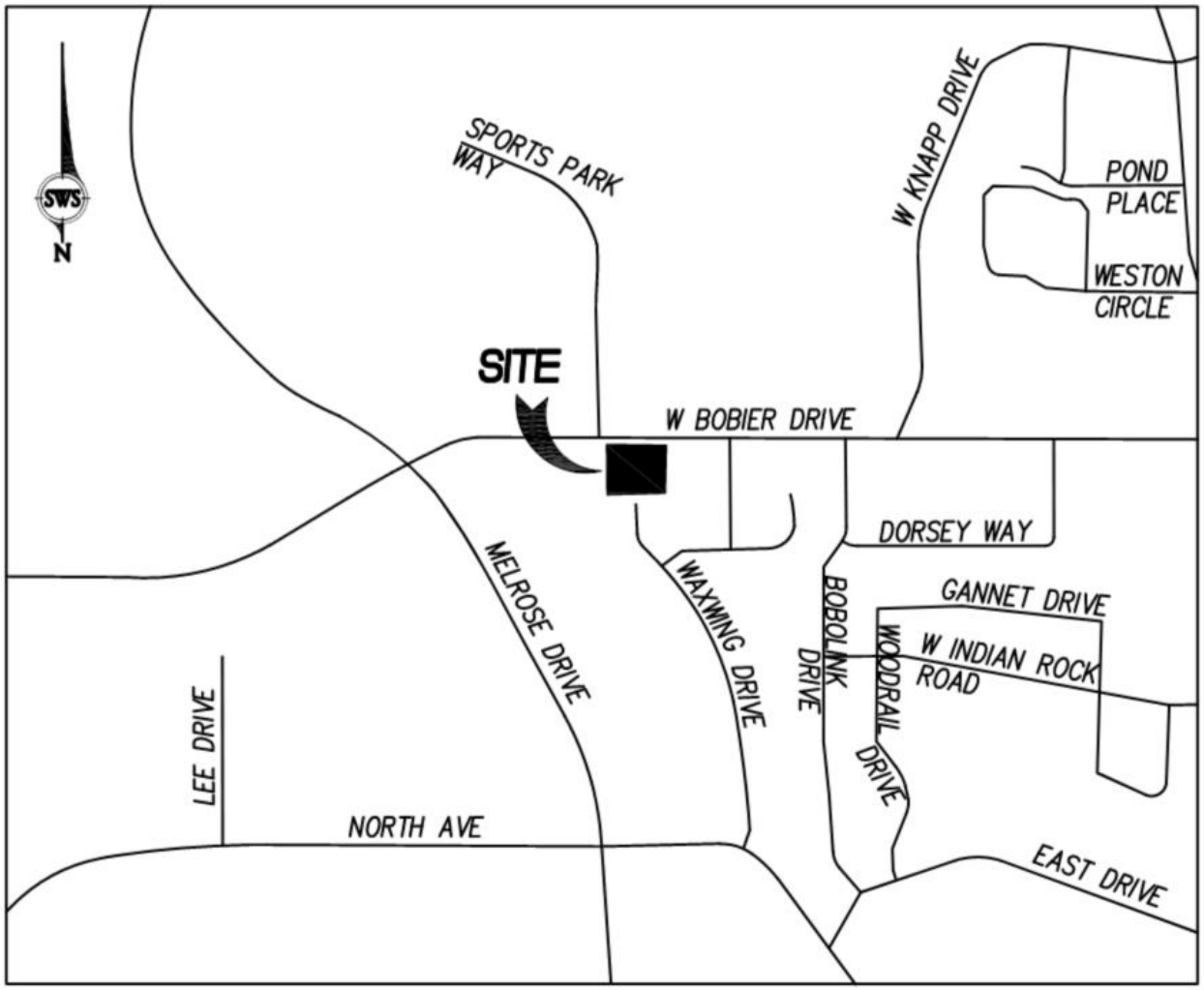
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PROJECT VICINITY MAP

Project Name: Waxwing Subdivision

Permit Application Number: P24-0164

Insert Project Vicinity Map Below:



FORM 1 – PROJECT CATEGORY DETERMINATION CHECKLIST

This form is used to assess stormwater BMP requirements applicable to the proposed project. The form is available as a stand-alone fillable checklist on the City's website and a completed copy must be included with the final SWQMP submitted to the City. The form is available at:

http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms

Project ID: P24-0164

CITY OF VISTA
CALIFORNIA

CHECKLIST FOR DETERMINATION OF PROJECT CATEGORY

Project Name: Waxwing Subdivision

Project Location: 552 W Bobier Drive, Vista CA 92083

APPLICABILITY OF PERMANENT, POST-CONSTRUCTION STORMWATER BMP REQUIREMENTS AND PROJECT TYPE DETERMINATION

Overview and Instructions

The City of Vista's (City's) Stormwater Management Program is regulated by the San Diego regional municipal stormwater permit (referred to as a Municipal Separate Storm Sewer System Permit). This permit requires that new development and redevelopment projects incorporate permanent stormwater Best Management Practices (BMPs) into the project design. The City of Vista's *BMP Design Manual* (formerly *SUSMP Manual*) discusses BMP requirements applicable to new development and redevelopment projects.

ALL STANDARD AND PRIORITY PROJECTS ARE REQUIRED TO INCORPORATE SITE DESIGN AND SOURCE CONTROL BMPS. Additional treatment control and hydromodification management BMP requirements apply to projects that meet specific criteria or thresholds. This checklist must be completed by the project applicant or proponent, and is used to determine if those additional BMPs are required.

Not all site improvements are considered "development projects" under the MS4 Permit.

Development projects are defined by the MS4 Permit as "construction, rehabilitation, redevelopment, or reconstruction of any public or private projects". Development projects are issued local permits to allow construction activities. To further clarify, this checklist applies only to new development or redevelopment activities and/or projects that have the potential to contact storm water and contribute an anthropogenic source of pollutants, or reduce the natural absorption and infiltration abilities of the land.

A project must be defined consistent with the California Environmental Quality Act (CEQA) definitions of "project."

CEQA requires that the project include "the whole of the action". "Whole of the Action" means the project may not be segmented or phased into small parts either onsite or offsite if the effect is to reduce the quantity of impervious area and fall below thresholds for applicability of storm water requirements. This requirement precludes "piece-mealing," which is the improper (and often artificial) separation of a project into smaller parts to avoid preparing Environmental Impact Report level documentation.

As indicated above, for the purposes of the *BMP Design Manual*, the "project" is the "whole of the action" which has the potential for adding or replacing or resulting in the addition or replacement of, roofs, pavement, or other impervious surfaces, thereby resulting in increased flows and storm water pollutants.

When defining the project, the following questions are considered:

- What are the project activities?
- Do they occur onsite or offsite?
- What are the limits of the project (project boundary)?
- What is the whole of the action associated with the project (i.e. what is the total amount of new or

replaced impervious area considering all of the collective project components through all phases of the project)?

- Are any facilities or agreements to build facilities offsite in conjunction with providing service to the project (street-widening, utilities)?

Responses to the checklist represent an initial assessment of the proposed project conditions and impacts. City staff will confirm this checklist based on assessment of the development application and/or project plans. Results of the checklist will classify a project as one of the following: Priority Development Project, Standard Project, or Non-development Project.

If additional information is needed while completing this checklist, please refer to the City's *BMP Design Manual*. Alternatively, contact City Land Development staff.

This Form is divided into 4 sections:

1. Post-Construction Stormwater Requirement Exemptions
2. Priority Development Project Determination
3. Special Consideration for Redevelopment Projects (50 Percent Rule)
4. Final Project Determination

SECTION 1 – POST CONSTRUCTION STORMWATER REQUIREMENT EXEMPTIONS	City of Vista BMP Design Manual	
This section will determine whether your project is exempt from post-construction BMP requirements and would be classified as a Non-Development Project. See section 1.3 of the City's *BMP Design Manual* for further discussion.	**YES**	**NO**
(a) Replacement of impervious surfaces that are part of a routine maintenance activity, such as (check yes if any apply): (i) Replacing roof material on an existing building (ii) Rebuilding a structure to original design after damage from earthquake, fire or similar disaster (iii) Restoring pavement or other surface materials affected by trenches from utility work (iv) Resurfacing existing roads and parking lots, including slurry, overlay and restriping (v) Routine replacement of damaged pavement, including full depth replacement, if the sole purpose is to repair the damage (vi) Constructing new sidewalk, pedestrian ramps or bike lanes on existing roads (within existing street right-of-way) (vii) Restoring a historic building to its original historic design (viii) Routine replacement of damaged pavement, such as pothole repair **Note**: Work that creates impervious surface outside of the existing impervious footprint is not considered routine maintenance.	☐	■
(b) Repair or improvements to an existing building or structure that do not alter the size (check yes if any apply): (i) Plumbing, electrical and HVAC work (ii) Interior alterations including major interior remodels and tenant build-out within an existing commercial building (iii) Exterior alterations that do not change the general dimensions and structural framing of the building (does not include building additions or projects where the existing building is demolished)	☐	■
If you answered **YES** to either category (a) or (b), your project is considered a Non-Development Project, and post construction BMP requirements do not apply. Please proceed to Section 4 and check the **Non-Development Project** box. If you answered **NO** to category (a) and (b), please proceed to Section 2.		

SECTION 2 – PRIORITY DEVELOPMENT PROJECT DETERMINATION	City of Vista BMP Design Manual	
This section determines whether your project is a **Priority Development Project (PDP)** or a **Standard Project.** See section 1.4 of the City's *BMP Design Manual* for further discussion. The following eight (8) types of projects are defined as **PDPs:**	**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.	■	☐
(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.	☐	■
(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.	☐	■

(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 discharge 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; 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 City. For projects adjacent to an ESA, but not discharging to an ESA, the 2,500 sq-ft threshold does not apply as long as the project does not physically disturb the ESA and the ESA is upstream of the project. There are no Areas of Special Biological Significance (ASBS) or State Water Quality Protected Areas in the City's jurisdiction. The ESAs within the City's boundaries which include 303(d)-listed impairments and RARE beneficial use designations are listed below: • Agua Hedionda Creek • Buena Creek • Buena Vista Creek • Loma Alta Creek	☐	[redacted]
(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. This category includes Retail gasoline outlets that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic of 100 or more vehicles per day.	☐	[redacted]
(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. This means any activity that moves soils or substantially alters the pre-existing vegetated or man-made cover of any land. This includes, but is not limited to the following: (i) Grading, digging, cutting, scraping, stockpiling, pavement removal, and exterior construction; (ii) Substantial removal of vegetation where soils are disturbed including but not limited to removal by clearing or grubbing; or (iii) Any activity which bares soil or rock or involves streambed alterations or the diversion or piping of any watercourse.	☐	[redacted]

If you answered **YES** to any of the categories above (a-f), your project is considered a PDP. Please proceed to section 3 and check the **Priority Development Project** Box in Section 4.

If you answer **NO** to all categories, then your project is considered a Standard Project. Please proceed to Section 4 and check the **Standard Project Box**.

SECTION 3 – SPECIAL CONSIDERATIONS FOR REDEVELOPMENT PROJECTS (50 PERCENT RULE)	City of Vista BMP Design Manual	
This section determines additional considerations required for **Redevelopment PDPs.** See section 1.7 of the City's *BMP Design Manual* for further discussion.	**YES**	**NO**
Will redevelopment result in the creation or replacement of impervious surface in an amount of more than 50 percent of the surface area of the previously existing development? See clarification on calculation of the ratio of impervious surface below. These requirements for managing storm water on an entire redevelopment project site are commonly referred to as the "50 Percent Rule". For the purpose of calculating the ratio, the surface area of the previously existing development shall be the area of impervious surface within the previously existing development. The following steps shall be followed to estimate the area that requires treatment to satisfy the MS4 Permit requirements: 1. How much total impervious area currently exists on the site? 2. How much existing impervious area will be replaced with new impervious area? 3. How much new impervious area will be created in areas that are pervious in the existing condition? 4. Total created and/or replaced impervious surface = Step 2 + Step 3. 5. **50 Percent Rule Test**: Is step 4 more than 50 Percent of Step 1? If yes, treat all impervious surface on the site (including existing impervious surface not being replaced or added). If no, then treat only Step 4 impervious surface and any area that comingles with created and/or replaced impervious surface area. Note: Step 2 and Step 3 must not overlap, as it is fundamentally not possible for a given area to be both "replaced" and "created" at the same time. Also activities that occur as routine maintenance (see Section 1 of this form) shall not be included in Step 2 and Step 3 calculation. For example, a 10,000 square foot development proposes replacement of 4,000 square feet of impervious area. The treated area is less than 50 percent of the total development area and only the 4,000 square foot area is required to be treated.	☐	■

If you answered **YES**, then you must implement the PDP requirements for all impervious surfaces across the entire site. Please proceed to Section 4 and check the box under PDP indicating that the Project **Is a Redevelopment Project Subject to the 50 Percent Rule**.

If you answered **NO,** then you are only required to treat impervious surfaces that are replaced or created. Please proceed to section 4 and check the box under PDP indicating this is **Not a Redevelopment Project Subject to the 50 Percent Rule**.

SECTION 4 – FINAL PROJECT DETERMINATION

City of Vista

BMP Design Manual

BASED ON THE INFORMATION PROVIDED IN SECTIONS 1-3, THIS PROJECT IS DETERMINED TO BE A:

☒ **PRIORITY DEVELOPMENT PROJECT.** PRIORITY REQUIREMENTS APPLY AND A STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) MUST BE SUBMITTED AT THE TIME OF APPLICATION.

☐ THIS **IS** A REDEVELOPMENT PROJECT SUBJECT TO THE 50 PERCENT RULE.

☒ THIS **IS NOT** A REDEVELOPEMNT PROJECT SUBJECT TO THE 50 PERCENT RULE.

☐ **STANDARD PROJECT.** STANDARD REQUIREMENTS APPLY AND APPLICABLE SECTIONS OF A STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) MUST BE SUBMITTED AT THE TIME OF APPLICATION.

☐ **NON DEVELOPMENT PROJECT.**

Applicant Information and Signature Box

Address: SWS Engineering, Inc. 1635 Lake San Marcos Drive, Suite 200	APN(s) 161-030-07
Applicant Name: Michael D. Schweitzer	Applicant Title: CEO/President
Applicant Signature:	Date: 3/17/2025

City use only

Concur:	Yes	No
By:		
Date:		
Land Dev #:		

Supporting discussion for this checklist, as well as BMP requirements for Priority Development Projects and Standard Projects, is provided in the City of Vista *BMP Design Manual*.

FORM 2 – PROJECT OVERVIEW

Page 1 of 11

Project Name	Waxwing Drive Subdivision
Project Address	552 W Bobier Drive, Vista, CA 92083
Assessor's Parcel Number(s) (APN(s))	161-030-07
Permit Application Number	P24-0164
Watershed *(select one checkbox; use webpage below to determine watershed)* http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms	
San Luis Rey	☒ Lower San Luis Rey – Mission, 903.11
Carlsbad	☒ Loma Alta – Loma Alta, 904.10 ☐ Buena Vista – El Salto, 904.21 ☒ Buena Vista – Vista, 904.22 ☐ Agua Hedionda – Los Monos, 904.31 ☐ Agua Hedionda – Buena, 904.32 ☐ San Marcos – Batiquitos, 904.51
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	1.67 Acres (72,901 Square Feet)
Area to be Disturbed by the Project (Project Area)	1.70 Acres (74,242 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	0.67 Acres (42,160 Square Feet)
Project Proposed Pervious Area (subset of Project Area)	0.74 Acres (32,083 Square Feet)
NOTE: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	

2

Form 2, Page 2 of 11

DESCRIPTION OF EXISTING SITE CONDITIONS

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

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

Describe:
Parcel is located on 1.67 acres land currently being undeveloped. The site had an existing structure that has been demolished around 2008-2009 with no new development.

Existing Land Cover Includes (select all that apply and describe below):

- ☒ Vegetative Cover 1.49 Acres (64,801 Square Feet)
- ☐ Non-Vegetated Pervious Areas Acres (Square Feet)
- ☒ Impervious Areas 0.18 Acres (8,100 Square Feet)

Describe: The site had an existing structure that has been demolished around 2008-2009 with no new development.

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 and describe in next section):

- ☐ Drainage ditch/Swale/Waterway
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☒ None

Form 2, Page 3 of 11

DESCRIPTION OF EXISTING SITE DRAINAGE PATTERNS

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

1. Is existing site drainage conveyance natural or improved storm drain (urbanized);
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 project is situated on one parcel of total area 1.67 ac undeveloped land. The site had an existing structure that has been demolished around 2008-2009 with no new development. The site slopes range from 2-25%. Runoff from Basin 1 of the project site will surface flow from the undisturbed natural terrain north onto West Bobier Drive, where it enters the existing storm drain system located on the west of the high point on Bobier that drains to Guajome Lake and ultimately into San Luis Rey River. Basin 2 also drains into W Bobier Drive where it also enters into existing storm drain systems located on Moa Dr (east of Marabou Ln) and ultimately discharges into Buena Vista Creek. Runoff from basins (3-5) sheet flow along natural terrain in the southeasterly direction (not concentrated) towards the existing residential development on Waxwing Drive and Mynah Place which then discharge into existing storm drain systems located on Moa Dr (east of Marabou Ln) and ultimately into Buena Vista Creek.

Runoff from Basin 6 surface flows along the natural terrain that discharges offsite (adjacent property) in the southwesterly direction into existing concrete lined channel along the southern portion of the adjacent property then into public storm drain system and ultimately into Loam Alta Creek and finally into Pacific Ocean.

Majority of the site runoffs discharge into Loma Alta Creek and smaller area into Buena Vista Creek and ultimately into the Pacific Ocean. The small area draining toward Guajome Lake will be routed toward Buena Vista Creek in post condition.

The development of the site will not have any negative impact to the adjacent properties on the east, west and south as the development of the site will reduce the site runoff below the existing condition by constructing multiple basins to detain any excess water onsite. Also, much of the existing runoff to the east toward adjacent properties will be routed to the southwest in post condition. Rip rap will be added at the discharge point of each basin and POC points to reduce the runoff velocity of the discharge. The discharge points of the site will also be reduced.

There is no offsite run on in the existing condition. The improvement of the adjacent property on the west won't have any negative impact to our site as there is slope along site the project site drains away from out site and therefore there won't be any offsite draining to our project stie. (Refer to drainage report for more detail information).

Form 2, Page 4 of 11

DESCRIPTION OF PROPOSED SITE DEVELOPMENT

Project Description / Proposed Land Use and/or Activities:

The proposed project site consists of 15 townhomes (two-story structure), patio (future contingency) with associated driveway, private street, utilities, and other associated improvements and onsite treatment basins as well as the Tree-Well (to site front improvement area). The project site is one parcel with a total area of 1.67 ac that is located south of West Bobier Drive and at the north end of the current extent of Waxwing Drive in the City of Vista, California. The site is located on R-1-B (7.5) Single-Family Residential zone and is currently undeveloped land. The proposed land use for this project is MDR (Medium Density Residential). (Refer to drainage report for more detail information).

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

15 Single family residential units, patio (future contingency), drive lanes, associated driveways, private street,

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

Landscape Areas

Does the project include grading and changes to site topography?

☒ Yes

☐ No

Describe: The proposed site will be entirely regraded to maintain as close to the original drainage discharge locations, and with associated cut and fill to balance earth work and reduce the export and import.

Form 2, Page 5 of 11

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 proposed site is undeveloped land that consists of 15 townhomes (two-story structure) with associated driveway, private street, utilities, and other associated improvements and treatment basins. The project site is one parcel with a total area of 1.67 ac that is located south of West Bobier Drive, and on the north end of the existing Waxwing Drive within the City of Vista, California.

The proposed site drainage from Basins 1 and 3 will surface flow via proposed site roofs, hardscape, and curb-gutter into a proposed treatment basins located in the north and northeast portion of the site prior to discharging into W Bobier Drive east of high point. Basin 2 that has small improvement will also surface flow in northerly direction into W Bobier Drive east of high point. Basins (4.1, 4.2, 4.3) which are landscape area will sheet flow offsite in the easterly direction as it does in the existing condition with very minor runoffs less/equal than 0.1 cfs. All the runoff from basins (1-4) ultimately discharge into existing storm drain systems located on Moa Dr (east of Marabou Ln) similar to the existing condition prior to discharging in Buena Vista Creek.

Basin 5 will sheet flow in the easterly direction into proposed treatment basin and then routed offsite via proposed storm drain system into southwest corner of the site. Basins 6 and 7 will discharge via curb gutter and catch basins into proposed treatment basins located on the west north and south side of the project site prior to discharging toward southwest offsite corner of the site via proposed storm drain systems. All the discharge runoff from basins (5-8) will discharge into existing lined channel along southern portion of the adjacent property on the west via concrete ditch that is built along eastside of the adjacent property (after the adjacent property development is completed). Basin 8 is a small landscape area that will sheet flow offsite on the westerly direction.

Majority of the site 1.24 ac (basins 5-8) runoffs will discharge into Loma Alta Creek and smaller area on the east portion of the site 0.43 ac (basins 1-4) into Buena Vista Creek via sheet flow and existing public storm drain systems and ultimately discharge into the Pacific Ocean.

The discharging runoff from basins 1-3 into W Babier Drive, will confluence with the runoff from basins (4.1, 4.2, 4.3) at Mynah Pl and Marabou Ln which ultimately discharge in existing storm drain systems located on Moa Dr (east of Marabou Ln).

The proposed project site will have an increase in flow compared to the existing condition due to the coefficient C, diversion and time of concentration. The excess Q will be detained by multiple proposed biofiltration basins to reduce the Q below the existing condition at the two POCs, one from basins (1-4) at the confluence point of Mynah Pl and Marabou Ln and the second at the southwest corner of the site from basins (5-8).

There is no offsite run-on in the post-condition. The improvement of the adjacent property on the west won't have any negative impact to our site as there is slope along site the project site drains away from our site and therefore there won't be any offsite draining to our project site. The development of our project site won't have any negative impact to the adjacent property since the excess runoff compared to existing condition will be detained onsite. The attenuated runoff will discharge into existing lined channel along the southern portion of the adjacent property via concrete ditch that is built along eastside of the adjacent property (after the property development is completed). (Refer to drainage report for more detail information).

Form 2, Page 6 of 11

POTENTIAL POLLUTANT SOURCE AREAS

Identify whether any of the following features, activities, and/or pollutant source areas will be present. Select all Pollutant Source Areas that apply and include them on the DMA Exhibit. Source control BMPs must be identified for each of these areas in Form 3 of this SWQMP:

☒ On-site storm drain inlets

☐ Sump pumps or French drains

☐ Interior or sub-surface parking garages

☒ Need for future indoor & structural pest control

☒ Landscape/outdoor pesticide use

☐ Pools, spas, ponds, decorative fountains, or other water features

☐ Food preparation and/or service

☒ Refuse/trash collection areas

☐ Industrial processes

☐ Outdoor storage of equipment, chemicals, or materials

☐ Vehicle and equipment cleaning

☐ Vehicle/equipment repair and maintenance

☐ Fuel dispensing areas

☐ Loading docks

☒ Fire sprinkler test and relief point

☒ Miscellaneous drain or wash down areas

☒ Plazas, sidewalks, and parking lots

Describe: the pollutant source area (impervious) are the roofs, patio and decks, downspouts, Trash areas, driveways, private street.
The anticipated pollutant for attached residential development are: sediment, nutrients, trash and debris, potential Oxygen demanding substances, potential oil ang grease, potential bacteria & viruses, pesticides

Form 2, Page 7 of 11

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 site flow will discharge from the site into Loma Alta Creek, then into Loma Alta Slough, and ultimately into 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
Loma Alta Creek (904.10)	Phosphorus, Selenium, Toxicity, Pyrethroids, Bifenthrin, Cyfluthrin, Cyhalothrin, Lambda, Benthic Community Effects, Indicator Bacteria, Nitrogen	Phosphorus (Alternative TMDL – Addressed By Regional MS4 Permit Per Carlsbad WMA WQIP)
Loma Alta Slough (904.10	Eutrophic, Indicator Bacteria	Phosphorus (Alternative TMDL – Addressed By Regional MS4 Permit Per Carlsbad WMA WQIP)
Pacific Ocean Shoreline, Loma Alta HAS, at Loma Alta Creek Mouth (904.10)	Indicator Bacteria, Trash	Phosphorus (Alternative TMDL – Addressed By Regional MS4 Permit Per Carlsbad WMA WQIP)
Buena Vista Creek (904.21)	Phosphorus, Selenium, Total Dissolved Solids, Toxicity, Bifenthrin, Cyfluthrin, Benthic Community Effects, Indicator Bacteria, Nitrogen, Pyrethroids, Cypermethrin	N/A (No TMDLs or WQIP HPWQCs)
Buena Vista Lagoon (904.21)	Indicator Bacteria, Nutrients, Sedimentation/Siltation, Toxicity	N/A (No TMDLs or WQIP HPWQCs)
Pacific Ocean Shoreline, Buena Vista Creek HA, at Buena Vista Lagoon Oulter (904.21)	N/A	N/A (No TMDLs or WQIP HPWQCs)
Guajome Lake	Eutrophic	Indicator Bacteria
Lower San Luis Rey River	Pyrethroids, Bifenthrin, Benthic Community Effects, Chloride, Oxygen, Dissolved, Phosphorus, Total Dissolved Solids, Toxicity, Nitrogen	Indicator Bacteria

Pacific Ocean Shoreline at San Luis Rey River	Indicator Bacteria	Indicator Bacteria

Identification of Project Site Pollutants* N/A Site is not participating in an Alternative Compliance

***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	☐	☐	☐

Form 2, Page 8 of 11

HYDROMODIFICATION MANAGEMENT REQUIREMENTS

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual; select one box and describe below)?

☒ 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.

Describe:
There are two POCs on site, POC-1 located on the northeast for DMA (1-4), POC-2 located on the southwest corner of the site where DMAs 5-8 will discharge into from multiple biofiltration basins into existing storm drain systems. DMA 4 and 8 are self-mitigating areas (used in the SWMM analysis) sheet flow offsite (not concentrated) as they do in the existing condition.

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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 (select all that apply and describe below)? Additional signed and stamped reports must be provided to document any exemption from coarse sediment yield requirements.

☐ 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.

Describe:

Form 2, Page 10 of 11

FLOW CONTROL FOR POST-PROJECT RUNOFF

**This section only required if hydromodification management requirements apply*

List and describe point(s) of compliance for hydromodification management flow control (see Section 6.3.1). Identify each point of compliance for flow control on the Hydromodification Management Exhibit in Attachment 2A.

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 the report.

Discussion / Additional Information: (optional)

Form 2, Page 11 of 11

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.

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.

There is a small site front improvement that will be treated via proposed Tree-Well. This proposed Tree-Well will treat any site frontage improvement and portion of the site front street in exchange for the DMA-2.1 that cannot be treated.

FORM 3 – SOURCE CONTROL BMPS FOR ALL DEVELOPMENT PROJECTS

PROJECT IDENTIFICATION & SOURCE CONTROLS

Project Name: Waxwing Subdivision

Permit Application Number: P24-0164

All development projects must implement source control BMPs SC-1 through SC-6, unless justification is provided by qualified design professional 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, and provide description.

- "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.
- "No" means the BMP is applicable to the project but it is not feasible to implement.
- "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).

Source Control Requirement	Applied?		
SC-1 Prevention of Illicit Discharges into the MS4	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: Providing educational material to homeowners "as a suit of housekeeping BMP" to effectively eliminate discharges of non-storm water into the storm drain system which would include effective irrigation, dispersion of non-storm water discharges into landscaping for infiltration, and controlling wash water from vehicle washing. Appropriate signage will be provided on storm inlets to discourage the deposition of any illicit materials.			
SC-2 Storm Drain Stenciling or Signage	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: Appropriate signage will be provided on each storm inlet. Signage will be maintained or replaced as needed.			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No outdoor material storage area is proposed			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No outdoor work area is proposed			

Form 3, Page 2 of 4			
Source Control Requirement	**Applied?**		
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No centralized trash storage areas are proposed			
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)	**Applied?**		
a. On-site storm drain inlets	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: Appropriate signage will be implemented on each storm drain inlet. Signage will be maintained and replaced as needed.			
b. Sump pumps or French drains	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No sump pumps or French drains proposed.			
c. Interior or sub-surface parking garages	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No interior or sub-surface parking garages proposed.			
d. Need for future indoor & structural pest control	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: Building design will include features such as weather stripping that discourage entry of pests.			
e. Landscape/outdoor pesticide use	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: Usage of pest-resisting plants in landscape will be used, pesticide sued will be kept to a minimum.			

Form 3, Page 3 of 4			
Source Control Requirement	**Applied?**		
f. Pools, spas, ponds, decorative fountains, or other water features	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No pools, spas, ponds, decorative fountains, or other water features are proposed.			
g. Food preparation and/or service	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No food preparation/service will be implemented on-site.			
h. Refuse/trash collection areas	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No centralized trash storage areas are proposed			
i. Industrial processes	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No industrial processes will be implemented on-site.			
j. Outdoor storage of equipment, chemicals, or materials	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No outdoor storage areas are proposed.			
k. Vehicle and equipment cleaning	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No vehicle and equipment cleaning areas are proposed.			
l. Vehicle/equipment repair and maintenance	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No vehicle/equipment repair or maintenance areas are proposed.			
m. Fuel dispensing areas	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No fuel dispensing areas are proposed.			

Form 3, Page 4 of 4			
n. Loading docks	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: No loading docks are proposed.			
o. Fire sprinkler test water and relief point	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible:			
p. Miscellaneous drain or wash down areas	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: Roofing, gutters, and trim of proposed buildings will not be made of copper or any other unprotected metal that may leach into runoff.			
q. Plaza, sidewalks, parking lots	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: Sidewalks shall be swept regularly by HOA to prevent the accumulation of litter and debris. Washing will be kept to a minimum, and debris from occasional washing will be collected to prevent entry into storm drain system.			
Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.			

FORM 4 – SITE DESIGN BMPS FOR ALL DEVELOPMENT PROJECTS

PROJECT IDENTIFICATION

Project Name: Waxwing Subdivision

Permit Application Number: P24-0164

All development projects must implement site design BMPs SD-1 through SD-8, unless justification is provided by qualified design professional. 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, and provide description.

- "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.
- "No" means the BMP is applicable to the project but it is not feasible to implement.
- "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).

Site Design Requirement	Applied?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☐ Yes	☐ No	☒ N/A
Describe how site design will be implemented, or justify if not feasible: The site will be entirely graded.			
SD-2 Conserve Natural Areas, Soils, and Vegetation	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: Portion of the site on the north won't be graded (in DMA-2.1).			
SD-3 Minimize Impervious Area	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: Impervious footprint minimized in plan. North, south and east portion of the site would be landscape to minimize imperviousness on the site and also east side of the site would function as self-mitigating areas.			
SD-4 Minimize Soil Compaction	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: Soil compaction will be minimized in natural landscape areas. Disturbed slope soils will also be amended and aerated.			

Form 4, Page 2 of 2			
SD-5 Impervious Area Dispersion	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: Where feasible landscape will effectively receive, infiltrate and treat runoff from impervious areas prior to discharging into series of biofiltration basins. Roof drains will be directed to landscape areas where feasible prior to discharging to treatment basins and then into storm water conveyance systems.			
SD-6 Runoff Collection	☐ Yes	☒ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: Green Roofs: Requirement of more than 90% is the roof surface being vegetated is infeasible due to building design. However, the building design will include a light-colored roof to reduce the heat island effect, similar to a green roof. Permeable Pavement: Due to the constrained nature of the site, permeable pavement cannot be provided in appreciable sizes without disturbing underground utilities. Site landscape will be used instead to provide percolation of storm water into the subsurface. Rain Barrels: County requirements per fact sheet SD-E include landscape areas that are greater than 30 percent of the project footprint, which this site is not.			
SD-7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: Native/drought tolerant plants will be implemented.			
SD-8 Harvest and Use of Precipitation	☐Yes	☒ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: County requirements per fact sheet SD-E include landscape areas that are greater than 30 percent of the project footprint, which this site is not. Due to this harvest and use calculations were completed and it was determined infeasible. See calculations on Worksheet B.3-1. Per the site design for this project, series of biofiltration basins area proposed throughout the site to reduce the site required DCV.			

FORM 5 – STRUCTURAL POLLUTANT CONTROL AND HYDROMODIFICATION MANAGEMENT BMPS

PROJECT IDENTIFICATION

Project Name: Waxwing Subdivision

Permit Application Number: P24-0164

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 BMP selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate structures.

Note: Each structural pollutant control and hydromodification management BMP must be clearly identified on a site map (Attachment 1a), and described in supporting table (Attachment 1B).

-The area to be disturbed was measured and a DCV was calculated for DMAs 1, 3, 5, 6, 7 per attached DMA map.
-Harvest and use was not deemed feasible per worksheet B.3-1.
-Site soil and geologic conditions dictate that the infiltration (Average 0.09 in/hr with Factor of Safety 2) is not possible at this site (Please see the infiltration testing report prepared by CW Soils, dated April 25, 2024.
-The project will involve construction of five biofiltration basins along the southern, norther, eastern boundary of the parcel in DMAs (1, 3, 5, 6, 7). The site runoffs from rooftops and private street will discharge into biofiltration basins via surface flow, curb gutter, and storm drain systems.
-Design of the biofiltration basins will account for the necessary treatment and hydromodification requirements and for the 100-year storm event.
-The DMAs (1, 3, 5, 6, 7) containing the treatment BMPs are of impervious area, with flows ultimately discharging into Loma Alta Creek ang Buena Vista Creek.
Tree-Well will be provided to treat the site front improvement and portion of the site front street to swap for the DMA-2.1 that cannot be treated.

FORM 6 – STORMWATER BMP MAINTENANCE MECHANISM

PROJECT IDENTIFICATION
Project Name: Waxwing Drive Subdivision
Permit Application Number
Maintenance Requirements: P24-0164

A stormwater structural BMP operations and maintenance plan must be prepared for PDPs. A template plan is available at:
http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms

Has a stormwater structural BMP operations and maintenance plan been prepared?

☒ Yes, included with Attachment 3A

☐ No – **To be provided at final engineering**

[INSERT PLAN NAME]
[INSERT PLAN DATE]
[INSERT PREPARER'S NAME]
[INSERT PREPARER'S TITLE/COMPANY]

All projects are required to maintain designed functionality of structural BMPs in perpetuity. Privately-owned projects must record a *Storm Drain Maintenance Agreement* with the County of San Diego Assessor's Office. A template *Storm Drain Maintenance Agreement* is available at:
http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms

Has a Storm Drain Maintenance Agreement been submitted to the County?

☐ Yes, copy included with Attachment 3B

☒ No – **To be provided at final engineering**

☐ Not Applicable (e.g., city-owned property/project)

ATTACHMENT 1 – POLLUTANT CONTROLS: SUPPORT DOCUMENT AND CHECKLIST

Each of the attachments indicated below should be considered for inclusion with the SWQMP. Use this checklist to indicate which attachments are included behind this coversheet.

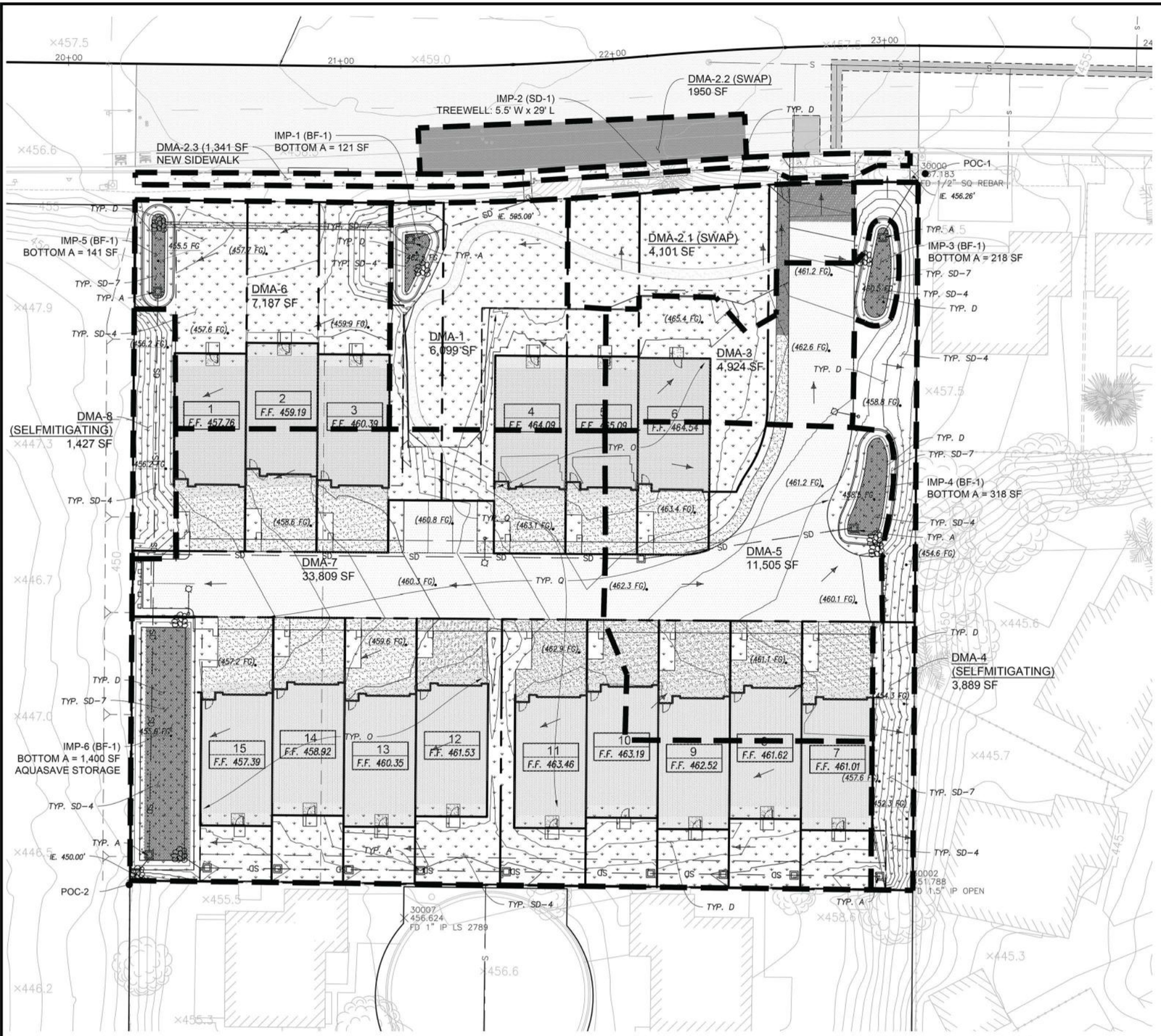
Attachment Sequence	Contents	Checklist
Attachment 1A	Drainage Management Area (DMA) Exhibit See DMA Exhibit Checklist on next page.	☒ Included
Attachment 1B	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, DMA Type, and BMPs* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1A	☒ Included on DMA Exhibit in Attachment 1A ☒ Included as Attachment 1B
Attachment 1C	Harvest and Use Feasibility Screening Checklist (Worksheet B.3-1) Refer to Appendix B.3-1 of the *BMP Design Manual*.	☒ Included ☐ Not included because the entire project will use Infiltration BMPs
Attachment 1D	Categorization of Infiltration Feasibility Condition (Worksheet C.4-1) Refer to Appendices C and D of the *BMP Design Manual*.	☒ Included ☐ Not included because the entire project will use Harvest and Use BMPs
Attachment 1E	Pollutant Control BMP Design Worksheets and Calculations Refer to Appendices B and E of the *BMP Design Manual* for structural pollutant control BMP design guidelines	☒ Included

ATTACHMENT 1A – DMA EXHIBIT CHECKLIST

For Attachment 1A, provide map(s) for the project site, titled "DMA Exhibit." The checklist below identifies minimum elements that must be included with the DMA Exhibit.

☒ Underlying hydrologic soil group
☒ Approximate depth to groundwater
☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands, etc.)
☒ Critical coarse sediment yield areas to be protected
☒ Existing topography and impervious areas
☒ Existing and proposed site drainage network and storm drain structures
☒ Proposed connections to offsite drainage
☒ Proposed demolition
☒ Proposed grading
☒ Proposed impervious features
☒ Proposed design features and surface treatments used to minimize imperviousness
☒ Drainage management area (DMA) boundaries
☒ DMA identification numbers (DMA ID)
☒ DMA areas (square footage or acreage)
☒ DMA type (Drains to BMP, Self-mitigating, De Minimis, or Self-retaining)
☒ Potential pollutant source areas and corresponding required source controls (see Form 2 and Form 3 of SWQMP, *BMP Design Manual* Chapter 4 and Appendix E.1)
☒ Proposed Structural BMPs (see Form 5 of SWQMP)

ATTACHMENT 1A & 1B



LEGEND

- DMA BOUNDARY
- "D" SOIL TYPE
- > 9' GROUNDWATER TABLE
- FLOW DIRECTION
- LANDSCAPE AREA
- BIOFILTRATION AREA
- IMPERVIOUS AREA (BLDG)
- IMPERVIOUS AREA (CONCRETE)
- IMPERVIOUS AREA (AC)
- AREA THAT CAN NOT BE TREATED ONSITE (SWAP AREA)
- STREET UNDISTURBED AREA (SWAP AREA)

TABULAR SUMMARY OF DMAs

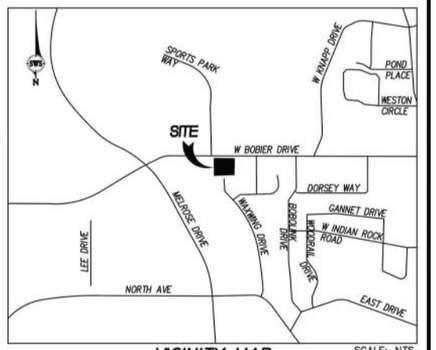
DMA	IMP #	AREA (SF)	IMPERVIOUS AREA (SF)	% IMP	HSG	AREA WEIGHTED** RUNOFF COEFFICIENT	VOLUME (DCV)	TREATMENT SYSTEM
1	1	6,099	1,290	21.1	D	0.43	144	BIOFILTRATION
*2.1	2	4,101	830	20.2	D	0.42	163 DMAs (2.2+2.3)	TREEWELLS
*2.2		1,950	1,950	100	D	0.90		
*2.3		1341	1341	100	D	0.90		
3	3	4,924	2,812	57.1	D	064	173	BIOFILTRATION
4	–	3,889	0.00	0.0	D	0.30	–	SELF–MITIGATING
5	4	11,505	9,661	84.0	D	0.80	506	BIOFILTRATION
6	5	7,187	2,561	35.6	D	0.51	202	BIOFILTRATION
7	6	33,809	23,665	70.0	D	0.72	1,339	BIOFILTRATION/ AQUASAVE
8	–	1,427	0	0.0	D	0.30	–	SELF–MITIGATING

–*THE IMPERVIOUS AREA FROM DMA–2.1 IS REQUIRED TO BE TREATED BUT IT CAN NOT,THEREFORE IT WILL BE SWAPPED WITH THE ADDITIONAL AREA "DMA–2.2" (HALF FRONTAGE STREET) THAT WILL TREAT THE OFFSITE IMPROVEMENT AREA VIA PROPOSED TREE–WELLS.

–LOMA ALTA CREEK AND BUENA VISTA CREEK ARE EXISTING NATURAL HYDROLOGIC FEATURES (WATERCOURSES, SEEPS, SPRINGS, WETLANDS)
NO CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED
MULTI STORY STRUCTURES MINIMIZE IMPERVIOUS AREA

–**PER PERVIOUS C COEFFICIENT = 0.3 & IMPERVIOUS C COEFFICIENT = 0.9

SITE DESIGN BMPS	
SD–3	MINIMIZE IMPERVIOUS AREA
SD–4	MINIMIZE SOIL COMPACTION
SD–7	LANDSCAPING WITH NATIVE DROUGHT TOLERANT SPECIES
SOURCE CONTROL NOTES	
SC–1	"NO DUMPING! FLOWS TO CREEK"
SC–2	STORM DRAIN STENCILING AND SINGAGE
SC–6:	
A	STENCIL ON–SITE INLETS: "NO DUMPING! FLOWS TO CREEK"
D	LANDSCAPE/OUTDOOR PESTICIDE USE: PROVIDE IMP
O	ROOF AND EQUIPMENT: CONNECT CONDENSATE DRAIN TO SANITARY SEWER, PROVIDE ROOFING AND/SECONDARY CONTAINMENT TO EQUIPMENT, AVOID USE OF UNPROTECTED METALS.
Q	PLAZAS, SIDEWALKS, AND PARKING LOTS: SWEEP REGULARY, COLLECT DEBRIS, COLLECT WASHWATER AND DISCHARGE TO SANITARY SEWER



VICINITY MAP SCALE: NTS

–POC–1: (DMAs 1–3) DRAIN INTO BUENA VISTA CREEK
DMA–4 ALSO DRAINS INTO BUENA VISTA CREEK
DMAs (1–4) CONFLUENCE AT MYNAH PL AND MARABOU LN

–POC–2: (DMAs 5–7) DRAIN INTO LOMA ALTA CREEK
DMA–8 ALSO DRAINS INTO LOMA ALSO CREEK

20 10 0 20 40 60
SCALE IN FEET
GRAPHIC SCALE

1" = 20'

N

DMA MAP 1 OF 2
FOR
WAX WING DRIVE 15-LOTS
VISTA, CA

SWS ENGINEERING, INC.
CIVIL ENGINEERING • LAND PLANNING • SURVEYING
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011 F: 760-744-0046

24" x 36"

BIOFILTRATION CHART (BF-1)

DMA #	IMP #	ORIFICE DIAMETER (IN)	ORIFICE INVERT ELEVATION (FT)	OUTLET PIPE (IN)	# OF RISERS	GRATE SIZE IN FEET (X,Y)	BASIN TOTAL SURFACE * DEPTH (IN)	BASIN REQUIRED TREATMENT AREA (SF)	BASIN BOTTOM AREA (SF)	BASIN PROVIDED TREATMENT AREA (SF)	PERFORATED PIPE DIAMETER (IN)	MULCH DEPTH "A" (IN)	AMENDED SOIL DEPTH "B" (IN)	FILTER COURSE DEPTH "C1&C2" (IN)**	STORAGE "D" (IN)***	BOTTOM BASIN ELEVATION (FT)	DISTANCE FROM BOTTOM OF POND TO TOP OF GRATE	TOP OF GRATE ELEVATION++ (FT)	DCV (CF)	VOLUME PROVIDED**** (CF)	HMP ELEVATION (FT)	100YR ELEVATION (FT)	EFFECTIVE ELEVATION (FT)	TOP OF BERM ELEVATION (FT)	PROVIDED FREE BOARD (IN)	SIDE SLOPE Z:1
1	1	0.25	459.50'	6	1	1' X 1'	21"	79	121	121	6"	3"	18"	6"	12"	462.50	0.83'	463.33'	144	336	463.33'	463.54'	463.66'	464.25	7.08"	2:1
3	3	0.25	457.50'	8	1	1' X 1'	21"	95	218	218	6"	3"	18"	6"	12"	460.50'	0.83'	461.33'	173	580	461.33'	461.53'	461.58'	462.25'	8.04"	2:1
5	4	0.26	455.50'	10	1	1' X 1'	21"	280	318	318	6"	3"	18"	6"	12"	458.50'	0.83'	459.33'	506	1,097	459.33'	459.60'	459.53'	460.25'	7.80"	2:1
6	5	0.25	451.00'	10	1	1' X 1'	21"	110	141	141	6"	3"	18"	6"	12"	455.50'	0.83'	456.33'	202	396	456.33'	456.63'	456.69'	457.25'	6.72"	2:1
7	6	0.8 3	450.25' 455.25'	12	1	1' X 1'	21"	731	1400	1400	–	3"	18"	3"	33"	455.00'	0.83'	455.83'	1,339	6,095	455.83'	456.04'	455.86'	456.75'	8.52"	2:1

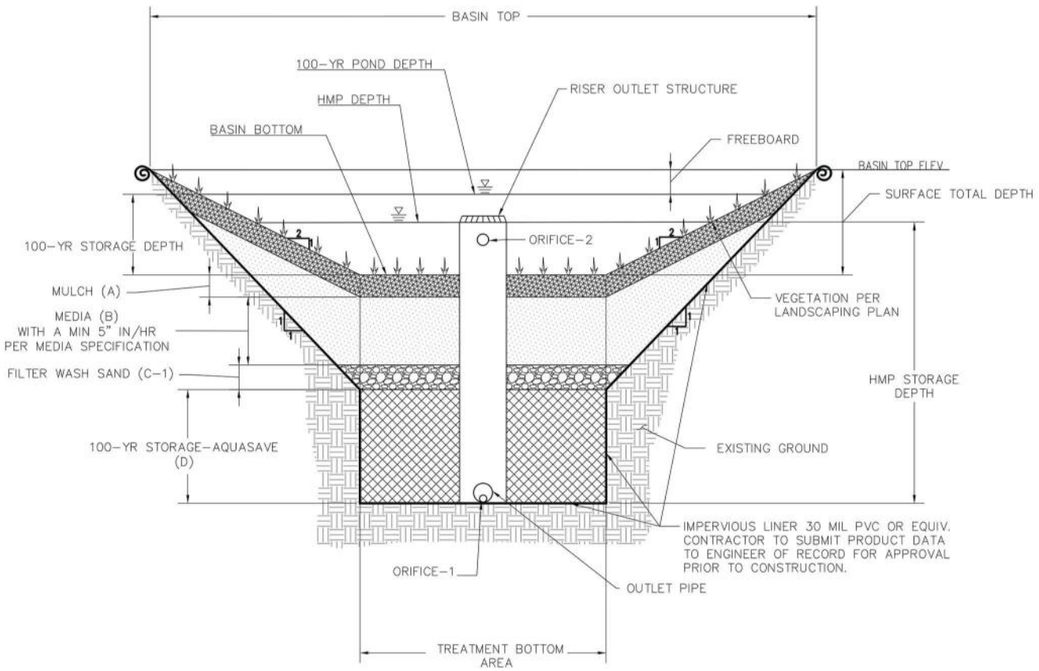
* FROM TOP OF MULCH TO TOP OF BERM

** 3" ASTM 33 (TOP) , 3" ASTM NO 8 (BOTTOM)

***(GRAVEL, ASTM 57) FOR IMPS (1,3,4,5), AQUASAVE FOR IMP-6

++PER HMP

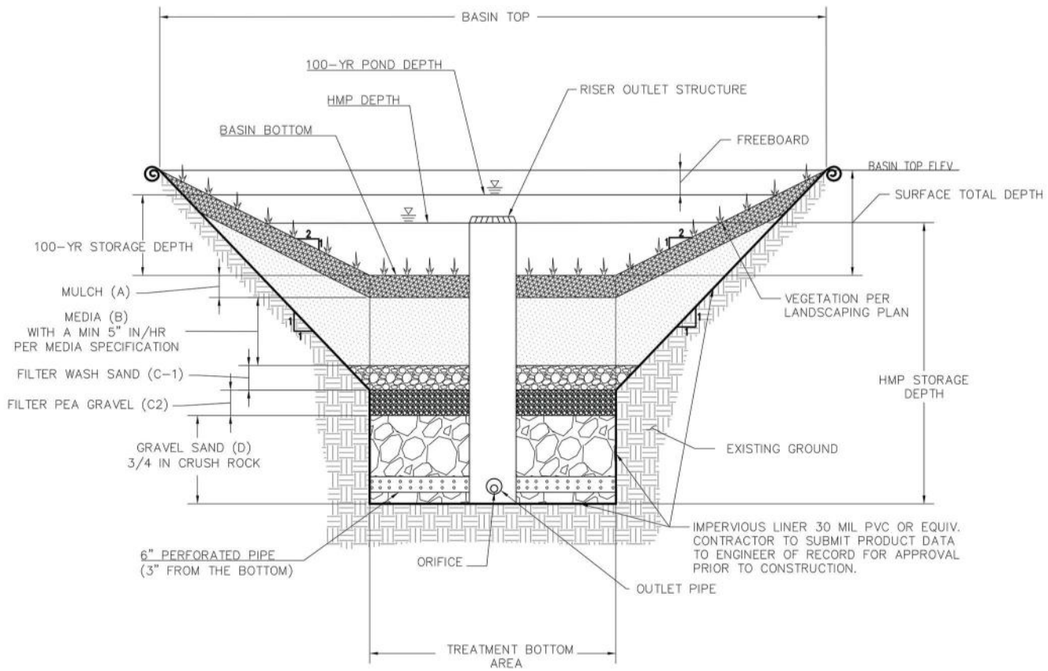
**** INCLUDES: 12" SURFACE 100% VOID
SOIL, GRAVEL 40% VOID
90% VOID FOR AQUASAVE STORAGE (IMP-6)



FOR LETTERS (A TO D) PLEASE
SEE BIOFILTRATION CHART (BF-1)

BIOFILTRATION FACILITY DETAIL (IMP-6)

NTS



FOR LETTERS (A TO D) PLEASE
SEE BIOFILTRATION CHART (BF-1)

BIOFILTRATION FACILITY DETAIL (IMPs 1,3,4,5)

NTS

BIOFILTRATION SOIL MEDIA (BSM)
SHALL MEET REQUIREMENTS OF THE COUNTY OF SAN DIEGO LOW IMPACT DEVELOPMENT HANDBOOK, APPENDIX G AND ALLOW FOR A LONG TERM, IN-PLACE INFILTRATION RATE OF 5 INCHES PER HOUR. BSM SHALL BE COMPOSED OF THE FOLLOWING:

BSM COMPOSITION	SAND	SANDY LOAM			COMPOST
		SAND	SILT	CLAY	
VOLUME	60-80%	0-20%			20%
WEIGHT	75-80%	10% MAX	3% MAX		9% MAX[1]

[1] 9% COMPOST BY WEIGHT RESULTS IN APPROXIMATELY 5% ORGANIC MATTER BY WEIGHT.
NUTRIENT-SENSITIVE BSM MIX PER FACTSHEET BF-2

BIOFILTRATION PLATE & ORIFICE DETAIL (IMP-6)

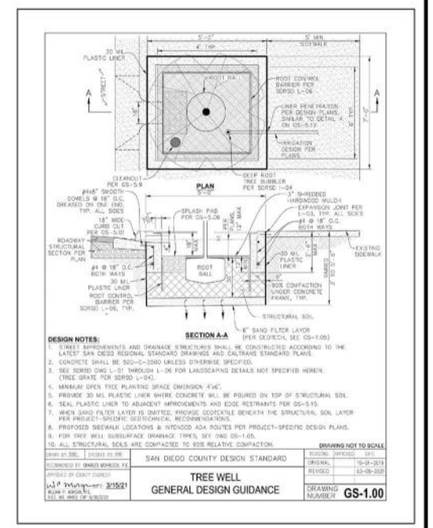
NTS

BIOFILTRATION PLATE & ORIFICE DETAIL (IMPs 1,3,4,5)

NTS

AQUASAVE (IMP-6)

NTS



TREE-WELL (IMP-2)

NTS

DMA MAP 2 OF 2
FOR
WAX WING DRIVE 15-LOTS
VISTA, CA

SWS ENGINEERING, INC.
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24" x 36"

ATTACHMENT 1B – TEMPLATE TABULAR DMA SUMMARY

The template tabular summary of DMAs must accompany the DMA Exhibit (Attachment 1A). A template table is provided below.

DMA ID	DMA Surface Type (roof, street, etc.)	DMA Area (sq.ft.)	DMA Type[1]	Structural BMP ID	Proposed Structural BMP Type[2]	Structural BMP Size[3]
1	Building, Patio, Driveways, Street, Sidewalks	6,099	Drains to BMP	IMP-1	Biofiltration	Treatment area: 121 sf
2.1 (SWAP)	Building, Patio, Driveways, Street, Sidewalks	4,101	-	IMP-2	Tree-Well	5.5 W' x29' L Tree-Well
2.2 (SWAP)	Frontage Street	1,950	Drains to BMP			
2.3	Sidewalk	1,341	Drains to BMP			
3	Undisturbed Pervious Area	4,924	Drains to BMP	IMP-3	Biofiltration	Treatment area: 218 sf
4	Building, Driveways, Street, Sidewalks	3,889	Self-mitigating	-	Self-Mitigating	-
5	Building, Driveways, Street, Sidewalks	11,505	Drains to BMP	IMP-4	Biofiltration	Treatment area: 318 sf
6	Walkway, driveway	7,187	Drains to BMP	IMP-5	Biofiltration	Treatment area: 141 sf
7	Building, Patio, Driveways, Street, Sidewalks	33,809	Drains to BMP	IMP-6	Biofiltration	Treatment area: 1400 sf
8	Pervious Area	1,427	Self-mitigating	-	Self-Mitigating	-

[1] DMA Type can only be: 1) Drains to BMP, 2) Self-mitigating, 3) De Minimis, or 4) Self-retaining

[2] BMP Type must be consistent with terminology in the *BMP Design Manual* and/or CASQA Fact Sheets

[3] Structural BMP Size is typically presented as an area (sq. ft.) or size (e.g., proprietary devices)

ATTACHMENT 1C

Worksheet B.3-1. Harvest and Use Feasibility Screening

Harvest and Use Feasibility Screening	Worksksheet B.3-1

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

- [x] Toilet and urinal flushing
- [x] Landscape irrigation
- [x] Other: Harvest and Use is Infeasible

Per Table B.3-3, the Irrigation demand 36 hour:
Moderate Plant Water Use = 1,470 gal / acre / 36 hrs
Proposed Planted Area (DMAs 1-8) = 35,062 sf or 0.81 acres
1,470 gal / acre x 0.81 acres / 7.48 gal / cf = **159 cf**

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.

Per Table B.3-1, Residential flushes per day amounts to 9.3 gallon per resident per day.
This development will employ the use of low-flow toilets:
9.3 gallon Per resident per day x 60 residents x 1.5 days x (1 cf/7.48 Gal) = **112 cf** per 36 hour demand

3. Calculate the DCV using worksheet B-2.1.

DCV (DMAs 1, 3, 5, 6,7) = 144 + 173 + 506 + 202 + 1,339 = 2,364 cubic feet
0.25*2,210 cubic feet = 591 cubic feet > (159 +112) cubic feet

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.

ATTACHMENT 1D

April 25, 2024 Project No. 23185-10

Mr. Michael Schweitzer, P.E.
SWS ENGINEERING, INC.
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078

Subject: **Infiltration System Design Interpretive Report, Proposed Vista Project, South side of West Bobier Drive and East of Sports Park Way, Oceanside, San Diego County, California**

In accordance with your request, CW Soils is pleased to present this infiltration system interpretive report for the proposed Vista Project, located on the south side of West Bobier Drive and east of Sports Park Way, Oceanside, San Diego County, California. The purpose of our feasibility study was to determine the onsite infiltration rates and physical characteristics of the subsurface soils within the vicinity of the proposed infiltration systems. We have provided guidelines for the design of onsite infiltration systems. This interpretive report is intended to provide onsite infiltration rates for the existing soils.

PROPOSED DEVELOPMENT

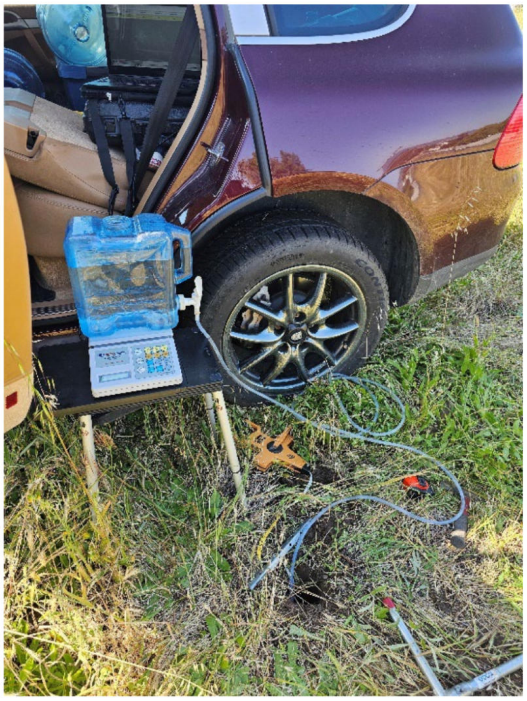
Based on our understanding of the proposed project, will include three main buildings consisting of 14 units along with 3 ADU buildings consisting of 6 units, private streets, interior driveways, utilities, and on-site infiltration areas.

INFILTRATION TESTING

INFILTRATION TESTING

Aardvark Permeameter testing was utilized to conduct in-situ infiltration tests within the proposed basins on April 11, 2024, to evaluate the infiltration rate(s) in order to estimate the amount of storm water runoff that can infiltrate into the proposed systems. The testing utilizes the constant head method with extremely accurate (0.2 ml resolution) hydraulic conductivity testing under saturated conditions, for the determination of reliable in-situ infiltration rates. Automated readings are taken at 1 minute intervals until the rate becomes constant and saturated hydraulic conductivity for the particular soil has been reached. This is reflected by the flattening of the curve generated by sample test data as shown on the Water Consumption Rate graph (Plot of Water Consumption Rate

vs. Time) in the Appendices herein. Steady Flow Rate is achieved when the Water Consumption Rate changes less than +/- 5% for 3 consecutive readings.



The Aardvark Permeameter was utilized in replacement of the Guelph Permeameter as recommended by Soil Moisture Equipment Corporation, due to the higher reliability, accuracy, and ease of use. The Aardvark Permeameter is the latest version of the Guelph Permeameter.

Infiltration testing was conducted in a 3-inch diameter test hole, at depths of 3.5 to 4 feet deep. The approximate location of infiltration testing is indicated on the attached Infiltration Map, Plate 1. Infiltration testing was located by property boundary measurement on the site plan and/or by using geographic features.

Relatively shallow Aardvark Permeameter testing (P-1 & P-2) was conducted using the guidelines of the product instruction manuals. Stabilized infiltration test readings are summarized in the following table and more detailed test data recorded in the field can be found in Appendix A. The test results are anticipated to be representative of the soils found in the vicinity of the test locations.

INFILTRATION TEST SUMMARY

TEST NUMBER	TEST HOLE DIAMETER (in)	HOLE DEPTH (in)	INFILTRATION RATE (in/hr)	SOIL DESCRIPTION
P-1	3	48	0.19	Claey SAND
P-2	3	42	0.18	Claey SAND

FINDINGS

SOILS

A general description of the soils observed on site is provided below:

- Cretaceous Tonalite (map symbol Kt): Cretaceous age plutonic rock consisting of tonalite was mapped throughout the site. The tonalite was observed to be light grayish brown, slightly moist to moist, and in a moderately hard to very hard state. Typically, the upper 1 to 3 feet of this unit is more weathered and not as hard.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

The shallow in-situ soils have an average infiltration rate of 0.185 in/hr. in the aeras tested, with no additional factor of safety being applied.

PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **SWS** and their authorized representative. It is unlikely to contain sufficient information for other parties or other uses. CW Soils should be provided the opportunity to review the final design plans and specifications prior to construction, in order to verify that the recommendations have been properly incorporated into the project plans and specifications. If CW Soils is not accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

We recommend that CW Soils be retained to provide soils engineering and engineering geologic services during the grading and foundation excavation phases of work, in order to allow for design changes in the event that the subsurface conditions differ from those anticipated prior to construction.

CW Soils should review any changes in the project and modify the conclusions and recommendations of this report in writing. This report along with the drawings contained within are intended for design input purposes only and are not intended to act as construction drawings or specifications. In the event that conditions during grading or construction operations appear to differ from those indicated in this report, our office should be notified immediately, as appropriate revisions may be required.

REPORT LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists, practicing at the time and location this report was prepared. No warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Soils vary in type, strength, and other engineering properties between points of observation and exploration. Groundwater and moisture conditions can also vary due to natural processes or the works of man on this or adjacent properties. As a result, we do not and cannot have complete knowledge of the subsurface conditions beneath the proposed project. No practical study can completely eliminate uncertainty with regard to the anticipated geologic and soils engineering conditions in connection with a proposed project. The conclusions and recommendations within this report are based upon the findings at the points of observation and are subject to confirmation by CW Soils based on the conditions revealed during grading and construction operations.

This report was prepared with the understanding that it is the responsibility of the owner, to ensure that the conclusions and recommendations contained herein are brought to the attention of the other project consultants and are incorporated into the plans and specifications. The owners' contractor should implement the recommendations in this report and notify the owner as well as our office if they consider any of the recommendations presented herein to be unsafe or unsuitable.

CW Soils appreciates the opportunity to offer our services on this project. If we can be of further assistance, please do not hesitate to contact the undersigned at your convenience.

Respectfully submitted,

CW Soils

Chad E. Welke, PG, CEG, PE
Principal Geologist/Engineer

CERTIFIED ENGINEERING GEOLOGIST * CHAD E. WELKE NO. 2376 * STATE OF CALIFORNIA *

REGISTERED PROFESSIONAL ENGINEER * CHAD E. WELKE NO. C63712 CIVIL * STATE OF CALIFORNIA *

Distribution: (1) Addressee (email)

Attachments: Appendix A – Infiltration Test Results
Plate 1 – Infiltration Map *(Rear of Text)*

APPENDIX A

INFILTRATION TEST RESULTS

Aardvark Permeameters

Location: 23185

Site: P1

Time interval between readings: 1 minute

Ksat Method: Glover Solution

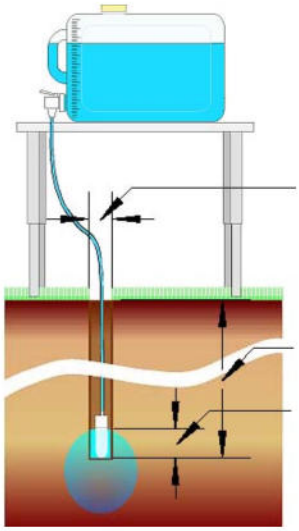
Steady Flow Rate Condition

Steady Flow Rate achieved when Water Consumption Rate changes less than

+/- 10 % for 3 consecutive readings

Steady Flow Rate:	39.800 ml/min
Temp. Adj. FR:	39.880 ml/min
Percolation Rate:	1.260 min/cm
Ksat:	0.19 Inches / hour

Notes:



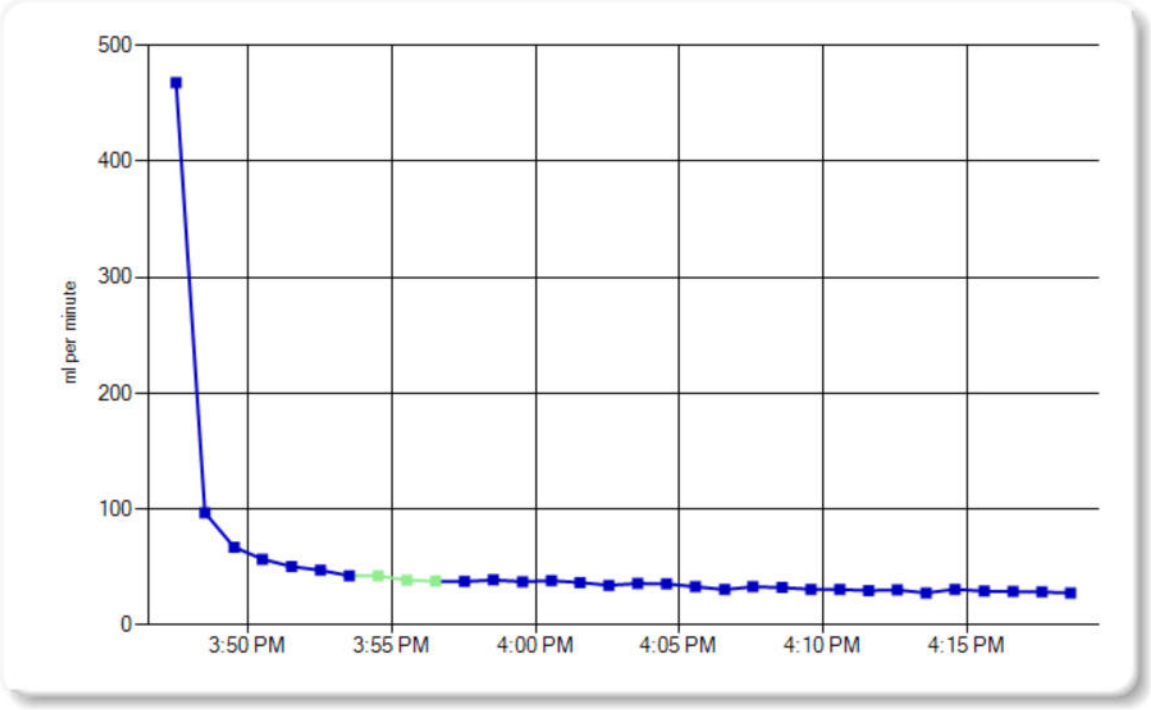
3.1 inches	Hole Diameter
70 ° F	Water Temperature
48 inches	Hole Depth
16.1 inches	Water Height in Hole
	Water Table Depth

Site GPS Position

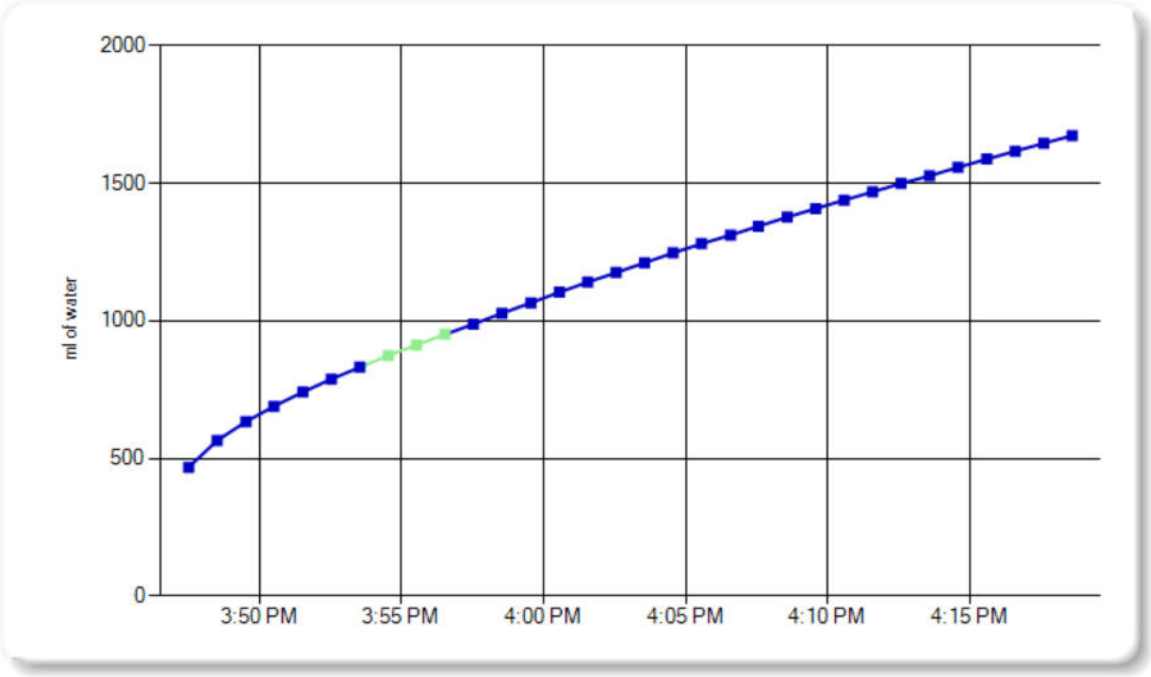
	Degrees	Minutes	Seconds	
Longitude:	0	0	0	East
Latitude:	0	0	0	North

Soil Texture-Structure Category:

Water Consumption Rate



Total Water Consumed



Time	Reservoir Water Level	Elapsed Time Interval	Interval Water Consumed	Total Water Consumed	Water Consumption Rate	Ignore Reading
3:46:31 PM	7352.8 ml					
3:47:31 PM	6884.8 ml	1 minute	468.0 ml	468.0 ml	468.000 ml/min	
3:48:31 PM	6787.8 ml	1 minute	97.0 ml	565.0 ml	97.000 ml/min	
3:49:32 PM	6719.4 ml	1 minute	68.4 ml	633.4 ml	67.279 ml/min	
3:50:31 PM	6663.4 ml	59 seconds	56.0 ml	689.4 ml	56.949 ml/min	
3:51:32 PM	6612.0 ml	1 minute	51.4 ml	740.8 ml	50.557 ml/min	
3:52:32 PM	6564.6 ml	1 minute	47.4 ml	788.2 ml	47.400 ml/min	
3:53:32 PM	6522.0 ml	1 minute	42.6 ml	830.8 ml	42.600 ml/min	
3:54:32 PM	6479.4 ml	1 minute	42.6 ml	873.4 ml	42.600 ml/min	
3:55:32 PM	6440.6 ml	1 minute	38.8 ml	912.2 ml	38.800 ml/min	
3:56:32 PM	6402.6 ml	1 minute	38.0 ml	950.2 ml	38.000 ml/min	
3:57:32 PM	6365.0 ml	1 minute	37.6 ml	987.8 ml	37.600 ml/min	
3:58:32 PM	6326.0 ml	1 minute	39.0 ml	1026.8 ml	39.000 ml/min	
3:59:33 PM	6287.8 ml	1 minute	38.2 ml	1065.0 ml	37.574 ml/min	
4:00:33 PM	6249.4 ml	1 minute	38.4 ml	1103.4 ml	38.400 ml/min	
4:01:33 PM	6212.6 ml	1 minute	36.8 ml	1140.2 ml	36.800 ml/min	
4:02:33 PM	6178.2 ml	1 minute	34.4 ml	1174.6 ml	34.400 ml/min	
4:03:33 PM	6142.2 ml	1 minute	36.0 ml	1210.6 ml	36.000 ml/min	
4:04:33 PM	6106.6 ml	1 minute	35.6 ml	1246.2 ml	35.600 ml/min	
4:05:33 PM	6073.4 ml	1 minute	33.2 ml	1279.4 ml	33.200 ml/min	
4:06:34 PM	6042.2 ml	1 minute	31.2 ml	1310.6 ml	30.689 ml/min	
4:07:33 PM	6009.6 ml	59 seconds	32.6 ml	1343.2 ml	33.153 ml/min	
4:08:34 PM	5976.6 ml	1 minute	33.0 ml	1376.2 ml	32.459 ml/min	
4:09:34 PM	5945.6 ml	1 minute	31.0 ml	1407.2 ml	31.000 ml/min	
4:10:34 PM	5914.8 ml	1 minute	30.8 ml	1438.0 ml	30.800 ml/min	
4:11:34 PM	5885.0 ml	1 minute	29.8 ml	1467.8 ml	29.800 ml/min	
4:12:34 PM	5854.6 ml	1 minute	30.4 ml	1498.2 ml	30.400 ml/min	
4:13:34 PM	5826.8 ml	1 minute	27.8 ml	1526.0 ml	27.800 ml/min	
4:14:34 PM	5795.8 ml	1 minute	31.0 ml	1557.0 ml	31.000 ml/min	
4:15:35 PM	5766.0 ml	1 minute	29.8 ml	1586.8 ml	29.311 ml/min	
4:16:35 PM	5737.0 ml	1 minute	29.0 ml	1615.8 ml	29.000 ml/min	
4:17:35 PM	5708.4 ml	1 minute	28.6 ml	1644.4 ml	28.600 ml/min	
4:18:35 PM	5680.6 ml	1 minute	27.8 ml	1672.2 ml	27.800 ml/min	

Aardvark Permeameters

Location: 23185

Site: P2

Time interval between readings: 1 minute

Ksat Method: Glover Solution

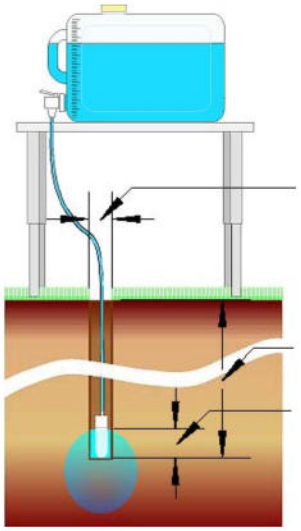
Steady Flow Rate Condition

Steady Flow Rate achieved when Water Consumption Rate changes less than

+/- 10 % for 3 consecutive readings

Steady Flow Rate:	38.000 ml/min
Temp. Adj. FR:	38.076 ml/min
Percolation Rate:	1.320 min/cm
Ksat:	0.18 Inches / hour

Notes:



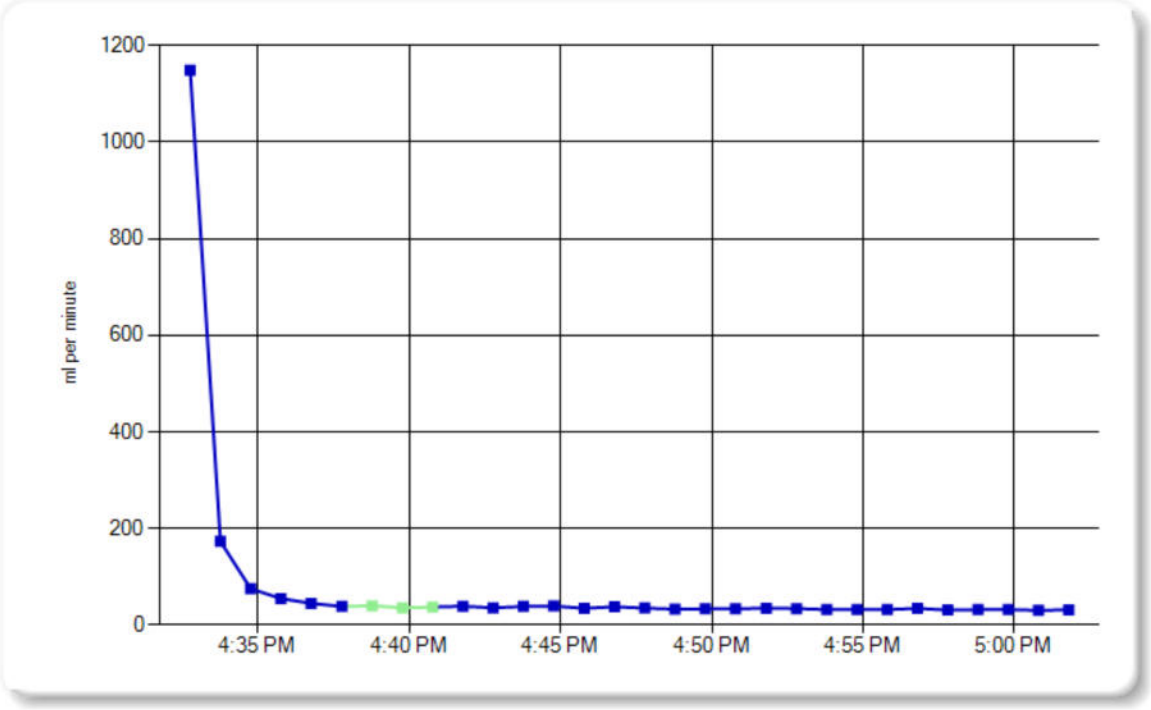
3.1 inches	Hole Diameter
70 ° F	Water Temperature
42.1 inches	Hole Depth
16.1 inches	Water Height in Hole
	Water Table Depth

Site GPS Position

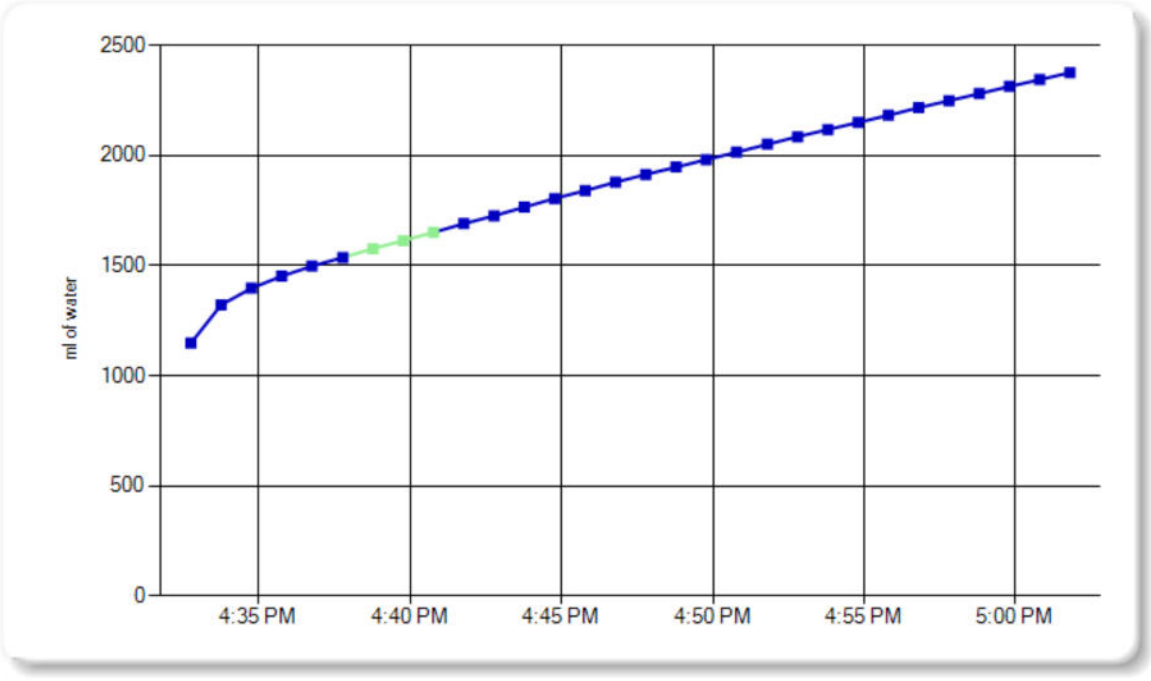
	Degrees	Minutes	Seconds	
Longitude:	0	0	0	East
Latitude:	0	0	0	North

Soil Texture-Structure Category:

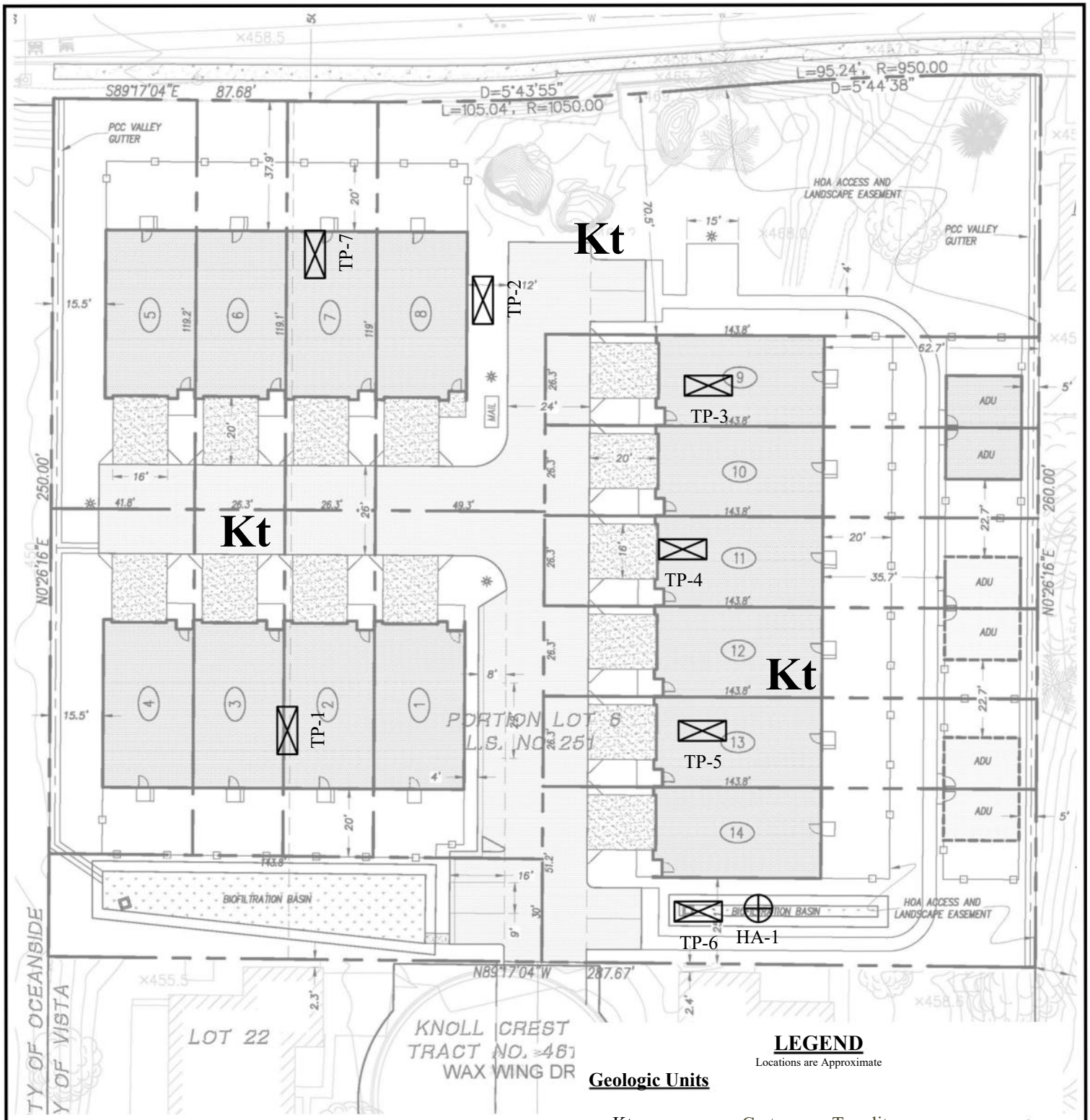
Water Consumption Rate



Total Water Consumed



Time	Reservoir Water Level	Elapsed Time Interval	Interval Water Consumed	Total Water Consumed	Water Consumption Rate	Ignore Reading
4:31:45 PM	8338.0 ml					
4:32:45 PM	7189.8 ml	1 minute	1148.2 ml	1148.2 ml	1148.200 ml/min	
4:33:45 PM	7016.4 ml	1 minute	173.4 ml	1321.6 ml	173.400 ml/min	
4:34:45 PM	6940.8 ml	1 minute	75.6 ml	1397.2 ml	75.600 ml/min	
4:35:45 PM	6885.6 ml	1 minute	55.2 ml	1452.4 ml	55.200 ml/min	
4:36:45 PM	6840.4 ml	1 minute	45.2 ml	1497.6 ml	45.200 ml/min	
4:37:46 PM	6801.0 ml	1 minute	39.4 ml	1537.0 ml	38.754 ml/min	
4:38:46 PM	6760.8 ml	1 minute	40.2 ml	1577.2 ml	40.200 ml/min	
4:39:46 PM	6724.6 ml	1 minute	36.2 ml	1613.4 ml	36.200 ml/min	
4:40:46 PM	6687.0 ml	1 minute	37.6 ml	1651.0 ml	37.600 ml/min	
4:41:46 PM	6647.6 ml	1 minute	39.4 ml	1690.4 ml	39.400 ml/min	
4:42:46 PM	6611.6 ml	1 minute	36.0 ml	1726.4 ml	36.000 ml/min	
4:43:46 PM	6572.8 ml	1 minute	38.8 ml	1765.2 ml	38.800 ml/min	
4:44:46 PM	6533.2 ml	1 minute	39.6 ml	1804.8 ml	39.600 ml/min	
4:45:47 PM	6497.6 ml	1 minute	35.6 ml	1840.4 ml	35.016 ml/min	
4:46:47 PM	6459.4 ml	1 minute	38.2 ml	1878.6 ml	38.200 ml/min	
4:47:47 PM	6424.0 ml	1 minute	35.4 ml	1914.0 ml	35.400 ml/min	
4:48:47 PM	6390.8 ml	1 minute	33.2 ml	1947.2 ml	33.200 ml/min	
4:49:47 PM	6357.0 ml	1 minute	33.8 ml	1981.0 ml	33.800 ml/min	
4:50:47 PM	6323.0 ml	1 minute	34.0 ml	2015.0 ml	34.000 ml/min	
4:51:48 PM	6287.2 ml	1 minute	35.8 ml	2050.8 ml	35.213 ml/min	
4:52:48 PM	6252.8 ml	1 minute	34.4 ml	2085.2 ml	34.400 ml/min	
4:53:48 PM	6220.4 ml	1 minute	32.4 ml	2117.6 ml	32.400 ml/min	
4:54:48 PM	6188.2 ml	1 minute	32.2 ml	2149.8 ml	32.200 ml/min	
4:55:48 PM	6155.8 ml	1 minute	32.4 ml	2182.2 ml	32.400 ml/min	
4:56:48 PM	6121.0 ml	1 minute	34.8 ml	2217.0 ml	34.800 ml/min	
4:57:48 PM	6089.6 ml	1 minute	31.4 ml	2248.4 ml	31.400 ml/min	
4:58:48 PM	6057.4 ml	1 minute	32.2 ml	2280.6 ml	32.200 ml/min	
4:59:48 PM	6024.8 ml	1 minute	32.6 ml	2313.2 ml	32.600 ml/min	
5:00:48 PM	5994.0 ml	1 minute	30.8 ml	2344.0 ml	30.800 ml/min	
5:01:48 PM	5962.0 ml	1 minute	32.0 ml	2376.0 ml	32.000 ml/min	



LEGEND

Locations are Approximate

Geologic Units

Kt – Cretaceous Tonalite

Symbols

TP-7 – Exploratory Test Pit

HA-1 – Exploratory Hand Auger

North

CW SOILS	Proposed Vista	23185-10
	GEOTECHNICAL MAP	1" = 40 '
		2024
		PLATE 1

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.		X

Provide basis:

The average Infiltration rate is 0.185 in/hr (with No Safety Factor being applied) per infiltration testing report by CW Soils, dated April 25, 2024

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:

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: 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: 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		No Full 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 the City 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.		X

Provide basis:

The average Infiltration rate is 0.185 in/hr (with No Safety Factor being applied) per infiltration testing report by CW Soils, dated April 25, 2024

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.		X

Provide basis:

Site having low infiltration rate of 0.185 in/hr (with no Safety Factor being applied) and other site constrains like building footing, utilities

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: 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: 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 5-8 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**	No Partial Infiltration	

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

ATTACHMENT 1E

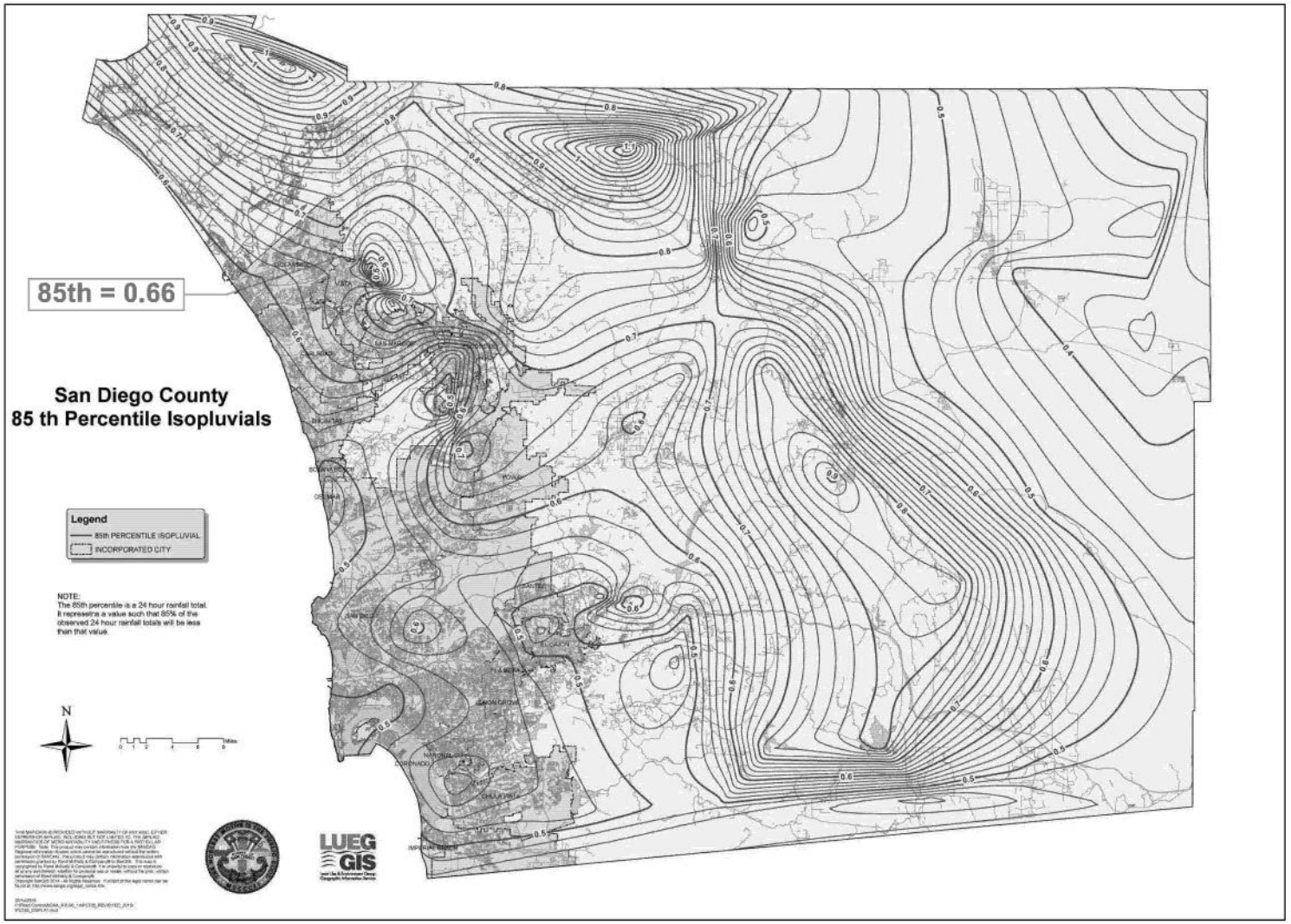


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-1	DMA-3	DMA-5	DMA-6	DMA-7	unitless
	2	85th Percentile 24-hr Storm Depth	0.66	0.66	0.66	0.66	0.66	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	1,290	2,812	9,661	2,561	23,665	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)						sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)						sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)						sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)						sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)						sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	4,809	2,112	1,844	4,626	10,144	sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)						sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)						sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)						sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)						sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)						sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)						sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)						sq-ft
	18	Number of Tree Wells Proposed per SD-A						#
	19	Average Mature Tree Canopy Diameter						ft
	20	Number of Rain Barrels Proposed per SD-E						#
	21	Average Rain Barrel Size						gal
Initial Runoff Factor Calculation	22	Total Tributary Area	6,099	4,924	11,505	7,187	33,809	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.43	0.64	0.80	0.51	0.72	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.43	0.64	0.80	0.51	0.72	unitless
	26	Initial Design Capture Volume	144	173	506	202	1,339	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.43	0.64	0.80	0.51	0.72	unitless
	32	Design Capture Volume After Dispersion Techniques	144	173	506	202	1,339	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.43	0.64	0.80	0.51	0.72	unitless
	36	Final Effective Tributary Area	2,623	3,151	9,204	3,665	24,342	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	144	173	506	202	1,339	cubic-feet

No Warning Messages

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	Units
Basic Analysis	1	Drainage Basin ID or Name	DMA-1	DMA-3	DMA-5	DMA-6	DMA-7	unitless
	2	85th Percentile Rainfall Depth	0.66	0.66	0.66	0.66	0.66	inches
	3	Predominant NRCS Soil Type Within BMP Location	D	D	D	D	D	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	unitless
	5	Nature of Restriction	Soil Type	Soil Type	Soil Type	Soil Type	Soil Type	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.093	0.093	0.093	0.093	0.093	in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	1.5%	1.5%	1.5%	1.5%	1.5%	percentage
	12	Fraction of DCV Requiring Retention	0.01	0.01	0.01	0.01	0.01	ratio
	13	Required Retention Volume	1	2	5	2	13	cubic-feet

No Warning Messages

No offset.
AquaSave Storage is proposed

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	i	ii	iii	iv	v	Units
BMP Inputs	1	Drainage Basin ID or Name	DMA-1	DMA-3	DMA-5	DMA-6	DMA-7	sq-ft
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	0.000	0.000	in/hr
	3	Design Capture Volume Tributary to BMP	144	173	506	202	1,339	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless
	5	Is BMP Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined	Lined	unitless
	6	Does BMP Have an Underdrain?	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard	Standard	unitless
	8	Provided Surface Area	121	218	318	141	1,400	sq-ft
	9	Provided Surface Ponding Depth	10	10	10	10	10	inches
	10	Provided Soil Media Thickness	24	24	24	24	24	inches
	11	Provided Gravel Thickness (Total Thickness)	15	15	15	15	33	inches
	12	Underdrain Offset	3	3	3	3	0	inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	0.25	0.25	0.26	0.25	0.80	inches
	14	Specialized Soil Media Filtration Rate						in/hr
	15	Specialized Soil Media Pore Space for Retention						unitless
	16	Specialized Soil Media Pore Space for Biofiltration						unitless
	17	Specialized Gravel Media Pore Space						unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	cubic-feet
	19	Ponding Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	unitless
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.00	0.00	0.00	0.00	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	2.40	2.40	2.40	2.40	1.20	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.17	0.25	0.13	0.14	0.10	ratio
	25	Calculated Retention Storage Drawdown Time	120	120	120	120	120	hours
	26	Efficacy of Retention Processes	0.19	0.26	0.15	0.16	0.12	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	28	46	76	33	162	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	116	127	430	169	1,177	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.0032	0.0032	0.0035	0.0032	0.0396	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	1.15	0.64	0.47	0.98	1.22	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	1.15	0.64	0.47	0.98	1.22	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	6.87	3.82	2.83	5.90	7.33	inches
	34	Ponding Pore Space Available for Biofiltration	1.00	1.00	1.00	1.00	1.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	unitless
	37	Effective Depth of Biofiltration Storage	19.60	19.60	19.60	19.60	28.00	inches
	38	Drawdown Time for Surface Ponding	9	16	21	10	8	hours
	39	Drawdown Time for Effective Biofiltration Depth	17	31	42	20	23	hours
	40	Total Depth Biofiltered	26.47	23.42	22.43	25.50	35.33	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	175	191	644	254	1,766	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	175	191	594	254	1,766	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	87	96	322	127	883	cubic-feet
	44	Option 2 - Provided Storage Volume	87	96	322	127	883	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	1.00	1.00	1.00	1.00	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	1.00	1.00	1.00	1.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	0	0	0	0	0	cubic-feet

Attention!

- BMPs must have at least 3 inches of gravel below the underdrain. If lined, a maximum of 3 inches of gravel is permitted beneath underdrain

E.12 BF-1 Biofiltration



Location: 43rd Street and Logan Avenue, San Diego, California

MS4 Permit Category
Biofiltration

Manual Category
Biofiltration

Applicable Performance Standard
Pollutant Control
Flow Control

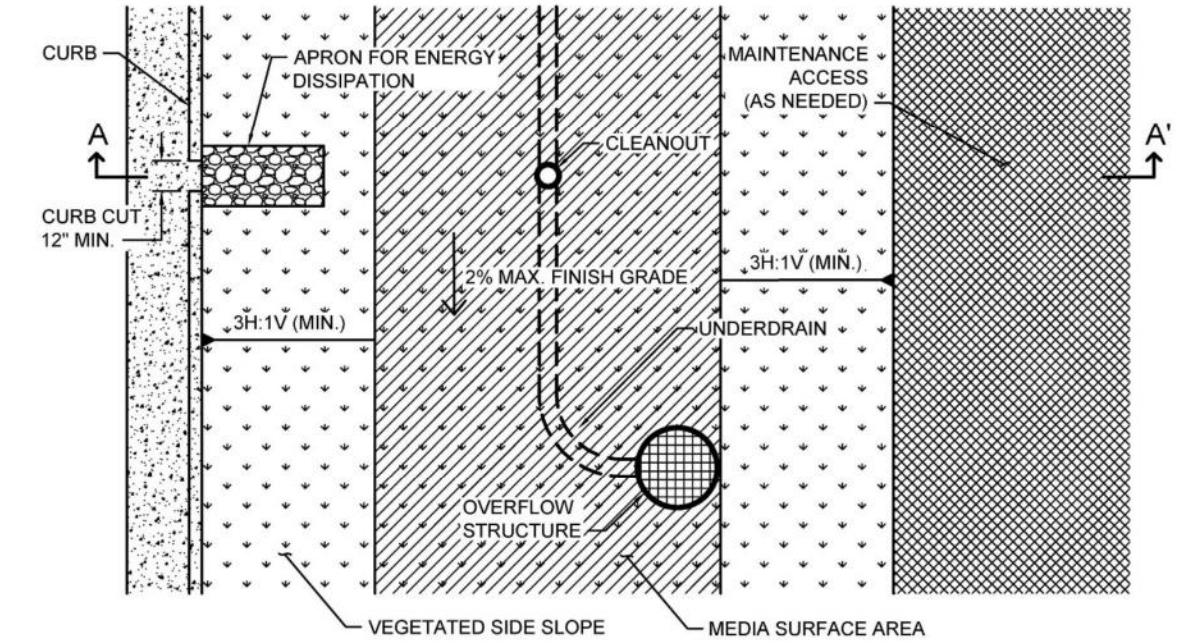
Primary Benefits
Treatment
Volume Reduction (Incidental)
Peak Flow Attenuation (Optional)

Description

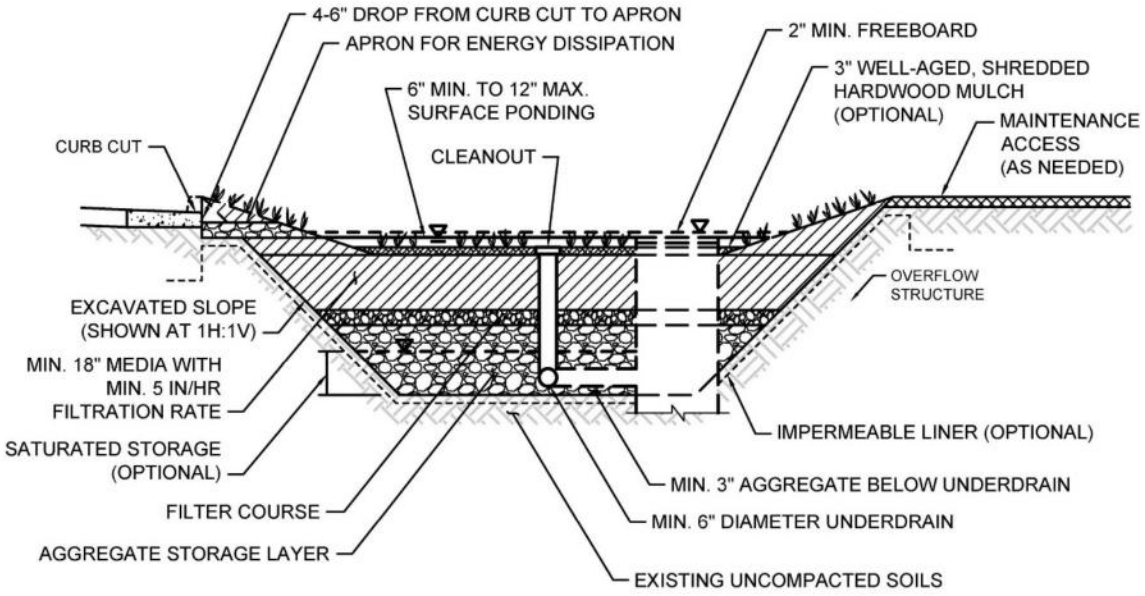
Biofiltration (Bioretention with underdrain) facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Bioretention with underdrain facilities are commonly incorporated into the site within parking lot landscaping, along roadsides, and in open spaces. Because these types of facilities have limited or no infiltration, they are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Treatment is achieved through filtration, sedimentation, sorption, biochemical processes and plant uptake.

Typical bioretention with underdrain components include:

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



PLAN
NOT TO SCALE



SECTION A-A'
NOT TO SCALE

Typical plan and Section view of a Biofiltration BMP

Design Adaptations for Project Goals

Biofiltration Treatment BMP for storm water pollutant control. The system is lined or un-lined to provide incidental infiltration, and an underdrain is provided at the bottom to carry away filtered runoff. This configuration is considered to provide biofiltration treatment via flow through the media layer. Storage provided above the underdrain within surface ponding, media, and aggregate storage is considered included in the biofiltration treatment volume. Saturated storage within the aggregate storage layer can be added to this design by raising the underdrain above the bottom of the aggregate storage layer or via an internal weir structure designed to maintain a specific water level elevation.

Integrated storm water flow control and pollutant control configuration. The system can be designed to provide flow rate and duration control by primarily providing increased surface ponding and/or having a deeper aggregate storage layer above the underdrain. This will allow for significant detention storage, which can be controlled via inclusion of an outlet structure at the downstream end of the underdrain.

Design Criteria and Considerations

Bioretention with underdrain must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

	Siting and Design	*Intent/Rationale*
☑	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, and liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
☑	An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration or lateral flows should not be allowed.	Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
☑	Contributing tributary area shall be ≤ 5 acres (≤ 1 acre preferred).	Bigger BMPs require additional design features for proper performance. Contributing tributary area greater than 5 acres may be allowed at the discretion of the City Engineer if the following conditions are met: 1) incorporate design features (e.g. flow spreaders) to minimizing short circuiting of flows in

Siting and Design		*Intent/Rationale*
		the BMP and 2) incorporate additional design features requested by the City Engineer for proper performance of the regional BMP.
☑	Finish grade of the facility is ≤ 2%.	Flatter surfaces reduce erosion and channelization within the facility.
Surface Ponding		
☑	Surface ponding is limited to a 24-hour drawdown time.	Surface ponding limited to 24 hour for plant health. Surface ponding drawdown time greater than 24-hours but less than 96 hours may be allowed at the discretion of the City Engineer if certified by a landscape architect or agronomist.
☑	Surface ponding depth is ≥ 6 and ≤ 12 inches.	Surface ponding capacity lowers subsurface storage requirements. Deep surface ponding raises safety concerns. Surface ponding depth greater than 12 inches (for additional pollutant control or surface outlet structures or flow-control orifices) may be allowed at the discretion of the City Engineer if the following conditions are met: 1) surface ponding depth drawdown time is less than 24 hours; and 2) safety issues and fencing requirements are considered (typically ponding greater than 18" will require a fence and/or flatter side slopes) and 3) potential for elevated clogging risk is considered.
☑	A minimum of 2 inches of freeboard is provided.	Freeboard provides room for head over overflow structures and minimizes risk of uncontrolled surface discharge.
☑	Side slopes are stabilized with vegetation and are = 3H:1V or shallower.	Gentler side slopes are safer, less prone to erosion, able to establish vegetation more quickly and easier to maintain.
Vegetation		

Siting and Design	*Intent/Rationale*
☑ Plantings are suitable for the climate and expected ponding depth. A plant list to aid in selection can be found in Appendix E.20.	Plants suited to the climate and ponding depth are more likely to survive.
☑ An irrigation system with a connection to water supply should be provided as needed.	Seasonal irrigation might be needed to keep plants healthy.
Mulch	
☑ A minimum of 3 inches of well-aged, shredded hardwood mulch that has been stockpiled or stored for at least 12 months is provided.	Mulch will suppress weeds and maintain moisture for plant growth. Aging mulch kills pathogens and weed seeds and allows the beneficial microbes to multiply.
Media Layer	
☑ Media maintains a minimum filtration rate of 5 in/hr over lifetime of facility. An initial filtration rate of 8 to 12 in/hr is recommended to allow for clogging over time; the initial filtration rate should not exceed 12 inches per hour.	A filtration rate of at least 5 inches per hour allows soil to drain between events. The initial rate should be higher than long term target rate to account for clogging over time. However an excessively high initial rate can have a negative impact on treatment performance, therefore an upper limit is needed.
☑ Media is a minimum 18 inches deep, meeting either of these two media specifications: City of San Diego Low Impact Development Design Manual (page B-18) (July 2011, unless superseded by more recent edition) **or** County of San Diego Low Impact Development Handbook: Appendix G -Bioretention Soil Specification (June 2014, unless superseded by more recent edition). Alternatively, for proprietary designs and custom media mixes not meeting the media specifications contained in the City or County LID Manual, the media meets the pollutant treatment performance criteria in Section F.1.	A deep media layer provides additional filtration and supports plants with deeper roots. Standard specifications shall be followed. For non-standard or proprietary designs, compliance with F.1 ensures that adequate treatment performance will be provided.

Siting and Design		*Intent/Rationale*
☑	Media surface area is 3% of contributing area times adjusted runoff factor or greater. Unless demonstrated that the BMP surface area can be smaller than 3%.	Greater surface area to tributary area ratios: a) maximizes volume retention as required by the MS4 Permit and b) decrease loading rates per square foot and therefore increase longevity. Adjusted runoff factor is to account for site design BMPs implemented upstream of the BMP (such as rain barrels, impervious area dispersion, etc.). Refer to Appendix B.2 guidance. Use Worksheet B.5-1 Line 26 to estimate the minimum surface area required per this criteria.
☑	Where receiving waters are impaired or have a TMDL for nutrients, the system is designed with nutrient sensitive media design (see fact sheet BF-2).	Potential for pollutant export is partly a function of media composition; media design must minimize potential for export of nutrients, particularly where receiving waters are impaired for nutrients.
Filter Course Layer		
☑	A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used.	Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade. Filter fabric is more likely to clog.
☑	Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog the facility and impede infiltration.
☑	Filter course calculations assessing suitability for particle migration prevention have been completed.	Gradation relationship between layers can evaluate factors (e.g., bridging, permeability, and uniformity) to determine if particle sizing is appropriate or if an intermediate layer is needed.
Aggregate Storage Layer		
☑	Class 2 Permeable per Caltrans specification 68-1.025 is recommended for the storage layer. Washed, open-graded crushed rock may be used, however a 4-6 inch washed pea gravel	Washing aggregate will help eliminate fines that could clog the aggregate storage layer void spaces or subgrade.

	Siting and Design	*Intent/Rationale*
	filter course layer at the top of the crushed rock is required.	
☑	The depth of aggregate provided (12-inch typical) and storage layer configuration is adequate for providing conveyance for underdrain flows to the outlet structure.	Proper storage layer configuration and underdrain placement will minimize facility drawdown time.
	Inflow, Underdrain, and Outflow Structures	
☑	Inflow, underdrains and outflow structures are accessible for inspection and maintenance.	Maintenance will prevent clogging and ensure proper operation of the flow control structures.
☑	Inflow velocities are limited to 3 ft./s or less or use energy dissipation methods. (e.g., riprap, level spreader) for concentrated inflows.	High inflow velocities can cause erosion, scour and/or channeling.
☑	Curb cut inlets are at least 12 inches wide, have a 4-6 inch reveal (drop) and an apron and energy dissipation as needed.	Inlets must not restrict flow and apron prevents blockage from vegetation as it grows in. Energy dissipation prevents erosion.
☑	Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer.	A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked.
☑	Minimum underdrain diameter is 6 inches.	Smaller diameter underdrains are prone to clogging.
☑	Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.
☑	An underdrain cleanout with a minimum 6-inch diameter and lockable cap is placed every 250 to 300 feet as required based on underdrain length.	Properly spaced cleanouts will facilitate underdrain maintenance.
☑	Overflow is safely conveyed to a downstream storm drain system or discharge point Size overflow structure to pass 100-year peak flow	Planning for overflow lessens the risk of property damage due to flooding.

Siting and Design	Intent/Rationale
for on-line infiltration basins and water quality peak flow for off-line basins.	

Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only

To design bioretention with underdrain for storm water pollutant control only (no flow control required), the following steps should be taken:

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Calculate the DCV per Appendix B based on expected site design runoff for tributary areas.
3. Use the sizing worksheet presented in Appendix B.5 to size biofiltration BMPs.

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or durations will typically require significant surface ponding and/or aggregate storage volumes, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Iteratively determine the facility footprint area, surface ponding and/or aggregate storage layer depth required to provide detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If bioretention with underdrain cannot fully provide the flow rate and duration control required by this manual, an upstream or downstream structure with significant storage volume such as an underground vault can be used to provide remaining controls.
4. After bioretention with underdrain has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

E.13 BF-2 Nutrient Sensitive Media Design

Some studies of bioretention with underdrains have observed export of nutrients, particularly inorganic nitrogen (nitrate and nitrite) and dissolved phosphorus. This has been observed to be a short-lived phenomenon in some studies or a long term issue in some studies. The composition of the soil media, including the chemistry of individual elements is believed to be an important factor in the potential for nutrient export. Organic amendments, often compost, have been identified as the most likely source of nutrient export. The quality and stability of organic amendments can vary widely.

The biofiltration media specifications contained in the County of San Diego Low Impact Development Handbook: Appendix G -Bioretention Soil Specification (June 2014, unless superseded by more recent edition) and the City of San Diego Low Impact Development Design Manual (page B-18) (July 2011, unless superseded by more recent edition) were developed with consideration of the potential for nutrient export. These specifications include criteria for individual component characteristics and quality in order to control the overall quality of the blended mixes. As of the publication of this manual, the June 2014 County of San Diego specifications provide more detail regarding mix design and quality control.

The City and County specifications noted above were developed for general purposes to meet permeability and treatment goals. In cases where the BMP discharges to receiving waters with nutrient impairments or nutrient TMDLs, the biofiltration media should be designed with the specific goal of minimizing the potential for export of nutrients from the media. Therefore, in addition to adhering to the City or County media specifications, the following guidelines should be followed:

1. Select plant palette to minimize plant nutrient needs

A landscape architect or agronomist should be consulted to select a plant palette that minimizes nutrient needs. Utilizing plants with low nutrient needs results in less need to enrich the biofiltration soil mix. If nutrient quantity is then tailored to plants with lower nutrient needs, these plants will generally have less competition from weeds, which typically need higher nutrient content. The following practices are recommended to minimize nutrient needs of the plant palette:

- **Utilize native, drought-tolerant plants and grasses where possible.** Native plants generally have a broader tolerance for nutrient content, and can be longer lived in leaner/lower nutrient soils.

- **Start plants from smaller starts or seed.** Younger plants are generally more tolerant of lower nutrient levels and tend to help develop soil structure as they grow. Given the lower cost of smaller plants, the project should be able to accept a plant mortality rate that is somewhat higher than starting from larger plants and providing high organic content.

2. Minimize excess nutrients in media mix

Once the low-nutrient plant palette is established (item 1), the landscape architect and/or agronomist should be consulted to assist in the design of a biofiltration media to balance the interests of plant

establishment, water retention capacity (irrigation demand), and the potential for nutrient export. The following guidelines should be followed:

- **The mix should not exceed the nutrient needs of plants.** In conventional landscape design, the nutrient needs of plants are often exceeded intentionally in order to provide a factor of safety for plant survival. This practice must be avoided in biofiltration media as excess nutrients will increase the chance of export. The mix designer should keep in mind that nutrients can be added later (through mulching, tilling of amendments into the surface), but it is not possible to remove nutrients, once added.

- **The actual nutrient content and organic content of the selected organic amendment source should be determined when specifying mix proportions.** Nutrient content (i.e., C:N ratio; plant extractable nutrients) and organic content (i.e., % organic material) are relatively inexpensive to measure via standard agronomic methods and can provide important information about mix design. If mix design relies on approximate assumption about nutrient/organic content and this is not confirmed with testing (or the results of prior representative testing), it is possible that the mix could contain much more nutrient than intended.

- **Nutrients are better retained in soils with higher cation exchange capacity.** Cation exchange capacity can be increased through selection of organic material with naturally high cation exchange capacity, such as peat or coconut coir pith, and/or selection of inorganic material with high cation exchange capacity such as some sands or engineered minerals (e.g., low P-index sands, zeolites, rhyolites, etc.). Including higher cation exchange capacity materials would tend to reduce the net export of nutrients. Natural silty materials also provide cation exchange capacity; however potential impacts to permeability need to be considered.

- **Focus on soil structure as well as nutrient content.** Soil structure is loosely defined as the ability of the soil to conduct and store water and nutrients as well as the degree of aeration of the soil. Soil structure can be more important than nutrient content in plant survival and biologic health of the system. If a good soil structure can be created with very low amounts of organic amendment, plants survivability should still be provided. While soil structure generally develops with time, biofiltration media can be designed to promote earlier development of soil structure. Soil structure is enhanced by the use of amendments with high humus content (as found in well-aged organic material). In addition, soil structure can be enhanced through the use of organic material with a distribution of particle sizes (i.e., a more heterogeneous mix).

- **Consider alternatives to compost.** Compost, by nature, is a material that is continually evolving and decaying. It can be challenging to determine whether tests previously done on a given compost stock are still representative. It can also be challenging to determine how the properties of the compost will change once placed in the media bed. More stable materials such as aged coco coir pith, peat, biochar, shredded bark, and/or other amendments should be considered.

With these considerations, it is anticipated that less than 10 percent organic amendment by volume

could be used, while still balancing plant survivability and water retention. If compost is used, designers should strongly consider utilizing less than 10 percent by volume.

3. Design with partial retention and/or internal water storage

An internal water storage zone, as described in Fact Sheet PR-1 is believed to improve retention of nutrients. For lined systems, an internal water storage zone worked by providing a zone that fluctuates between aerobic and anaerobic conditions, resulting in nitrification/denitrification. In soils that will allow infiltration, a partial retention design (PR-1) allows significant volume reduction and can also promote nitrification/denitrification.

Acknowledgment: This fact sheet has been adapted from the Orange County Technical Guidance Document (May 2011). It was originally developed based on input from: Deborah Deets, City of Los Angeles Bureau of Sanitation, Drew Ready, Center for Watershed Health, Rick Fisher, ASLA, City of Los Angeles Bureau of Engineering, Dr. Garn Wallace, Wallace Laboratories, Glen Dake, GDML, and Jason Schmidt, Tree People. The guidance provided herein does not reflect the individual opinions of any individual listed above and should not be cited or otherwise attributed to those listed.

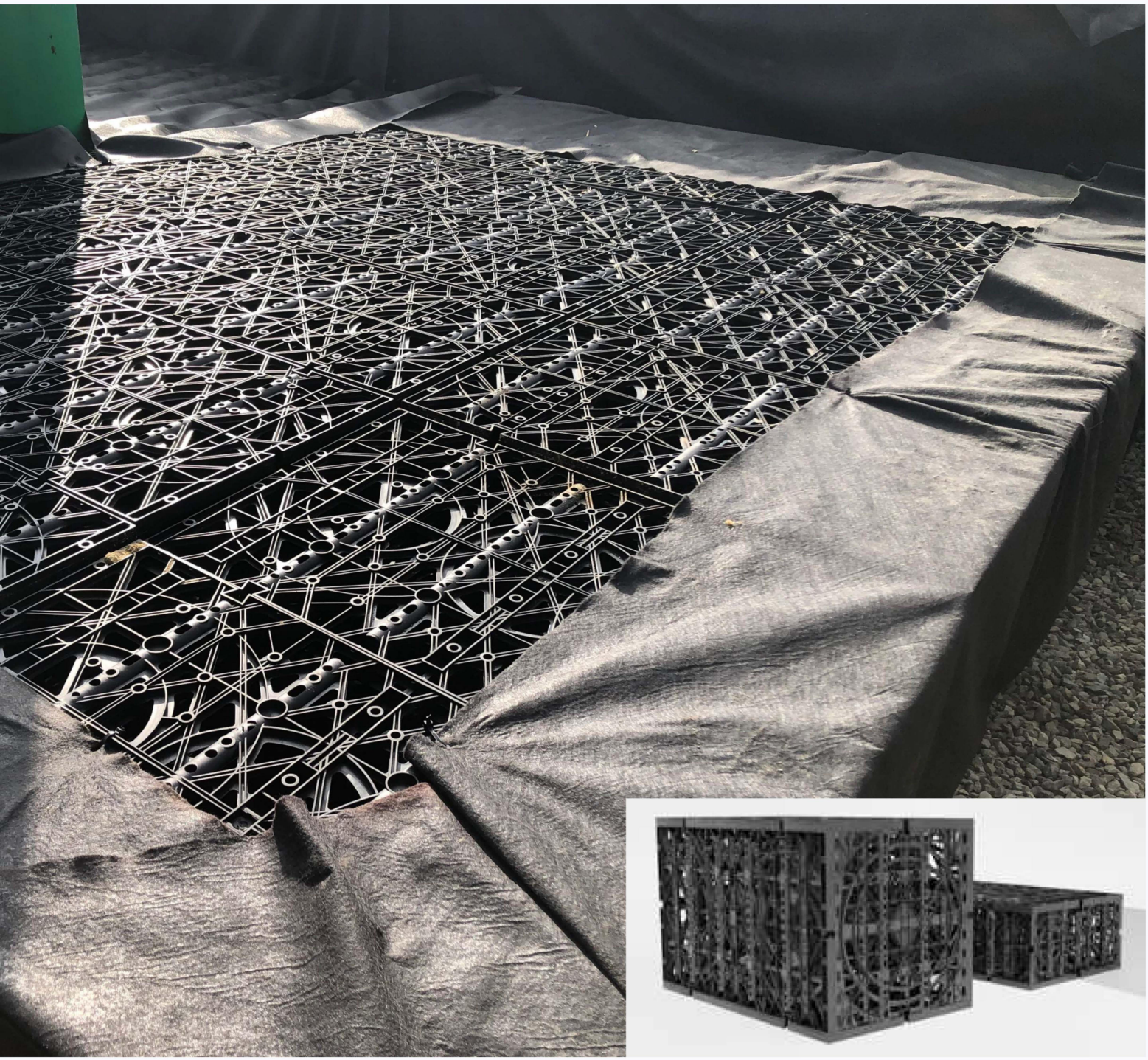
PACIFIC STORMWATER SYSTEMS, LLC

AquaSave™ TANKS

Modular Tank System for

- Detention
- Infiltration
- Rainwater Harvesting

PACIFIC STORMWATER SYSTEMS, LLC PSS



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A distributor of Aquasave Tanks in CA, AZ & NV



Aquasave is an underground modular tank system designed to retain, store, and/or infiltrate stormwater. Made from recycled plastics, Aquasave has over a 90% void space and is ideal for creating tanks for any of three desired purposes:

- Traditional Storage System: The tank is wrapped in a woven or non-woven geotextile and pipes are connected via pipe-boots directly to the tank.
- Infiltration System: The tank is wrapped in a microgrid mesh liner which allows the free flow of water from the tank into permeable soils.
- Rain Harvesting System: The tank is wrapped in 30mil visqueen and then sealed. A pump is installed, and this water can be used for irrigation.

- Aquasave is comprised of individual modular units that can be stacked and placed in a variety of ways to create any tank size and/or configuration.
- They are assembled simply with a rubber mallet.
- With an HS-20 load rating, contractors can gain buildable space on their site while also saving money.
- Aquasave is also stronger and less expensive than its competitors.
- Testing data provided by a third-party lab is available upon request. 10-year limited WARRANTY.
- Pre-construction trainings are provided to installing contractors to ensure proper assembly and placement.
- Maintenance ports are installed for easy accessibility.



Aquasave 8053 & 8025 Modules

PACIFIC STORMWATER SYSTEMS, LLC
AquaSave™
TANKS



Aquasave 8053

Length	Width	Height
31.8"	19.4"	21"
2.65'	1.61667'	1.75'

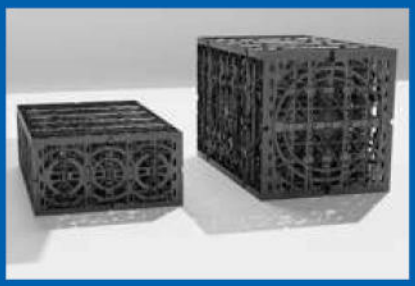
Storage Volume 6.75 cf

Aquasave 8025

Length	Width	Height
31.8"	19.4"	10"
2.65'	1.61667'	0.8333'

Storage Volume 3.21 cf

AS 8053	Storage Volume (cf)	Height of Module (inches)
AS8053-1	6.75	21
AS8053-2	13.50	41.25
AS8053-3	20.24	61.5
AS8053-4	26.99	81.75
AS8053-5	33.74	102
AS 8025		
AS8025 - 1	3.21	10
AS8025 - 2	6.43	19.25
AS8025 - 3	9.64	28.5
AS8025 - 4	12.85	37.75
AS8025 - 5	16.07	47
AS 8025 - 6	19.28	56.25
AS8025 - 7	22.49	65.5
AS8025 - 8	25.71	74.75
AS8025 - 9	28.92	84
AS8025 - 10	32.13	93.25



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DMA-2.2 IS SWAPPED TO BE TREATED
IN EXCHANGE FOR DMA-2.1 THAT WON'T BE TREATED

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

Category	#	Description	*i*	*ii*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-2.1	DMA-2.2	unitless
	2	85th Percentile 24-hr Storm Depth	0.66	0.66	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	830	1,950	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)			sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)			sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)			sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)			sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	3,271		sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)			sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)			sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)			sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	18	Number of Tree Wells Proposed per SD-A			#
	19	Average Mature Tree Canopy Diameter			ft
	20	Number of Rain Barrels Proposed per SD-E			#
	21	Average Rain Barrel Size			gal
Initial Runoff Factor Calculation	22	Total Tributary Area	4,101	1,950	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.42	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.42	0.90	unitless
	26	Initial Design Capture Volume	95	97	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.42	0.90	unitless
	32	Design Capture Volume After Dispersion Techniques	95	97	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.42	0.90	unitless
	36	Final Effective Tributary Area	1,722	1,755	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	95	97	cubic-feet

No Warning Messages

THIS DCV IS PROVIDED IN SSD-BMP
WORKSHEET FOR TREEWELL DESIGN

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)				
Category	**#**	**Description**	***i***	**Units**
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA 2.2+2.3	unitless
	2	85th Percentile 24-hr Storm Depth	0.66	inches
	3	Is Hydromodification Control Applicable?	No	yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	3,291	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)		sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?		yes/no
	12	Does Tributary Incorporate Tree Wells?		yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)		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)		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	3,291	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	unitless
	26	Initial Design Capture Volume	163	cubic-feet
Dispersion Area Adjustment & Rain Barrel Adjustment	27	Total Impervious Area Dispersed to Pervious Surface	0	sq-ft
	28	Total Pervious Dispersion Area	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area for DCV Reduction	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	unitless
	32	Design Capture Volume After Dispersion Techniques	163	cubic-feet
	33	Total Rain Barrel Volume Reduction	0	cubic-feet
Results	34	Final Adjusted Runoff Factor	0.90	unitless
	35	Final Effective Tributary Area	2,962	sq-ft
	36	Initial Design Capture Volume Retained by Dispersion Area and Rain Barrel(s)	0	cubic-feet
	37	Remaining Design Capture Volume Tributary to Tree Well(s)	163	cubic-feet

SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)				
Category	**#**	**Description**	***i***	**Units**
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA 2.2+2.3	unitless
	2	Design Capture Volume Tributary to BMP	163	cubic-feet
	3	Is Hydromodification Control Applicable?	No	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location	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	20' - Other	unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**	48	inches
	7	Number of Identical* Tree Wells Proposed for this DMA	1	trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree	5.5	feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree	29.0	feet
Tree Data	10	Botanical Name of Tree Species	Provide in PDP SWQMP	unitless
	11	Tree Species Mature Height per SD-A	Provide in PDP SWQMP	feet
	12	Tree Species Mature Canopy Diameter per SD-A	20	feet
	13	Minimum Soil Volume Required In Tree Well (2 Cubic Feet Per Square Foot of Mature Tree Canopy Projection Area)	628	cubic-feet
	14	Credit Volume Per Tree	180	cubic-feet
Tree Well Sizing Calculations	15	DCV Multiplier To Meet Flow Control Requirements	n/a	unitless
	16	Required Retention Volume (RRV) To Meet Flow Control Requirements	n/a	cubic-feet
	17	Number of Trees Required	1	trees
	18	Total Area of Tree Well Soil Required for Each Tree	157	sq-ft
	19	Approximate Required Width of Tree Well Soil Area for Each Tree	13	feet
	20	Approximate Required Length of Tree Well Soil Area for Each Tree	13	feet
	21	Number of Trees Proposed for this DMA	1	trees
	22	Total Area of Tree Well Soil Proposed for Each Tree	160	sq-ft
	23	Minimum Spacing Between Multiple Trees To Meet Soil Area Requirements (when applicable)***	n/a	feet
Results	24	Are Tree Well Soil Installation Requirements Met?	Yes	yes/no
	25	Is Remaining DCV Requirement Fully Satisfied by Tree Well(s)?	Yes	yes/no
	26	Is Hydromodification Control Requirement Satisfied by Tree Well(s)?	n/a	yes/no

E.1 SD-A Tree Well



(Source: County of San Diego LID Manual – EOA, Inc.)

MS4 Permit Category
Site Design Retention
Manual Category
Site Design Infiltration
Applicable Performance Standard
Site Design Pollutant Control Flow Control
Primary Benefits
Volume Reduction

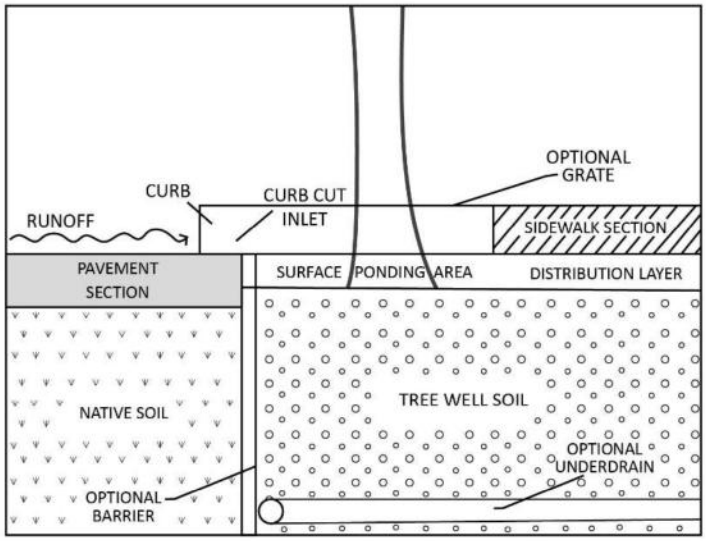
Description

Trees planted to intercept rainfall and runoff as described in this fact sheet may be used as storm water management measures to provide runoff reduction of the DCV per Appendix B.1.4. Additional benefits associated with tree wells, include energy conservation, air quality improvement, and aesthetic enhancement. Tree wells located in the City's Right-of-Way are subject to the discretion of City Engineer and Parks and Recreation Director. Typical storm water management benefits associated with trees include:

- **Treatment of storm water** – Storm water from impervious area should be directed to the tree wells. Trees provide treatment through uptake of nutrients and other storm water pollutants (phytoremediation) and support of other biological processes that break down pollutants
- **Interception of rainfall** – tree surfaces (roots, foliage, bark, and branches) intercept, evaporate, store, or convey precipitation to the soil before it reaches surrounding impervious surfaces
- **Reduced erosion** – trees protect denuded area by intercepting or reducing the velocity of rain drops as they fall through the tree canopy
- **Increased infiltration** – soil conditions created by roots and fallen leaves promote infiltration

Typical tree well system components include:

- Directing runoff from impervious areas through a drainage opening into a tree well planting area.
- Trees of the appropriate species for site conditions and constraints. Refer to the Plant List fact sheet (Appendix E.21).
- Available soil media reservoir volume based on mature tree size, soil type, water availability, surrounding land uses, and project goals
- Optional suspended pavement design to provide structural support for adjacent pavement without requiring compaction of underlying layers



Schematic of Tree Well

- Optional root barrier devices as needed; a root barrier is a device installed in the ground, between a tree and the sidewalk or other structures, intended to guide roots down and away from the sidewalk or structures in order to prevent damage 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 underdrain

Design Adaptations for Project Goals

Site design BMP to provide incidental treatment. Tree wells primarily functions as site design BMPs for incidental treatment.

Storm water pollutant control BMP to provide treatment. Project proponents are allowed to design tree wells to reduce the volume of stormwater runoff that requires treatment, (the Design Capture Volume [DCV]), or completely fulfill the pollutant control BMP requirements by retaining the entire DCV. Benefits from tree wells are accounted for by using the volume reduction values in Table B.1-3 presented in Appendix B. This credit can apply to other trees that are used for landscaping purposes that meet the same criteria. Project proponents are required to provide calculations supporting the amount of credit claimed from implementing trees within the project footprint. Tree wells designed to completely fulfill the pollutant control BMP requirements by retaining the entire

DCV are designated as SSD-BMPs and located in Appendix I.

Flow Control BMP to meet hydromodification requirements. Project proponents are also allowed to design tree wells as a flow control BMP. Benefits from tree wells are accounted for by using the DCV multipliers listed in Appendix I. Project proponents are required to provide calculations showing that the entire DCV including the DCV multiplier is retained.

Design Criteria and Considerations

Tree Wells, whether designed as Site Design BMPs, as Stormwater Pollutant Control BMP, or as a Flow Control BMP must meet the following design criteria and considerations, and if placed in the right-of-way must be consistent with the County of San Diego Green Streets Standard Drawings. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

	Siting and Design	*Intent/Rationale*
☑	**Tree species** is appropriately chosen for the development (private or public). For public rights-of-ways, city planning guidelines and zoning provisions for the permissible species and placement of trees are consulted. A list of trees appropriate for site design are provided in Appendix E.21	Proper tree placement and species selection minimizes problems such as pavement damage by surface roots and poor growth.
☑	**Tree well placement:** ensure area is graded; and the well is located so that full amount of DCV reduction drains to well.	Minimizes short-circuiting of run off and assures DCV reductions are retained onsite.
☑	**Location of trees** planted along public streets follows city requirements and guidelines. Vehicle and pedestrian line of sight are considered in tree selection and placement. Location of trees planted within private development follows city landscape guidelines. Building setbacks, utility alignments, vehicle and pedestrian line of sight are considered in tree selection and placement. Unless otherwise approved by the City Engineer the following minimum tree separation distance is followed	Roadway safety for both vehicular and pedestrian traffic is a key consideration for placement along public streets.

Siting and Design		*Intent/Rationale*
	Improvement: Minimum distance to Tree Well Traffic Signal, Stop sign: 20 feet Underground Utility lines (except sewer): 5 feet Sewer Lines: 10 feet Above ground utility structures (Transformers, Hydrants, Utility poles, etc.): 10 feet Driveways: 10 feet Intersections (intersecting curb lines of two streets): 25 feet	
☐	**Underground utilities and overhead wires** are considered in the design and avoided or circumvented. Underground utilities are routed around or through the planter in suspended pavement applications. All underground utilities are protected from water and root penetration.	Tree growth can damage utilities and overhead wires resulting in service interruptions. Protecting utilities routed through the planter prevents damage and service interruptions.
☐	**Suspended pavement** is used for confined Tree Well soil volume. Suspended pavement design was developed where appropriate to minimize soil compaction and improve infiltration and filtration capabilities. Suspended pavement was constructed with an approved structural cell.	Suspended pavement designs provide structural support without compaction of the underlying layers, thereby promoting tree growth. Recommended structural cells include poured in place concrete columns, Silva Cells manufactured by Deeproot Green Infrastructures and Stratacell and Stratavault systems manufactured by Citygreen Systems or approved equal. Suspended pavement shall not be used within the city's right-of-way and easements.
☐	A minimum soil volume of 2 cubic feet per square foot of canopy projection volume is provided for each tree. Canopy projection area	The minimum soil volume ensures that there is adequate storage volume to allow for unrestricted evapotranspiration and infiltration.

	Siting and Design	*Intent/Rationale*
	is the ground area beneath the tree, measured at the drip line. Soil volume must be within 1.5 times the mature tree canopy radius. Soil depth shall be a minimum of 30 inches deep, preferably 36 inches deep. When placing tree well next to curbs or other structures use Structural Soil as outlined in the section below titled "Confined Tree Well Soil Volume". Use Amended Soil per Fact Sheet SD-F in all other cases.	
☐	DCV from the tributary area draining to the tree is equal to or greater than the tree credit volume	The minimum tributary area ensures that the tree receives enough runoff to fully utilize the infiltration and evapotranspiration potential provided. In cases where the minimum tributary area is not provided, the tree credit volume must be reduced proportionately to the actual tributary area.
☐	Inlet opening to the tree that is at least 18 inches wide. A minimum 2 inch drop in grade from the inlet to the finish grade of the tree. Grated inlets are allowed for pedestrian circulation. Grates need to be ADA compliant and have sufficient slip resistance.	Design requirement to ensure that the runoff from the tributary area is not bypassed. Different inlet openings and drops in grade may be allowed at the discretion of the City Engineer if calculations are shown that the diversion flow rate (Appendix B.4.4) from the tributary area can be conveyed to the tree. In cases where the inlet capacity is limiting the amount of runoff draining to the tree, the tree credit volume must be reduced proportionately.

Conceptual Design and Sizing Approach for Site Design

Determine the areas where tree wells can be used in the site design to achieve incidental treatment. Tree wells reduce runoff volumes from the site. Refer to Appendix B.1. Document the proposed tree locations in the SWQMP.

For conceptual design and sizing approach for pollutant control and flow control, refer to Appendix I.

Tree Planting Design in New or Reconstructed Streetscapes

1. Maximized open soil area for tree planting is the most cost effective method of achieving the required soil volume.
2. Tree wells within sidewalks shall have a minimum open area of four feet wide by six feet long. Larger areas may be required to accommodate large root balls.
3. Tree well soil characteristics shall meet the requirements of SD-F Amended Soil.

Structural Requirements for Confined Tree Well Soil Volume

In order to provide adequate soil volume for tree wells, soils may be placed confined beneath adjacent paved surfaces. Acceptable soil systems capable of carrying D-50 loading include structural soils, structural slabs, and structural cells:

1. Structural soil systems include CU-StructuralSoil™, Stalite Structural Soil, or equivalent.
2. Suspended pavements that allow uncompacted growing soil beneath the sidewalk include; structural slabs that span between structural supports, structural cells, and other commercially available structural systems. Manufacturer details and certification must be provided for commercial systems. Structural calculations and details must be provided for structural slab installations. Structural cells are commercially-available structural systems placed subsurface that support the sidewalk and are filled with amended soil (SD-F). Manufacturer details and certification must be provided for commercial systems.

Suspended pavement shall not be used within the city's right-of-way and easements.

Stormwater Retention and Treatment Volume

Tree wells with expanded soil volume will serve as a method of capturing and retaining the required volume of stormwater in accordance with City requirements in Appendix B of this manual. These facilities can be designed to meet the City requirements when surface ponding volume is provided, whether designed as an enclosed plant bed with covered soil volume, or a continuous open area (either mulched or with turf) with soil volume under the adjacent sidewalk.

Maintenance Overview

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. Trees wells are site design BMPs that normally do not require maintenance actions beyond routine landscape maintenance. The normal expected

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

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

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.

Summary of Standard Inspection and Maintenance

The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district.

Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.

Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Tree health	Routine actions as necessary to maintain tree health.	• Inspect monthly. • Maintain when needed.
Dead or diseased tree	Remove dead or diseased tree. Replace per original plans.	• Inspect monthly. • Maintain 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. • Maintain 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. • Maintain when needed

Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
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. • Maintain when needed.

ATTACHMENT 2 – HYDROMODIFICATION MANAGEMENT CONTROLS: SUPPORT DOCUMENTATION & CHECKLIST

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

Each of the attachments indicated below should be considered for inclusion with the SWQMP. Use this checklist to indicate which attachments are included behind this coversheet.

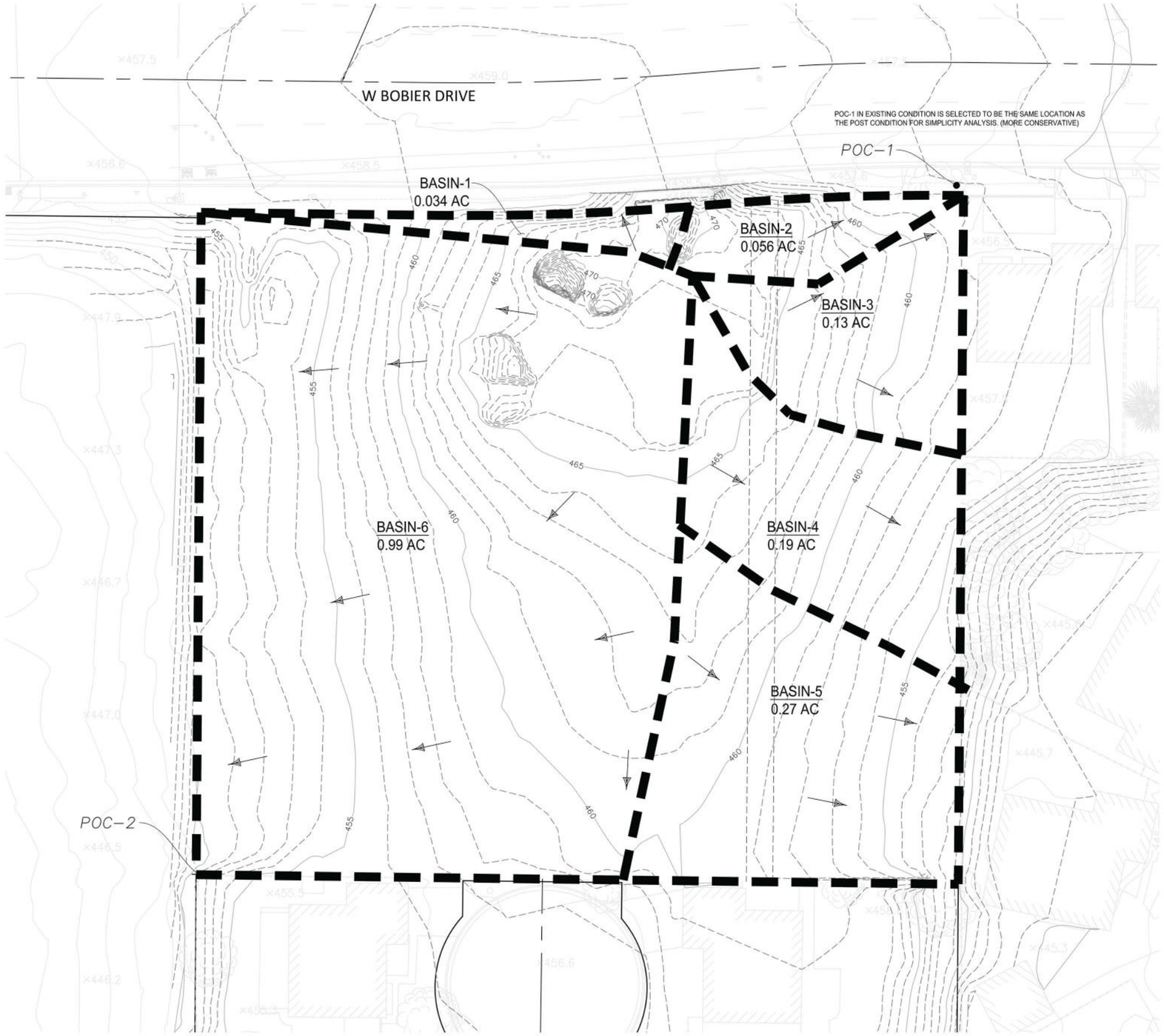
Attachment Sequence	Contents	Checklist
Attachment 2A	Hydromodification Management Exhibit	☒ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2B	Management of Critical Coarse Sediment Yield Areas See Section 6.2 of the *BMP Design Manual*.	☒ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map Analyses, as applicable, for Critical Coarse Sediment Yield Area Determination, per *BMP Design Manual:* ☐ 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 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 See Chapter 6 and Appendix G of the *BMP Design Manual*	☐ Included ☐ Submitted as separate stand-alone document
Attachment 2E	Vector Control Plan	☐ Included ☒ Not required because BMPs will drain in less than 96 hours

ATTACHMENT 2A – HYDROMODIFICATION MANAGEMENT EXHIBIT

For Attachment 2A, provide map(s) for the project site, titled "Hydromodification Management Exhibit." The checklist below identifies minimum elements that must be included with the exhibit.

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

ATTACHMENT 2A



LEGEND

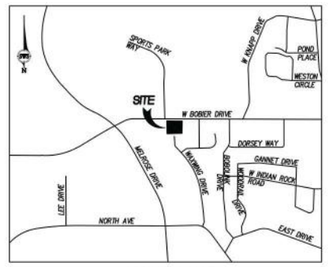
DMA BOUNDARY	
"D"	SOIL TYPE
> 9'	GROUNDWATER TABLE
	FLOW DIRECTION

LOMA ALTA CREEK AND BUENA VISTA CREEK ARE EXISTING NATURAL HYDROLOGIC FEATURES (WATERCOURSES, SEEPS, SPRINGS, WETLANDS)
No CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED
MULTI STORY STRUCTURES MINIMIZE IMPERVIOUS AREA

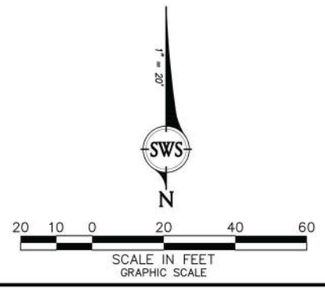
–POC–1 BUENA VISTA CREEK (BASINS 2–5)
BASINS (2–5) CONFLUENCE DOWSTREAM OF THE SITE AT MYNAH PL AND MARABOU LN

–POC–2 LOMA ALTA CREEK (BASIN–6)

–BASIN–1 DRAINS INTO GUAJOME LAKE THAT WILL BE ROUTED TO POC–1 IN POST CONDITION



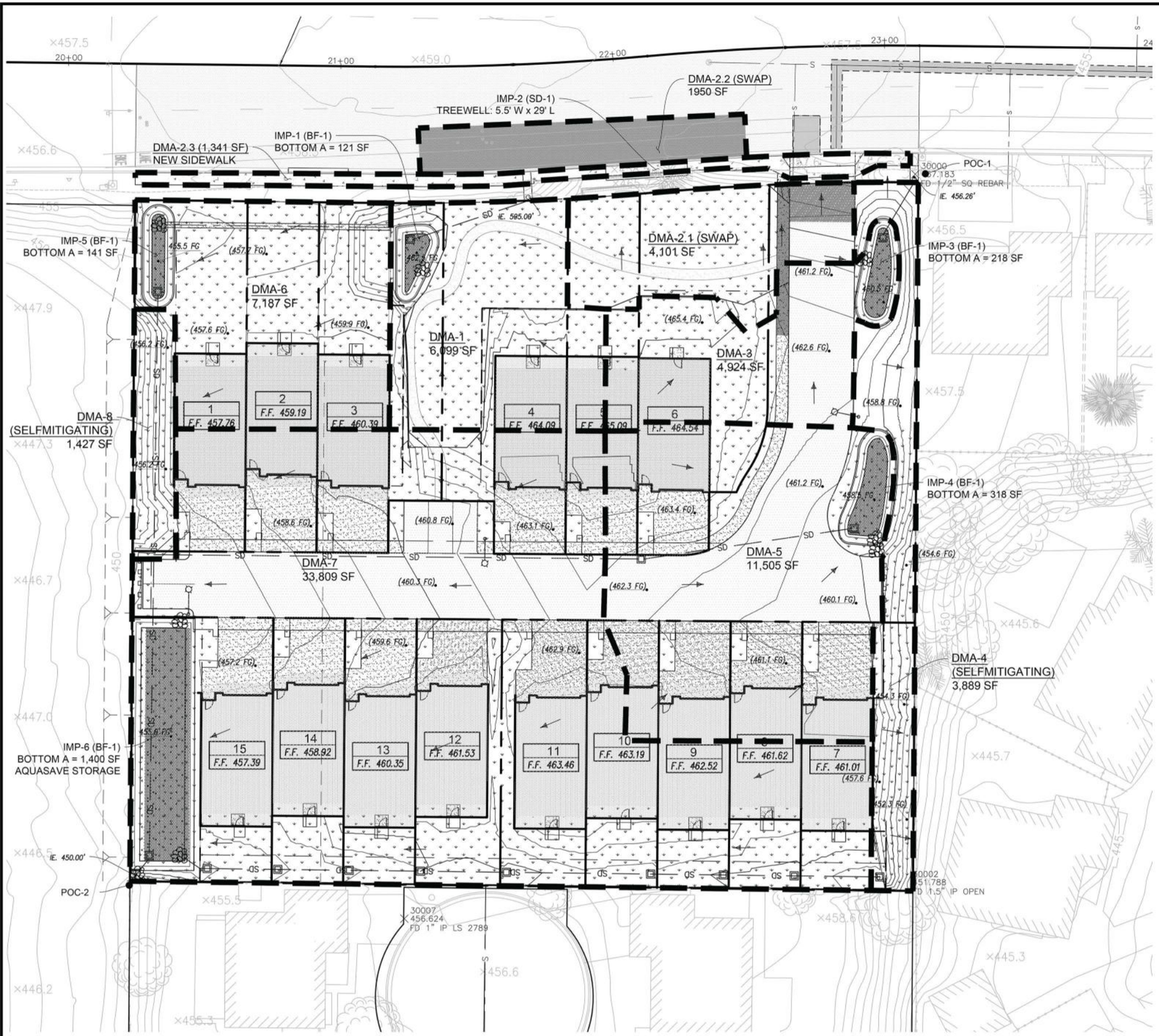
VICINITY MAP



PRE HMP MAP
FOR
WAX WING DRIVE 15-LOTS
VISTA, CA

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CIVIL ENGINEERING ◆ LAND PLANNING ◆ SURVEYING
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011 F: 760-744-0046

24" × 36"



LEGEND

- DMA BOUNDARY
- "D" — SOIL TYPE
- > 9' — GROUNDWATER TABLE
- FLOW DIRECTION
- LANDSCAPE AREA
- BIOFILTRATION AREA
- IMPERVIOUS AREA (BLDG)
- IMPERVIOUS AREA (CONCRETE)
- IMPERVIOUS AREA (AC)
- AREA THAT CAN NOT BE TREATED ONSITE (SWAP AREA)
- STREET UNDISTURBED AREA (SWAP AREA)

TABULAR SUMMARY OF DMAs

DMA	IMP #	AREA (SF)	IMPERVIOUS AREA (SF)	% IMP	HSG	AREA WEIGHTED** RUNOFF COEFFICIENT	VOLUME (DCV)	TREATMENT SYSTEM
1	1	6,099	1,290	21.1	D	0.43	144	BIOFILTRATION
*2.1	2	4,101	830	20.2	D	0.42	163 DMAs (2.2+2.3)	TREEWELLS
*2.2		1,950	1,950	100	D	0.90		
*2.3		1341	1341	100	D	0.90		
3	3	4,924	2,812	57.1	D	064	173	BIOFILTRATION
4	–	3,889	0.00	0.0	D	0.30	–	SELF–MITIGATING
5	4	11,505	9,661	84.0	D	0.80	506	BIOFILTRATION
6	5	7,187	2,561	35.6	D	0.51	202	BIOFILTRATION
7	6	33,809	23,665	70.0	D	0.72	1,339	BIOFILTRATION/ AQUASAVE
8	–	1,427	0	0.0	D	0.30	–	SELF–MITIGATING

–*THE IMPERVIOUS AREA FROM DMA–2.1 IS REQUIRED TO BE TREATED BUT IT CAN NOT,THEREFORE IT WILL BE SWAPPED WITH THE ADDITIONAL AREA "DMA–2.2" (HALF FRONTAGE STREET) THAT WILL TREAT THE OFFSITE IMPROVEMENT AREA VIA PROPOSED TREE–WELLS.

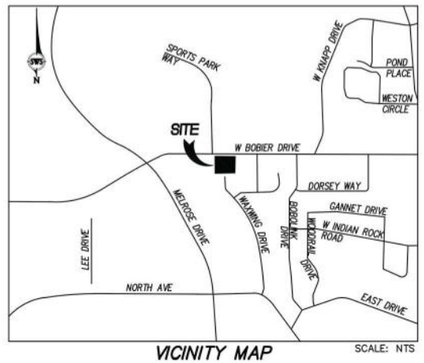
–LOMA ALTA CREEK AND BUENA VISTA CREEK ARE EXISTING NATURAL HYDROLOGIC FEATURES (WATERCOURSES, SEEPS, SPRINGS, WETLANDS)
NO CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED
MULTI STORY STRUCTURES MINIMIZE IMPERVIOUS AREA

–**PER PERVIOUS C COEFFICIENT = 0.3 & IMPERVIOUS C COEFFICIENT = 0.9

–POC–1: (DMAs 1–3) DRAIN INTO BUENA VISTA CREEK
DMA–4 ALSO DRAINS INTO BUENA VISTA CREEK
DMAs (1–4) CONFLUENCE DOWNSTREAM OF THE SITE AT MYNAH PL AND MARABOU LN

–POC–2: (DMAs 5–7) DRAIN INTO LOMA ALTA CREEK
DMA–8 ALSO DRAINS INTO LOMA ALSO CREEK

1" = 20'
N
20 10 0 20 40 60
SCALE IN FEET
GRAPHIC SCALE



VICINITY MAP SCALE: NTS

POST HMP MAP 1 OF 2
FOR
WAX WING DRIVE 15-LOTS
VISTA, CA

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San Marcos, CA 92078
P: 760-744-0011 F: 760-744-0046

24" x 36"

BIOFILTRATION CHART (BF-1)

DMA #	IMP #	ORIFICE DIAMETER (IN)	ORIFICE INVERT ELEVATION (FT)	OUTLET PIPE (IN)	# OF RISERS	GRATE SIZE IN FEET (X,Y)	BASIN TOTAL SURFACE * DEPTH (IN)	BASIN REQUIRED TREATMENT AREA (SF)	BASIN BOTTOM AREA (SF)	BASIN PROVIDED TREATMENT AREA (SF)	PERFORATED PIPE DIAMETER (IN)	MULCH DEPTH "A" (IN)	AMENDED SOIL DEPTH "B" (IN)	FILTER COURSE DEPTH "C1&C2" (IN)**	STORAGE "D" (IN)***	BOTTOM BASIN ELEVATION (FT)	DISTANCE FROM BOTTOM OF POND TO TOP OF GRATE	TOP OF GRATE ELEVATION++ (FT)	DCV (CF)	VOLUME PROVIDED**** (CF)	HMP ELEVATION (FT)	100YR ELEVATION (FT)	EFFECTIVE ELEVATION (FT)	TOP OF BERM ELEVATION (FT)	PROVIDED FREE BOARD (IN)	SIDE SLOPE Z:1
1	1	0.25	459.50'	6	1	1' X 1'	21"	79	121	121	6"	3"	18"	6"	12"	462.50	0.83'	463.33'	144	336	463.33'	463.54'	463.66'	464.25	7.08"	2:1
3	3	0.25	457.50'	8	1	1' X 1'	21"	95	218	218	6"	3"	18"	6"	12"	460.50'	0.83'	461.33'	173	580	461.33'	461.53'	461.58'	462.25'	8.04"	2:1
5	4	0.26	455.50'	10	1	1' X 1'	21"	280	318	318	6"	3"	18"	6"	12"	458.50'	0.83'	459.33'	506	1,097	459.33'	459.60'	459.53'	460.25'	7.80"	2:1
6	5	0.25	451.00'	10	1	1' X 1'	21"	110	141	141	6"	3"	18"	6"	12"	455.50'	0.83'	456.33'	202	396	456.33'	456.63'	456.69'	457.25'	6.72"	2:1
7	6	0.8 3	450.25' 455.25'	12	1	1' X 1'	21"	731	1400	1400	–	3"	18"	3"	33"	455.00'	0.83'	455.83'	1,339	6,095	455.83'	456.04'	455.86'	456.75'	8.52"	2:1

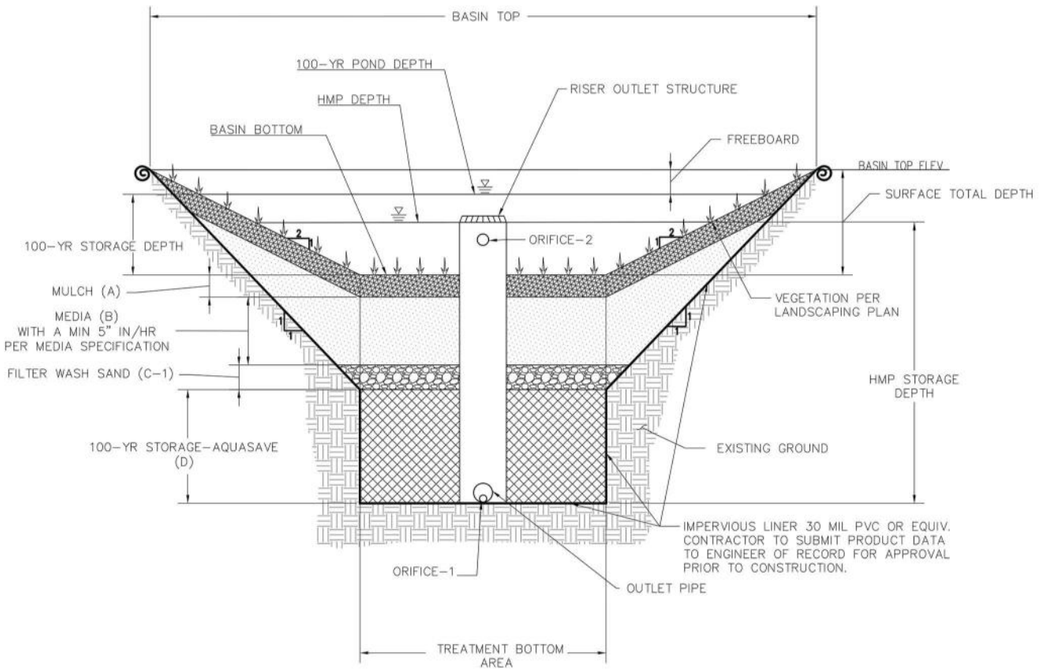
* FROM TOP OF MULCH TO TOP OF BERM

** 3" ASTM 33 (TOP) , 3" ASTM NO 8 (BOTTOM)

***(GRAVEL, ASTM 57) FOR IMPS (1,3,4,5), AQUASAVE FOR IMP-6

++PER HMP

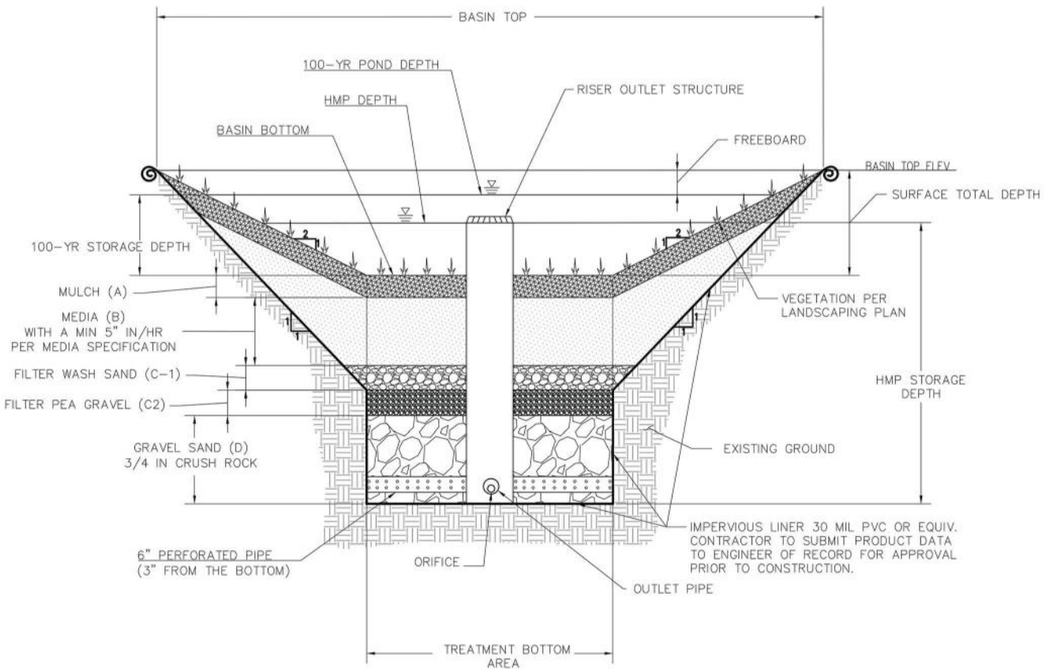
**** INCLUDES: 12" SURFACE 100% VOID
SOIL, GRAVEL 40% VOID
90% VOID FOR AQUASAVE STORAGE (IMP-6)



FOR LETTERS (A TO D) PLEASE
SEE BIOFILTRATION CHART (BF-1)

BIOFILTRATION FACILITY DETAIL (IMP-6)

NTS



FOR LETTERS (A TO D) PLEASE
SEE BIOFILTRATION CHART (BF-1)

BIOFILTRATION FACILITY DETAIL (IMPs 1,3,4,5)

NTS

BIOFILTRATION SOIL MEDIA (BSM)
SHALL MEET REQUIREMENTS OF THE COUNTY OF SAN DIEGO LOW IMPACT DEVELOPMENT HANDBOOK, APPENDIX G AND ALLOW FOR A LONG TERM, IN-PLACE INFILTRATION RATE OF 5 INCHES PER HOUR. BSM SHALL BE COMPOSED OF THE FOLLOWING:

BSM COMPOSITION	SAND	SANDY LOAM			COMPOST
		SAND	SILT	CLAY	
VOLUME	60-80%	0-20%			20%
WEIGHT	75-80%	10% MAX	3% MAX		9% MAX[1]

[1] 9% COMPOST BY WEIGHT RESULTS IN APPROXIMATELY 5% ORGANIC MATTER BY WEIGHT.
NUTRIENT-SENSITIVE BSM MIX PER FACTSHEET BF-2

BIOFILTRATION PLATE & ORIFICE DETAIL (IMP-6)

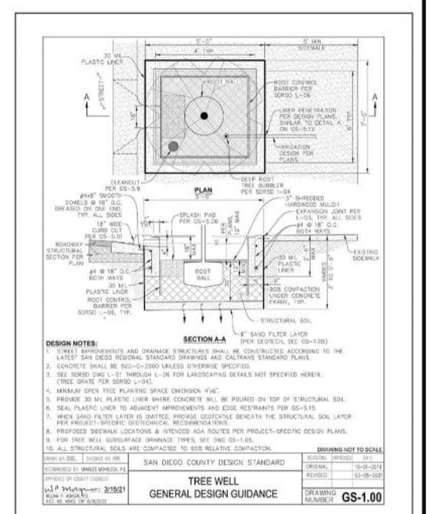
NTS

BIOFILTRATION PLATE & ORIFICE DETAIL (IMPs 1,3,4,5)

NTS

AQUASAVE (IMP-6)

NTS



TREE-WELL (IMP-2)

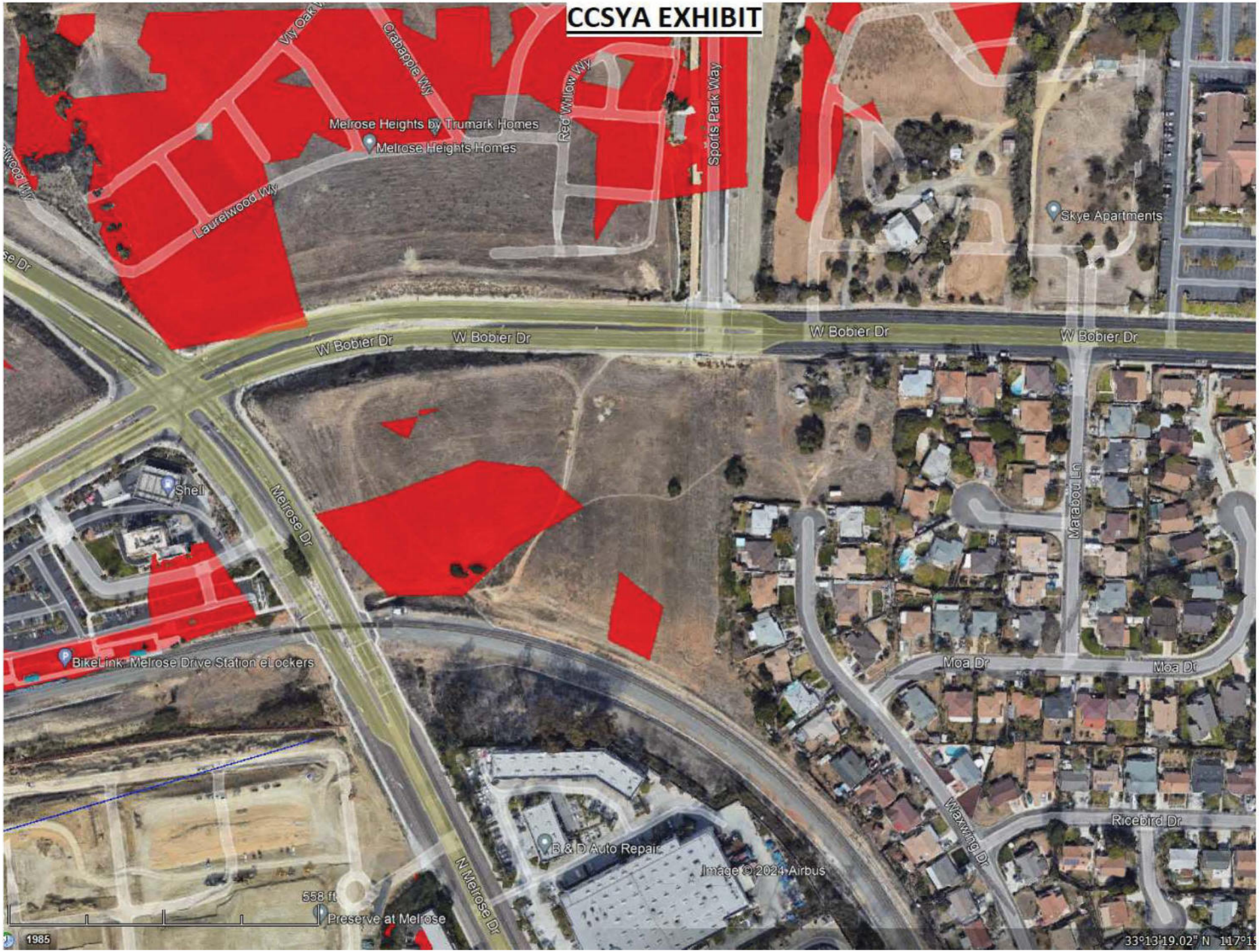
NTS

POST HMP MAP 2 OF 2
FOR
WAX WING DRIVE 15-LOTS
VISTA, CA

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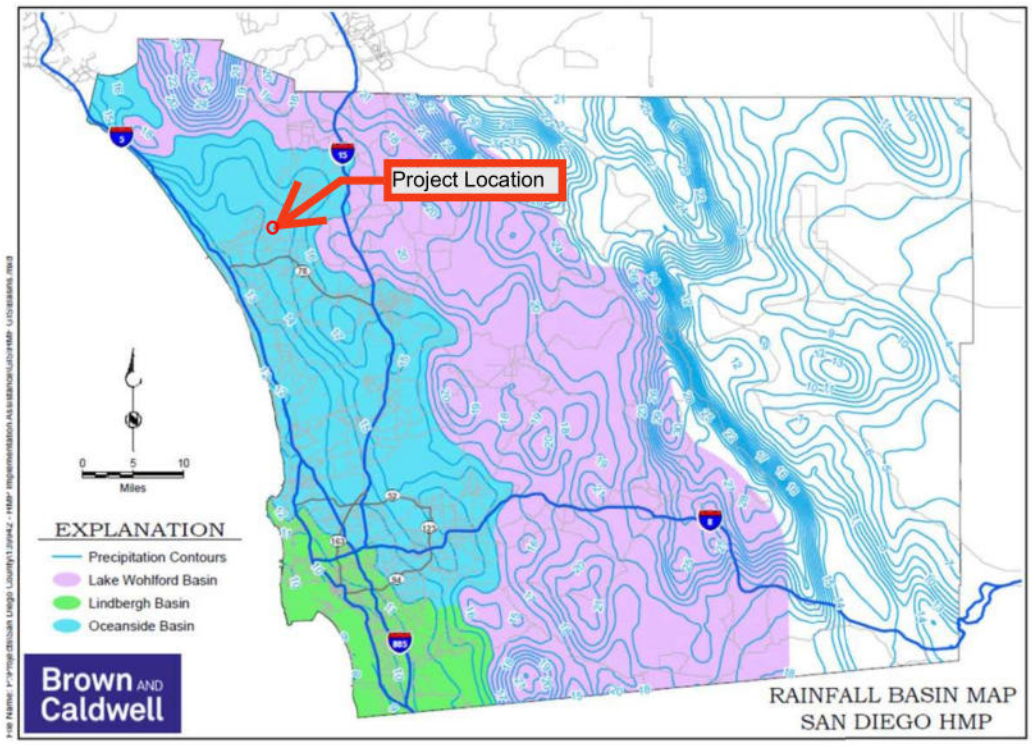
ATTACHMENT 2B


CCSYA EXHIBIT
Melrose Heights by Trumark Homes
Melrose Heights Homes
Crabapple Wy
Red Willow Wy
Sports Park Way
Laurelwood Wy
Skye Apartments
W Bobier Dr
W Bobier Dr
W Bobier Dr
W Bobier Dr
Shell
Melrose Dr
Marbon Ln
BikeLink: Melrose Drive Station eLockers
Moa Dr
Moa Dr
Waxwing Dr
Ricebird Dr
B & D Auto Repair
Image © 2024 Airbus
N Melrose Dr
558 ft
Preserve at Melrose
1985
33°13'19.02" N

SWMM ANALYSIS

FLOW DURATION CURVE ANALYSIS

ATTACHMENT 2D


Project Location
0 5 10
Miles
EXPLANATION
Precipitation Contours
Lake Wohlford Basin
Lindbergh Basin
Oceanside Basin
Brown AND Caldwell
RAINFALL BASIN MAP
SAN DIEGO HMP

INTRODUCTION:

The approach used to model the proposed residential development project site in the city of Vista using the Environmental Agency (EPA) Storm Water Management Model 5.1 (SWMM). SWMM models were prepared for the pre and post-development conditions at the project site to determine if the proposed LID treatment basins have sufficient volume to meet Hydromodification Management Plan (HMP) requirements. The San Diego Regional Water Quality Control board (SDRWQCB) established these requirements in the final HMP , dated March 2011, prepared for the County of San Diego by Brown and Caldwell, as modified by the HMP dated February 2016 per City of Vista BMP Design Manual.

SWMM MODEL DEVELOPMENT

The proposed project site consists of 15 townhomes (two-story structure) with associated driveway, private street, utilities, and other associated improvements and treatment basins within the City of Vista, California. The total developed area is 1.67 ac. SWMM models were prepared for this study, one for pre-development and one for post-development conditions.

There are two POCs on site (selected per post condition), POC-1 located on the northeast for DMAs (1-4), POC-2 located on the southwest corner of the site where DMAs 5-7 will discharge into from multiple biofiltration basins into existing storm drain systems. DMA 4 and 8 are self-mitigating areas sheet flow offsite as they do in the existing condition.

The project site in existing condition drains into three watershed bodies. Small area (basin-1, 0.034 ac) of the existing condition, west of high point on W Babier Drive will drain toward Guajome Lake and then into lower San Luis Rey River and basins 2 and 3 drain into Buena Vista Creek and basin-4 into loma Alta Creek. Basin 3 sheet flows easterly to offsite (not concentrated).

In post condition, the runoff from basins 1-4 will drain toward Buena Vista Creek which will eliminate the small area that was draining to Guajome in existing condition to be routed toward Buena Vista Creek as well.

For both SWMM models, flow duration curves were prepared for POCs 1-2 to determine if the proposed HMP facility is sufficient to meet the current HMP requirements. Table 1.0 summarizes the contributing area for POC 1-2 in pre and post-development conditions.

TABLE 1.0

POC	Pre-Dev Area (ac)	Post-Dev Area (ac)
1	0.43 (basins 2-5) *	0.43 (basins 1-4)
2	0.99 (basin-6)	1.24 (basins 5-8)

*HMP analysis for POC-1 would be challenging if we analyze and use the basins that discharge north and easterly of the site into multiple locations. We know that all the basins (2-5) sheet flow offsite and concentrate in multiple points until they confluence at one point that is the downstream of the project site (Mynah Pl and Marabou Ln) and finally discharge into an existing storm drain system located on Moa Dr (west of Marabou Ln) (prior to discharging into Buena Vista Creek. Only small portion of the site (0.034 ac) drains into West of the high point on Bobier Dr. and ultimately into Guajome Lake and then into San Luis Rey River, however, this small area in post condition, will be routed into Buena Vista Creek. Therefore, for the simplicity of the analysis at POC-1 which is also more conservative, we will assume the same pre

HMP area (basins 2-5) to match the area (basins 1-4) in the post HMP analysis that drain into same watershed (Buena Vista Creek).

The inputs required to develop SWMM models include rainfall, watershed characteristics, and Integrated Management Practices (IMP) configurations. The Oceanside gauge from the Project Clean Water website was used for this study, since it is the most representative of the project site precipitation due to elevation and proximity of the project site.

Evaporation for the site was modeled using average monthly values from City of Vista BMP Design Manual Appendices, Table G.1-1. According to the NRCS WebSoil Survey, the site has a soils type "D".

HMP MODELING

PROPOSED CONDITION

POC-1

POC-1 is where all the treated and self-mitigating runoff from DMAs 1-4 discharge into west of W Bobier Drive and adjacent properties and then discharge into Buena Vista Creek and ultimately to the Pacific Ocean.

POC-2 is where all the treated runoff from DMAs 5-8 will discharge southwest corner offsite and then into Loma Alta Creek and ultimately to Pacific Ocean.

The biofiltration basins (IMPs 1, 3, 4, 5 ,6) are responsible for handling hydromodification requirements for POC-1 and 2. The biofiltration basins have been designed with a uniform surface depth of 10-inch for IMPs (1, 3, 4, 5, 6) with each basin total depth to be 21-inch for HMP and 100yr required freeboard. Each IMP is comprised of a 3-inch mulch layer, 18-inch layer of amended soil (a highly sandy, organic rich compost with an infiltration rate of 5 in/hr), 6-inch of filter course and 12 inch gravel layer for IMPs (1, 3, 4, 5). IMP-6 is comprised of a 3-inch mulch layer, 18-inch layer of amended soil (a highly sandy, organic rich compost with an infiltration rate of 5 in/hr), 3-inch of filter course and 33 inch storage layer (AquaSave) for additional detention (see underground layers depth below[1]). Below the gravel/AquaSave layer, each basin is lined to prevent infiltration into the underlying soil. Flow will discharge from basins (IMPs 1, 3, 4) via a low flow orifice outlet set at the bottom, 3 inch from bottom of the gravel. There are two orifices proposed for the IMP-6, 0.8 inch at the bottom of storage (AqauSave) and 3 inch orifice set 60 inch from the bottom of the storage. A riser structures will be constructed in each basin that peak flows can be safely discharged to the receiving storm drain systems. The area and depth used in SWMM model is deferent than what is shown on the "Biofiltration Value Table" because of limitation of SWMM software (volume used in SWMM model is equivalent to what will be constructed).

TABLE 1.1- Summary of Existing Condition for POC-1 and POC-2

DMA	Tributary Area, A(ac)	Impervious Percentage, IP
POC-1: Basins 2-5	0.43	0%
POC-2: Basin 6	0.99	0%

ABLE 1.2- Summary of Developed Condition for POC-1

DMA	Biofiltration #	Tributary Area, A(ac)	Impervious Percentage, IP
DMA-1	IMP-1	0.14	21.6%
DMA-2	-	0.09	20.2%
DMA-3	IMP-3	0.11	59.8%
DMA-4	Self-Mitigating	0.089	0.0

TABLE 1.3- Summary of Developed Condition for POC-2

DMA	Biofiltration #	Tributary Area, A(ac)	Impervious Percentage, IP
DMA-5	IMP-4	0.26	86.4%
DMA-6	IMP-5	0.17	36.3%
DMA-7	IMP-6	0.78	73.0%
DMA-8	Self-Mitigating	0.03	0.0

Effective Depth

IMPs	Depth (ft)
IMP-1	1.17
IMP-3	1.08
IMP-4	1.03
IMP-5	1.19
IMP-6	0.86

The biofiltration basins were modeled using the biofiltration LID module within SWMM. The biofiltration module can model the underground gravel, underdrain with an orifice plate, amended soil layer, and a surface pond up to the elevation of the invert of the spillway.

It should be noted that detailed outlet location and elevations will be shown on the construction plans based on the recommendations of this study.

Underground layers depth

For (IMPs 1,3,4,5):

3" Mulch
18" Soil
6" Filter Course
12" gravel

For (IMP-6):

3" Mulch
18" Soil
3" Filter Course
33" AquaSave Storage

BMP MODELING FOR HMP PURPOSES

* The Green Ampt data's for Soil D are selected for this site.

FLOW DURATION CURVE COMPARISON

The flow Duration Curve (FDC) were compared at the project's POCs by exporting the hourly runoff time result from the SWMM to a spreadsheet. For each POC, the FDC was compared between 10% of the existing condition Q_2 up to the existing condition Q_{10}. Q_2 and Q_{10} were determined by the statistics analysis report exported to spreadsheet from the SWMM model, which is based on the Weibull Plotting Positions. The runoff time series was also exported from the SWMM model to a spreadsheet to calculate flow durations.

The range between 10% of Q2 and Q10 was divided into 100 equal time intervals; the number of hours that each flow rate was exceeded was counted from the hourly series. Additionally, the intermediate peaks with a return period "i" were obtained (Qi with i=3 to 9). For the purpose of the plot, the values were presented as percentage of time exceeded for each flow rate. FDC comparison for each POC is illustrated in the following Figure-1.

As can be seen in Figures 1, the FDCs for the proposed condition with the HMP facilities are within 110% of the curve for the existing condition in both peak flow and duration. The additional runoff volume generated from developing the site will be released to the storm drain system at a flow rate below the 10% Q2 lower threshold. Additionally, the project will not increase peak flow rates between the Q2 and the Q10.

DRAWDOWN TIME

To ensure compliance with the 96 hour toral drawdown requirements and 24 hour surface ponding drawdown requirement per current City of Vista BMP Design Manual Appendicies, drawdown calculation are provided below in this report. Please see the calculations (Elevation Discharge and Drawdown Summary).

Orifice Area: ((D/12/2)^2)*π

Orifice flow Rate (Q): $Q = \frac{\pi}{4} C_g \frac{D^2}{144} \sqrt{2g \frac{(H-H_D)}{12}}$

HD is the elevation of the centroid of the orifice in inches (assumed equal to the invert of the orifice for small orifices and in our design equal to 0)
H is the depth of the water in inches.
Drawdown Time (hr): (V/Q)/3600
Where:
D is Orifice diameter (in)
Cg is Orifice discharge coefficient = 0.61
A is Orifice area (sf)
V is DCV volume (cf)
g = 32.2 ft/s^2
C = Cg (605/ALID) (πD^2/8) √(g/6) , per Section G.1.5.3.4 of Appendix G of the County of San Diego BMP Design Manual

	DMA 1	DMA 3
Cg	0.61	0.61
DIAMETER	0.250	0.250
AREA	121	218
C*	0.1734	0.0963

	DMA 5	DMA-6	DMA-7
Cg	0.61	0.61	0.61
DIAMETER	0.260	0.250	0.800
AREA	318	141	1400
C*	0.0714	0.1499	0.1535

SUMMARY

This study has demonstrated that the proposed biofiltration basins with gravel storage layer provided within the Vista project are sufficient to meet the current HMP criteria and the respective orifice and outlet structure, are incorporated as specified within the proposed project site.

KEY ASSUMPTIONS

1. The biofiltration basins are lined in order to prevent infiltration into the underlying soil.

Drawdown Calculation Summary
Vista Waxwing Drive

Biofiltration		IMP-1	IMP-3	IMP-4	IMP-5	IMP-6
Surface						
Average Discharge Rate	cfs	0.0032	0.032	0.0035	0.0032	0.1346
Ponding Depth	in	10	10	10	10	10
Bottom Area	sf	121	218	318	141	1400
Top Area	sf	308	465	601	371	2045
Drawdown Time	**hr**	**15.5**	**2.5**	**30.4**	**18.5**	**3.0**
Soil Layer						
Average Discharge Rate	cfs	0.0025	0.0025	0.0027	0.0025	0.0324
Thickness	in	24	24	24	24	24
Area	sf	121	218	318	141	1400
Porosity		0.4	0.4	0.4	0.4	0.4
Field Capacity		0.2	0.2	0.2	0.2	0.2
Drawdown Time	**hr**	**5.4**	**9.7**	**13.1**	**6.3**	**4.8**
Gravel/AquaSave Layer						
Average Discharge Rate	cfs	0.0013	0.0013	0.0014	0.0013	0.0198
Thickness	in	15	15	15	15	33
Area	sf	121	218	318	141	1400
Porosity		0.4	0.4	0.4	0.4	0.4
Drawdown Time	**hr**	**12.9**	**23.3**	**31.5**	**15.1**	**21.6**
TOTAL DRAWDOWN TIME	**hr**	**33.8**	**35.4**	**75.0**	**39.8**	**29.4**

ELEVATION-DISCHARGE CALCULATOR
DISCHARGE THRU UNDERDRAIN ORIFICE
WEIR FLOW (1-'D-1' inches)
ORIFICE FLOW ('D' inches and over)

DMA-1 (IMP-1)

INPUT
Orifice Diameter, D = 0.2500 inches

Gravel = 15"
Soil = 24"
Surface pond = 10"
Total surface depth = 21"

CALCULATE
Weir Equation, $Q = 3.0WH^{1.5}$
Orifice Equation, $Q = 0.61A(2gH)^{0.5}$

ELEVATION (in)	DISCHARGE (cfs)		EFFECTIVE HEIGHT H (in)	ORIFICE AREA (sq ft)	WEIR LENGTH (ft)
1	0.0005	**Bottom of Storage**	0.875	0.0003	0.00
2	0.0007		1.875	0.0003	0.00
3	0.0008		2.875	0.0003	0.00
4	0.0009		3.875	0.0003	0.00
5	0.0011		4.875	0.0003	0.00
6	0.0012		5.875	0.0003	0.00
7	0.0013	Ave Storage	6.875	0.0003	0.00
8	0.0014		7.875	0.0003	0.00
9	0.0014		8.875	0.0003	0.00
10	0.0015		9.875	0.0003	0.00
11	0.0016		10.875	0.0003	0.00
12	0.0017		11.875	0.0003	0.00
13	0.0017		12.875	0.0003	0.00
14	0.0018		13.875	0.0003	0.00
15	0.0019	**Top of Storage**	14.875	0.0003	0.00
16	0.0019		15.875	0.0003	0.00
17	0.0020		16.875	0.0003	0.00
18	0.0020		17.875	0.0003	0.00
19	0.0021		18.875	0.0003	0.00
20	0.0021		19.875	0.0003	0.00
21	0.0022		20.875	0.0003	0.00
22	0.0023		21.875	0.0003	0.00
23	0.0023		22.875	0.0003	0.00
24	0.0024		23.875	0.0003	0.00
25	0.0024		24.875	0.0003	0.00
26	0.0025		25.875	0.0003	0.00
27	0.0025	Ave soil	26.875	0.0003	0.00
28	0.0025		27.875	0.0003	0.00
29	0.0026		28.875	0.0003	0.00
30	0.0026		29.875	0.0003	0.00
31	0.0027		30.875	0.0003	0.00
32	0.0027		31.875	0.0003	0.00
33	0.0028		32.875	0.0003	0.00
34	0.0028		33.875	0.0003	0.00
35	0.0028		34.875	0.0003	0.00
36	0.0029		35.875	0.0003	0.00
37	0.0029		36.875	0.0003	0.00
38	0.0030		37.875	0.0003	0.00
39	0.0030	**Top of Mulch**	38.875	0.0003	0.00
40	0.0030		39.875	0.0003	0.00
41	0.0031		40.875	0.0003	0.00
42	0.0031		41.875	0.0003	0.00
43	0.0032		42.875	0.0003	0.00
44	0.0032	Ave Surface	43.875	0.0003	0.00
45	0.0032		44.875	0.0003	0.00
46	0.0033		45.875	0.0003	0.00
47	0.0033		46.875	0.0003	0.00
48	0.0033		47.875	0.0003	0.00
49	0.0034	**Surface Pond 10**	48.875	0.0003	0.00
50	0.0034		49.875	0.0003	0.00
51	0.0034		50.875	0.0003	0.00
52	0.0035		51.875	0.0003	0.00
53	0.0035		52.875	0.0003	0.00
54	0.0035		53.875	0.0003	0.00
55	0.0036		54.875	0.0003	0.00
56	0.0036		55.875	0.0003	0.00
57	0.0036		56.875	0.0003	0.00
58	0.0037		57.875	0.0003	0.00
59	0.0037		58.875	0.0003	0.00
60	0.0037		59.875	0.0003	0.00
61	0.0038		60.875	0.0003	0.00
62	0.0038		61.875	0.0003	0.00
63	0.0038		62.875	0.0003	0.00
64	0.0038		63.875	0.0003	0.00
65	0.0039		64.875	0.0003	0.00
66	0.0039		65.875	0.0003	0.00
67	0.0039		66.875	0.0003	0.00
68	0.0040		67.875	0.0003	0.00
69	0.0040		68.875	0.0003	0.00
70	0.0040		69.875	0.0003	0.00
71	0.0041		70.875	0.0003	0.00
72	0.0041		71.875	0.0003	0.00
73	0.0041		72.875	0.0003	0.00
74	0.0041		73.875	0.0003	0.00
75	0.0042		74.875	0.0003	0.00
76	0.0042		75.875	0.0003	0.00
77	0.0042		76.875	0.0003	0.00
78	0.0043		77.875	0.0003	0.00

ELEVATION-DISCHARGE CALCULATOR
DISCHARGE THRU UNDERDRAIN ORIFICE
WEIR FLOW (1-'D-1' inches)
ORIFICE FLOW ('D' inches and over)

DMA-3 (IMP-3)

INPUT
Orifice Diameter, D = 0.2500 inches

Gravel = 15"
Soil = 24"
Surface pond = 10"
Total surface depth = 21"

CALCULATE
Weir Equation, $Q = 3.0WH^{1.5}$
Orifice Equation, $Q = 0.61A(2gH)^{0.5}$

ELEVATION (in)	DISCHARGE (cfs)		EFFECTIVE HEIGHT H (in)	ORIFICE AREA (sq ft)	WEIR LENGTH (ft)
1	0.0005	**Bottom of Storage**	0.875	0.0003	0.00
2	0.0007		1.875	0.0003	0.00
3	0.0008		2.875	0.0003	0.00
4	0.0009		3.875	0.0003	0.00
5	0.0011		4.875	0.0003	0.00
6	0.0012		5.875	0.0003	0.00
7	0.0013	Ave Storage	6.875	0.0003	0.00
8	0.0014		7.875	0.0003	0.00
9	0.0014		8.875	0.0003	0.00
10	0.0015		9.875	0.0003	0.00
11	0.0016		10.875	0.0003	0.00
12	0.0017		11.875	0.0003	0.00
13	0.0017		12.875	0.0003	0.00
14	0.0018		13.875	0.0003	0.00
15	0.0019	**Top of Storage**	14.875	0.0003	0.00
16	0.0019		15.875	0.0003	0.00
17	0.0020		16.875	0.0003	0.00
18	0.0020		17.875	0.0003	0.00
19	0.0021		18.875	0.0003	0.00
20	0.0021		19.875	0.0003	0.00
21	0.0022		20.875	0.0003	0.00
22	0.0023		21.875	0.0003	0.00
23	0.0023		22.875	0.0003	0.00
24	0.0024		23.875	0.0003	0.00
25	0.0024		24.875	0.0003	0.00
26	0.0025		25.875	0.0003	0.00
27	0.0025	Ave soil	26.875	0.0003	0.00
28	0.0025		27.875	0.0003	0.00
29	0.0026		28.875	0.0003	0.00
30	0.0026		29.875	0.0003	0.00
31	0.0027		30.875	0.0003	0.00
32	0.0027		31.875	0.0003	0.00
33	0.0028		32.875	0.0003	0.00
34	0.0028		33.875	0.0003	0.00
35	0.0028		34.875	0.0003	0.00
36	0.0029		35.875	0.0003	0.00
37	0.0029		36.875	0.0003	0.00
38	0.0030		37.875	0.0003	0.00
39	0.0030	**Top of Mulch**	38.875	0.0003	0.00
40	0.0030		39.875	0.0003	0.00
41	0.0031		40.875	0.0003	0.00
42	0.0031		41.875	0.0003	0.00
43	0.0032		42.875	0.0003	0.00
44	0.0032	Ave Surface	43.875	0.0003	0.00
45	0.0032		44.875	0.0003	0.00
46	0.0033		45.875	0.0003	0.00
47	0.0033		46.875	0.0003	0.00
48	0.0033		47.875	0.0003	0.00
49	0.0034	**Surface Pond 10"**	48.875	0.0003	0.00
50	0.0034		49.875	0.0003	0.00
51	0.0034		50.875	0.0003	0.00
52	0.0035		51.875	0.0003	0.00
53	0.0035		52.875	0.0003	0.00
54	0.0035		53.875	0.0003	0.00
55	0.0036		54.875	0.0003	0.00
56	0.0036		55.875	0.0003	0.00
57	0.0036		56.875	0.0003	0.00
58	0.0037		57.875	0.0003	0.00
59	0.0037		58.875	0.0003	0.00
60	0.0037		59.875	0.0003	0.00
61	0.0038		60.875	0.0003	0.00
62	0.0038		61.875	0.0003	0.00
63	0.0038		62.875	0.0003	0.00
64	0.0038		63.875	0.0003	0.00
65	0.0039		64.875	0.0003	0.00
66	0.0039		65.875	0.0003	0.00
67	0.0039		66.875	0.0003	0.00
68	0.0040		67.875	0.0003	0.00
69	0.0040		68.875	0.0003	0.00
70	0.0040		69.875	0.0003	0.00
71	0.0041		70.875	0.0003	0.00
72	0.0041		71.875	0.0003	0.00
73	0.0041		72.875	0.0003	0.00
74	0.0041		73.875	0.0003	0.00
75	0.0042		74.875	0.0003	0.00
76	0.0042		75.875	0.0003	0.00
77	0.0042		76.875	0.0003	0.00
78	0.0043		77.875	0.0003	0.00

ELEVATION-DISCHARGE CALCULATOR
DISCHARGE THRU UNDERDRAIN ORIFICE
WEIR FLOW (1-'D-1' inches)
ORIFICE FLOW ('D' inches and over)

DMA-5 (IMP-4)

INPUT
Orifice Diameter, D = 0.2600 inches

Gravel = 15"
Soil = 24"
Surface pond = 10"
Total surface depth = 21"

CALCULATE
Weir Equation, Q = $3.0WH^{1.5}$
Orifice Equation, Q = $0.61A(2gH)^{0.5}$

ELEVATION (in)	DISCHARGE (cfs)		EFFECTIVE HEIGHT H (in)	ORIFICE AREA (sq ft)	WEIR LENGTH (ft)
1	0.0005	**Bottom of Storage**	0.870	0.0004	0.00
2	0.0007		1.870	0.0004	0.00
3	0.0009		2.870	0.0004	0.00
4	0.0010		3.87	0.0004	0.00
5	0.0011		4.87	0.0004	0.00
6	0.0013		5.87	0.0004	0.00
7	0.0014	Ave Storage	6.87	0.0004	0.00
8	0.0015		7.87	0.0004	0.00
9	0.0016		8.87	0.0004	0.00
10	0.0016		9.87	0.0004	0.00
11	0.0017		10.87	0.0004	0.00
12	0.0018		11.87	0.0004	0.00
13	0.0019		12.87	0.0004	0.00
14	0.0019		13.87	0.0004	0.00
15	0.0020	**Top of Storage**	14.87	0.0004	0.00
16	0.0021		15.87	0.0004	0.00
17	0.0021		16.87	0.0004	0.00
18	0.0022		17.87	0.0004	0.00
19	0.0023		18.87	0.0004	0.00
20	0.0023		19.87	0.0004	0.00
21	0.0024		20.87	0.0004	0.00
22	0.0024		21.87	0.0004	0.00
23	0.0025		22.87	0.0004	0.00
24	0.0025		23.87	0.0004	0.00
25	0.0026		24.87	0.0004	0.00
26	0.0027		25.87	0.0004	0.00
27	0.0027	Ave soil	26.87	0.0004	0.00
28	0.0028		27.87	0.0004	0.00
29	0.0028		28.87	0.0004	0.00
30	0.0028		29.87	0.0004	0.00
31	0.0029		30.87	0.0004	0.00
32	0.0029		31.87	0.0004	0.00
33	0.0030		32.87	0.0004	0.00
34	0.0030		33.87	0.0004	0.00
35	0.0031		34.87	0.0004	0.00
36	0.0031		35.87	0.0004	0.00
37	0.0032		36.87	0.0004	0.00
38	0.0032		37.87	0.0004	0.00
39	0.0032	**Top of Mulch**	38.87	0.0004	0.00
40	0.0033		39.87	0.0004	0.00
41	0.0033		40.87	0.0004	0.00
42	0.0034		41.87	0.0004	0.00
43	0.0034		42.87	0.0004	0.00
44	0.0035	Ave Surface	43.87	0.0004	0.00
45	0.0035		44.87	0.0004	0.00
46	0.0035		45.87	0.0004	0.00
47	0.0036		46.87	0.0004	0.00
48	0.0036		47.87	0.0004	0.00
49	0.0036	**Surface Pond 10"**	48.87	0.0004	0.00
50	0.0037		49.87	0.0004	0.00
51	0.0037		50.87	0.0004	0.00
52	0.0038		51.87	0.0004	0.00
53	0.0038		52.87	0.0004	0.00
54	0.0038		53.87	0.0004	0.00
55	0.0039		54.87	0.0004	0.00
56	0.0039		55.87	0.0004	0.00
57	0.0039		56.87	0.0004	0.00
58	0.0040		57.87	0.0004	0.00
59	0.0040		58.87	0.0004	0.00
60	0.0040		59.87	0.0004	0.00
61	0.0041		60.87	0.0004	0.00
62	0.0041		61.87	0.0004	0.00
63	0.0041		62.87	0.0004	0.00
64	0.0042		63.87	0.0004	0.00
65	0.0042		64.87	0.0004	0.00
66	0.0042		65.87	0.0004	0.00
67	0.0043		66.87	0.0004	0.00
68	0.0043		67.87	0.0004	0.00
69	0.0043		68.87	0.0004	0.00
70	0.0044		69.87	0.0004	0.00
71	0.0044		70.87	0.0004	0.00
72	0.0044		71.87	0.0004	0.00
73	0.0044		72.87	0.0004	0.00
74	0.0045		73.87	0.0004	0.00
75	0.0045		74.87	0.0004	0.00
76	0.0045		75.87	0.0004	0.00
77	0.0046		76.87	0.0004	0.00
78	0.0046		77.87	0.0004	0.00

ELEVATION-DISCHARGE CALCULATOR
DISCHARGE THRU UNDERDRAIN ORIFICE
WEIR FLOW (1-'D-1' inches)
ORIFICE FLOW ('D' inches and over)

DMA-6 (IMP-5)

INPUT
Orifice Diameter, D = 0.2500 inches

Gravel = 33"
Soil = 24"
Surface pond = 10"
Total surface depth = 21"

CALCULATE
Weir Equation, $Q = 3.0WH^{1.5}$
Orifice Equation, $Q = 0.61A(2gH)^{0.5}$

ELEVATION (in)	DISCHARGE (cfs)		EFFECTIVE HEIGHT H (in)	ORIFICE AREA (sq ft)	WEIR LENGTH (ft)
1	0.0005	**Bottom of Storage**	0.875	0.0003	0.00
2	0.0007		1.875	0.0003	0.00
3	0.0008		2.875	0.0003	0.00
4	0.0009		3.875	0.0003	0.00
5	0.0011		4.875	0.0003	0.00
6	0.0012		5.875	0.0003	0.00
7	0.0013	Ave Storage	6.875	0.0003	0.00
8	0.0014		7.875	0.0003	0.00
9	0.0014		8.875	0.0003	0.00
10	0.0015		9.875	0.0003	0.00
11	0.0016		10.875	0.0003	0.00
12	0.0017		11.875	0.0003	0.00
13	0.0017		12.875	0.0003	0.00
14	0.0018		13.875	0.0003	0.00
15	0.0019	**Top of Storage**	14.875	0.0003	0.00
16	0.0019		15.875	0.0003	0.00
17	0.0020		16.875	0.0003	0.00
18	0.0020		17.875	0.0003	0.00
19	0.0021		18.875	0.0003	0.00
20	0.0021		19.875	0.0003	0.00
21	0.0022		20.875	0.0003	0.00
22	0.0023		21.875	0.0003	0.00
23	0.0023		22.875	0.0003	0.00
24	0.0024		23.875	0.0003	0.00
25	0.0024		24.875	0.0003	0.00
26	0.0025		25.875	0.0003	0.00
27	0.0025	Ave soil	26.875	0.0003	0.00
28	0.0025		27.875	0.0003	0.00
29	0.0026		28.875	0.0003	0.00
30	0.0026		29.875	0.0003	0.00
31	0.0027		30.875	0.0003	0.00
32	0.0027		31.875	0.0003	0.00
33	0.0028		32.875	0.0003	0.00
34	0.0028		33.875	0.0003	0.00
35	0.0028		34.875	0.0003	0.00
36	0.0029		35.875	0.0003	0.00
37	0.0029		36.875	0.0003	0.00
38	0.0030		37.875	0.0003	0.00
39	0.0030	**Top of Mulch**	38.875	0.0003	0.00
40	0.0030		39.875	0.0003	0.00
41	0.0031		40.875	0.0003	0.00
42	0.0031		41.875	0.0003	0.00
43	0.0032		42.875	0.0003	0.00
44	0.0032	Ave Surface	43.875	0.0003	0.00
45	0.0032		44.875	0.0003	0.00
46	0.0033		45.875	0.0003	0.00
47	0.0033		46.875	0.0003	0.00
48	0.0033		47.875	0.0003	0.00
49	0.0034	**Surface Pond 10"**	48.875	0.0003	0.00
50	0.0034		49.875	0.0003	0.00
51	0.0034		50.875	0.0003	0.00
52	0.0035		51.875	0.0003	0.00
53	0.0035		52.875	0.0003	0.00
54	0.0035		53.875	0.0003	0.00
55	0.0036		54.875	0.0003	0.00
56	0.0036		55.875	0.0003	0.00
57	0.0036		56.875	0.0003	0.00
58	0.0037		57.875	0.0003	0.00
59	0.0037		58.875	0.0003	0.00
60	0.0037		59.875	0.0003	0.00
61	0.0038		60.875	0.0003	0.00
62	0.0038		61.875	0.0003	0.00
63	0.0038		62.875	0.0003	0.00
64	0.0038		63.875	0.0003	0.00
65	0.0039		64.875	0.0003	0.00
66	0.0039		65.875	0.0003	0.00
67	0.0039		66.875	0.0003	0.00
68	0.0040		67.875	0.0003	0.00
69	0.0040		68.875	0.0003	0.00
70	0.0040		69.875	0.0003	0.00
71	0.0041		70.875	0.0003	0.00
72	0.0041		71.875	0.0003	0.00
73	0.0041		72.875	0.0003	0.00
74	0.0041		73.875	0.0003	0.00
75	0.0042		74.875	0.0003	0.00
76	0.0042		75.875	0.0003	0.00
77	0.0042		76.875	0.0003	0.00
78	0.0043		77.875	0.0003	0.00

ELEVATION-DISCHARGE CALCULATOR
ORIFICE FLOW (D inches and over) **DMA-7 (IMP-6)**

INPUT

Lower Orifice Diameter, D = 0.8000 inches

Upper Orifice Diameter, D = 3.0000 inches

Lower Orifice Elevation = 0 Feet (0 Inches)

Upper Orifice Elevation = 5.000 Feet (60.00 Inches)

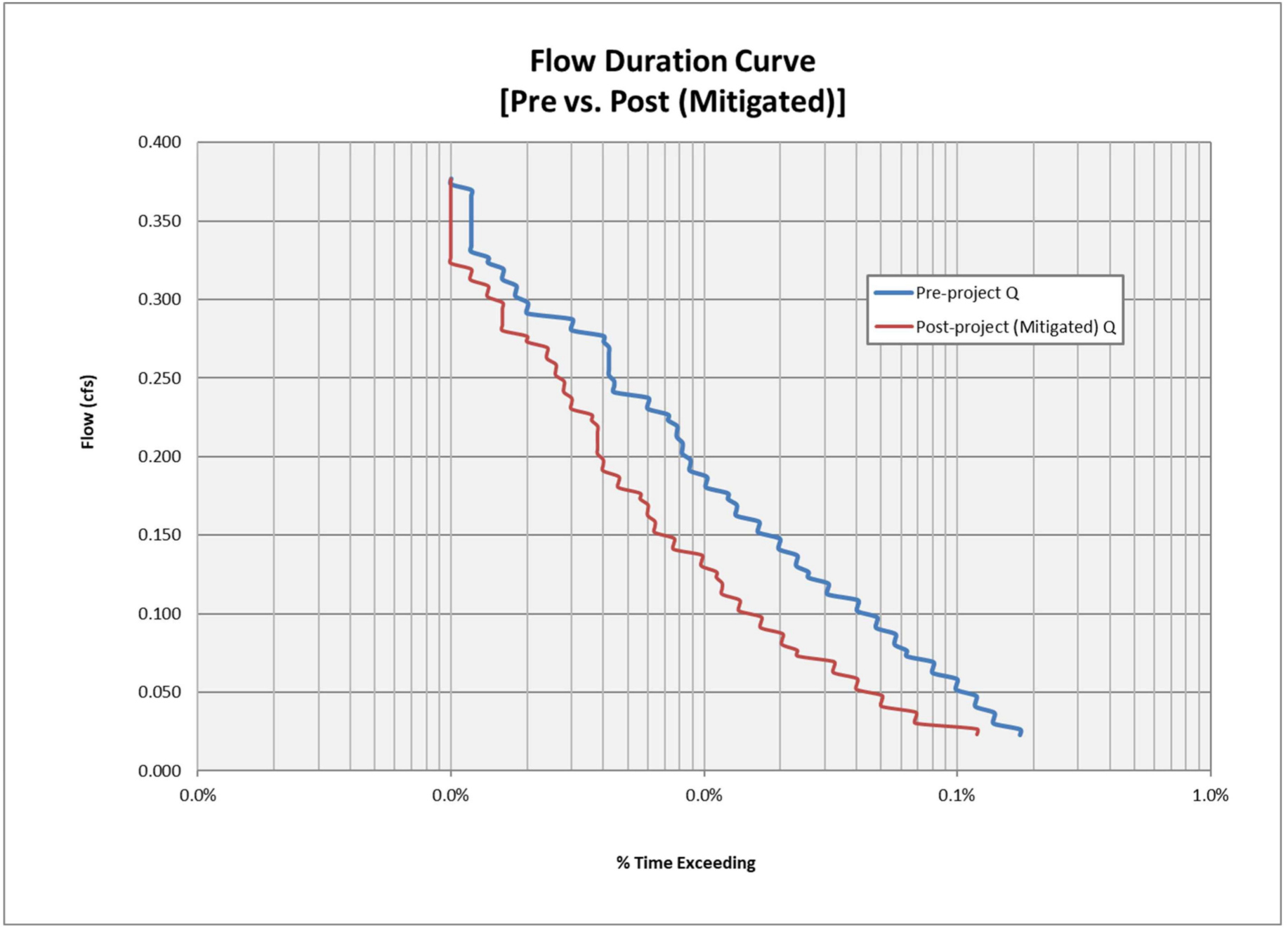
CALCULATE

Orifice Equation, $Q = 0.67A(2gH)^{0.5}$

ELEVATION ABOVE LOWER ORIFICE (in)	LOWER ORIFICE DISCHARGE (cfs)	ELEVATION ABOVE UPPER ORIFICE (in)	UPPER ORIFICE DISCHARGE (cfs)	LOWER ORIFICE EFFECTIVE HEIGHT H (in)	UPPER ORIFICE EFFECTIVE HEIGHT H (in)	LOWER ORIFICE AREA (sq ft)	UPPER ORIFICE AREA (sq ft)	ELEV (FT)	LOWER ORIFICE DISCHARGE (CFS)	ELEV (FT)	COMBINED ORIFICE DISCHARGE (CFS)	
1	0.0038	0	0	0.6	0	0.003	0.00	0.0833	0.0038	0.0833	0.0038	**Bottom of AQ**
2	0.0061	0	0	1.6	0	0.003	0.00	0.1667	0.0061	0.1667	0.0061	
3	0.0078	0	0	2.6	0	0.003	0.05	0.2500	0.0078	0.2500	0.0078	
4	0.0092	0	0	3.6	0	0.003	0.05	0.3333	0.0092	0.3333	0.0092	
5	0.0104	0	0	4.6	0	0.003	0.05	0.4167	0.0104	0.4167	0.0104	
6	0.0115	0	0	5.6	0	0.003	0.05	0.5000	0.0115	0.5000	0.0115	
7	0.0125	0	0	6.6	0	0.003	0.05	0.5833	0.0125	0.5833	0.0125	
8	0.0134	0	0	7.6	0	0.003	0.05	0.6667	0.0134	0.6667	0.0134	
9	0.0142	0	0	8.6	0	0.003	0.05	0.7500	0.0142	0.7500	0.0142	
10	0.0150	0	0	9.6	0	0.003	0.05	0.8333	0.0150	0.8333	0.0150	
11	0.0158	0	0	10.6	0	0.003	0.05	0.9167	0.0158	0.9167	0.0158	
12	0.0165	0	0	11.6	0	0.003	0.05	1.0000	0.0165	1.0000	0.0165	
13	0.0172	0	0	12.6	0	0.003	0.05	1.0833	0.0172	1.0833	0.0172	
14	0.0179	0	0	13.6	0	0.003	0.05	1.1667	0.0179	1.1667	0.0179	
15	0.0185	0	0	14.6	0	0.003	0.05	1.2500	0.0185	1.2500	0.0185	
16	0.0192	0	0	15.6	0	0.003	0.05	1.3333	0.0192	1.3333	0.0192	
17	0.0198	0	0	16.6	0	0.003	0.05	1.4167	0.0198	1.4167	0.0198	Average AQ
18	0.0204	0	0	17.6	0	0.003	0.05	1.5000	0.0204	1.5000	0.0204	
19	0.0209	0	0	18.6	0	0.003	0.05	1.5833	0.0209	1.5833	0.0209	
20	0.0215	0	0	19.6	0	0.003	0.05	1.6667	0.0215	1.6667	0.0215	
21	0.0220	0	0	20.6	0	0.003	0.05	1.7500	0.0220	1.7500	0.0220	
22	0.0225	0	0	21.6	0	0.003	0.05	1.8333	0.0225	1.8333	0.0225	
23	0.0231	0	0	22.6	0	0.003	0.05	1.9167	0.0231	1.9167	0.0231	
24	0.0236	0	0	23.6	0	0.003	0.05	2.0000	0.0236	2.0000	0.0236	
25	0.0241	0	0	24.6	0	0.003	0.05	2.0833	0.0241	2.0833	0.0241	
26	0.0245	0	0	25.6	0	0.003	0.05	2.1667	0.0245	2.1667	0.0245	
27	0.0250	0	0	26.6	0	0.003	0.05	2.2500	0.0250	2.2500	0.0250	
28	0.0255	0	0	27.6	0	0.003	0.05	2.3333	0.0255	2.3333	0.0255	
29	0.0259	0	0	28.6	0	0.003	0.05	2.4167	0.0259	2.4167	0.0259	
30	0.0264	0	0	29.6	0	0.003	0.05	2.5000	0.0264	2.5000	0.0264	
31	0.0268	0	0	30.6	0	0.003	0.05	2.5833	0.0268	2.5833	0.0268	
32	0.0273	0	0	31.6	0	0.003	0.05	2.6667	0.0273	2.6667	0.0273	
33	0.0277	0	0	32.6	0	0.003	0.05	2.7500	0.0277	2.7500	0.0277	**Top AQ**
34	0.0281	0	0	33.6	0	0.003	0.05	2.8333	0.0281	2.8333	0.0281	
35	0.0285	0	0	34.6	0	0.003	0.05	2.9167	0.0285	2.9167	0.0285	
36	0.0289	0	0	35.6	0	0.003	0.05	3.0000	0.0289	3.0000	0.0289	**Top Soil**
37	0.0294	0	0.0000	36.6	0	0.003	0.05	3.0833	0.0294	3.0833	0.0294	

38	0.0298	0	0.0000	37.6	0	0.003	0.05	3.1667	0.0298	3.1667	0.0298	
39	0.0301	0	0.0000	38.6	0	0.003	0.05	3.2500	0.0301	3.2500	0.0301	
40	0.0305	0	0.0000	39.6	0	0.003	0.05	3.3333	0.0305	3.3333	0.0305	
41	0.0309	0	0.0000	40.6	0	0.003	0.05	3.4167	0.0309	3.4167	0.0309	
42	0.0313	0	0.0000	41.6	0	0.003	0.05	3.5000	0.0313	3.5000	0.0313	
43	0.0317	0	0.0000	42.6	0	0.003	0.05	3.5833	0.0317	3.5833	0.0317	
44	0.0320	0	0.0000	43.6	0	0.003	0.05	3.6667	0.0320	3.6667	0.0320	
45	0.0324	0	0.0000	44.6	0	0.003	0.05	3.7500	0.0324	3.7500	0.0324	Average Soil
46	0.0328	0	0.0000	45.6	0	0.003	0.05	3.8333	0.0328	3.8333	0.0328	
47	0.0331	0	0.0000	46.6	0	0.003	0.05	3.9167	0.0331	3.9167	0.0331	
48	0.0335	0	0.0000	47.6	0	0.003	0.05	4.0000	0.0335	4.0000	0.0335	
49	0.0338	0	0.0000	48.6	0	0.003	0.05	4.0833	0.0338	4.0833	0.0338	
50	0.0342	0	0.0000	49.6	0	0.003	0.05	4.1667	0.0342	4.1667	0.0342	
51	0.0345	0	0.0000	50.6	0	0.003	0.05	4.2500	0.0345	4.2500	0.0345	
52	0.0349	0	0.0000	51.6	0	0.003	0.05	4.3333	0.0349	4.3333	0.0349	
53	0.0352	0	0.0000	52.6	0	0.003	0.05	4.4167	0.0352	4.4167	0.0352	
54	0.0355	0	0.0000	53.6	0	0.003	0.05	4.5000	0.0355	4.5000	0.0355	**Top Mulch**
55	0.0359	0	0.0000	54.6	0	0.003	0.05	4.5833	0.0359	4.5833	0.0359	
56	0.0362	0	0.0000	55.6	0	0.003	0.05	4.6667	0.0362	4.6667	0.0362	
57	0.0365	0	0.0000	56.6	0	0.003	0.05	4.7500	0.0365	4.7500	0.0365	**Tope Surface**
58	0.0368	0	0.0000	57.6	0	0.003	0.05	4.8333	0.0368	4.8333	0.0368	
59	0.0371	0	0.0000	58.6	0	0.003	0.05	4.9167	0.0371	4.9167	0.0371	
60	0.0375	0	0.0000	59.6	0	0.003	0.05	5.0000	0.0375	5.0000	0.0375	
61	0.0378	1	0.0682	60.6	1	0.003	0.05	5.0833	0.0378	5.0833	0.1060	
62	0.0381	2	0.0965	61.6	2	0.003	0.05	5.1667	0.0381	5.1667	0.1346	Ave Surface
63	0.0384	3	0.0836	62.6	1.5	0.003	0.05	5.2500	0.0384	5.2500	0.1220	
64	0.0387	4	0.1079	63.6	2.5	0.003	0.05	5.3333	0.0387	5.3333	0.1466	
65	0.0390	5	0.1276	64.6	3.5	0.003	0.05	5.4167	0.0390	5.4167	0.1666	
66	0.0393	6	0.1447	65.6	4.5	0.003	0.05	5.5000	0.0393	5.5000	0.1840	
67	0.0396	7	0.1600	66.6	5.5	0.003	0.05	5.5833	0.0396	5.5833	0.1996	**Surface Poind @ 10"**
68	0.0399	8	0.1740	67.6	6.5	0.003	0.05	5.6667	0.0399	5.6667	0.2138	
69	0.0402	9	0.1869	68.6	7.5	0.003	0.05	5.7500	0.0402	5.7500	0.2270	
70	0.0405	10	0.1989	69.6	8.5	0.003	0.05	5.8333	0.0405	5.8333	0.2394	
71	0.0408	11	0.2103	70.6	9.5	0.003	0.05	5.9167	0.0408	5.9167	0.2511	
72	0.0411	12	0.2211	71.6	10.5	0.003	0.05	6.0000	0.0411	6.0000	0.2621	
73	0.0413	13	0.2314	72.6	11.5	0.003	0.05	6.0833	0.0413	6.0833	0.2727	
74	0.0416	14	0.2412	73.6	12.5	0.003	0.05	6.1667	0.0416	6.1667	0.2829	
75	0.0419	15	0.2507	74.6	13.5	0.003	0.05	6.2500	0.0419	6.2500	0.2926	
76	0.0422	16	0.2598	75.6	14.5	0.003	0.05	6.3333	0.0422	6.3333	0.3020	
77	0.0425	17	0.2686	76.6	15.5	0.003	0.05	6.4167	0.0425	6.4167	0.3111	
78	0.0427	18	0.2772	77.6	16.5	0.003	0.05	6.5000	0.0427	6.5000	0.3199	

POC-1


Flow Duration Curve
[Pre vs. Post (Mitigated)]
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
Flow (cfs)
Pre-project Q
Post-project (Mitigated) Q
0.0%
0.0%
0.0%
0.1%
1.0%
% Time Exceeding

Q2 to Q10 Comparison Table- POC-1

Return Period	Existing Condition (cfs)	Mitigated Condition (cfs)	Reduction, Exist - Mitigated (cfs)
2-year	0.230	0.151	0.079
3-year	0.249	0.191	0.059
4-year	0.285	0.232	0.053
5-year	0.294	0.263	0.031
6-year	0.301	0.275	0.026
7-year	0.317	0.293	0.024
8-year	0.325	0.304	0.021
9-year	0.351	0.315	0.036
10-year	0.377	0.335	0.042

Lower Flow Threshold:	10%	
0.1xQ2 (Pre):	0.023	cfs
Q10 (Pre):	0.3769	cfs
# of Ordinates:	99	
Incremental Q (pre)	0.0036	cfs
Total Houly Data:	499320	hours

Interval	Pre-project Flow (cfs)	Pre-Project Hours	Pre-project % Time Exceeding	Post-Project Hours	Post-project % Time Exceeding	Percentage	Pass?Fail
1	0.023	883	0.2%	599	0.12%	68	pass
2	0.027	883	0.2%	599	0.12%	68	pass
3	0.030	698	0.1%	343	0.07%	49	pass
4	0.034	698	0.1%	343	0.07%	49	pass
5	0.037	698	0.1%	343	0.07%	49	pass
6	0.041	592	0.1%	252	0.05%	43	pass
7	0.044	592	0.1%	252	0.05%	43	pass
8	0.048	592	0.1%	252	0.05%	43	pass
9	0.052	497	0.1%	201	0.04%	40	pass
10	0.055	497	0.1%	201	0.04%	40	pass
11	0.059	497	0.1%	201	0.04%	40	pass
12	0.062	401	0.1%	163	0.03%	41	pass
13	0.066	401	0.1%	163	0.03%	41	pass
14	0.069	401	0.1%	163	0.03%	41	pass
15	0.073	316	0.1%	117	0.02%	37	pass
16	0.077	316	0.1%	117	0.02%	37	pass
17	0.080	284	0.1%	102	0.02%	36	pass
18	0.084	284	0.1%	102	0.02%	36	pass
19	0.087	284	0.1%	102	0.02%	36	pass
20	0.091	240	0.0%	84	0.02%	35	pass
21	0.094	240	0.0%	84	0.02%	35	pass
22	0.098	240	0.0%	84	0.02%	35	pass
23	0.102	202	0.0%	69	0.01%	34	pass
24	0.105	202	0.0%	69	0.01%	34	pass
25	0.109	202	0.0%	69	0.01%	34	pass
26	0.112	154	0.0%	59	0.01%	38	pass
27	0.116	154	0.0%	59	0.01%	38	pass
28	0.120	154	0.0%	59	0.01%	38	pass
29	0.123	129	0.0%	56	0.01%	43	pass

30	0.127	129	0.0%	56	0.01%	43	pass
31	0.130	116	0.0%	49	0.01%	42	pass
32	0.134	116	0.0%	49	0.01%	42	pass
33	0.137	116	0.0%	49	0.01%	42	pass
34	0.141	99	0.0%	38	0.01%	38	pass
35	0.145	99	0.0%	38	0.01%	38	pass
36	0.148	99	0.0%	38	0.01%	38	pass
37	0.152	82	0.0%	32	0.01%	39	pass
38	0.155	82	0.0%	32	0.01%	39	pass
39	0.159	82	0.0%	32	0.01%	39	pass
40	0.162	67	0.0%	30	0.01%	45	pass
41	0.166	67	0.0%	30	0.01%	45	pass
42	0.170	67	0.0%	30	0.01%	45	pass
43	0.173	62	0.0%	28	0.01%	45	pass
44	0.177	62	0.0%	28	0.01%	45	pass
45	0.180	51	0.0%	23	0.00%	45	pass
46	0.184	51	0.0%	23	0.00%	45	pass
47	0.187	51	0.0%	23	0.00%	45	pass
48	0.191	44	0.0%	20	0.00%	45	pass
49	0.195	44	0.0%	20	0.00%	45	pass
50	0.198	44	0.0%	20	0.00%	45	pass
51	0.202	41	0.0%	19	0.00%	46	pass
52	0.205	41	0.0%	19	0.00%	46	pass
53	0.209	41	0.0%	19	0.00%	46	pass
54	0.212	39	0.0%	19	0.00%	49	pass
55	0.216	39	0.0%	19	0.00%	49	pass
56	0.220	39	0.0%	19	0.00%	49	pass
57	0.223	36	0.0%	18	0.00%	50	pass
58	0.227	36	0.0%	18	0.00%	50	pass
59	0.230	30	0.0%	15	0.00%	50	pass
60	0.234	30	0.0%	15	0.00%	50	pass
61	0.237	30	0.0%	15	0.00%	50	pass
62	0.241	22	0.0%	14	0.00%	64	pass
63	0.245	22	0.0%	14	0.00%	64	pass
64	0.248	22	0.0%	14	0.00%	64	pass
65	0.252	21	0.0%	13	0.00%	62	pass
66	0.255	21	0.0%	13	0.00%	62	pass
67	0.259	21	0.0%	13	0.00%	62	pass
68	0.263	21	0.0%	12	0.00%	57	pass

69	0.266	21	0.0%	12	0.00%	57	pass
70	0.270	21	0.0%	12	0.00%	57	pass
71	0.273	20	0.0%	10	0.00%	50	pass
72	0.277	20	0.0%	10	0.00%	50	pass
73	0.280	15	0.0%	8	0.00%	53	pass
74	0.284	15	0.0%	8	0.00%	53	pass
75	0.288	15	0.0%	8	0.00%	53	pass
76	0.291	10	0.0%	8	0.00%	80	pass
77	0.295	10	0.0%	8	0.00%	80	pass
78	0.298	10	0.0%	8	0.00%	80	pass
79	0.302	9	0.0%	7	0.00%	78	pass
80	0.305	9	0.0%	7	0.00%	78	pass
81	0.309	9	0.0%	7	0.00%	78	pass
82	0.313	8	0.0%	6	0.00%	75	pass
83	0.316	8	0.0%	6	0.00%	75	pass
84	0.320	8	0.0%	6	0.00%	75	pass
85	0.323	7	0.0%	5	0.00%	71	pass
86	0.327	7	0.0%	5	0.00%	71	pass
87	0.330	6	0.0%	5	0.00%	83	pass
88	0.334	6	0.0%	5	0.00%	83	pass
89	0.338	6	0.0%	5	0.00%	83	pass
90	0.341	6	0.0%	5	0.00%	83	pass
91	0.345	6	0.0%	5	0.00%	83	pass
92	0.348	6	0.0%	5	0.00%	83	pass
93	0.352	6	0.0%	5	0.00%	83	pass
94	0.355	6	0.0%	5	0.00%	83	pass
95	0.359	6	0.0%	5	0.00%	83	pass
96	0.363	6	0.0%	5	0.00%	83	pass
97	0.366	6	0.0%	5	0.00%	83	pass
98	0.370	6	0.0%	5	0.00%	83	pass
99	0.373	5	0.0%	5	0.00%	100	pass
100	0.377	5	0.0%	5	0.00%	100	pass

SWMM Input Data in Input Format
(Existing & Proposed Models)

PRE-DEV INPUT (POC-1)

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/28/1951
START_TIME           05:00:00
REPORT_START_DATE    08/28/1951
REPORT_START_TIME    05:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1
```

```
[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.06   0.08   0.110  0.15   0.17   0.19   0.19   0.18   0.15   0.11   0.08   0.06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Oceanside        INTENSITY 1:00     1.0      TIMESERIES Oceanside

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ---------
Basins_1-4       Oceanside        POC-1            0.43     0        193      8        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
Basins_1-4       0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
Basins_1-4       9          0.025      0.30       7          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC-1            0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Oceanside        FILE "Z:\Projects\2023\23-221\PROD\Reports\WQMP\SWMM\oceanside.dat"
```

```
[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -966.709 0.000 10966.709 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ----------
POC-1            -367.616           582.482

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ----------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ----------
Basins_1-4       -494.717           551.400
Basins_1-4       -442.956           551.400
Basins_1-4       -439.819           598.455
Basins_1-4       -494.717           600.024

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ----------
Oceanside        -445.129           623.600
```

POST-DEV INPUT (POC-1)

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/28/1951
START_TIME           05:00:00
REPORT_START_DATE    08/28/1951
REPORT_START_TIME    05:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.566
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4
```

```
[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Oceanside        INTENSITY 1:00     1.0      TIMESERIES Oceanside

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
POST_DMA-1       Oceanside        IMP-1            0.137    21.6     156      2.5      0
IMP-1            Oceanside        POC-1            0.0027778 0        10       0        0
POST_DMA-3       Oceanside        IMP-3            0.108    59.8     98       2.5      0
IMP-3            Oceanside        POC-1            0.00500  0        10       0        0
POST_DMA-2       Oceanside        POC-1            0.094    20.24    67       9        0
POST_DMA-4       Oceanside        POC-1            0.089    0        243      33       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
POST_DMA-1       0.012      0.15       0.05       0.1        25         OUTLET
IMP-1            0.012      0.15       0.05       0.1        25         OUTLET
POST_DMA-3       0.012      0.15       0.05       0.1        25         OUTLET
IMP-3            0.012      0.15       0.05       0.1        25         OUTLET
POST_DMA-2       0.012      0.15       0.05       0.1        25         OUTLET
POST_DMA-4       0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
POST_DMA-1       9          0.01875    0.3        7          0
IMP-1            1.5        0.3        0.33       7          0
POST_DMA-3       9          0.01875    0.3        7          0
IMP-3            1.5        0.3        0.33       7          0
POST_DMA-2       1.5        0.3        0.33       7          0
POST_DMA-4       9          0.01875    0.3        7          0

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
IMP-1            BC
IMP-1            SURFACE    10         0.0        0          0          5
IMP-1            SOIL       24         0.4        0.2        0.1        5          5          1.5
IMP-1            STORAGE    15         0.67       0          0
IMP-1            DRAIN      0.1734     0.5        3          6          0          0

IMP-3            BC
IMP-3            SURFACE    10         0.0        0          0          5
IMP-3            SOIL       24         0.4        0.2        0.1        5          5          1.5
IMP-3            STORAGE    15         0.67       0          0
IMP-3            DRAIN      0.0963     0.5        3          6          0          0
```

```
[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile                    DrainTo          FromPerv
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- ------------------------ ---------------- ----------
IMP-1            IMP-1            1       121.00     0          0          100        0          *                          POC-1            0
IMP-3            IMP-3            1       217.80     0          0          100        0          *                          POC-1            0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC-1            0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Oceanside        FILE "C:\Users\massy.fatini\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Reports\WQMP\SWMM\oceanside Raingauge\oceanside.dat"

[REPORT]
;;Reporting Options
INPUT      YES
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]
```

```
[MAP]
DIMENSIONS -129.191 -319.762 933.945 189.693
Units      Feet

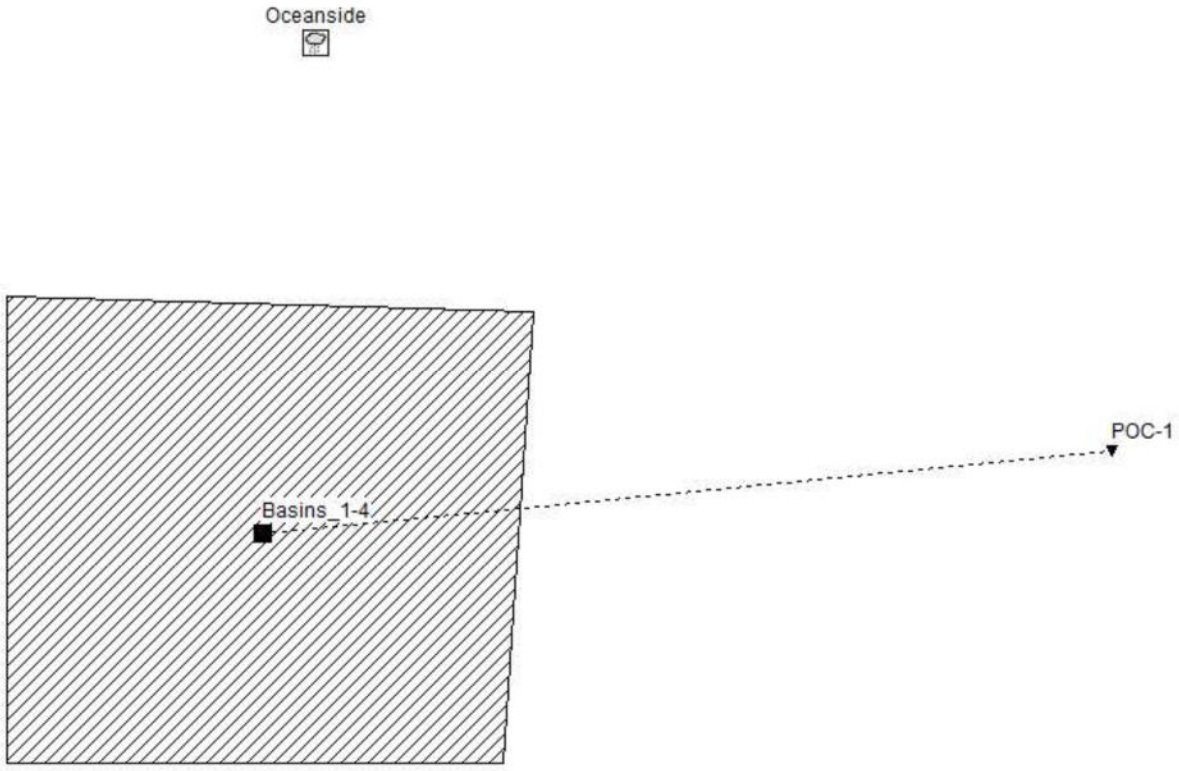
[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------
POC-1            357.977            112.874

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------
POST_DMA-1       11.872             -194.843
POST_DMA-1       108.689            -194.843
POST_DMA-1       107.455            -128.243
POST_DMA-1       10.022             -130.710
IMP-1            43.322             4.495
IMP-1            92.655             3.878
IMP-1            92.655             -30.039
IMP-1            39.005             -27.572
POST_DMA-3       393.566            -125.452
POST_DMA-3       395.434            -192.677
POST_DMA-3       299.577            -195.166
POST_DMA-3       296.465            -127.942
IMP-3            343.382            21.775
IMP-3            386.331            21.775
IMP-3            390.066            -17.439
IMP-3            342.760            -18.061
IMP-3            342.760            10.571
POST_DMA-2       250.857            -132.000
POST_DMA-2       251.671            -189.026
POST_DMA-2       156.356            -189.841
POST_DMA-2       156.356            -130.370
POST_DMA-4       542.977            -127.626
POST_DMA-4       547.294            -180.660
POST_DMA-4       467.744            -186.210
POST_DMA-4       465.277            -128.243

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------
Oceanside        237.533            183.321
```

PRE-DEVELOPMENT CONDITION (POC-1)



Rain Gage Oceanside

Property	Value
Name	Oceanside
X-Coordinate	-457.027
Y-Coordinate	629.462
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	Oceanside
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN

Outfall POC-1

Property	Value
Name	POC-1
X-Coordinate	-381.439
Y-Coordinate	585.194
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Route To	
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

Subcatchment Basins_1-4

Property	Value
Name	Basins_1-4
X-Coordinate	-468.052
Y-Coordinate	575.320
Description	
Tag	
Rain Gage	Oceanside
Outlet	POC-1
Area	0.43
Width	193
% Slope	8
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

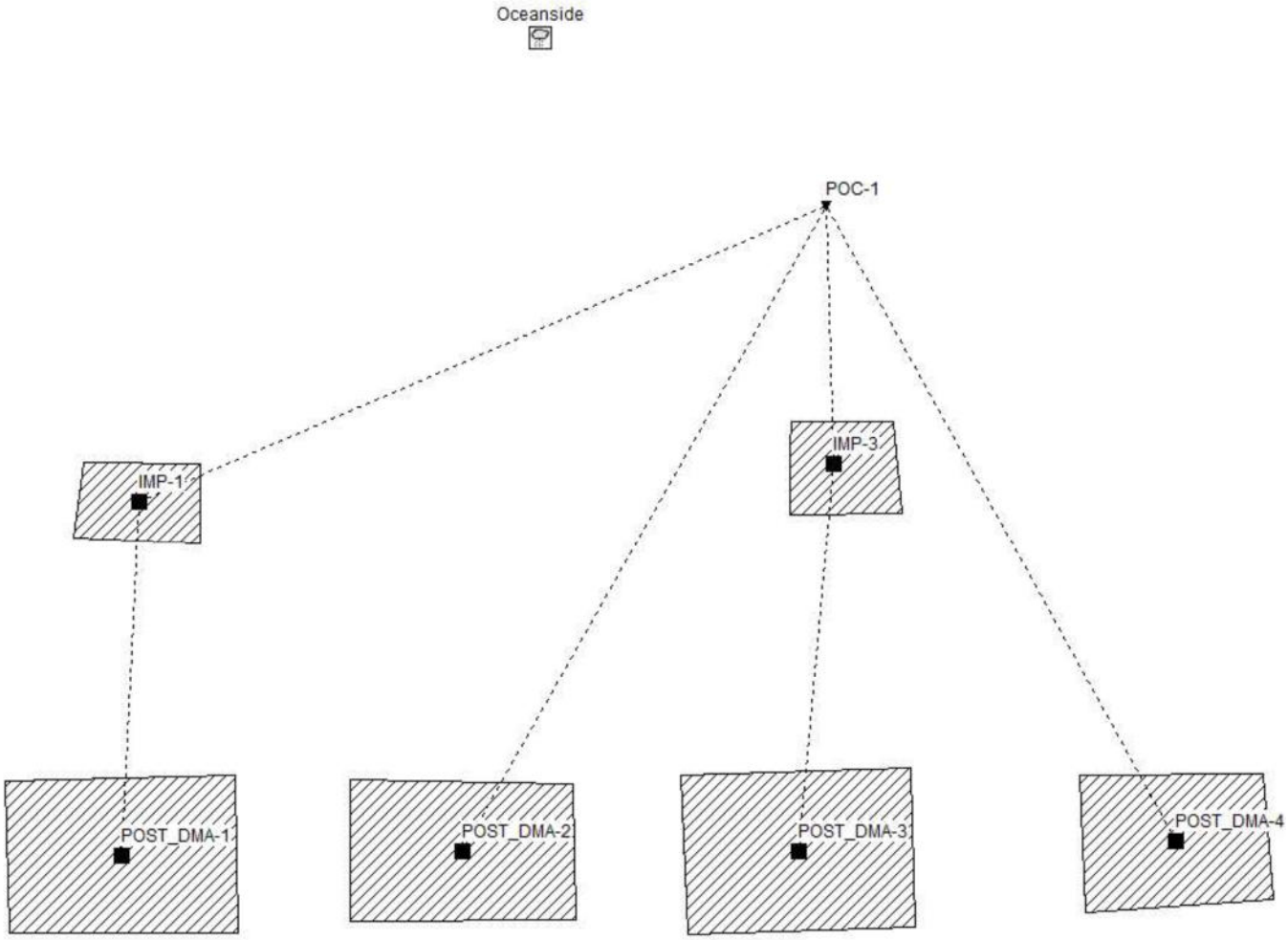
Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.025
Initial Deficit	0.30

Soil capillary suction head (inches or mm)

POST-DEVELOPMENT CONDITION (POC-1)



Subcatchment POST_DMA-1

Property	Value
Name	POST_DMA-1
X-Coordinate	59.510
Y-Coordinate	-162.160
Description	
Tag	
Rain Gage	Oceanside
Outlet	IMP-1
Area	0.137
Width	156
% Slope	2.5
% Imperv	21.6
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

Subcatchment IMP-1

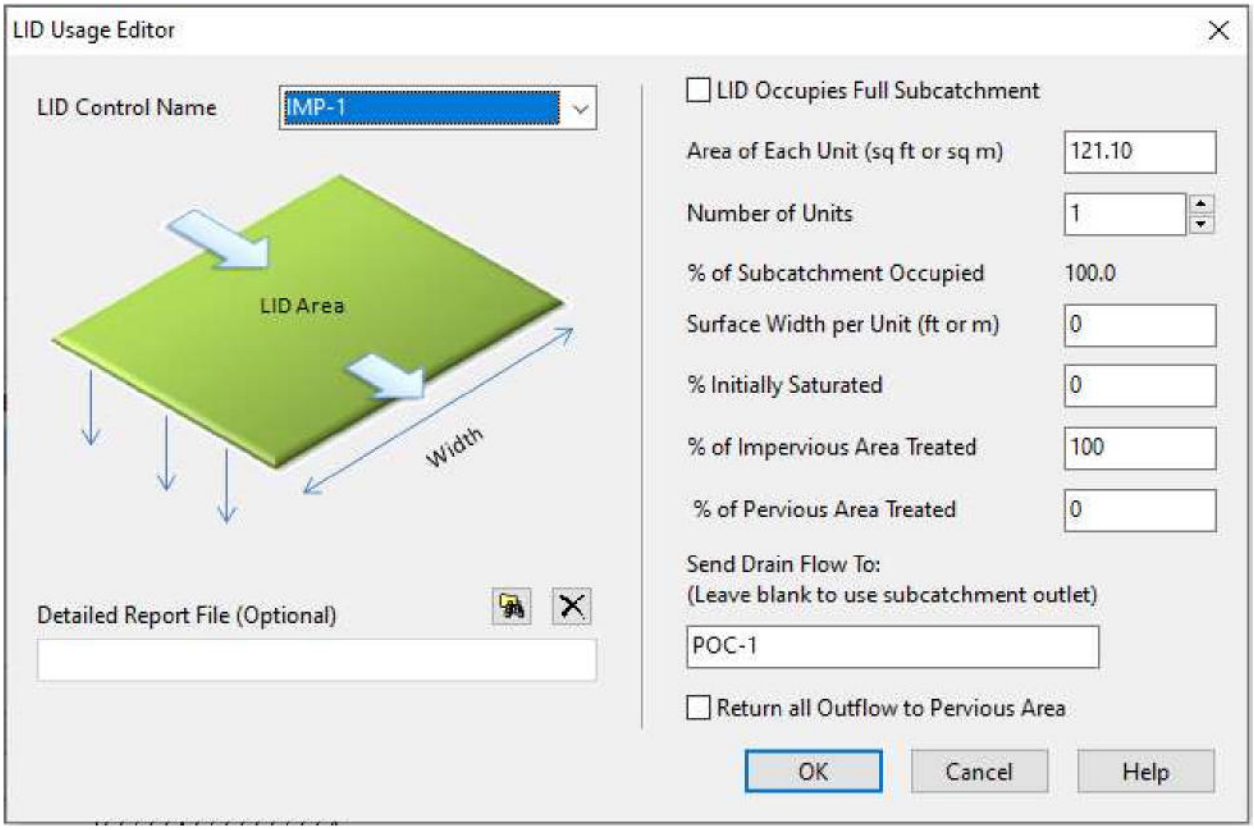
Property	Value
Name	IMP-1
X-Coordinate	66.909
Y-Coordinate	-12.310
Description	
Tag	
Rain Gage	Oceanside
Outlet	POC-1
Area	0.0027778
Width	10
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT ...
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

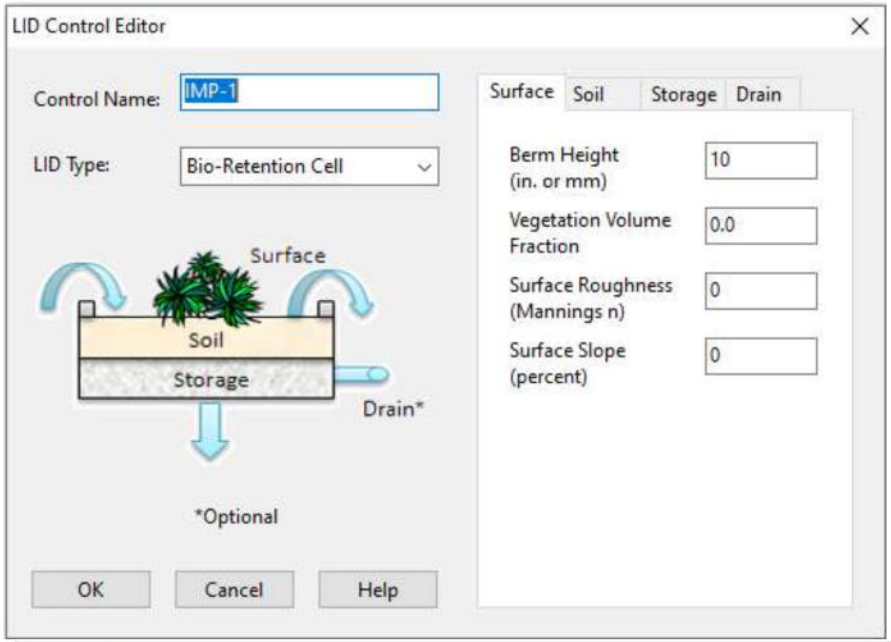
Infiltration Editor

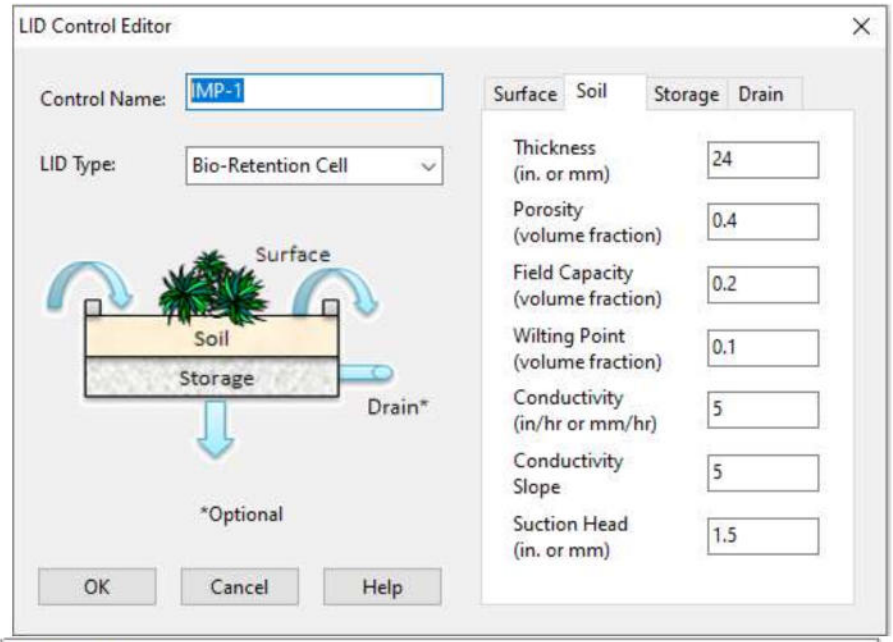
Infiltration Method: GREEN_AMPT

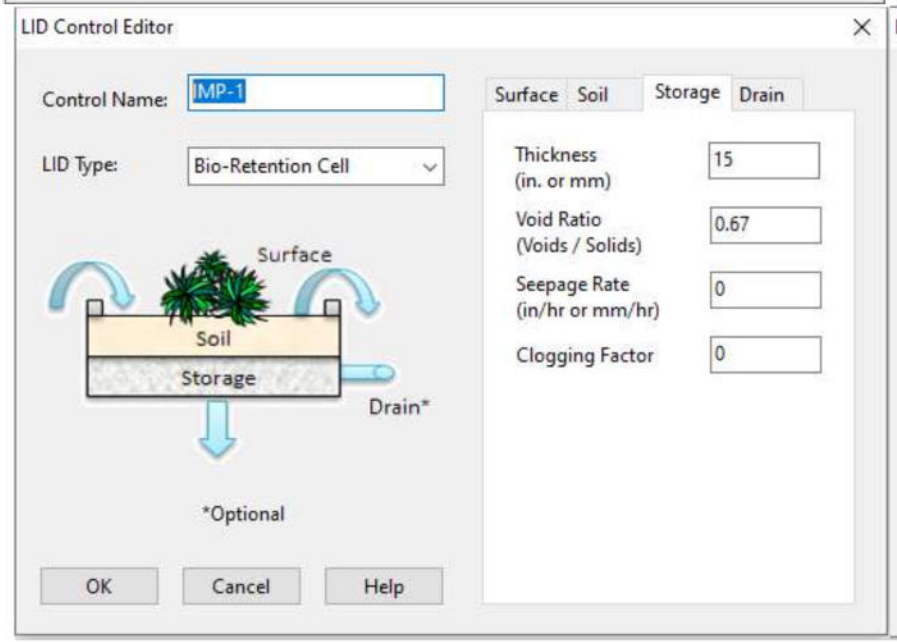
Property	Value
Suction Head	1.5
Conductivity	0.3
Initial Deficit	0.33

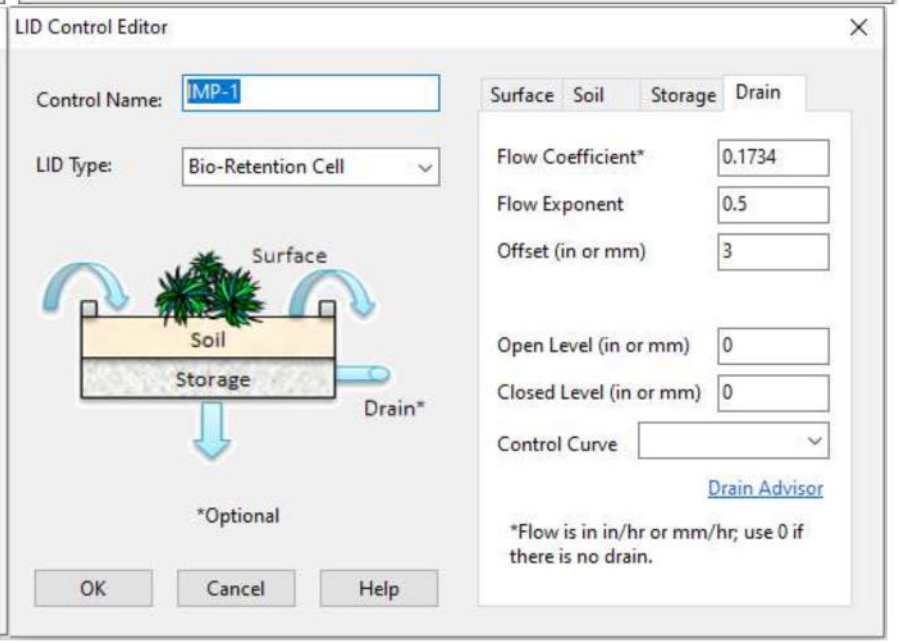
Soil capillary suction head (inches or mm)


LID Usage Editor
LID Control Name
IMP-1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
121.10
Number of Units
1
% of Subcatchment Occupied
100.0
Surface Width per Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100
% of Pervious Area Treated
0
LID Area
Width
Detailed Report File (Optional)
Send Drain Flow To:
(Leave blank to use subcatchment outlet)
POC-1
Return all Outflow to Pervious Area
OK
Cancel
Help


LID Control Editor
Control Name: IMP-1
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Berm Height (in. or mm) 10
Vegetation Volume Fraction 0.0
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0


LID Control Editor
Control Name: IMP-1
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Thickness (in. or mm) 24
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5


LID Control Editor
Control Name: IMP-1
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Thickness (in. or mm) 15
Void Ratio (Voids / Solids) 0.67
Seepage Rate (in/hr or mm/hr) 0
Clogging Factor 0


LID Control Editor
Control Name: IMP-1
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Flow Coefficient* 0.1734
Flow Exponent 0.5
Offset (in or mm) 3
Open Level (in or mm) 0
Closed Level (in or mm) 0
Control Curve
Drain Advisor
*Flow is in in/hr or mm/hr; use 0 if there is no drain.

Subcatchment POST_DMA-2

Property	Value
Name	POST_DMA-2
X-Coordinate	203.810
Y-Coordinate	-160.309
Description	
Tag	
Rain Gage	Oceanside
Outlet	POC-1
Area	0.094
Width	67
% Slope	9
% Imperv	20.24
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.30

Soil capillary suction head (inches or mm)

Subcatchment POST_DMA-3

Property	Value
Name	POST_DMA-3
X-Coordinate	346.261
Y-Coordinate	-160.309
Description	
Tag	
Rain Gage	Oceanside
Outlet	IMP-3
Area	0.108
Width	98
% Slope	2.5
% Imperv	59.8
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0 ...
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.30

Soil capillary suction head (inches or mm)

Subcatchment IMP-3

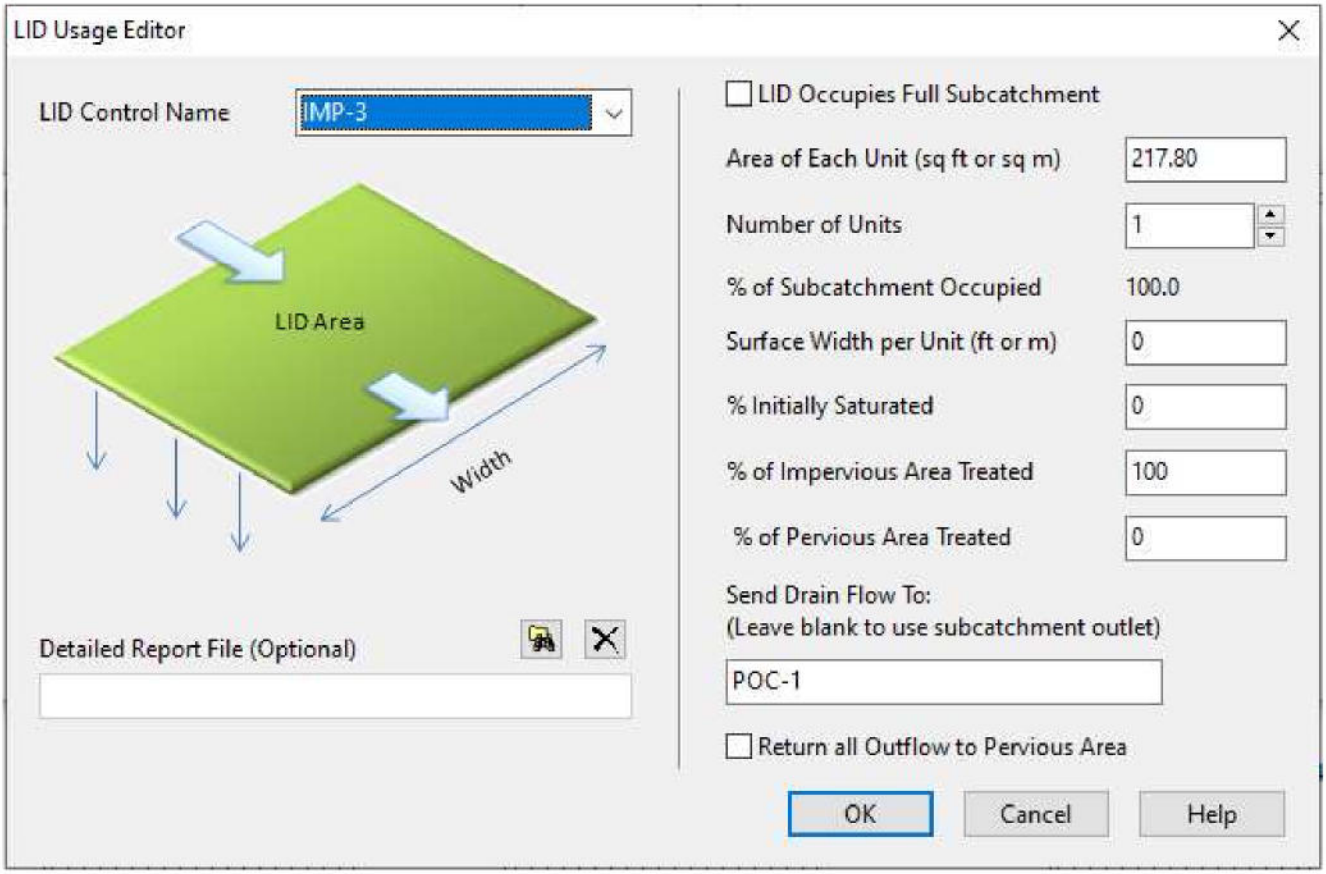
Property	Value
Name	IMP-3
X-Coordinate	361.060
Y-Coordinate	3.724
Description	
Tag	
Rain Gage	Oceanside
Outlet	POC-1
Area	0.00500
Width	10
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT ...
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

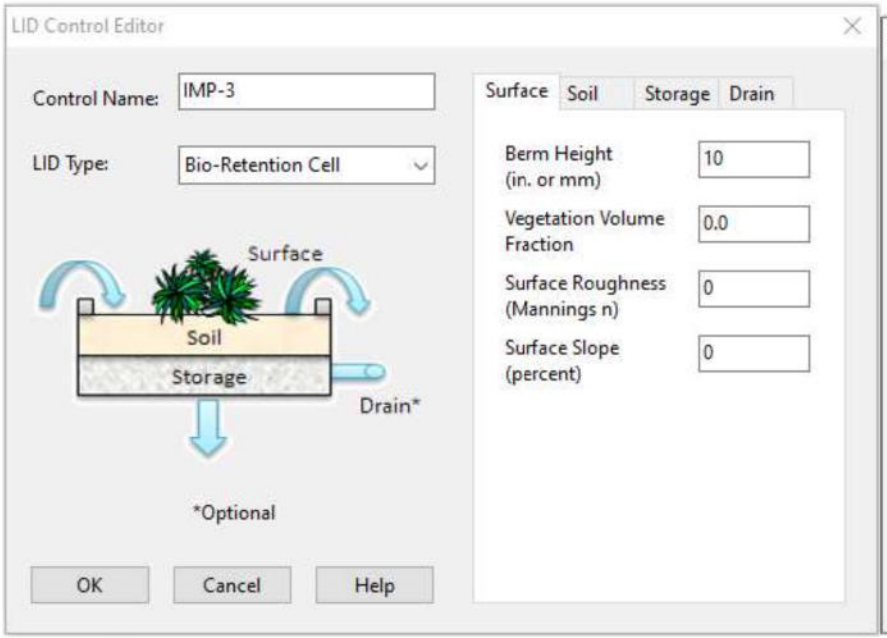
Infiltration Editor

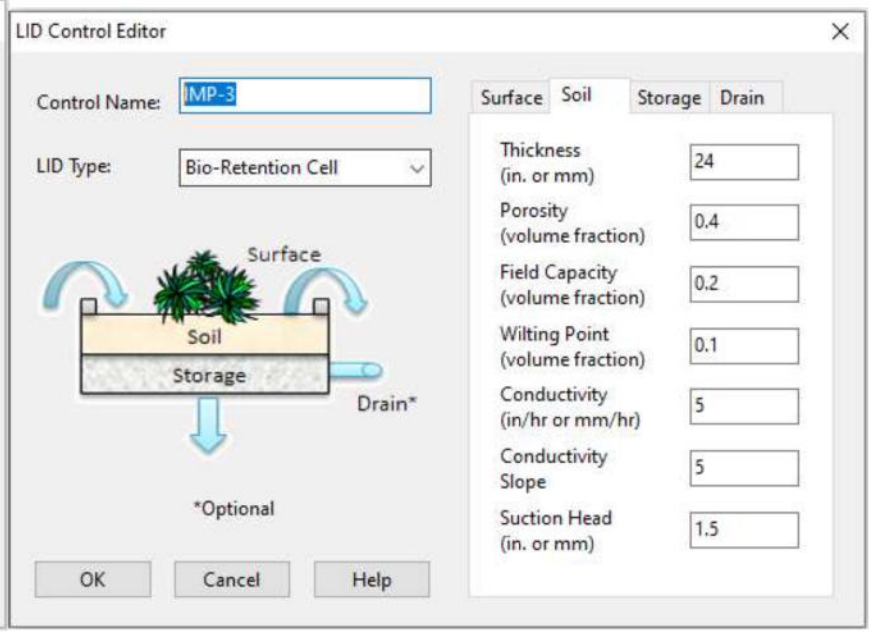
Infiltration Method: GREEN_AMPT

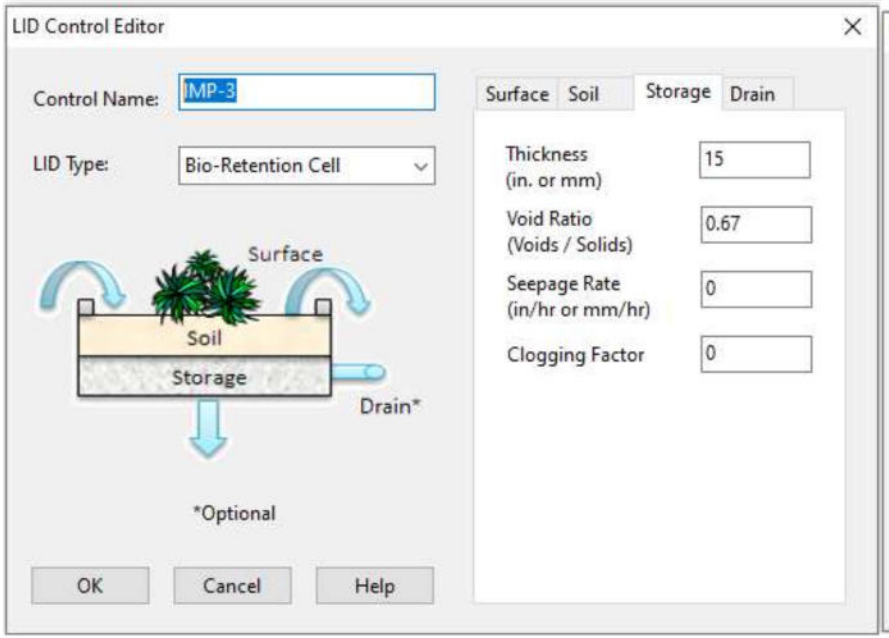
Property	Value
Suction Head	1.5
Conductivity	0.3
Initial Deficit	0.33

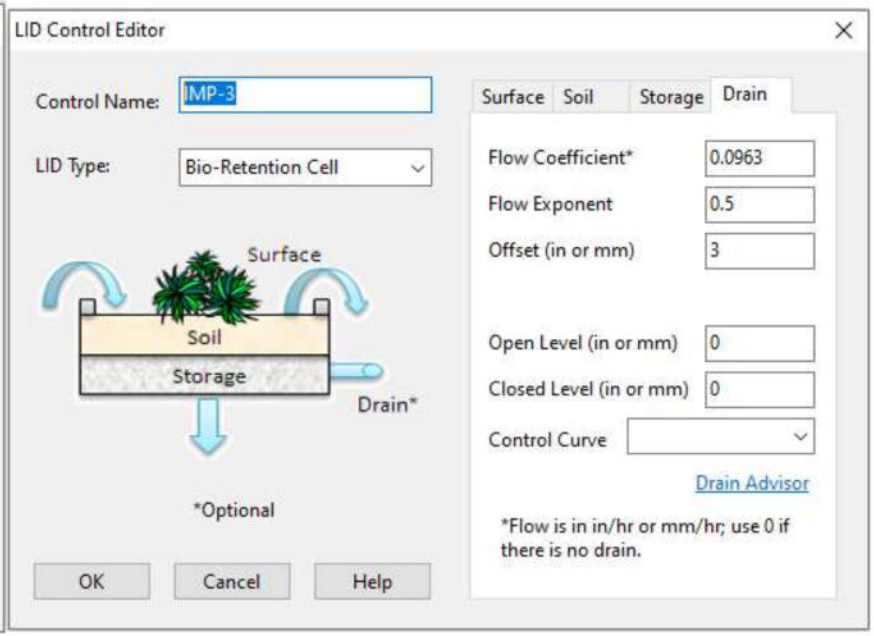
Soil capillary suction head (inches or mm)


LID Usage Editor
LID Control Name
IMP-3
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
217.80
Number of Units
1
% of Subcatchment Occupied
100.0
Surface Width per Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100
% of Pervious Area Treated
0
LID Area
Width
Detailed Report File (Optional)
Send Drain Flow To:
(Leave blank to use subcatchment outlet)
POC-1
Return all Outflow to Pervious Area
OK
Cancel
Help


LID Control Editor
Control Name: IMP-3
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface
Soil
Storage
Drain
Berm Height (in. or mm) 10
Vegetation Volume Fraction 0.0
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0


LID Control Editor
Control Name: IMP-3
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface
Soil
Storage
Drain
Thickness (in. or mm) 24
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5


LID Control Editor
Control Name: IMP-3
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface
Soil
Storage
Drain
Thickness (in. or mm) 15
Void Ratio (Voids / Solids) 0.67
Seepage Rate (in/hr or mm/hr) 0
Clogging Factor 0


LID Control Editor
Control Name: IMP-3
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface
Soil
Storage
Drain
Flow Coefficient* 0.0963
Flow Exponent 0.5
Offset (in or mm) 3
Open Level (in or mm) 0
Closed Level (in or mm) 0
Control Curve
Drain Advisor
*Flow is in in/hr or mm/hr; use 0 if there is no drain.

Subcatchment POST_DMA-4

Property	Value
Name	POST_DMA-4
X-Coordinate	505.823
Y-Coordinate	-155.685
Description	
Tag	
Rain Gage	Oceanside
Outlet	POC-1
Area	0.089
Width	243
% Slope	33
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT ...
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.30

Soil capillary suction head (inches or mm)

Summary Files from the SWMM Model

PRE-DEV OUTPUT (POC-1)

```
************************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
************************************************************

****************
Analysis Options
****************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date ..... 08/28/1951 05:00:00
Ending Date ..... 05/23/2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation .....         24.191       675.110
Evaporation Loss .....             0.899        25.096
Infiltration Loss .....           18.350       512.088
Surface Runoff .....              5.462       152.423
Final Storage .....               0.000         0.001
Continuity Error (%) .....        -2.148


**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .....          0.000         0.000
Wet Weather Inflow .....          5.462         1.780
Groundwater Inflow .....          0.000         0.000
RDII Inflow .....                 0.000         0.000
External Inflow .....            0.000         0.000
External Outflow .....           5.462         1.780
Flooding Loss .....               0.000         0.000
Evaporation Loss .....            0.000         0.000
Exfiltration Loss .....           0.000         0.000
Initial Stored Volume ....        0.000         0.000
Final Stored Volume ......        0.000         0.000
Continuity Error (%) .....        0.000
```

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
Basins_1-4	675.11	0.00	25.10	512.09	0.00	152.42	152.42	1.78	0.48	0.226

Analysis begun on: Tue Mar 4 08:39:26 2025
Analysis ended on: Tue Mar 4 08:39:39 2025
Total elapsed time: 00:00:13

POST-DEV OUTPUT (POC-1)

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


**************
Element Count
**************
Number of rain gages ...... 1
Number of subcatchments ... 6
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


*****************
Raingage Summary
*****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Oceanside            Oceanside                   INTENSITY   60 min.


**********************
Subcatchment Summary
**********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------
POST_DMA-1                  0.14    156.00     21.60    2.5000 Oceanside            IMP-1
IMP-1                       0.00     10.00      0.00    0.0000 Oceanside            POC-1
POST_DMA-3                  0.11     98.00     59.80    2.5000 Oceanside            IMP-3
IMP-3                       0.01     10.00      0.00    0.0000 Oceanside            POC-1
POST_DMA-2                  0.09     67.00     23.70    9.0000 Oceanside            POC-1
POST_DMA-4                  0.09    243.00      0.00   33.0000 Oceanside            POC-1


*********************
LID Control Summary
*********************
                                 No. of       Unit       Unit     % Area    % Imperv     % Perv
Subcatchment     LID Control      Units       Area      Width    Covered     Treated    Treated
-------------------------------------------------------------------------------------------------
IMP-1            IMP-1                1     121.00       0.00     100.00      100.00       0.00
IMP-3            IMP-3                1     217.80       0.00     100.00      100.00       0.00


*************
Node Summary
*************
                                    Invert      Max.    Ponded    External
Name                 Type            Elev.     Depth      Area    Inflow
-----------------------------------------------------------------------
POC-1                OUTFALL          0.00      0.00       0.0
```

```
************************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
************************************************************

****************
Analysis Options
****************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date ..... 08/28/1951 05:00:00
Ending Date ..... 05/23/2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Initial LID Storage .....          0.002         0.043
Total Precipitation .....         24.507       674.850
Evaporation Loss .....             2.116        58.266
Infiltration Loss .....           13.330       367.070
Surface Runoff .....              3.841       105.764
LID Drainage .....                5.520       152.018
Final Storage .....               0.002         0.063
Continuity Error (%) .....        -1.228


**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .....           0.000         0.000
Wet Weather Inflow .....           9.361         3.051
Groundwater Inflow .....           0.000         0.000
RDII Inflow .....                  0.000         0.000
External Inflow .....             0.000         0.000
External Outflow .....            9.361         3.051
Flooding Loss .....                0.000         0.000
Evaporation Loss .....             0.000         0.000
Exfiltration Loss .....            0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....        0.000
```

****
Subcatchment Runoff Summary
****

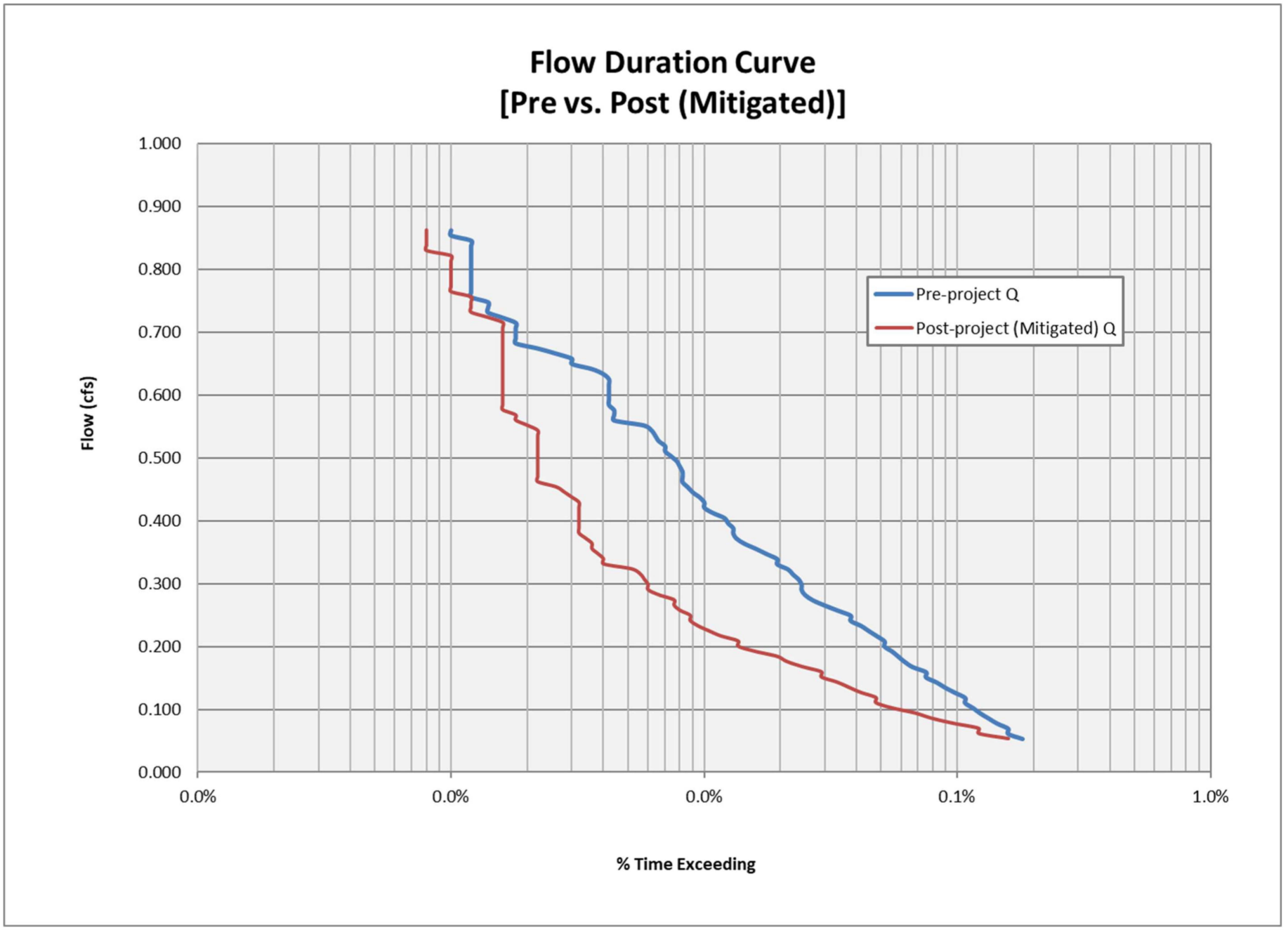
Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
POST_DMA-1	674.85	0.00	39.52	369.16	127.45	146.48	273.93	1.02	0.16	0.406
IMP-1	674.85	13509.97	1049.77	0.00	0.00	0.00	13134.32	0.99	0.16	0.926
POST_DMA-3	674.85	0.00	68.73	188.86	351.25	76.07	427.32	1.25	0.13	0.633
IMP-3	674.85	9230.11	1067.46	0.00	0.00	0.00	8836.87	1.20	0.13	0.892
POST_DMA-2	674.85	0.00	23.60	507.46	139.92	8.08	148.00	0.38	0.09	0.219
POST_DMA-4	674.85	0.00	23.40	463.91	0.00	199.50	199.50	0.48	0.10	0.296

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
IMP-1	IMP-1	14184.82	1049.82	0.00	3571.82	9563.09	2.40	2.88	-0.00
IMP-3	IMP-3	9904.96	1067.50	0.00	900.35	7936.84	2.40	2.93	-0.00

Analysis begun on: Tue Mar 4 08:53:50 2025
Analysis ended on: Tue Mar 4 08:54:05 2025
Total elapsed time: 00:00:15

POC-2


Flow Duration Curve
[Pre vs. Post (Mitigated)]
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Flow (cfs)
0.0%
0.0%
0.0%
0.1%
1.0%
% Time Exceeding
Pre-project Q
Post-project (Mitigated) Q

Q2 to Q10 Comparison Table- POC-2

Return Period	Existing Condition (cfs)	Mitigated Condition (cfs)	Reduction, Exist - Mitigated (cfs)
2-year	0.530	0.282	0.248
3-year	0.572	0.333	0.239
4-year	0.654	0.372	0.282
5-year	0.675	0.454	0.221
6-year	0.691	0.491	0.200
7-year	0.730	0.565	0.165
8-year	0.748	0.676	0.072
9-year	0.805	0.741	0.065
10-year	0.863	0.774	0.088

Lower Flow Threshold:	10%	
0.1xQ2 (Pre):	0.053	cfs
Q10 (Pre):	0.8629	cfs
# of Ordinates:	99	
Incremental Q (pre)	0.0082	cfs
Total Houly Data:	499320	hours

Interval	Pre-project Flow (cfs)	Pre-Project Hours	Pre-project % Time Exceeding	Post-Project Hours	Post-project % Time Exceeding	Percentage	Pass?Fail
1	0.053	900	0.2%	794	0.16%	88	pass
2	0.061	791	0.2%	606	0.12%	77	pass
3	0.069	791	0.2%	606	0.12%	77	pass
4	0.078	716	0.1%	479	0.10%	67	pass
5	0.086	663	0.1%	393	0.08%	59	pass
6	0.094	613	0.1%	339	0.07%	55	pass
7	0.102	576	0.1%	274	0.05%	48	pass
8	0.110	535	0.1%	238	0.05%	44	pass
9	0.118	535	0.1%	238	0.05%	44	pass
10	0.127	488	0.1%	207	0.04%	42	pass
11	0.135	446	0.1%	186	0.04%	42	pass
12	0.143	413	0.1%	167	0.03%	40	pass
13	0.151	375	0.1%	145	0.03%	39	pass
14	0.159	375	0.1%	145	0.03%	39	pass
15	0.168	332	0.1%	122	0.02%	37	pass
16	0.176	309	0.1%	106	0.02%	34	pass
17	0.184	292	0.1%	97	0.02%	33	pass
18	0.192	276	0.1%	79	0.02%	29	pass
19	0.200	257	0.1%	68	0.01%	26	pass
20	0.208	257	0.1%	68	0.01%	26	pass
21	0.217	240	0.0%	58	0.01%	24	pass
22	0.225	223	0.0%	52	0.01%	23	pass
23	0.233	208	0.0%	47	0.01%	23	pass
24	0.241	189	0.0%	44	0.01%	23	pass
25	0.249	189	0.0%	44	0.01%	23	pass
26	0.258	168	0.0%	40	0.01%	24	pass
27	0.266	149	0.0%	38	0.01%	26	pass
28	0.274	134	0.0%	38	0.01%	28	pass
29	0.282	125	0.0%	33	0.01%	26	pass

30	0.290	121	0.0%	30	0.01%	25	pass
31	0.298	121	0.0%	30	0.01%	25	pass
32	0.307	118	0.0%	29	0.01%	25	pass
33	0.315	112	0.0%	28	0.01%	25	pass
34	0.323	107	0.0%	26	0.01%	24	pass
35	0.331	97	0.0%	20	0.00%	21	pass
36	0.339	97	0.0%	20	0.00%	21	pass
37	0.347	88	0.0%	19	0.00%	22	pass
38	0.356	80	0.0%	18	0.00%	23	pass
39	0.364	72	0.0%	18	0.00%	25	pass
40	0.372	67	0.0%	17	0.00%	25	pass
41	0.380	65	0.0%	16	0.00%	25	pass
42	0.388	65	0.0%	16	0.00%	25	pass
43	0.397	62	0.0%	16	0.00%	26	pass
44	0.405	60	0.0%	16	0.00%	27	pass
45	0.413	54	0.0%	16	0.00%	30	pass
46	0.421	50	0.0%	16	0.00%	32	pass
47	0.429	50	0.0%	16	0.00%	32	pass
48	0.437	48	0.0%	15	0.00%	31	pass
49	0.446	45	0.0%	14	0.00%	31	pass
50	0.454	43	0.0%	13	0.00%	30	pass
51	0.462	41	0.0%	11	0.00%	27	pass
52	0.470	41	0.0%	11	0.00%	27	pass
53	0.478	41	0.0%	11	0.00%	27	pass
54	0.487	40	0.0%	11	0.00%	28	pass
55	0.495	39	0.0%	11	0.00%	28	pass
56	0.503	37	0.0%	11	0.00%	30	pass
57	0.511	35	0.0%	11	0.00%	31	pass
58	0.519	35	0.0%	11	0.00%	31	pass
59	0.527	33	0.0%	11	0.00%	33	pass
60	0.536	32	0.0%	11	0.00%	34	pass
61	0.544	31	0.0%	11	0.00%	35	pass
62	0.552	29	0.0%	10	0.00%	34	pass
63	0.560	22	0.0%	9	0.00%	41	pass
64	0.568	22	0.0%	9	0.00%	41	pass
65	0.577	22	0.0%	8	0.00%	36	pass
66	0.585	21	0.0%	8	0.00%	38	pass
67	0.593	21	0.0%	8	0.00%	38	pass
68	0.601	21	0.0%	8	0.00%	38	pass

69	0.609	21	0.0%	8	0.00%	38	pass
70	0.617	21	0.0%	8	0.00%	38	pass
71	0.626	21	0.0%	8	0.00%	38	pass
72	0.634	20	0.0%	8	0.00%	40	pass
73	0.642	18	0.0%	8	0.00%	44	pass
74	0.650	15	0.0%	8	0.00%	53	pass
75	0.658	15	0.0%	8	0.00%	53	pass
76	0.667	13	0.0%	8	0.00%	62	pass
77	0.675	11	0.0%	8	0.00%	73	pass
78	0.683	9	0.0%	8	0.00%	89	pass
79	0.691	9	0.0%	8	0.00%	89	pass
80	0.699	9	0.0%	8	0.00%	89	pass
81	0.707	9	0.0%	8	0.00%	89	pass
82	0.716	9	0.0%	8	0.00%	89	pass
83	0.724	8	0.0%	7	0.00%	88	pass
84	0.732	7	0.0%	6	0.00%	86	pass
85	0.740	7	0.0%	6	0.00%	86	pass
86	0.748	7	0.0%	6	0.00%	86	pass
87	0.757	6	0.0%	6	0.00%	100	pass
88	0.765	6	0.0%	5	0.00%	83	pass
89	0.773	6	0.0%	5	0.00%	83	pass
90	0.781	6	0.0%	5	0.00%	83	pass
91	0.789	6	0.0%	5	0.00%	83	pass
92	0.797	6	0.0%	5	0.00%	83	pass
93	0.806	6	0.0%	5	0.00%	83	pass
94	0.814	6	0.0%	5	0.00%	83	pass
95	0.822	6	0.0%	5	0.00%	83	pass
96	0.830	6	0.0%	4	0.00%	67	pass
97	0.838	6	0.0%	4	0.00%	67	pass
98	0.847	6	0.0%	4	0.00%	67	pass
99	0.855	5	0.0%	4	0.00%	80	pass
100	0.863	5	0.0%	4	0.00%	80	pass

SWMM Input Data in Input Format
(Existing & Proposed Models)

PRE-DEV INPUT (POC-2)

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/28/1951
START_TIME           05:00:00
REPORT_START_DATE    08/28/1951
REPORT_START_TIME    05:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1
```

```
[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.06   0.08   0.110  0.15   0.17   0.19   0.19   0.18   0.15   0.11   0.08   0.06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Oceanside        INTENSITY 1:00     1.0      TIMESERIES Oceanside

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ---------
Basins_6         Oceanside        POC-2            0.99     0        375      7.5      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
Basins_6         0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
Basins_6         9          0.025      0.30       7          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC-2            0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Oceanside        FILE "Z:\Projects\2023\23-221\PROD\Reports\WQMP\SWMM\oceanside.dat"
```

```
[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -966.709 0.000 10966.709 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ----------
POC-2            -380.739           582.919

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ----------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ----------
Basins_6         -494.717           551.400
Basins_6         -442.956           551.400
Basins_6         -439.819           598.455
Basins_6         -494.717           600.024

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ----------
Oceanside        -455.102           623.163
```

POST-DEV INPUT (POC-2)

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/28/1951
START_TIME           05:00:00
REPORT_START_DATE    08/28/1951
REPORT_START_TIME    05:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.566
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4
```

```
[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------
MONTHLY          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Oceanside        INTENSITY 1:00     1.0      TIMESERIES Oceanside

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ---------
POST_DMA-5       Oceanside        IMP-4            0.257    86.4     255      3.5      0
IMP-4            Oceanside        POC-2            0.00730028 0        10       0        0
POST_DMA-8       Oceanside        POC-2            0.03     0        90       48       0
POST_DMA-6       Oceanside        IMP-5            0.162    36.3     158      3.5      0
POST_DMA-7       Oceanside        IMP-6            0.744    73       635      3.5      0
IMP-5            Oceanside        POC-2            0.003214 0        10       0        0
IMP-6            Oceanside        DIV              0.032139 0        10       0        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
POST_DMA-5       0.012      0.15       0.05       0.1        25         OUTLET
IMP-4            0.012      0.15       0.05       0.1        25         OUTLET
POST_DMA-8       0.012      0.15       0.05       0.1        25         OUTLET
POST_DMA-6       0.012      0.15       0.05       0.1        25         OUTLET
POST_DMA-7       0.012      0.15       0.05       0.1        25         OUTLET
IMP-5            0.012      0.15       0.05       0.1        25         OUTLET
IMP-6            0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
POST_DMA-5       9          0.01875    0.3        7          0
IMP-4            1.5        0.3        0.33       7          0
POST_DMA-8       1.5        0.3        0.33       7          0
POST_DMA-6       9          0.01875    0.3        7          0
POST_DMA-7       9          0.01875    0.3        7          0
IMP-5            1.5        0.3        0.33       7          0
IMP-6            1.5        0.3        0.33       7          0

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
IMP-4            BC
IMP-4            SURFACE    10         0.0        0          0          5
IMP-4            SOIL       24         0.4        0.2        0.1        5          5          1.5
IMP-4            STORAGE    15         0.67       0          0
IMP-4            DRAIN      0.0714     0.5        3          6          0          0

IMP-5            BC
IMP-5            SURFACE    10         0.0        0          0          5
IMP-5            SOIL       24         0.4        0.2        0.1        5          5          1.5
IMP-5            STORAGE    15         0.67       0          0
IMP-5            DRAIN      0.1499     0.5        3          6          0          0

IMP-6            BC
IMP-6            SURFACE    10         0.0        0          0          5
IMP-6            SOIL       24         0.4        0.2        0.1        5          5          1.5
IMP-6            STORAGE    30         0.9        0          0
IMP-6            DRAIN      0.1535     0.5        0          6          0          0
```

```
[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile                  DrainTo          FromPerv
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- ------------------------ ---------------- ---------
IMP-4            IMP-4            1       318.00     0          0          100        0          *                        POC-2            0

IMP-5            IMP-5            1       140.00     0          0          100        0          *                        POC-2            0

IMP-6            IMP-6            1       1399.97    0          0          100        0          *                        POC-2            0


[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC-2            0          FREE                        NO

[DIVIDERS]
;;Name           Elevation  Diverted Link    Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
DIV              0          Bypass           CUTOFF     0.19       0          0          0          0

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ---------------------------- -------- -------- -------- -------- --------
AQ               0        5          0          TABULAR    Storage                      1800     0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
Bypass           DIV              AQ               400        0.01       0          0          0          0
Underdrain       DIV              POC-2            20         0.01       0          0          0          0

[OUTLETS]
;;Name           From Node        To Node          Offset     Type            QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ---------- --------
Outlet           AQ               POC-2            0          FUNCTIONAL/DEPTH 10.0             0.5        NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
Bypass           DUMMY        0                0          0          0          1
Underdrain       CIRCULAR     0.5              0          0          0          1
```

```
[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
Outletcurve      Rating     1          0.0170
Outletcurve                 2          0.0481
Outletcurve                 3          0.0850
Outletcurve                 4          0.1097
Outletcurve                 5          0.1298
Outletcurve                 6          0.1471
Outletcurve                 7          0.1627
Outletcurve                 8          0.1769
Outletcurve                 9          0.1900
Outletcurve                 10         0.2022
Outletcurve                 11         0.2138
Outletcurve                 12         0.2248
Outletcurve                 13         0.2352
Outletcurve                 14         0.2452
Outletcurve                 15         0.2549
Outletcurve                 16         0.2641
Outletcurve                 17         0.2731
Outletcurve                 18         0.2818
Outletcurve                 19         0.2902
Outletcurve                 20         0.2984
Outletcurve                 21         0.3063
Outletcurve                 22         0.3141
Outletcurve                 23         0.3216
Outletcurve                 24         0.3290
Outletcurve                 25         0.3363
Outletcurve                 26         0.3433
Outletcurve                 27         0.3503
Outletcurve                 28         0.3571
Outletcurve                 29         0.3638
Outletcurve                 30         0.3703
Outletcurve                 31         0.3768
Outletcurve                 32         0.3831
Outletcurve                 33         0.3893
Outletcurve                 34         0.3955
Outletcurve                 35         0.4015
Outletcurve                 36         0.4074
Outletcurve                 37         0.4133
Outletcurve                 38         0.4191
Outletcurve                 39         0.4248
Outletcurve                 40         0.4304
Outletcurve                 41         0.4360
Outletcurve                 42         0.4414
Outletcurve                 43         0.4469
Outletcurve                 44         0.4522
Outletcurve                 45         0.4575
Outletcurve                 46         0.4627
Outletcurve                 47         0.4679
Outletcurve                 48         0.4730
Outletcurve                 49         0.4781
Outletcurve                 50         0.4831
Outletcurve                 51         0.4880
Outletcurve                 52         0.4929
Outletcurve                 53         0.4978
Outletcurve                 54         0.5026
Outletcurve                 55         0.5074
Outletcurve                 56         0.5121
Outletcurve                 57         0.5168
Outletcurve                 58         0.5214
Outletcurve                 59         0.5260
Outletcurve                 60         0.5306
```

```
;
Storage          Storage    0          5
Storage                     2.5        5
Storage                     2.501      5
Storage                     4.5        5
Storage                     4.501      5
Storage                     5.33       5

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Oceanside        FILE "C:\Users\massy.fatini\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Reports\WQMP\SWMM\oceanside Raingauge
\oceanside.dat"

[REPORT]
;;Reporting Options
INPUT      YES
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -129.191 -319.762 933.945 189.693
Units      Feet
```

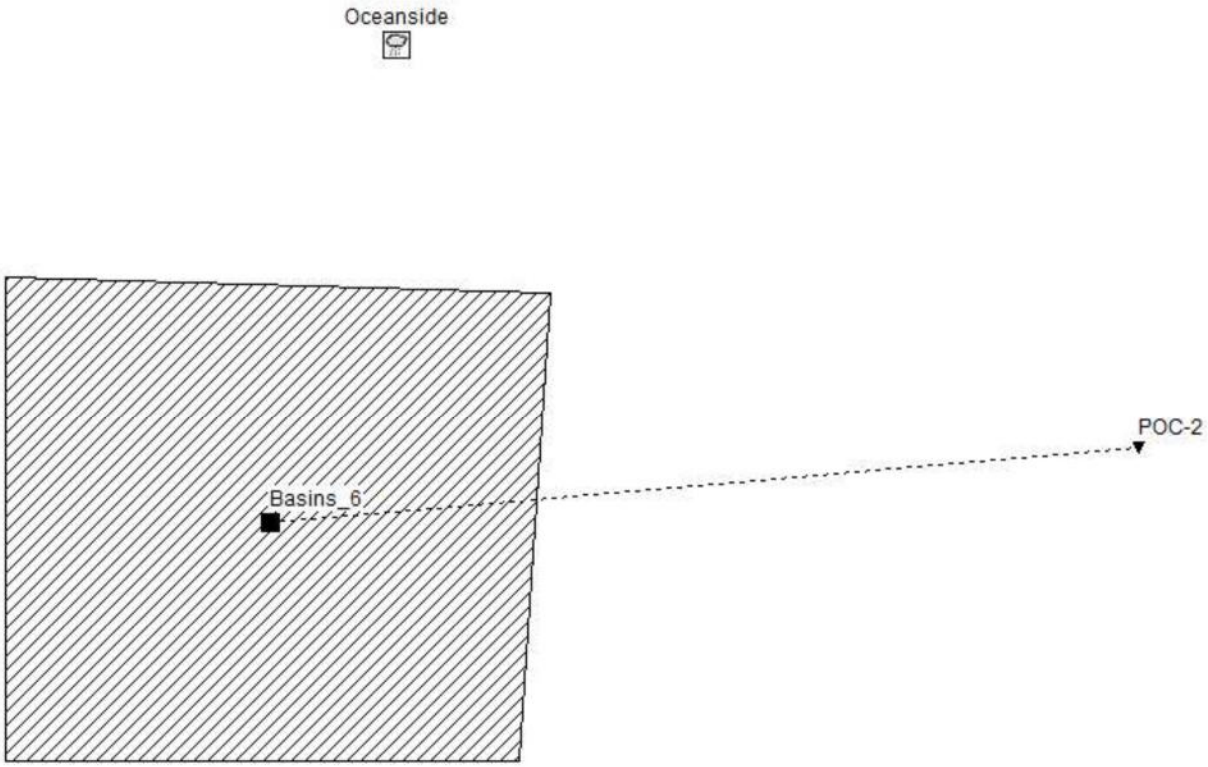
```
[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------
POC-2            302.477            -217.043
DIV              296.581            -145.918
AQ               209.227            -185.390

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------
POST_DMA-5       661.816            89.765
POST_DMA-5       663.684            22.540
POST_DMA-5       567.827            20.051
POST_DMA-5       564.715            87.275
IMP-4            585.116            -65.175
IMP-4            628.065            -65.175
IMP-4            631.800            -104.389
IMP-4            584.494            -105.011
IMP-4            584.494            -76.379
POST_DMA-8       568.161            -248.964
POST_DMA-8       568.975            -305.990
POST_DMA-8       473.660            -306.805
POST_DMA-8       473.660            -247.334
POST_DMA-6       485.781            81.733
POST_DMA-6       487.631            24.382
POST_DMA-6       404.998            21.299
POST_DMA-6       406.231            82.349
POST_DMA-7       315.581            72.483
POST_DMA-7       324.831            16.366
POST_DMA-7       241.581            13.899
POST_DMA-7       239.114            70.016
IMP-5            473.448            -71.355
IMP-5            473.911            -110.360
IMP-5            427.660            -111.593
IMP-5            425.194            -75.826
IMP-6            322.364            -80.760
IMP-6            323.598            -117.143
IMP-6            270.564            -118.993
IMP-6            266.247            -85.076

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------
Oceanside        262.393            152.341
```

PRE-DEVELOPMENT CONDITION (POC-2)



Rain Gage Oceanside

Property	Value
Name	Oceanside
X-Coordinate	-461.401
Y-Coordinate	627.712
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	Oceanside
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN

Outfall POC-2

Property	Value
Name	POC-2
X-Coordinate	-371.816
Y-Coordinate	587.643
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Route To	
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

Subcatchment Basins_6

Property	Value
Name	Basins_6
X-Coordinate	-468.052
Y-Coordinate	575.320
Description	
Tag	
Rain Gage	Oceanside
Outlet	POC-2
Area	0.99
Width	375
% Slope	7.5
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

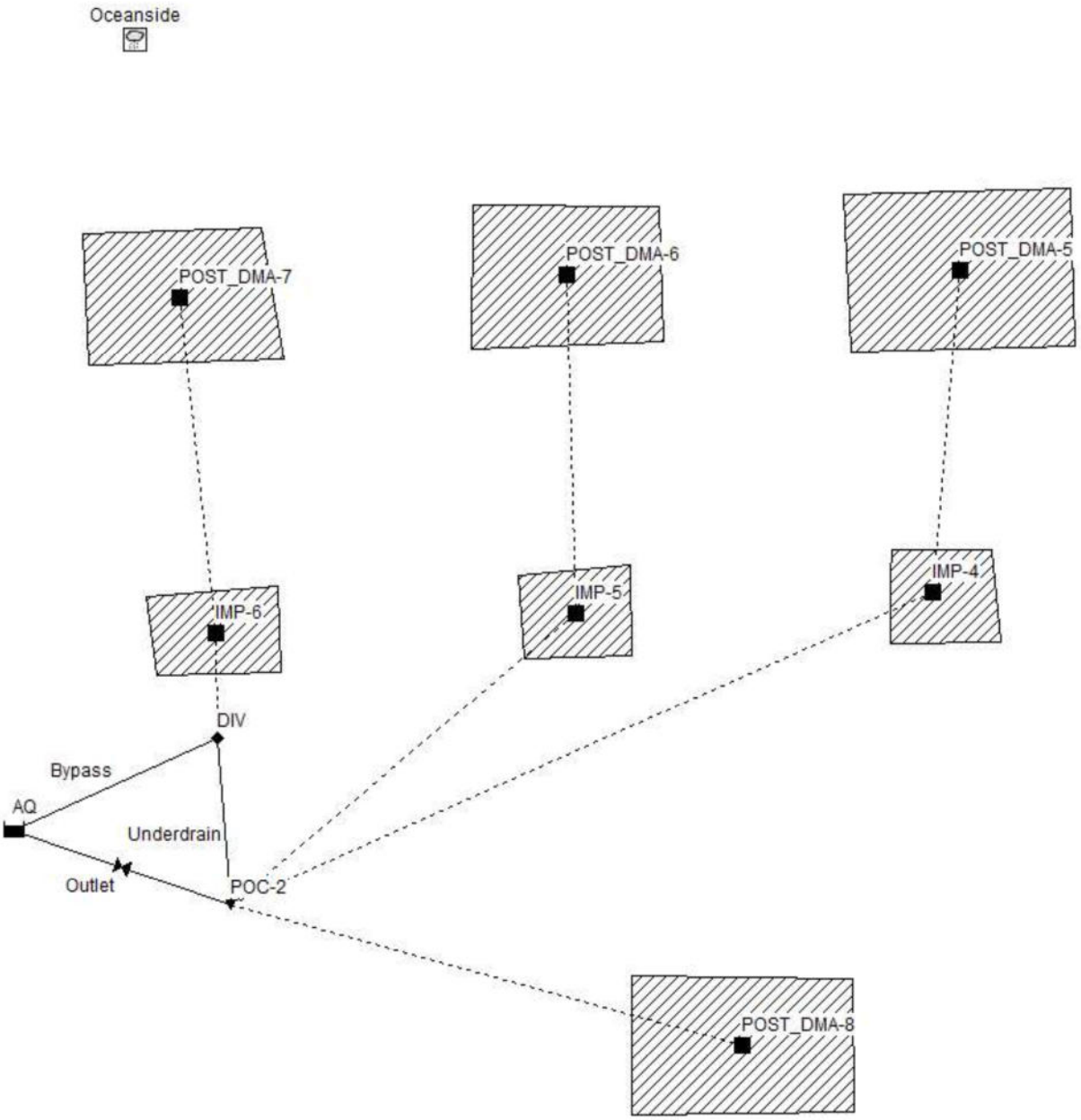
Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.025
Initial Deficit	0.30

Soil capillary suction head (inches or mm)

POST-DEVELOPMENT CONDITION (POC-2)



Rain Gage Oceanside

Property	Value
Name	Oceanside
X-Coordinate	245.127
Y-Coordinate	147.408
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	Oceanside
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN

Outfall POC-2

Property	Value
Name	POC-2
X-Coordinate	285.210
Y-Coordinate	-232.460
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Route To	
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

Subcatchment POST_DMA-5

Property	Value
Name	POST_DMA-5
X-Coordinate	614.511
Y-Coordinate	54.908
Description	
Tag	
Rain Gage	Oceanside
Outlet	IMP-4
Area	0.257
Width	255
% Slope	3.5
% Imperv	86.4
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

Subcatchment IMP-4

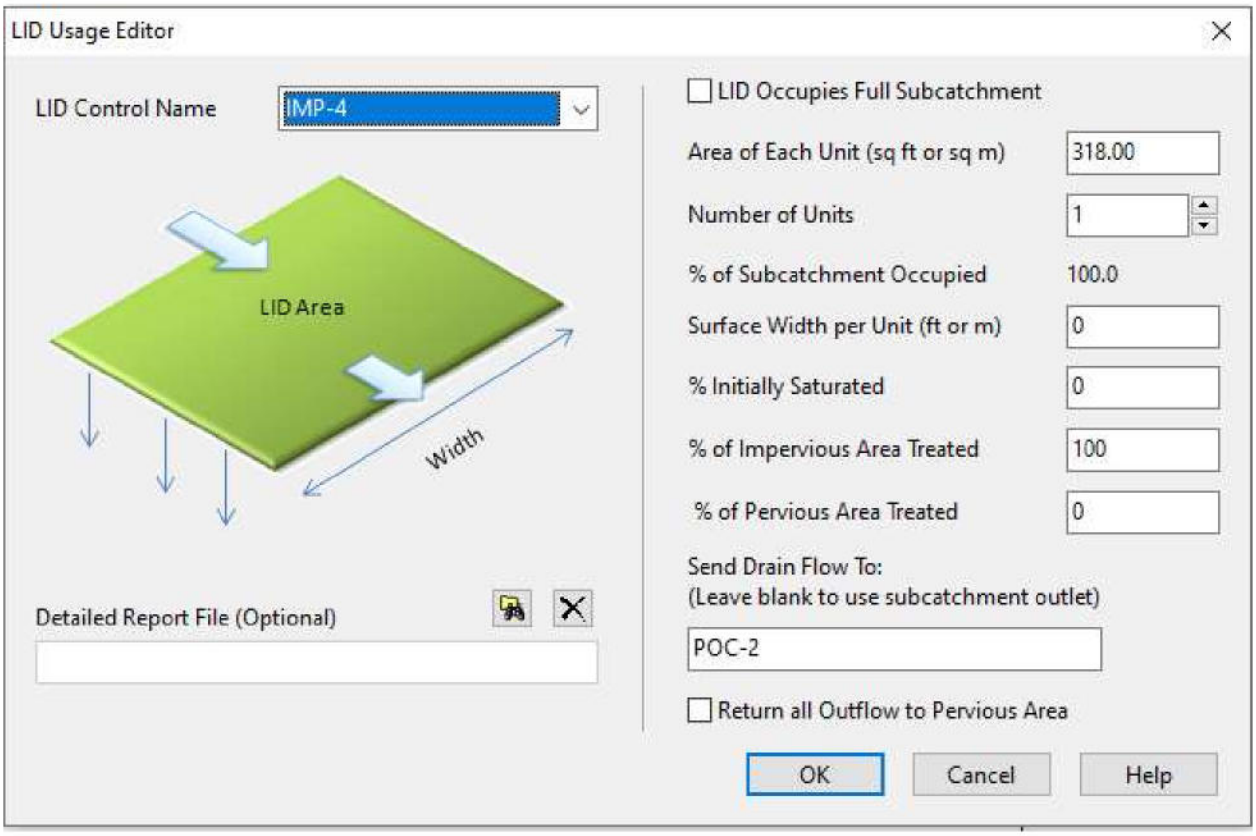
Property	Value
Name	IMP-4
X-Coordinate	602.794
Y-Coordinate	-83.226
Description	
Tag	
Rain Gage	Oceanside
Outlet	POC-2
Area	0.00730028
Width	10
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

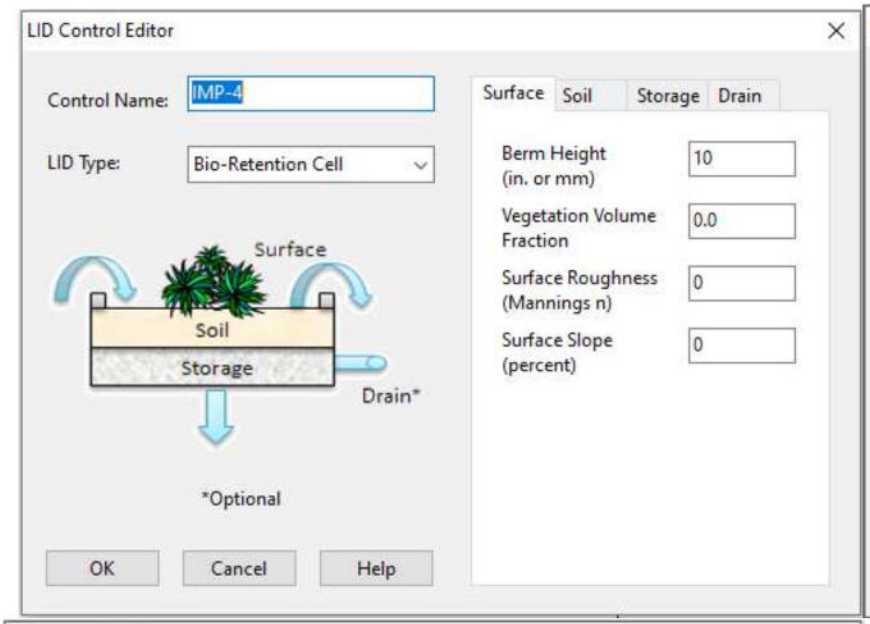
Infiltration Editor

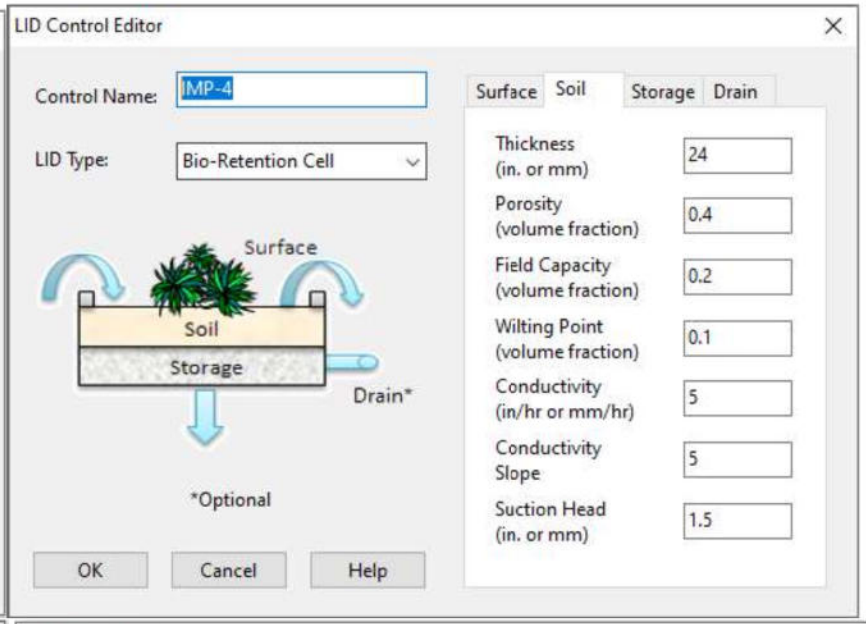
Infiltration Method: GREEN_AMPT

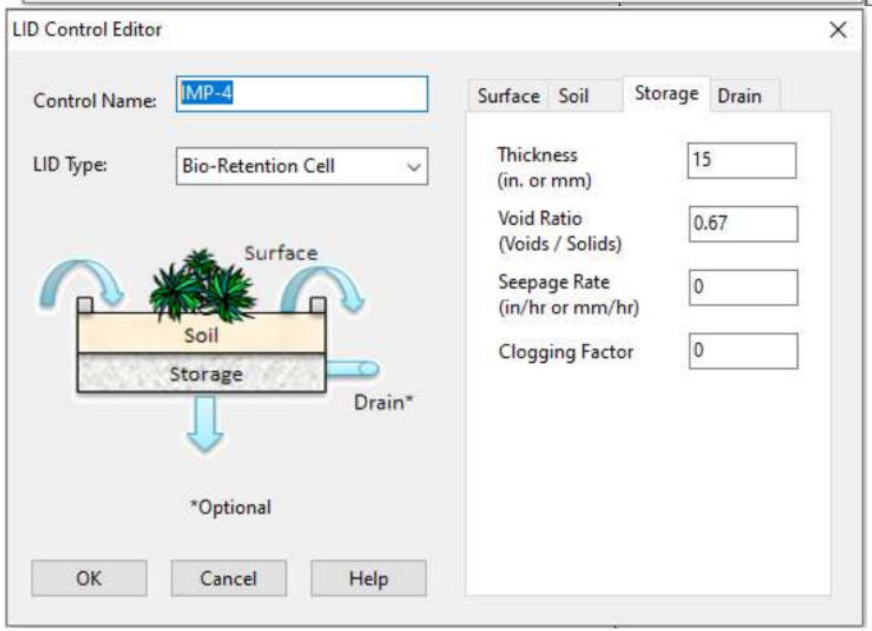
Property	Value
Suction Head	1.5
Conductivity	0.3
Initial Deficit	0.33

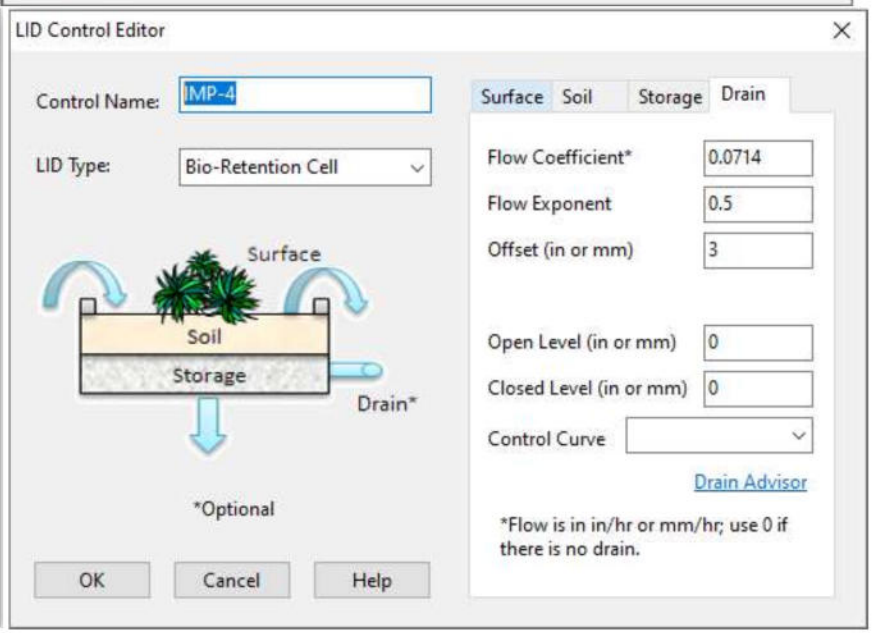
Soil capillary suction head (inches or mm)


LID Usage Editor
LID Control Name
IMP-4
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
318.00
Number of Units
1
% of Subcatchment Occupied
100.0
Surface Width per Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100
% of Pervious Area Treated
0
LID Area
Width
Detailed Report File (Optional)
Send Drain Flow To:
(Leave blank to use subcatchment outlet)
POC-2
Return all Outflow to Pervious Area
OK
Cancel
Help


LID Control Editor
Control Name: IMP-4
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Berm Height (in. or mm) 10
Vegetation Volume Fraction 0.0
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0


LID Control Editor
Control Name: IMP-4
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Thickness (in. or mm) 24
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5


LID Control Editor
Control Name: IMP-4
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Thickness (in. or mm) 15
Void Ratio (Voids / Solids) 0.67
Seepage Rate (in/hr or mm/hr) 0
Clogging Factor 0


LID Control Editor
Control Name: IMP-4
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Flow Coefficient* 0.0714
Flow Exponent 0.5
Offset (in or mm) 3
Open Level (in or mm) 0
Closed Level (in or mm) 0
Control Curve
Drain Advisor
*Flow is in in/hr or mm/hr; use 0 if there is no drain.

Subcatchment POST_DMA-6

Property	Value
Name	POST_DMA-6
X-Coordinate	446.160
Y-Coordinate	52.441
Description	
Tag	
Rain Gage	Oceanside
Outlet	IMP-5
Area	0.162
Width	158
% Slope	3.5
% Imperv	36.3
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0 ...
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

Subcatchment IMP-5

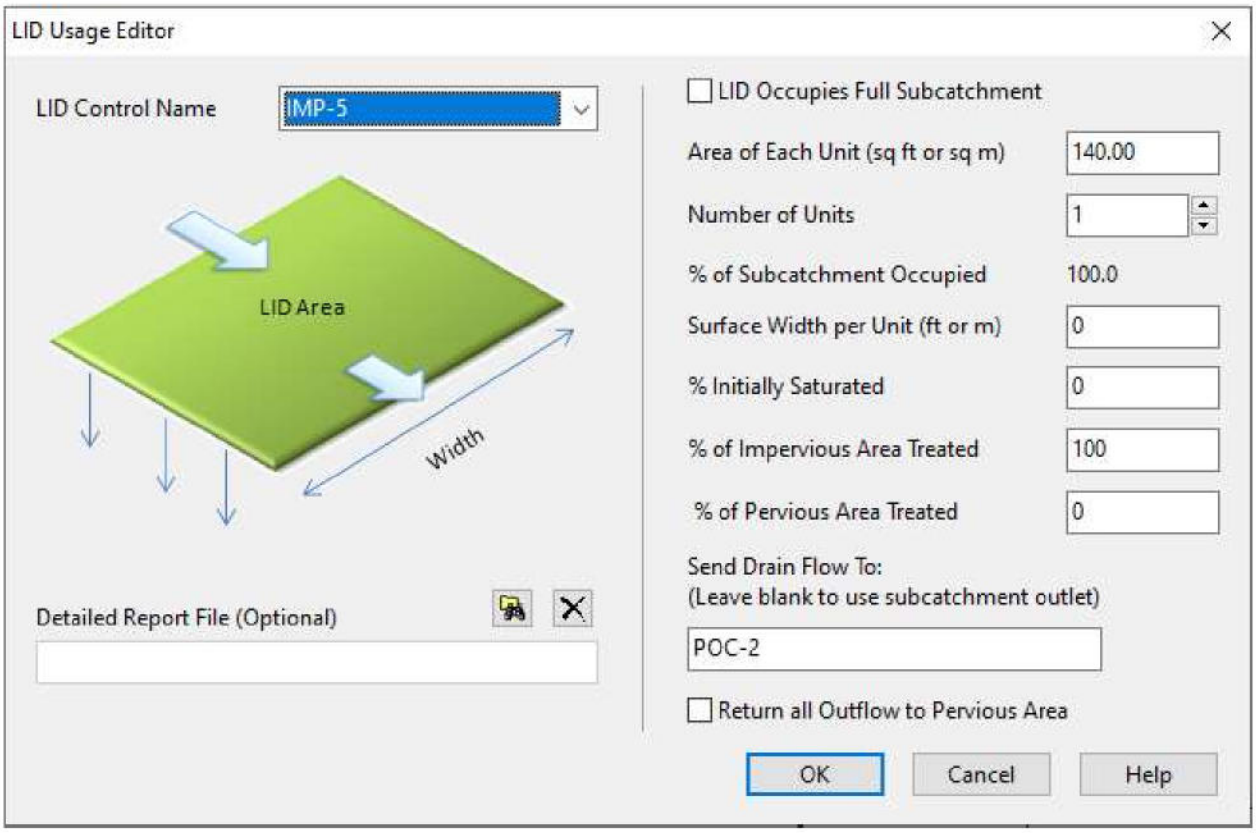
Property	Value
Name	IMP-5
X-Coordinate	450.053
Y-Coordinate	-92.284
Description	
Tag	
Rain Gage	Oceanside
Outlet	POC-2
Area	0.003214
Width	10
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

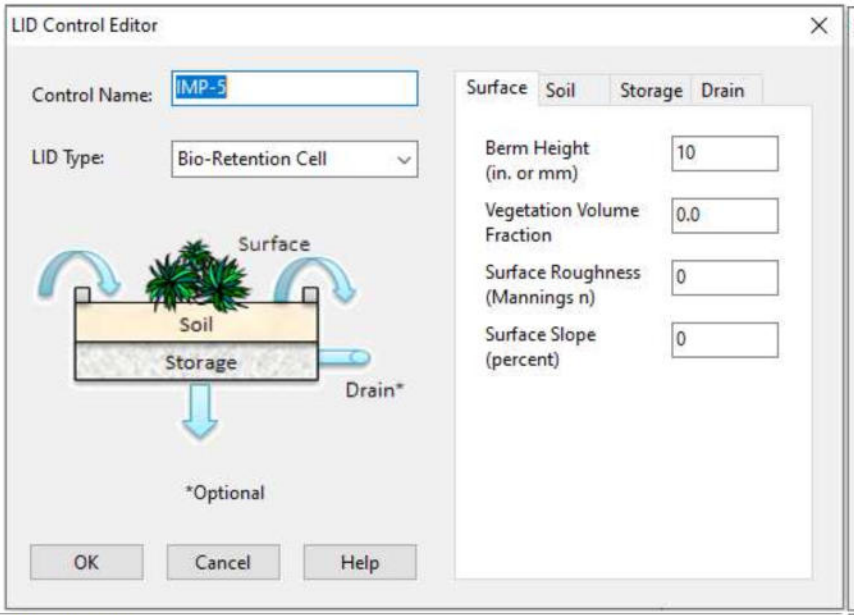
Infiltration Editor

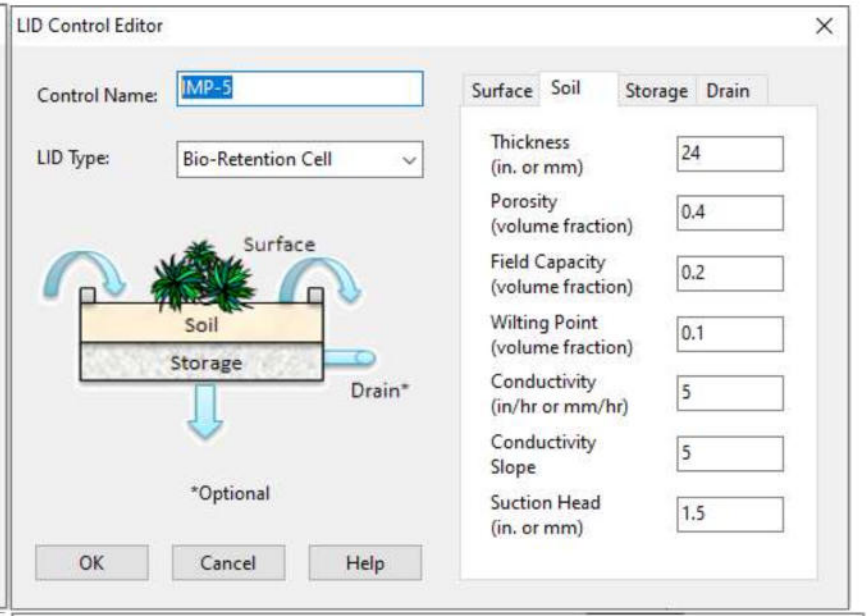
Infiltration Method: GREEN_AMPT

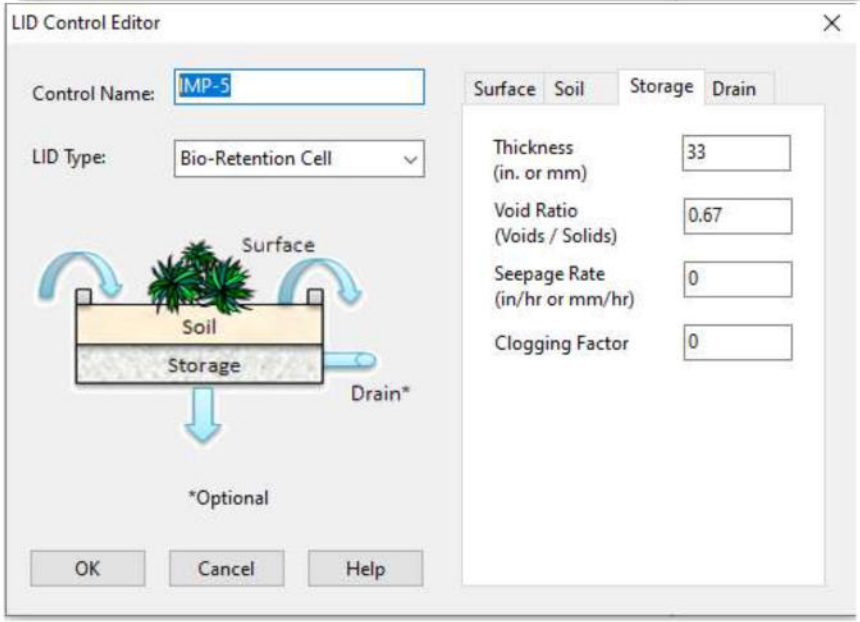
Property	Value
Suction Head	1.5
Conductivity	0.3
Initial Deficit	0.33

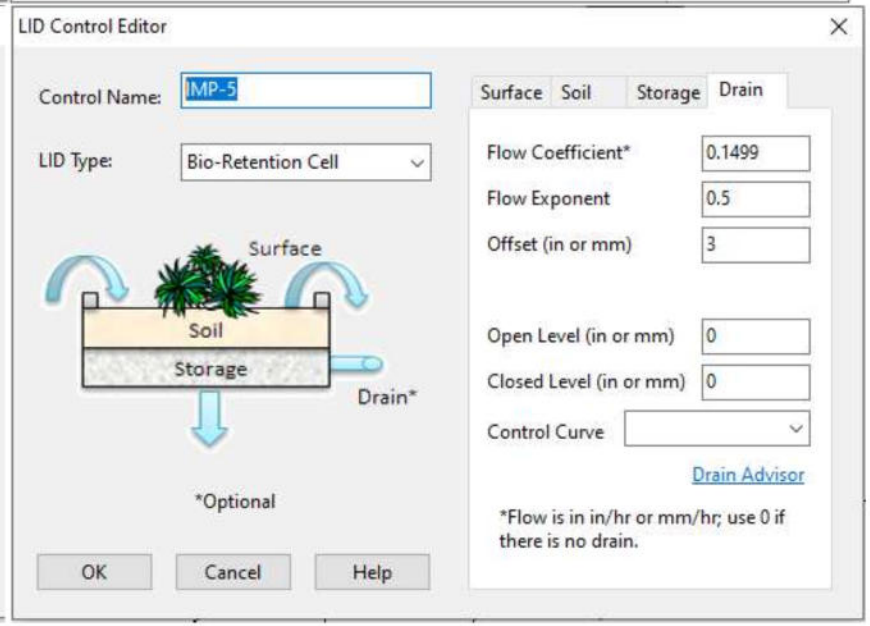
Soil capillary suction head (inches or mm)


LID Usage Editor
LID Control Name
IMP-5
LID Area
Width
Detailed Report File (Optional)
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
140.00
Number of Units
1
% of Subcatchment Occupied
100.0
Surface Width per Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100
% of Pervious Area Treated
0
Send Drain Flow To:
(Leave blank to use subcatchment outlet)
POC-2
Return all Outflow to Pervious Area
OK
Cancel
Help


LID Control Editor
Control Name: IMP-5
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Berm Height (in. or mm) 10
Vegetation Volume Fraction 0.0
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0


LID Control Editor
Control Name: IMP-5
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Thickness (in. or mm) 24
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5


LID Control Editor
Control Name: IMP-5
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Thickness (in. or mm) 33
Void Ratio (Voids / Solids) 0.67
Seepage Rate (in/hr or mm/hr) 0
Clogging Factor 0


LID Control Editor
Control Name: IMP-5
LID Type: Bio-Retention Cell
Surface
Soil
Storage
Drain*
*Optional
OK
Cancel
Help
Surface Soil Storage Drain
Flow Coefficient* 0.1499
Flow Exponent 0.5
Offset (in or mm) 3
Open Level (in or mm) 0
Closed Level (in or mm) 0
Control Curve
Drain Advisor
*Flow is in in/hr or mm/hr; use 0 if there is no drain.

Subcatchment POST_DMA-7

Property	Value
Name	POST_DMA-7
X-Coordinate	280.277
Y-Coordinate	43.191
Description	
Tag	
Rain Gage	Oceanside
Outlet	IMP-6
Area	0.744
Width	635
% Slope	3.5
% Imperv	73
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

Subcatchment IMP-6

Property	Value
Name	IMP-6
X-Coordinate	295.693
Y-Coordinate	-100.493
Description	
Tag	
Rain Gage	Oceanside
Outlet	DIV
Area	0.032139
Width	10
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT ...
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

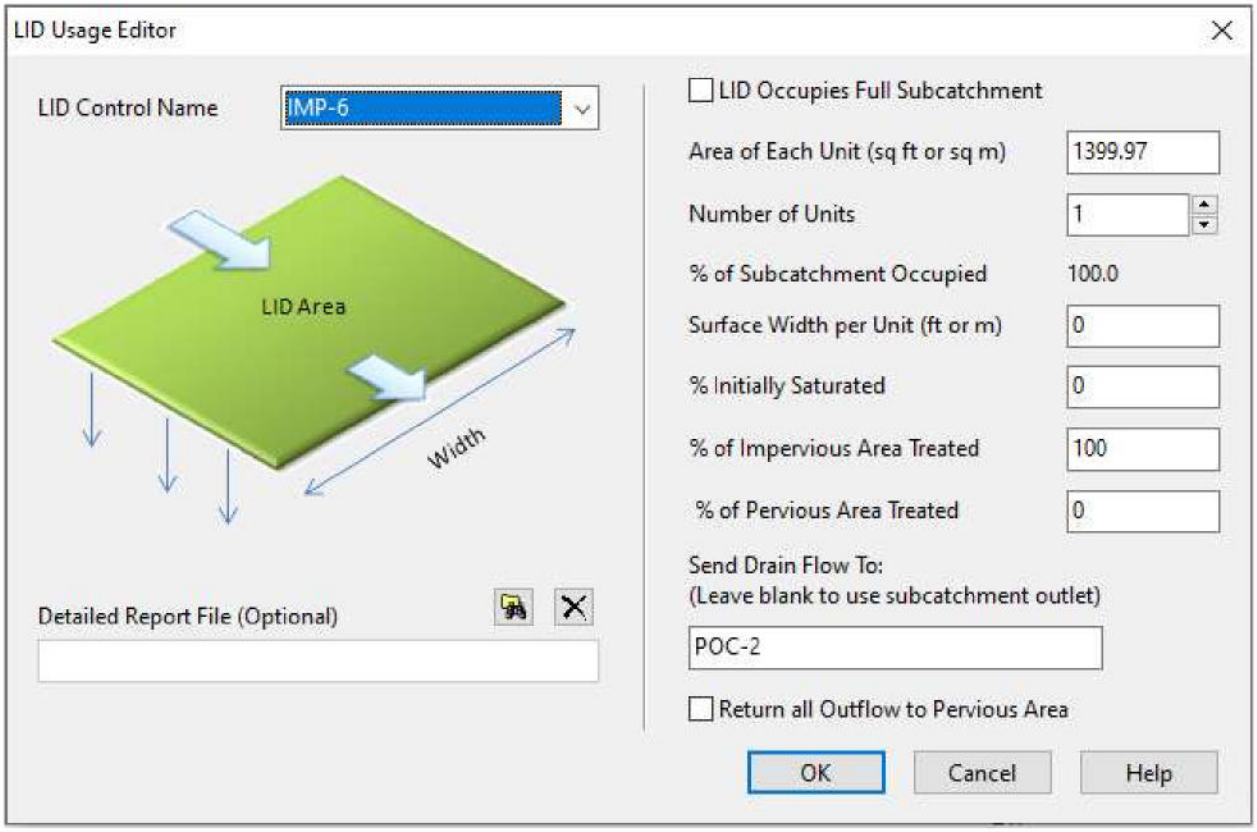
Infiltration Editor

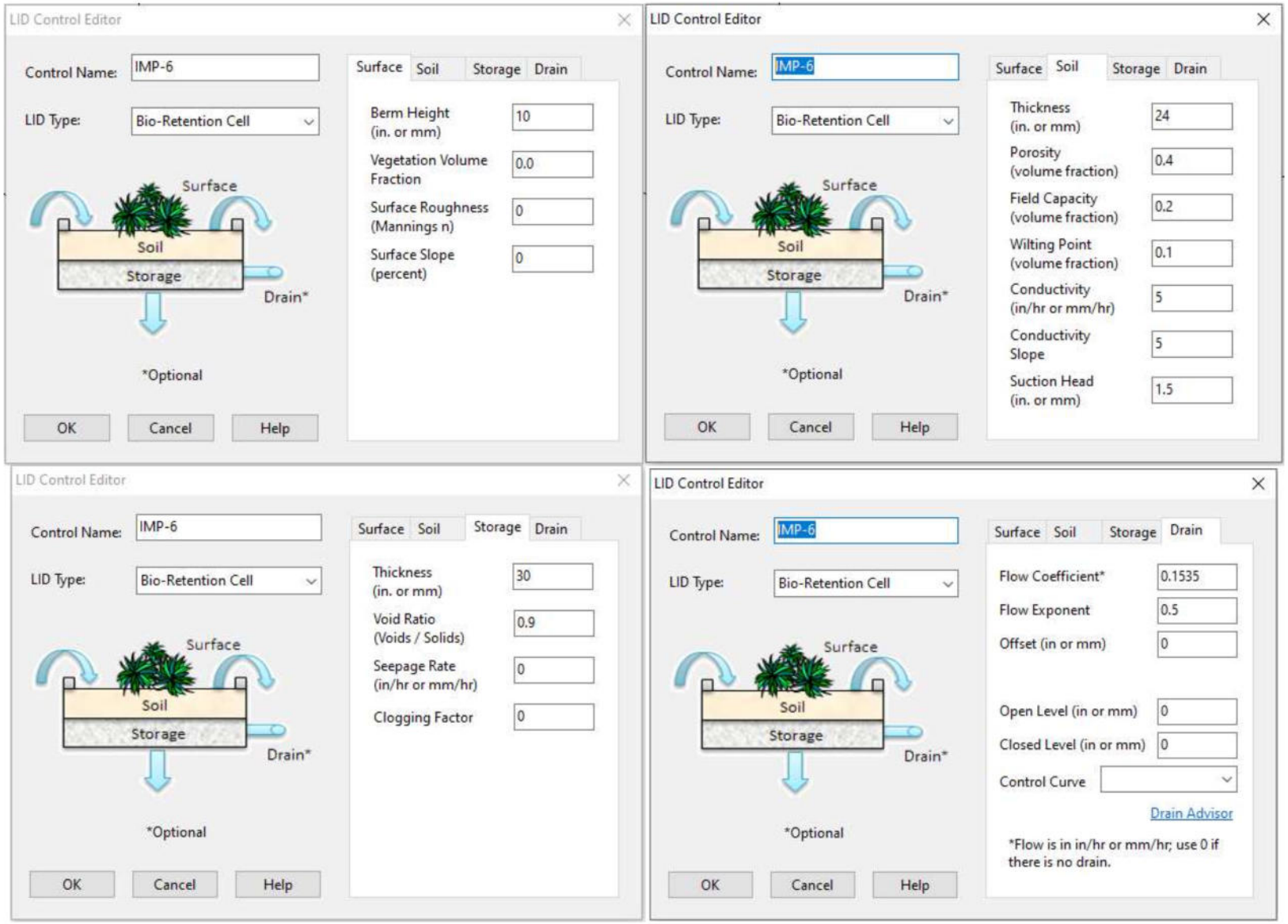
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	1.5
Conductivity	0.3
Initial Deficit	0.33

Soil capillary suction head (inches or mm)

OK Cancel Help


LID Usage Editor
LID Control Name
IMP-6
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
1399.97
Number of Units
1
% of Subcatchment Occupied
100.0
Surface Width per Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100
% of Pervious Area Treated
0
LID Area
Width
Detailed Report File (Optional)
Send Drain Flow To:
(Leave blank to use subcatchment outlet)
POC-2
Return all Outflow to Pervious Area
OK
Cancel
Help


LID Control Editor
Control Name: IMP-6
LID Type: Bio-Retention Cell
Surface Soil Storage Drain
Berm Height (in. or mm) 10
Vegetation Volume Fraction 0.0
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0
Surface
Soil
Storage
Drain*
*Optional
OK Cancel Help
LID Control Editor
Control Name: IMP-6
LID Type: Bio-Retention Cell
Surface Soil Storage Drain
Thickness (in. or mm) 24
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5
Surface
Soil
Storage
Drain*
*Optional
OK Cancel Help
LID Control Editor
Control Name: IMP-6
LID Type: Bio-Retention Cell
Surface Soil Storage Drain
Thickness (in. or mm) 30
Void Ratio (Voids / Solids) 0.9
Seepage Rate (in/hr or mm/hr) 0
Clogging Factor 0
Surface
Soil
Storage
Drain*
*Optional
OK Cancel Help
LID Control Editor
Control Name: IMP-6
LID Type: Bio-Retention Cell
Surface Soil Storage Drain
Flow Coefficient* 0.1535
Flow Exponent 0.5
Offset (in or mm) 0
Open Level (in or mm) 0
Closed Level (in or mm) 0
Control Curve
Drain Advisor
*Flow is in in/hr or mm/hr; use 0 if there is no drain.
Surface
Soil
Storage
Drain*
*Optional
OK Cancel Help

Subcatchment POST_DMA-8

Property	Value
Name	POST_DMA-8
X-Coordinate	86.643
Y-Coordinate	37.024
Description	
Tag	
Rain Gage	Oceanside
Outlet	POC-2
Area	0.03
Width	90
% Slope	48
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0 ...
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	1.5
Conductivity	0.3
Initial Deficit	0.33

Soil capillary suction head (inches or mm)

OK Cancel Help

Summary Files from the SWMM Model

PRE-DEV OUTPUT (POC-2)

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

***************
Analysis Options
***************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date ..... 08/28/1951 05:00:00
Ending Date ..... 05/23/2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00

*************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
*************************     ---------       -------
Total Precipitation .....         55.697       675.110
Evaporation Loss .....             2.078        25.191
Infiltration Loss .....           42.325       513.027
Surface Runoff .....              12.460       151.032
Final Storage .....                0.000         0.001
Continuity Error (%) .....       -2.095

*************************        Volume         Volume
Flow Routing Continuity        acre-feet       10^6 gal
*************************     ---------      ---------
Dry Weather Inflow .....           0.000          0.000
Wet Weather Inflow .....          12.460          4.060
Groundwater Inflow .....           0.000          0.000
RDII Inflow .....                  0.000          0.000
External Inflow .....             0.000          0.000
External Outflow .....            12.460          4.060
Flooding Loss .....                0.000          0.000
Evaporation Loss .....             0.000          0.000
Exfiltration Loss .....            0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume .....          0.000          0.000
Continuity Error (%) .....        0.000
```

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
Basins_6	675.11	0.00	25.19	513.03	0.00	151.03	151.03	4.06	1.11	0.224

Analysis begun on: Tue Jan 7 21:39:48 2025
Analysis ended on: Tue Jan 7 21:40:01 2025
Total elapsed time: 00:00:13

POST-DEV OUTPUT (POC-2)

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

WARNING 04: minimum elevation drop used for Conduit Bypass
WARNING 04: minimum elevation drop used for Conduit Underdrain

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 7
Number of nodes ........... 3
Number of links ........... 3
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
------------------------------------------------------------------------
Oceanside            Oceanside                   INTENSITY   60 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
------------------------------------------------------------------------------------------------
POST_DMA-5                  0.26    255.00     86.40    3.5000 Oceanside            IMP-4
IMP-4                       0.01     10.00      0.00    0.0000 Oceanside            POC-2
POST_DMA-8                  0.03     90.00      0.00   48.0000 Oceanside            POC-2
POST_DMA-6                  0.16    158.00     36.30    3.5000 Oceanside            IMP-5
POST_DMA-7                  0.74    635.00     73.00    3.5000 Oceanside            IMP-6
IMP-5                       0.00     10.00      0.00    0.0000 Oceanside            POC-2
IMP-6                       0.03     10.00      0.00    0.0000 Oceanside            DIV


********************
LID Control Summary
********************
                                  No. of       Unit       Unit     % Area    % Imperv     % Perv
Subcatchment     LID Control       Units       Area      Width    Covered     Treated    Treated
------------------------------------------------------------------------------------------------
IMP-4            IMP-4                 1     318.00       0.00     100.00      100.00       0.00
IMP-5            IMP-5                 1     140.00       0.00     100.00      100.00       0.00
IMP-6            IMP-6                 1    1399.97       0.00     100.00      100.00       0.00


************
Node Summary
************
                                    Invert      Max.    Ponded    External
Name                 Type            Elev.     Depth      Area    Inflow
------------------------------------------------------------------------
POC-2                OUTFALL          0.00      0.50       0.0
DIV                  DIVIDER          0.00      0.50       0.0
AQ                   STORAGE          0.00      5.00       0.0
```

```
************
Link Summary
************
```

Name	From Node	To Node	Type	Length	%Slope	Roughness
Bypass	DIV	AQ	CONDUIT	400.0	0.0003	0.0100
Underdrain	DIV	POC-2	CONDUIT	20.0	0.0050	0.0100
Outlet	AQ	POC-2	OUTLET			

```
*********************
Cross Section Summary
*********************
```

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
Bypass	DUMMY	0.00	0.00	0.00	0.00	1	0.00
Underdrain	CIRCULAR	0.50	0.20	0.13	0.50	1	0.05

```
***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

***************
Analysis Options
***************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Flow Routing Method ..... KINWAVE
Starting Date ..... 08/28/1951 05:00:00
Ending Date ..... 05/23/2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00
Routing Time Step ..... 60.00 sec
```

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Initial LID Storage	0.009	0.083
Total Precipitation	69.490	674.850
Evaporation Loss	11.077	107.572
Infiltration Loss	14.860	144.317
Surface Runoff	5.889	57.187
LID Drainage	38.720	376.025
Final Storage	0.014	0.136
Continuity Error (%)	-1.527	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	44.608	14.536
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	44.143	14.385
Flooding Loss	0.462	0.150
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.009	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step	:	60.00 sec
Average Time Step	:	60.00 sec
Maximum Time Step	:	60.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00
Percent Not Converging	:	0.00

Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
POST_DMA-5	674.85	0.00	89.12	63.21	507.36	26.98	534.35	3.73	0.31	0.792
IMP-4	674.85	18811.04	1180.29	0.00	0.00	0.00	18304.21	3.63	0.32	0.939
POST_DMA-8	674.85	0.00	0.57	663.95	0.00	11.97	11.97	0.01	0.03	0.018
POST_DMA-6	674.85	0.00	50.53	299.34	213.74	120.07	333.82	1.47	0.19	0.495
POST_DMA-7	674.85	0.00	78.94	125.90	428.66	52.36	481.02	9.72	0.88	0.713
IMP-5	674.85	16825.63	1114.85	0.00	0.00	0.00	16384.41	1.43	0.19	0.936
IMP-6	674.85	11135.27	960.87	0.00	0.00	0.00	10848.35	9.47	0.92	0.919

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
IMP-4	IMP-4	19485.89	1180.33	0.00	5627.18	12677.72	2.40	3.53	-0.00
IMP-5	IMP-5	17500.48	1114.91	0.00	4698.51	11686.72	2.40	3.14	-0.00
IMP-6	IMP-6	11810.12	960.91	0.00	439.54	10409.24	2.40	3.06	-0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
POC-2	OUTFALL	0.00	0.50	0.50	141 07:06	0.50
DIV	DIVIDER	0.00	0.50	0.50	141 07:05	0.50
AQ	STORAGE	0.00	1.34	1.34	18857 11:51	0.85

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
POC-2	OUTFALL	0.58	1.43	18857 11:52	14.2	14.4	0.000
DIV	DIVIDER	0.88	0.88	18857 12:01	0.384	0.384	0.000
AQ	STORAGE	0.00	0.69	18857 12:01	0	0.107	1.448

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Volume 1000 ft3
DIV	68.32	0.14	5200 16:59	0.150	0.000

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
AQ	0.000	0	0	0	0.007	27	18857 11:51	0.80

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
POC-2	7.42	0.01	1.43	14.384
System	7.42	0.01	1.43	14.384

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
Bypass	DUMMY	0.69	18857 12:01			
Underdrain	CONDUIT	0.06	14430 05:29	0.71	1.07	1.00
Outlet	DUMMY	0.80	18857 11:52			

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
Underdrain	67.52	67.52	67.52	67.90	67.52

Analysis begun on: Tue Mar 4 14:41:49 2025
Analysis ended on: Tue Mar 4 14:42:11 2025
Total elapsed time: 00:00:22

ATTACHMENT 3 - BMP MAINTENANCE INFORMATION

Each of the attachments indicated below should be considered for inclusion with the SWQMP. Use this checklist to indicate which attachments are included behind this coversheet.

Attachment Sequence	Contents	Checklist
Attachment 3A	Structural BMP Operations and Maintenance Plan	☒ Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3B	Draft Maintenance Agreement	☐ Included ☒ Not Applicable

ATTACHMENT 3A – MAINTENANCE PLAN REQUIREMENTS

For Attachment 3A, provide a BMP operation and maintenance plan (O&M Plan). The checklist below identifies minimum elements to be included with the O&M Plan. An O&M Plan template is available at:

http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms

☒ 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)

☐ Use of O&M Plan template, or plan of equivalent content

BF-1
Biofiltration

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP BF-1 BIOFILTRATION

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

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

Normal Expected Maintenance

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

Non-Standard Maintenance or BMP Failure

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

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

Other Special Considerations

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

BF-1
Biofiltration

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

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

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

References

American Mosquito Control Association.
http://www.mosquito.org/

California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook

County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet BF-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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BF-1
Biofiltration

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

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

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

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

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

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

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

BF-1
Biofiltration

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

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

BF-1
Biofiltration

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

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

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

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

SD-1
Tree Wells

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

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

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

Normal Expected Maintenance

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

Non-Standard Maintenance or BMP Failure

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

Surface ponding of runoff directed into tree wells is expected to infiltrate/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:		

AQUASAVE OPERATION & MAINTENANCE MANUAL

Operation

Your AquaSave System has been designed to function in conjunction with the engineered drainage system on your site, the existing municipal infrastructure, and/or the existing soils and geography of the receiving watershed. Unless your site included certain unique and rare features, the operation of your AquaSave System will be driven by naturally occurring systems and will function autonomously. However, upholding a proper schedule of Inspection & Maintenance is critical to ensuring continued functionality and optimum performance of the system.

Inspection

Both the AquaSave system and all stormwater pre-treatment features incorporated into your site must be inspected regularly. Inspection frequency for your system must be determined based on the contributing drainage area, but should never exceed one year between inspections (six months during the first year of operation).

Inspections may be required more frequently for pre-treatment systems. You should refer to the manufacturer requirements for the proper inspection schedule.

With the right equipment your inspection and measurements can be accomplished from the surface without physically entering any confined spaces. If your inspection does require confined space entry, you MUST follow all local/regional requirements as well as OSHA standards.

AquaSave Systems may incorporate Inspection Ports, Maintenance Ports, and/or adjoining manholes. Each of these features are easily accessed by removing the lid at the surface. With the cover removed, a visual inspection can be performed to identify sediment deposits within the structure. Using a flashlight, ALL access points should be examined to complete a thorough inspection.

Inspection Ports

Usually located centrally in the System, these perforated columns are designed to give the user a base-line sediment depth across the system floor.

Maintenance Ports

Usually located near the inlet and outlet connections, you'll likely find deeper deposits of heavier sediments when compared to the Inspection Ports.

Manholes

Most systems will include at least two manholes - one at the inlet and another at the outlet. There may be more than one location where stormwater enters the system, which would result in additional manholes to inspect.

Bear in mind that these manholes often include a sump below the invert of the pipe connecting to the system. These sumps are designed to capture sediment before it reaches the system, and they should be kept clean to ensure they function properly. However, existence of sediment in the sump does NOT necessarily mean sediment has accumulated in the system.

After inspecting the bottom of the structure, use a mirror on a pole (or some other device) to check for sediment or debris in the pipe connecting to the system.

If sediment or debris is observed in any of these structures, you should determine the depth of the material. This is typically accomplished with a stadia rod, but you should determine the best way to obtain the measurement.

All observations and measurements should be recorded on an Inspection Log kept on file. We've included a form you can use at the end of this guideline.

Maintenance

The AQUASAVE System should be back-flushed once sediment accumulation has reached 6" or 15% of the total system height.

Before any maintenance is performed on your system, be sure to plug the outlet pipe to prevent contamination of the adjacent systems.

To back-flush the system, water is pumped into the system through the Maintenance Ports as rapidly as possible. Water should be pumped into ALL Maintenance Ports. The turbulent action of the water moving through the system will suspend sediments which may then be pumped out.

If your system includes an Outlet Structure, this will be the ideal location to pump contaminated water out of the system. However, removal of back-flush water may be accomplished through the Maintenance Ports, as well.

For systems with large footprints that would require extensive volumes of water to properly flush the system, you should consider performing your maintenance within 24 hours of a rain event. Stormwater entering the system will aid in the suspension of sediments and reduce the volume of water required to properly flush the system.

Once removed, sediment-laden water may be captured for disposal or pumped through a Dirtbag™ (if permitted by the locality).

Step-By-Step Inspection & Maintenance Routine

1) Inspection

a. Inspection Port
   i. Remove Cap
   ii. Use flashlight to detect sediment deposits
   iii. If present, measure sediment depth with stadia rod
   iv. Record results on Maintenance Log
   v. Replace Cap

b. Maintenance Port/s
   i. Remove Cap
   ii. Use flashlight to detect sediment deposits
   iii. If present, measure sediment depth with stadia rod
   iv. Record results on Maintenance Log
   v. Replace Cap
   vi. Repeat for ALL Maintenance Ports

c. Adjacent Manholes
   i. Remove Cover
   ii. Use flashlight to detect sediment deposits
   iii. If present, measure sediment depth with stadia rod, accounting for depth of sump (if present)
   iv. Inspect pipes connecting to system
   v. Record results on Maintenance Log
   vi. Replace Cover
   vii. Repeat for ALL Manholes that connect to the system

2) Maintenance

a. Plug system outlet to prevent discharge of back-flush water
b. Determine best location to pump out back-flush water
c. Remove Cap from Maintenance Port
d. Pump water as rapidly as possible (without over-topping port) into system until at least 1”
   of water covers system bottom
e. Replace Cap
f. Repeat at ALL Maintenance Ports
g. Pump out back-flush water to complete back-flushing
h. Vacuum all adjacent structures and any other structures or stormwater pre-treatment systems that require attention
i. Sediment-laden water may be captured for disposal or pumped through a Dirtbag™.
j. Replace any remaining Caps or Covers
k. Record the back-flushing event in your Maintenance Log with any relevant specifics

Maintenance Log

Site Name:____________________________

Location:____________________________

System Owner:____________________________

Company Responsible for Maintenance:____________________________

Contact:____________________________

Phone Numer:____________________________

Date	Location	Depth to Bottom	Depth to Sediment	Sediment Depth	Observations/Notes	Initials

ATTACHMENT 3B – MAINTENANCE AGREEMENT

All projects are required to maintain designed functionality of structural BMPs in perpetuity. Privately-owned projects must record a *Storm Drain Maintenance Agreement* with the County of San Diego Assessor's Office. A template *Storm Drain Maintenance Agreement* is available at:

http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms

RECORDING REQUESTED BY:

CITY OF VISTA

WHEN RECORDED MAIL TO:

CITY OF VISTA
200 CIVIC CENTER DRIVE
VISTA, CA 92084-6275
ATTN: CITY CLERK

Fee Exempt: Government Code Section 27383

APN: xxx-xxx-xx
DTT: $0.00; R&TC § 11922, Conveyance to Government Agency; Signed:_____

PRIVATE STORM WATER POLLUTION CONTROL FACILITIES MAINTENANCE AGREEMENT

THIS AGREEMENT is entered into between the **CITY OF VISTA**, a chartered municipal corporation ("CITY") and **NAME,** status ("OWNER"), and dated for reference purposes as of date.

DEFINITIONS

BEST MANAGEMENT PRACTICES: Control measures ("BMPs") taken to mitigate changes to both quantity and quality of urban runoff as they may be defined or promulgated from time-to-time in the City's NPDES storm water management permit.

GOVERNING APPROVALS: C xxx; LD #xxx; GP(s) xxx; and DWG No(s). xxx

PROPERTY: Real property legally described in Exhibit A [and commonly known as _____][with no common street address].

FACILITIES: Those certain private storm water pollution control facilities ("SWPCFs") and appurtenances developed or installed on the PROPERTY as detailed in the GOVERNING APPROVALS as the same may be amended from time to time through changes in the governing ordinances and statutes.

WATER QUALITY TECHNICAL REPORT: The approved plan (the "WQTR") is designed to mitigate changes to both quantity and quality of urban runoff from the PROPERTY. The plan was initially approved by the City with GOVERNING APPROVALS, is on file with the City, and shall be modified from time-to-time pursuant to the City's then-current NPDES storm water management permit.

RECITALS

A. This Agreement is required as a condition of approval by the CITY.

B. The OWNER is the owner of the PROPERTY and is required to install and provide for the perpetual maintenance of the FACILITIES as a condition of being permitted to develop the PROPERTY.

C. It is the mutual desire of the parties hereto that the FACILITIES be maintained in a safe and usable condition by the OWNER.

D. It is the mutual intention of the parties that this Agreement constitutes a covenant running with the land, binding upon each successive lot owner of all or any portion of the PROPERTY.

SAMPLE

NOW, THEREFORE, IT IS HEREBY AGREED AS FOLLOWS:

1. The cost and expense of maintaining the FACILITIES shall be paid by the OWNER or the heirs, assigns and successors in interest of the OWNER.

2. Repairs and maintenance under this Agreement shall consist of all work reasonably necessary or proper in the sole discretion of the CITY to repair and preserve FACILITIES. Repair and maintenance responsibilities for all post-construction structural FACILITIES and required BMPs associated with the project are set forth in the most current WQTR. The WQTR shall all times specify by name, title, and phone number the persons or entities responsible for maintenance and reporting activity, the persons or entities responsible for funding, schedules and procedures for inspection and maintenance of the FACILITIES and implementation of worker training requirements, and any other activities necessary to ensure BMP maintenance. The plan shall provide for servicing of all post-construction structural FACILITIES as needed and at least once annually within 60 days prior to October 1st, and for the retention of inspection and maintenance records for at least three years. Adherence to the plan shall result in effective Storm Water pollution control. The CITY shall have the right to inspect the FACILITIES and records as needed to ensure the FACILITIES are being properly maintained.

3. OWNER Indemnification.

3.1. The OWNER shall indemnify and hold the CITY harmless against any and all liability, loss, damage, fine, penalty, expense, claim, or cost (including without limitation costs and fees of litigation) of every nature (collectively, “Liability”) arising out of or in connection with this Agreement or its performance (including acts of omission) except for Liability caused by the CITY’s sole negligence or willful misconduct.

3.2 For purposes of this Section, the CITY includes CITY’s officers, officials, employees, agents, representatives, and volunteers.

3.3 It is expressly understood and agreed that the foregoing provisions will survive termination of this Agreement.

3.4 The indemnity protections provided by this Section are not intended to exceed the indemnity available under applicable law. If the indemnity protections are found by a court to be unlawful in any way, the protection shall be curtailed or adjusted, but only to the minimum extent required to conform to applicable law.

4. If in the CITY’S sole judgment the FACILITIES are not being maintained to standards set forth in this Agreement, the CITY may thereupon provide written notice to the OWNER to initiate repairs or construction within ninety (90) days. Upon failure to demonstrate good faith to make repairs or construction within ninety (90) days, the OWNER agrees that the CITY may make all needed repairs to the FACILITIES to meet the standards set forth in paragraph 3 and to then assess costs to the OWNER.

5. CITY shall have no responsibility or liability for the exercise or non-exercise of any discretionary powers it may have under this Agreement. Nothing in this Agreement, the specifications or other contract documents relating to the work required by this Agreement, or CITY approval of the plans and specifications or inspection of the work, is intended to create any contractual liability, express or implied, for the construction, maintenance or repair of the FACILITIES required by this Agreement, and the CITY, CITY’S engineer, and their consultants, and each of their officials, directors, officers, employees and agents, shall have absolutely no responsibility or liability therefor.

6. If CITY elects to make necessary repairs in accordance with paragraph 5 above, that work shall be without warranty. The repairs shall be accepted “as is” by the OWNER without any warranty of workmanship and shall be guaranteed and indemnified by it in accordance with paragraph 4. CITY will endeavor to minimize interference with OWNER’s use of the PROPERTY.

SAMPLE

7. The foregoing covenants shall run with the land, shall be deemed to be for the direct benefit of the land, and shall be binding on the heirs, executors, administrators, successors, and assigns of the OWNER. Any subsequent purchaser of all or any portion thereof, by acceptance of delivery of a deed and/or conveyance regardless of form, shall be deemed to have consented to and become bound by these presents.

8. Nothing in this Agreement shall be construed to in any way limit or constrain CITY's exercise of its regulatory powers, police powers, or other powers of enforcement insofar as they may relate to the subject matter of this Agreement or any other matter within the power or authority of the CITY.

9. This Agreement shall be governed by the laws of the State of California. In the event that any of the provisions of this Agreement are held to be unenforceable or invalid by any court of competent jurisdiction, the validity, and enforceability of the remaining provisions shall not be affected thereby. The exclusive jurisdiction and venue of any legal action instituted in connection with this Agreement shall be San Diego County, California.

"CITY"

CITY OF VISTA, a chartered municipal corporation

By:_____
GREGORY D. MAYER, CITY ENGINEER

"OWNER"

NAME, status

By:_____

_____
Name/Title

By:_____

_____
Name/Title

(When signing as Corporation necessary signatures are President OR Vice President AND Secretary OR Assistant Secretary.)

NOTE: A CALIFORNIA ALL PURPOSE NOTARY ACKNOWLEDGMENT MUST BE ATTACHED FOR ALL SIGNATURES ABOVE

ATTEST:
KATHY VALDEZ, CITY CLERK

By:_____

APPROVED AS TO FORM:
DAROLD PIEPER, CITY ATTORNEY

By:_____

SAMPLE

ATTACHMENT 4 - REQUIREMENTS FOR CONSTRUCTION PLANS

Section 8.2.2 of the *BMP Design Manual* identifies minimum requirements for storm drain construction plan sheets. Use this checklist to ensure project construction plans submitted for review include necessary information for storm drain improvements. Construction plans must include the following:

☒ All items identified in Section 8.2.2 of the *BMP Design Manual*.

CITY OF VISTA

PLANNING CASE #24-0164

15-LOTS

TENTATIVE SUBDIVISION MAP AND GRADING PLAN

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF OCEANSIDE, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

ALL THAT CERTAIN REAL PROPERTY SITUATED IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

THE SOUTHEAST QUARTER OF LOT 6 AND THE EAST 70 FEET OF THE SOUTHWEST QUARTER OF LOT 6, LYING NORTHERLY OF THE ATCHISON, TOPEKA AND SANTA FE RAILWAY RIGHT OF WAY IN SECTION 13, TOWNSHIP 11 SOUTH, RANGE 4 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF VISTA, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF.

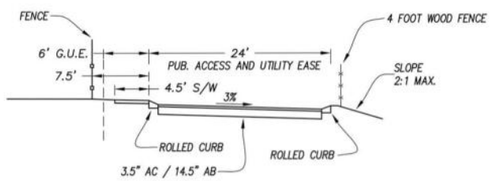
EXCEPTING THEREFROM THAT PORTION THEREOF LYING WITHIN KNOLL CREST, ACCORDING TO MAP THEREOF NO. 4617, FILED IN THE OFFICE OK THE COUNTY RECORDER OF SAN DIEGO COUNTY.

ALSO EXCEPTING THEREFROM THAT PORTION THEREOF LYING WITHIN A STRIP OF LAND 50.00 FEET WIDE, LYING SOUTHERLY OF AND PARALLEL TO THE FOLLOWING DESCRIBED LINE:

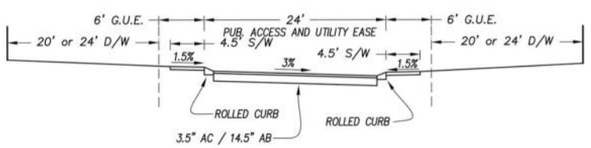
BEGINNING AT THE NORTHWEST CORNER OF THE ABOVE DESCRIBED PROPERTY; THENCE SOUTH 89°48'32" EAST ALONG THE NORTH LINE OF THE SOUTHWEST QUARTER AND THE SOUTHEAST QUARTER OF LOT 6, 87.92 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE NORTH, SAID CURVE HAVING A 1000.00 FOOT RADIUS AND CENTRAL ANGLE OF 5°43'55"; THENCE ALONG THE ARC OF SAID CURVE 100.04 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE SOUTH, SAID CURVE HAVING A 1000.00 FOOT RADIUS AND A CENTRAL ANGLE OF 5°43'55";

THENCE ALONG THE ARC OF SAID CURVE 100.04 FEET TO A POINT FROM WHICH THE NORTHEAST CORNER THEREOF BEARS SOUTH 0°U'28" WEST, 10.00 FEET. THE SOUTHERLY LINE OF THE ABOVE DESCRIBED PARCEL OF LAND IS TO BE EXTENDED OR SHORTENED SO AS TO INTERSECT WITH THE EASTERLY AND WESTERLY LINES OF THE ABOVE DESCRIBED PROPERTY.

LAT. – 33°13'14" N
LONG. – 117°15'20" W
TOWNSHIP – T11S
RANGE – R4W
SECTION – S13



PRIVATE ROAD A SECTION



PRIVATE ROAD B SECTION

SIGNATURES CONSTITUTE THAT ALL PLANS, SPECIFICATIONS GUARANTEES, AND OTHER REQUIREMENTS NECESSARY FOR ISSUANCE OF A BUILDING PERMIT CONFORMING TO THIS SITE DEVELOPMENT PLAN HAVE BEEN COMPLETED AND APPROVED BY THE APPROPRIATE DEPARTMENT.

PLANNING DEPARTMENT	DATE
ENGINEERING DEPARTMENT	DATE
FIRE DEPARTMENT	DATE
PUBLIC WORKS DEPARTMENT	DATE

ASSESSOR'S PARCEL NUMBER

161-030-07

ZONING

EXISTING: R-1-B
PROPOSED: R-1-B

SITE AREA

1.67 ACRES EXISTING/PROPOSED

PROJECT DESCRIPTION

15-LOT SUBDIVISION

DENSITY

8.98 DU/ACRE
ALLOWABLE DENSITY MEDIUM DENSITY RESIDENTIAL (MD) – 10 DU/AC
1.67 AC * 10 = 16.7 DU
PROPOSED – 15 DU / 1.67 = 8.98 DU / AC

PUBLIC SERVICE

WATER: VISTA IRRIGATION DISTRICT – 1391 ENGINEER ST, VISTA, CA 92081 – (760) 597-3100

REFUSE DISPOSAL: CITY OF VISTA – 200 CIVIC CENTER DRIVE, VISTA, CA 92084 – (760) 639-6177

SCHOOLS: VISTA UNIFIED SCHOOL DISTRICT – 234 ARCADIA AVENUE, VISTA CA 92084 – (760) 726-2170

FIRE: CITY OF VISTA FIRE DEPARTMENT – 200 CIVIC CENTER DRIVE, VISTA, CA 92084 – (760) 643-2801

POLICE: CITY OF VISTA – 325 SOUTH MELROSE DR., STE. 210, VISTA, CA 92081 – (760) 940-4551

ELECTRIC & NATURAL GAS: SDG&E – P.O. BOX 129831, SAN DIEGO, CA 92112-9831 – 1(800) 411-7343

TELEPHONE: PACIFIC BELL, COX – 6205-B PEACHTREE DUNWOODY ROAD NE, ATLANTA, GA 30328 – 1(800) 234-3993

SANITARY SEWERS: CITY OF VISTA – 200 CIVIC CENTER DRIVE, VISTA, CA 92084 – (760) 639-6115

LIGHTING: PRIVATE

STORMDRAIN: CITY OF VISTA SPECIFICATIONS – 200 CIVIC CENTER DRIVE, VISTA, CA 92084 – (760) 639-6111

CABLE TV: COX CABLE – 6205-B PEACHTREE DUNWOODY ROAD NE, ATLANTA, GA 30328 – 1(800) 234-3993

SITE ADDRESS

552 WEST BOBIER DRIVE
VISTA, CA

ENGINEER

SWS ENGINEERING, INC.
1635 LAKE SAN MARCOS DRIVE, SUITE 200
SAN MARCOS, CA 92069
P: (760) 744-0011
F: (760) 744-0046

OWNER

MCRT MELROSE VISTA LLC, A DELAWARE LLC
4320 La Jolla Village Drive | Suite 205 | San Diego, California, 92122

ARCHITECT

PSKISD
731 HGWY 101 #14
SOLANA BEACH, CA 92075
P: (858) 342-2185
PHILIP SZYMANSKI

LANDSCAPE ARCHITECT

GROUNDLEVEL
2605 STATE STREET b
SAN DIEGO, CA 92103
P: (619) 325-1992
BRAD LENAHAN

EARTHWORK QUANTITIES

CUT:	400 CY
FILL:	7,300 CY
IMPORT:	6,900 CY

YARDAGE SHOWN ARE BANK YARDS



VICINITY MAP
SCALE: NTS

SHEET INDEX

01 TENTATIVE SUBDIVISION MAP TITLE SHEET
02 EXISTING CONDITIONS MAP
03 GRADING PLAN
04 UTILITY PLAN
05 PROPOSED EASEMENTS
06 SITE SECTIONS
07 SLOPE ANALYSIS
08 RETAINING WALL AND DEEPENED FOOTING PLAN
09 FIRE TURNAROUND PLAN
10 SITE DEVELOPMENT PLAN COVER SHEET
11

BENCHMARK

CITY OF OCEANSID BENCHMARK NO. GPS 1049.
ELEV = 417.22 NAVD88
DESCRIBED AS: 2.5" BRASS DISK SET IN CURB INLET ON TOP OF WESTERLY CURB INLET OF MELROSE DRIVE (+/–) 150' SOUTH OF SPRINTER RAIL ROAD TRACKS.

SOURCE OF TOPOGRAPHY

THE EXISTING TOPOGRAPHY AS SHOWN ON THESE PLANS IS BASED ON A FIELD SURVEY ON 2/15/22 BY C&V CONSULTING..

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA SPATIAL REFERENCE SYSTEM (CSRS) ZONE 6, EPOCH 2017.50, AS DETERMINED LOCALLY BY G.P.S. MEASUREMENTS TAKEN ON 01/28/21 FROM CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS) CLBD AND VTOR OF THE CALIFORNIA REAL TIME NETWORK. I.E. N 48°24'33" E

FEMA INFORMATION

FIRM MAP NUMBER – 06073C0757G

FLOOD ZONE – X

LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE / LOT LINE	
EXISTING WATERLINE	W
EXISTING SEWER MAIN	S
EXISTING GAS LINE	G
EXISTING STORM DRAIN	SD
FINISHED GROUND CONTOUR	XXX
EXISTING GROUND CONTOUR	440
PROPOSED CUT\FILL SLOPE	2:1
FUTURE BUILDING LIMIT	
LOT NUMBER / FINISHED FLOOR ELEVATION	1 / 453.00
RETAINING WALL	
6' FAUX WOOD FENCE	
4' WOOD FENCE AROUND BASINS AND HOA AREAS	
SPOT ELEVATIONS	400.50TC / 400.00P
CURB RAMP W/ TRUNCATED DOMES	
6" CURB	
6" CURB & GUTTER	
FINISH SURFACE ELEV.	FS
TOP OF CURB ELEV.	TC
FLOW LINE	FL
DIRECTION OF DRAINAGE	
EXISTING SPOT ELEV.	(FS 98.0)
48" SEWER MANHOLE	
SEWER CLEANOUT	
1 1/2" IRRIGATION	
4" BACKFLOW PREVENTER AND METERED SERVICE	SCM
8" DCDA W/ FDC	
FIRE HYDRANT	
2" X 2" CATCH BASIN	
TYPE 'B' CURB INLET	
RIP-RAP	
PROPOSED WATERLINE	W
PROPOSED SEWER MAIN	S
PROPOSED GAS LINE	G
PROPOSED STORM DRAIN	SD
PROPOSED BIORETENTION BASIN	

NOTES:

1. BUILDING SITE AREA IS THE TOTAL OF THE TWO FLOORS.
2. LANDSCAPE SITE AREA IS THE TOTAL OF THE AREA TO BE LANDSCAPED BY THE BUILDER, EXCLUDING THE BACKYARDS.
3. PARKING AREA INCLUDES DRIVEWAYS AND THE STREET PARKING STALLS.
4. PRIVATE OPEN SPACE VARIOUS PER LOT. SF SHOWN PER 3 BDRM HOUSE IS AN AVERAGE.

CITY of VISTA — SHEET

P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330								
OWNER: MCRT MELROSE VISTA, LLC						PHONE: (760) 744-0011		
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122								
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.						PHONE: (760) 744-0011		
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078								
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES								
ZONE: R-1-B						APN(S): 161-030-07		
SITE DATA AREA (SQ. FT.)						DWELLING UNITS		OPEN SPACE DATA
					COVERAGE %	STUDIO	0	COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF				100%	1 BDRM	0	0	0
BLDG:	37,800				26%	2 BDRM	0	0	0
PARKING:	7,410				10%	3 BDRM	15	1,264	1,067
LOADING:(DRIVES):	10,424				14.3%	TOTAL UNITS	15	18,958	16,014
LANDSCAPE:	17,454				24%	DRIVEWAY (SIZE & SLOPE)			
PARKING		ORD. REQ.	60					SETBACKS	
GARAGE	30	LOADING	0	REC. VEH. STORAGE SPACES	0	1 WAY N.A.		FRONT 20'	REAR 20'
COVERED	0	HANDICAP	0			2 WAY 24'		L. SIDE 0'	SPECIAL
OPEN	35	TOTAL	65			SLOPE 3-7%		R. SIDE 0'	ACCES. BLDG

PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

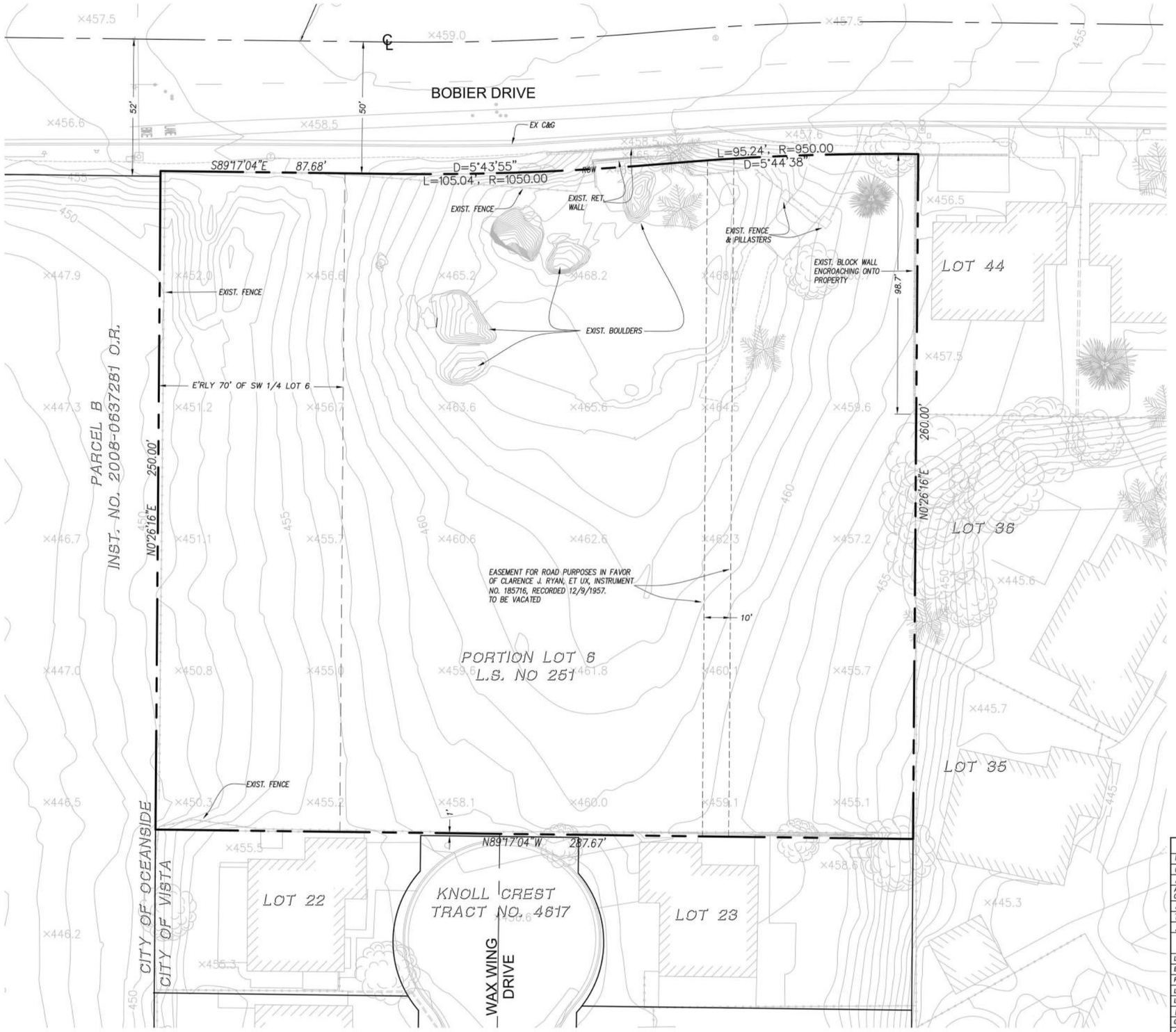
ADDRESS: 552 W. BOBIER DRIVE

SHEET 1 OF 16

REGISTERED PROFESSIONAL ENGINEER — MICHAEL D SCHWEITZER — No. 59658 — Exp. 12-31-2025 — CIVIL — STATE OF CALIFORNIA

SWS ENGINEERING, INC.
CIVIL ENGINEERING • LAND PLANNING • SURVEYING
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

DATE: Jan 02, 25 7:42am by:Mike.Schweitzer
FILE:C:\Users\mike.schweitzer.SWSENGINEERING\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Planning\TSM\23-299_TSM01.dwg



1"=20'

SWS

N

20 10 0 20 40 60

SCALE IN FEET
GRAPHIC SCALE

CITY of VISTA							SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330							
OWNER: MCRT MELROSE VISTA, LLC					PHONE: (760) 744-0011		
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122							
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.					PHONE: (760) 744-0011		
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078							
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES							
ZONE: R-1-8					APN(S): 161-030-07		
SITE DATA				DWELLING UNITS		OPEN SPACE DATA	
AREA (SQ. FT.)			COVERAGE %	STUDIO	0	COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF		100%	1 BDRM	0	0	0
BLDG:	37,800		26%	2 BDRM	0	0	0
PARKING:	7,410		10%	3 BDRM	15	1,264	1,067
LOADING: (DRIVES)	10,424		14.3%	TOTAL UNITS	15	18,958	16,014
LANDSCAPE:	17,454		24%	DRIVEWAY (SIZE & SLOPE)			
PARKING	ORD. REQ.	60				SETBACKS	
GARAGE 30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY N.A.		FRONT 20'	REAR 20'
COVERED 0	HANDICAP	0		2 WAY 24'		L. SIDE 0'	SPECIAL
OPEN 35	TOTAL	65	0	SLOPE 3-7%		R. SIDE 0'	ACCES. BLDG

EXISTING CONDITIONS — PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

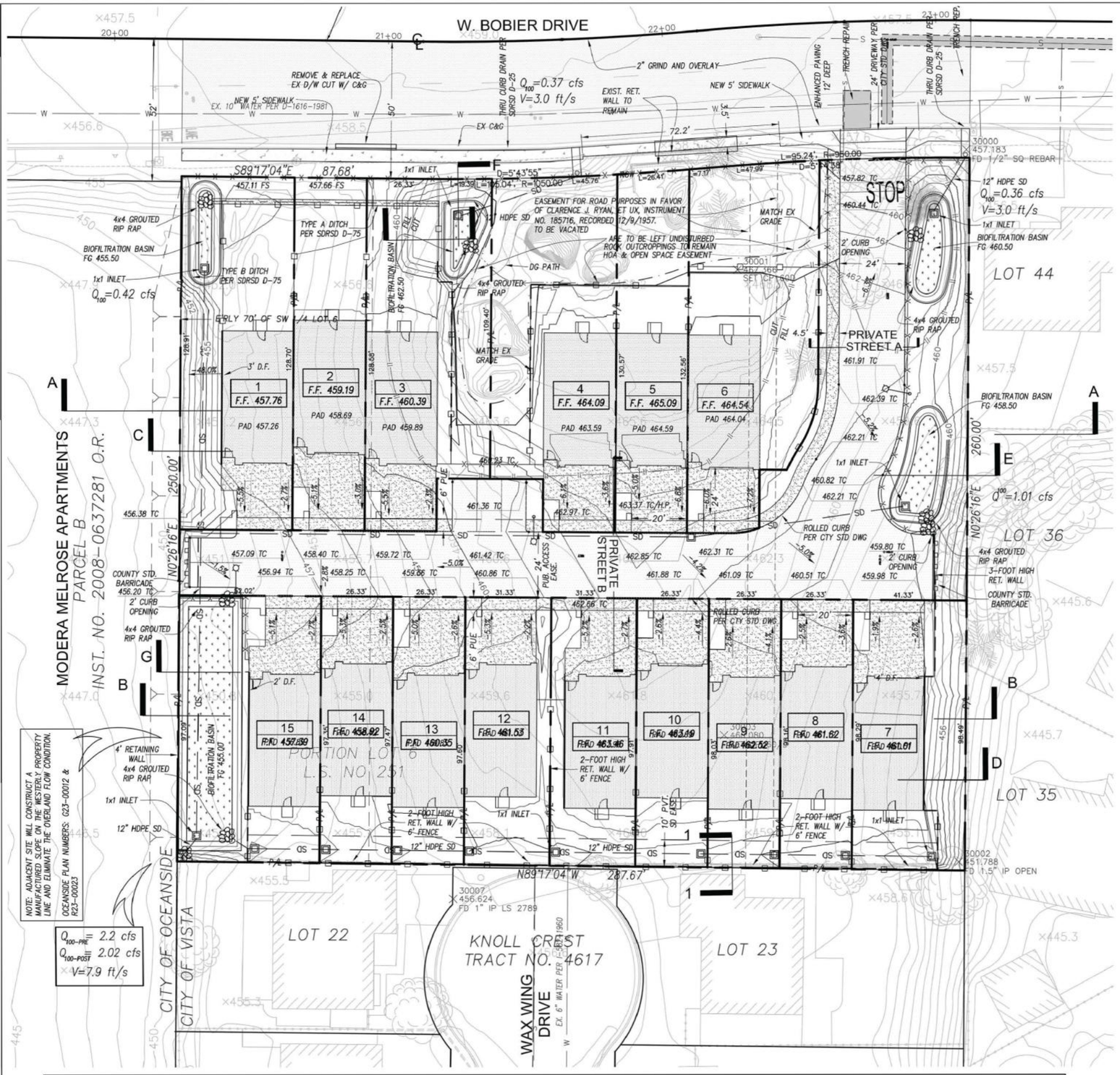
BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

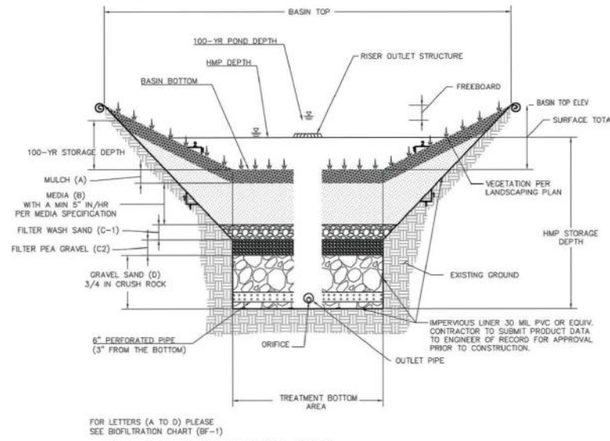
ADDRESS: 552 W. BOBIER DRIVE — SHEET 2 OF 16

REGISTERED PROFESSIONAL ENGINEER — MITCHELL D SCHWEITZER — No. 59658 Exp. 12-31-2025 — CIVIL — STATE OF CALIFORNIA

SWS ENGINEERING, INC.
CIVIL ENGINEERING ◆ LAND PLANNING ◆ SURVEYING
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

DATE: Dec 18, 24 10:26am by:Mike.Schweitzer
FILE:C:\Users\mike.schweitzer.SWSENGINEERING\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Planning\TSM\23-299_TSM02.dwg





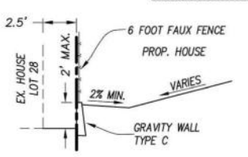
FOR LETTERS (A TO D) PLEASE SEE BIOFILTRATION CHART (BF-1)

BIOFILTRATION FACILITY DETAIL (IMPs 1,3,4,5)

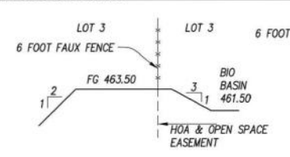
NTS

LEGEND

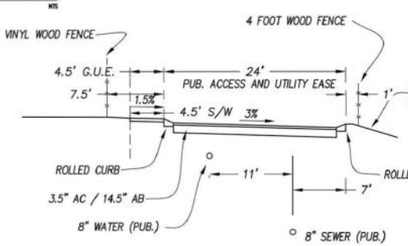
- PROPERTY LINE
- LOT LINE
- EXISTING WATERLINE — W
- EXISTING SEWER MAIN — S
- EXISTING GAS LINE — G
- EXISTING STORM DRAIN — SD
- LOT NUMBER / FINISHED FLOOR ELEVATION — 1 / 453.00
- RETAINING WALL
- 6' VINYL WOOD FENCE
- 4' VINYL WOOD FENCE
- PROPOSED WATERLINE — W
- PROPOSED SEWER MAIN — S
- PROPOSED GAS LINE — G
- PROPOSED STORM DRAIN — SD



SECTION 1-1
N.T.S.

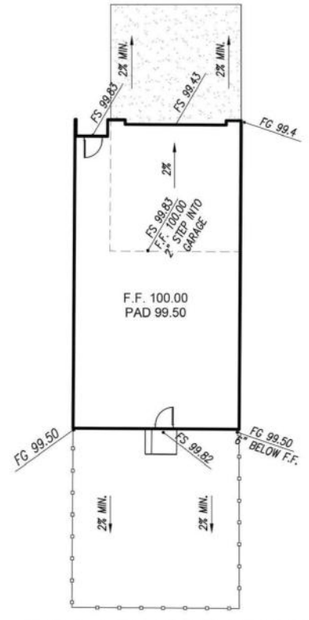


SECTION 2-2
N.T.S.

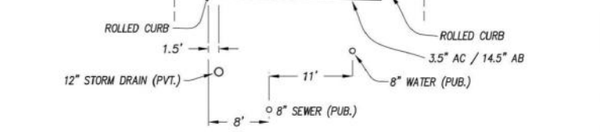


PRIVATE ROAD SECTION A
N.T.S.

NOTES:
1. REAR DOOR LANDING TO BE 1" BELOW F.F.
2. GRADE OUTSIDE OF THE REAR DOOR LANDING TO BE 6" BELOW F.F.
3. SITE SECTIONS ON SHEET 6.
4. AN IN LIEU FEE WILL BE REQUIRED FOR THE FUTURE MEDIAN CONSTRUCTION ALONG THE PROJECT FRONTAGE.



TYPICAL BUILDING GRADING
N.T.S.



PRIVATE ROAD SECTION B
N.T.S.

SCALE IN FEET
GRAPHIC SCALE

BIOFILTRATION CHART (BF-1)

DMA #	IMP #	ORIFICE DIAMETER (IN)	ORIFICE INVERT ELEVATION (FT)	OUTLET PIPE (IN)	# OF RISERS	GRATE SIZE IN FEET (X,Y)	BASIN TOTAL SURFACE * DEPTH (IN)	BASIN REQUIRED TREATMENT AREA (SF)	BASIN BOTTOM AREA (SF)	BASIN PROVIDED TREATMENT AREA (SF)	PERFORATED PIPE DIAMETER (IN)	MULCH DEPTH "A" (IN)	AMENDED SOIL DEPTH "B" (IN)	FILTER COURSE DEPTH "C1&C2" (IN)**	STORAGE "D" (IN)***	BOTTOM BASIN ELEVATION (FT)	DISTANCE FROM BOTTOM OF POND TO TOP OF GRATE	TOP OF GRATE ELEVATION++ (FT)	DCV (CF)	VOLUME PROVIDED**** (CF)	HMP ELEVATION (FT)	100YR ELEVATION (FT)	EFFECTIVE ELEVATION (FT)	TOP OF BERM ELEVATION (FT)	PROVIDED FREE BOARD (IN)	SIDE SLOPE Z:1
1	1	0.25	459.50'	6	1	1' X 1'	21"	79	121	121	6"	3"	18"	6"	12"	462.50	0.83'	463.33'	144	336	463.33'	463.54'	463.66'	464.25	7.08"	2:1
3	3	0.25	457.50'	8	1	1' X 1'	21"	95	218	218	6"	3"	18"	6"	12"	460.50'	0.83'	461.33'	173	580	461.33'	461.53'	461.58'	462.25'	8.04"	2:1
5	4	0.26	455.50'	10	1	1' X 1'	21"	280	318	318	6"	3"	18"	6"	12"	458.50'	0.83'	459.33'	506	1,097	459.33'	459.60'	459.53'	460.25'	7.80"	2:1
6	5	0.25	451.00'	10	1	1' X 1'	21"	110	141	141	6"	3"	18"	6"	12"	455.50'	0.83'	456.33'	202	396	456.33'	456.63'	456.69'	457.25'	6.72"	2:1
7	6	0.8 / 3	450.25' / 455.25'	12	1	1' X 1'	21"	731	1400	1400	–	3"	18"	3"	33"	455.00'	0.83'	455.83'	1,339	6,095	455.83'	456.04'	455.86'	456.75'	8.52"	2:1

* FROM TOP OF MULCH TO TOP OF BERM
** 3" ASTM 33 (TOP) , 3" ASTM NO 8 (BOTTOM)
***(GRAVEL, ASTM 57) FOR IMPS (1,3,4,5), AQUASAVE FOR IMP-6
++PER HMP
**** INCLUDES: 12" SURFACE 100% VOID SOIL, GRAVEL 40% VOID 90% VOID FOR AQUASAVE STORAGE (IMP-6)

CITY of VISTA	SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330	
OWNER: MCRT MELROSE VISTA, LLC	PHONE: (760) 744-0011
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122	
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.	PHONE: (760) 744-0011
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078	
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES	
ZONE: R-1-B	APN(S): 161-030-07

SITE DATA AREA (SQ. FT.)		COVERAGE %	DWELLING UNITS		OPEN SPACE DATA	
			STUDIO	0	COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF	100%	1 BDRM	0	0	0
BLDG:	18,930	26%	2 BDRM	0	0	0
PARKING:	7,410	10.2%	3 BDRM	15	1,264	1,067
LOADING:(DRIVES):	10,424	14.3%	TOTAL UNITS	15	18,958	16,014
LANDSCAPE:	35,981	49.5%				

PARKING	ORD. REQ.	60			DRIVEWAY (SIZE & SLOPE)		SETBACKS	
GARAGE	30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY	N.A.	FRONT 20'	REAR 20'
COVERED	0	HANDICAP	0		2 WAY	24'	L. SIDE 0'	SPECIAL
OPEN	35	TOTAL	65	0	SLOPE	3-7%	R. SIDE 0'	ACCES. BLDG

GRADING, DRAINAGE AND UTILITY PLAN PLANNING CASE #P24-0164

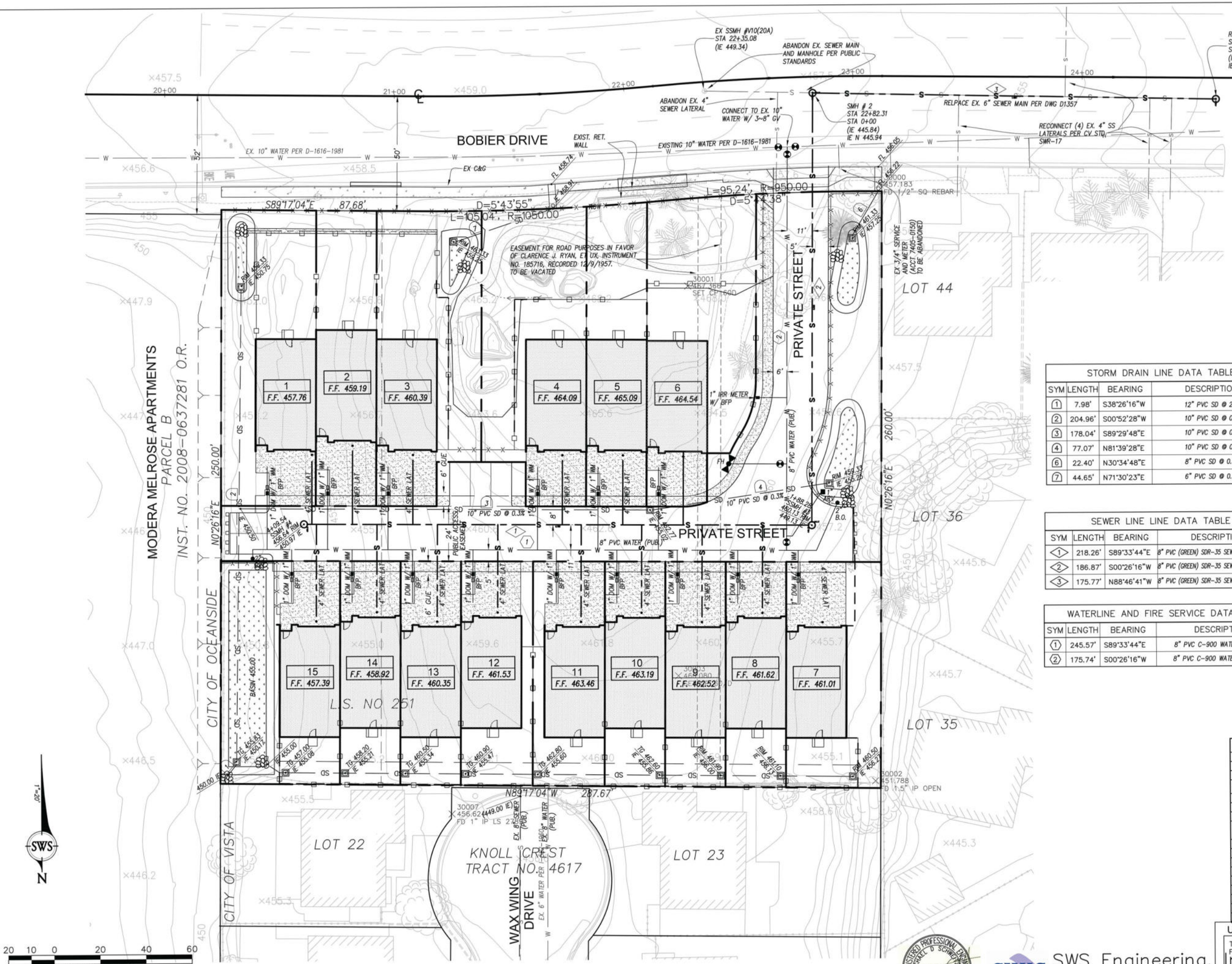
TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:
W. BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE SHEET 3 OF 20

REGISTERED PROFESSIONAL ENGINEER — MICHAEL D. SCHWERDTFEGER — No. 59658 Exp. 12-31-2025 — CIVIL — STATE OF CALIFORNIA

SWS Engineering, Inc.
CIVIL ENGINEERING • LAND PLANNING • SURVEYING
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

DATE: Mar 12, 25 3:31pm by:missy.fatini
FILE:C:\Users\missy.fatini\OD\ACCDocs\SWS Engineering\2025\Project Files\25-2981PRO\Planning\TSM\17x36_TSM15.dwg



SEWER NOTES

1. PROPOSED PUBLIC 8" PVC SEWER MAIN TO BE DESIGNED, CONSTRUCTED AND INSPECTED PER PUBLIC STANDARDS.
2. DESIGN CRITERIA:
   - 2.1. SWR MAIN PIPE – 8" PVC SDR-35 (GREEN) AT 0.75% MIN. SLOPE W/ 5' MIN. COVER OVER PIPE.
   - 2.2. SWR LATERAL PIPE – 4" MIN. PVC, SDR-35 (GREEN) AT 2% SLOPE WITH TWO-WAY SCO AND A UTILITY BOX (TYP.)
   - 2.3. MANHOLE – 60" SMH PER CV SM-02 & SWR-04 (EPOXY LINED & SPARK TESTED) AND 7-FT (MIN.) COVER OVER PIPE UNLESS OTHERWISE APPROVED.
3. ALL PRIVATE AND PUBLIC SEWER FACILITIES TO BE INSPECTED IN THE PRESENCE OF THE ENGINEERING FIELD INSPECTOR. WORK WITHOUT PROPER INSPECTION WILL BE REJECTED.
4. ALL NEW SEWER MAINS (PVT/PUB) ARE TO BE POST-CCTV INSPECTED.

SEWER LATERAL NOTES

1. MAINTAIN 4' (MIN) SEPARATION BETWEEN SEWER LATERALS (REFER TO THE MOST CURRENT CBC-PLUMBING)
2. MAINTAIN 5' (MIN) SEPARATION BETWEEN SEWER MANHOLE EDGE AND SEWER LATERAL.
3. RECONNECT EX. SEWER LATERALS (3) PER CV STD DWG SWR-17.

STORM DRAIN LINE DATA TABLE (PVT.)			
SYM	LENGTH	BEARING	DESCRIPTION
1	7.98'	S38°26'16"W	12" PVC SD @ 2%
2	204.96'	S00°52'28"W	10" PVC SD @ 0.3%
3	178.04'	S89°29'48"E	10" PVC SD @ 0.8%
4	77.07'	N81°39'28"E	10" PVC SD @ 0.3%
6	22.40'	N30°34'48"E	8" PVC SD @ 0.5%
7	44.65'	N71°30'23"E	6" PVC SD @ 0.5%

SEWER LINE LINE DATA TABLE			
SYM	LENGTH	BEARING	DESCRIPTION
1	218.26'	S89°33'44"E	8" PVC (GREEN) SDR-35 SEWER @ 0.7% (PUB.)
2	186.87'	S00°26'16"W	8" PVC (GREEN) SDR-35 SEWER @ 0.7% (PUB.)
3	175.77'	N88°46'41"W	8" PVC (GREEN) SDR-35 SEWER @ 1.5% (PUB.)

WATERLINE AND FIRE SERVICE DATA TABLE			
SYM	LENGTH	BEARING	DESCRIPTION
1	245.57'	S89°33'44"E	8" PVC C-900 WATER MAIN (PUB.)
2	175.74'	S00°26'16"W	8" PVC C-900 WATER MAIN (PUB.)

CITY of VISTA — SHEET

P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330

OWNER: MCRT MELROSE VISTA, LLC — PHONE: (760) 744-0011

ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122

ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC. — PHONE: (760) 744-0011

ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078

TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES

ZONE: R-1-B — APN(S): 161-030-07

SITE DATA				DWELLING UNITS		OPEN SPACE DATA	
AREA (SQ. FT.)		COVERAGE %		STUDIO	0	COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF	100%		1 BDRM	0	0	0
BLDG:	18,930	26%		2 BDRM	0	0	0
PARKING:	7,410	10.2%		3 BDRM	15	1,264	1,067
LOADING (DRIVES)	10,424	14.3%		TOTAL UNITS	15	18,958	16,014
LANDSCAPE:	35,981	49.5%		DRIVEWAY (SIZE & SLOPE)			
PARKING	ORD. REQ.	60		SETBACKS			
GARAGE 30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY N.A.	FRONT 20'	REAR 20'	
COVERED 0	HANDICAP	0		2 WAY 24'	L. SIDE 0'	SPECIAL	
OPEN 35	TOTAL	65	0	SLOPE 3-7%	R. SIDE 0'	ACCES. BLDG	

UTILITY PLAN — PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

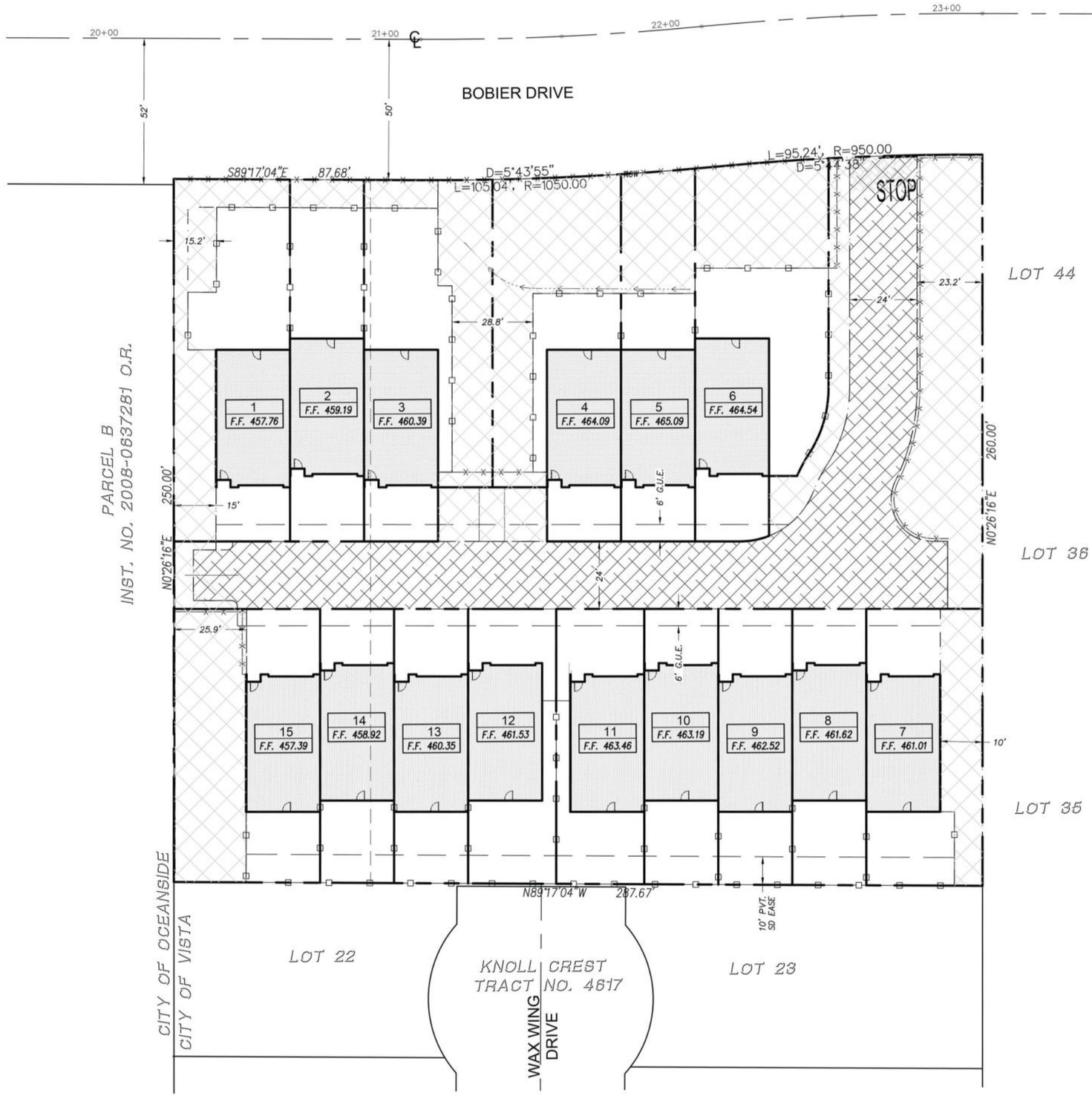
BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE — SHEET 4 OF 20

REGISTERED PROFESSIONAL ENGINEER — MICHAEL D SCHWEITZER — No. 59658 — Exp. 12-31-2025 — CIVIL — STATE OF CALIFORNIA

SWS Engineering, Inc.
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1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

DATE: Mar 12, 25 3:29pm by: massy.fatini
FILE: C:\Users\massy.fatini\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PRCD\Planning\TSM\23-299_TSM04.dwg



EASEMENT NOTES

HOA MAINTENANCE, OPEN SPACE & DRAINAGE EASEMENT
17,533 SF

PUBLIC ACCESS AND UTILITY EASEMENT
9,939 SF

1"=20'

N

20 10 0 20 40 60
SCALE IN FEET
GRAPHIC SCALE

CITY of VISTA							SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330							
OWNER: MCRT MELROSE VISTA, LLC					PHONE: (760) 744-0011		
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122							
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.					PHONE: (760) 744-0011		
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078							
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES							
ZONE: R-1-B					APN(S): 161-030-07		
SITE DATA					DWELLING UNITS		OPEN SPACE DATA
AREA (SQ. FT.)			COVERAGE %		STUDIO	0	COMMON/BDRM / PRIVATE/UNIT
LOT:	72,745 SF		100%		1 BDRM	0	0 / 0
BLDG:	37,800		26%		2 BDRM	0	0 / 0
PARKING:	7,410		10%		3 BDRM	15	1,264 / 1,067
LOADING (DRIVES):	10,424		14.3%		TOTAL UNITS	15	18,958 / 16,014
LANDSCAPE:	17,454		24%		DRIVEWAY (SIZE & SLOPE)		
PARKING	ORD. REQ.	60			SETBACKS		
GARAGE 30	LOADING	0	REC. VEH. STORAGE SPACES	0	1 WAY N.A.	FRONT 20'	REAR 20'
COVERED 0	HANDICAP	0			2 WAY 24'	L. SIDE 0'	SPECIAL
OPEN 35	TOTAL	65			SLOPE 3-7%	R. SIDE 0'	ACCES. BLDG

EASEMENT EXHIBIT

PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330
FOR:

BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

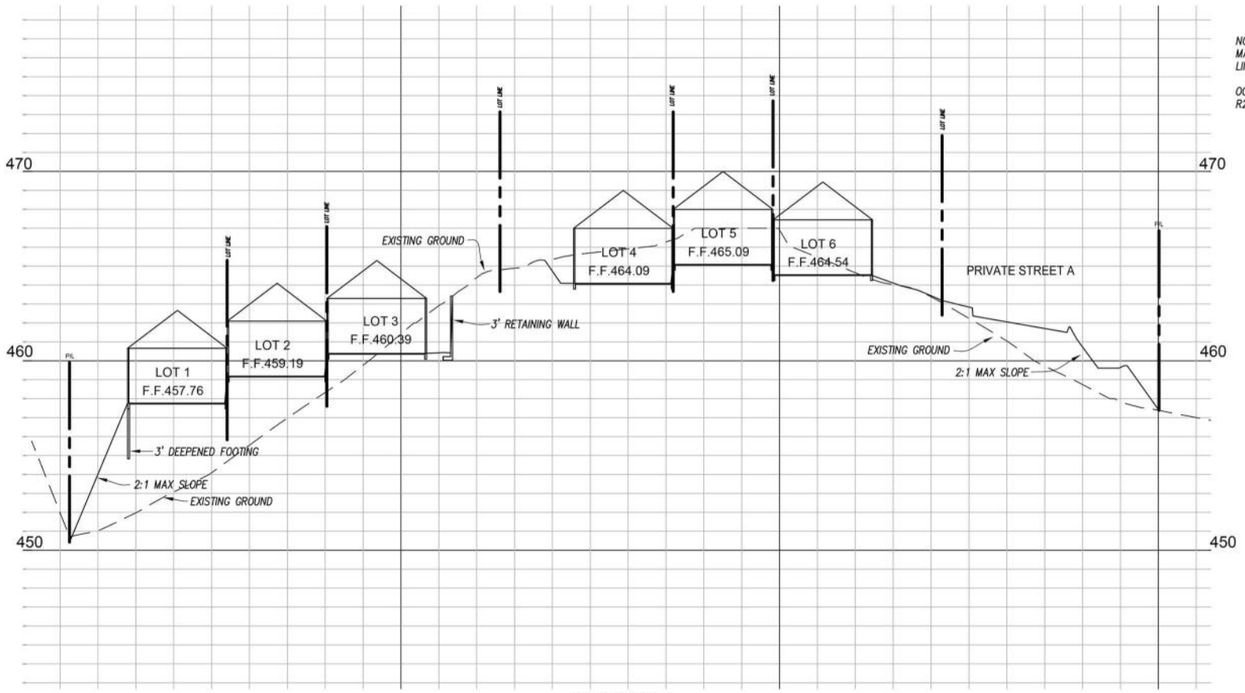
ADDRESS: 552 W. BOBIER DRIVE

SHEET 5 OF 16

REGISTERED PROFESSIONAL ENGINEER
MICHAEL D SCHWEITZER
No. 59658
Exp. 12-31-2025
CIVIL
STATE OF CALIFORNIA

SWS ENGINEERING, INC.
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SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

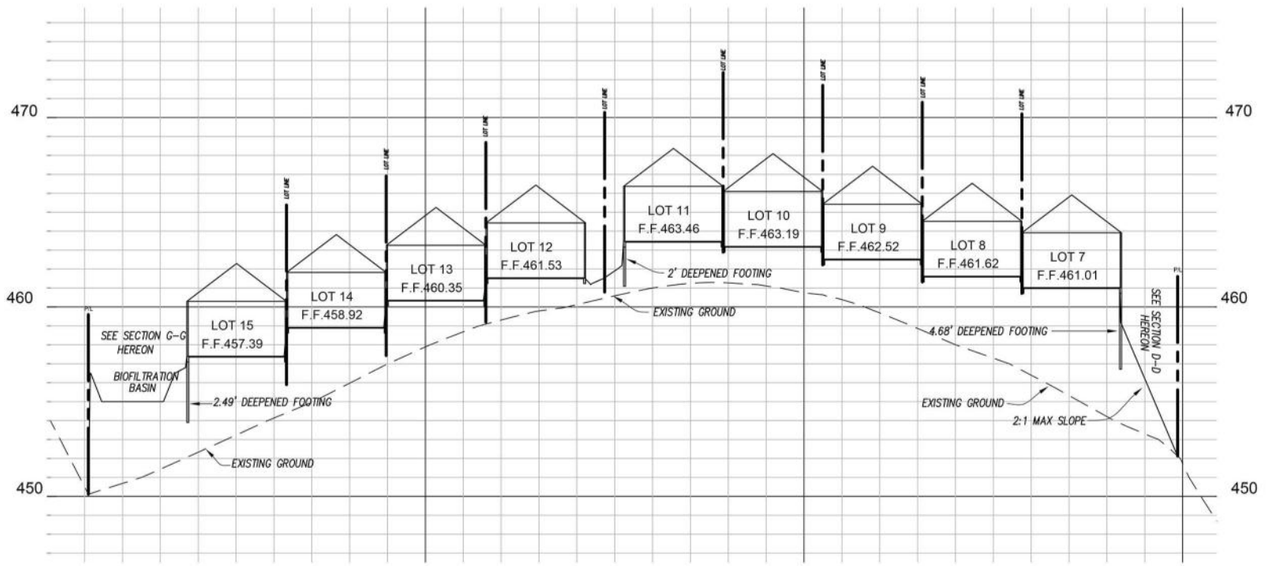
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SECTION A-A

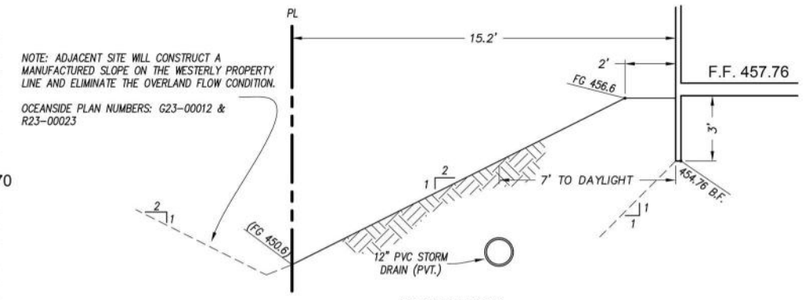
SCALE: H: 1" = 20' V: 1" = 4'

NOTE: THE VERTICAL EXAGGERATION OF THE HOMES IS NOT TO SCALE.



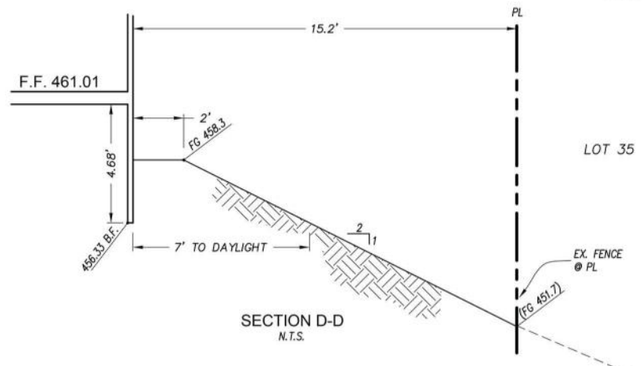
SECTION B-B

SCALE: H: 1" = 20' V: 1" = 4'



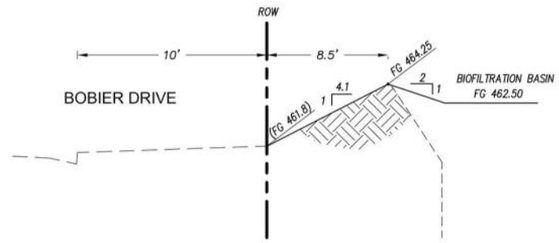
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N.T.S.



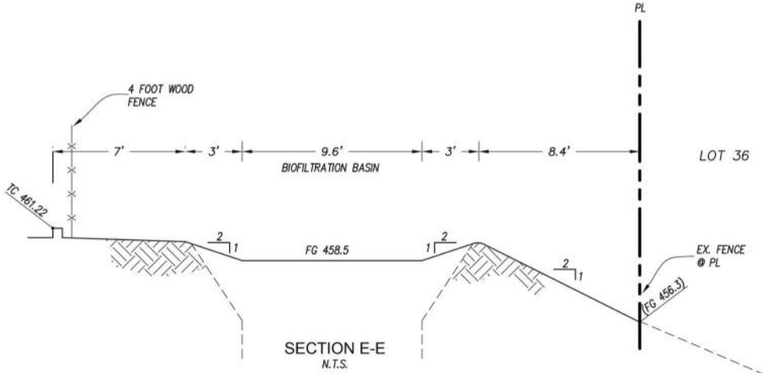
SECTION D-D

N.T.S.



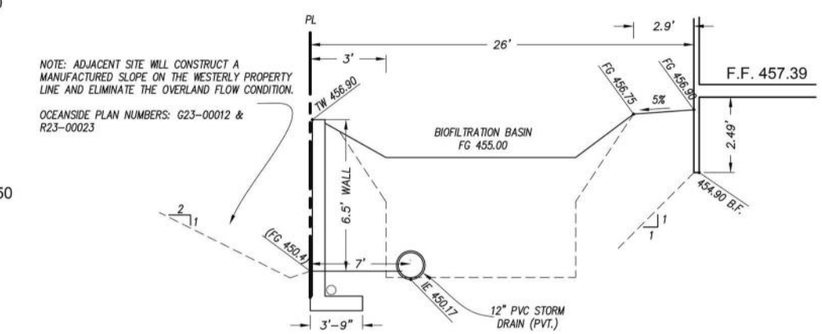
SECTION F-F

N.T.S.



SECTION E-E

N.T.S.



SECTION G-G

N.T.S.

NOTES:

1. SEE SHEET 3 FOR THE BIOFILTRATION TABLE AND THE STANDARD CROSS SECTION DETAIL.

CITY of VISTA						SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330						
OWNER: MCRT MELROSE VISTA, LLC					PHONE: (760) 744-0011	
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122						
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.					PHONE: (760) 744-0011	
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078						
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES						
ZONE: R-1-B					APN(S): 161-030-07	
SITE DATA AREA (SQ. FT.)				DWELLING UNITS		OPEN SPACE DATA
			COVERAGE %	STUDIO	0	COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF		100%	1 BDRM	0	0	0
BLDG:	18,930		26%	2 BDRM	0	0	0
PARKING:	7,410		10.2%	3 BDRM	15	1,264	1,067
LOADING: (DRIVES)	10,424		14.3%	TOTAL UNITS	15	18,958	16,014
LANDSCAPE:	35,981		49.5%	DRIVEWAY (SIZE & SLOPE)			
PARKING		ORD. REQ.	60	SETBACKS			
GARAGE	30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY N.A.	FRONT 20'	REAR 20'
COVERED	0	HANDICAP	0		2 WAY 24'	L. SIDE 0'	SPECIAL
OPEN	35	TOTAL	65	0	SLOPE 3-7%	R. SIDE 0'	ACCES. BLDG

SITE SECTIONS — PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

BOBIER DRIVE 15-LOT SUBDIVISION

VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE — SHEET 6 OF 20

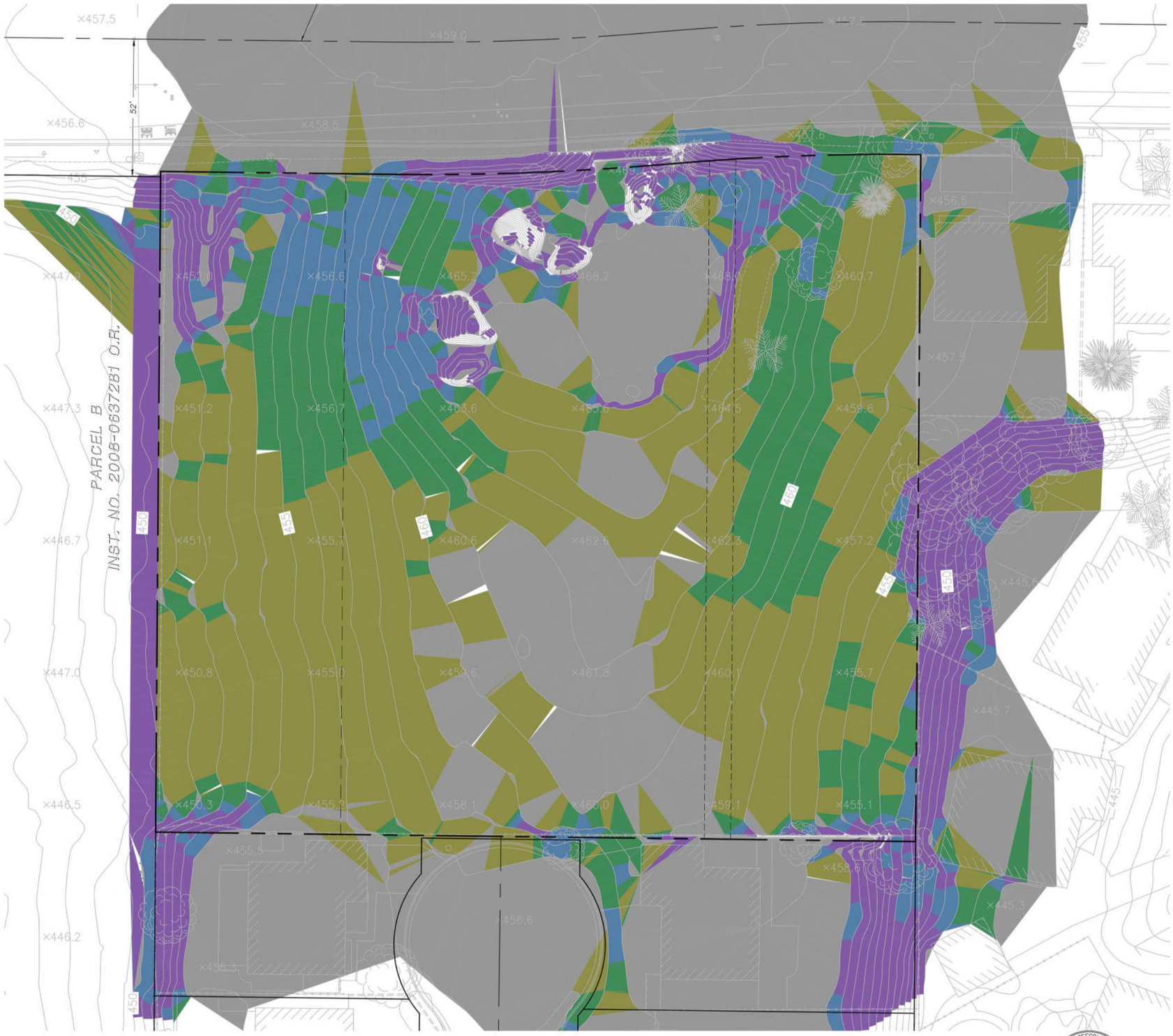
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SCALE IN FEET
GRAPHIC SCALE

REGISTERED PROFESSIONAL ENGINEER — MICHAEL D SCHNEIDER — No. 59658 — Exp. 12-31-2025 — CIVIL — STATE OF CALIFORNIA

SWS Engineering, Inc.
CIVIL ENGINEERING • LAND PLANNING • SURVEYING
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO · NASHVILLE · PHOENIX · ORLANDO

DATE: Mar 12, 25 3:28pm by:massy.fotini
FILE:C:\Users\massy.fotini\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Planning\TSM\23-299_TSM06.dwg



SLOPE LEGEND

	0% – 5%	0.33 ACRES
	6% – 10%	0.77 ACRES
	11% – 15%	0.30 ACRES
	16% – 25%	0.15 ACRES
	25% AND GREATER	0.12 ACRES
		1.67 TOTAL ACRES

ENGINEER

MICHAEL D. SCHWEITZER, P.E.
R.C.E. NO 59658 EXP. 12-31-2025
SWS ENGINEERING, INC.
1635 LAKE SAN MARCOS DRIVE, SUITE 200
SAN MARCOS, CA 92069
P: (760) 744-0011
F: (760) 744-0046

SOURCE OF TOPOGRAPHY

THE EXISTING TOPOGRAPHY AS SHOWN ON THESE PLANS IS BASED ON A FIELD SURVEY ON 2/15/22 BY C&V CONSULTING..

1"=20'

N

20 10 0 20 40 60
SCALE IN FEET
GRAPHIC SCALE

CITY of VISTA SHEET

P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330

OWNER: MCRT MELROSE VISTA, LLC PHONE: (760) 744-0011

ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122

ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC. PHONE: (760) 744-0011

ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078

TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES

ZONE: R-1-8 APN(S): 161-030-07

SITE DATA AREA (SQ. FT.)		COVERAGE %	DWELLING UNITS		OPEN SPACE DATA	
					COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF	100%	STUDIO	0	0	0
BLDG:	37,800	26%	1 BDRM	0	0	0
PARKING:	7,410	10%	2 BDRM	0	0	0
LOADING: (DRIVES)	10,424	14.3%	3 BDRM	15	1,264	1,067
LANDSCAPE:	17,454	24%	TOTAL UNITS	15	18,958	16,014
PARKING	ORD. REQ. 60		DRIVEWAY (SIZE & SLOPE)			
GARAGE 30	LOADING 0	REC. VEH. STORAGE SPACES 0	1 WAY N.A.		SETBACKS	
COVERED 0	HANDICAP 0		2 WAY 24'		FRONT 20'	REAR 20'
OPEN 35	TOTAL 65		SLOPE 3-7%		L. SIDE 0'	SPECIAL
					R. SIDE 0'	ACCES. BLDG

REGISTERED PROFESSIONAL ENGINEER MICHAEL D SCHWEITZER No. 59658 Exp. 12-31-2025 CIVIL STATE OF CALIFORNIA

SWS ENGINEERING, INC.
CIVIL ENGINEERING ◆ LAND PLANNING ◆ SURVEYING
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SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

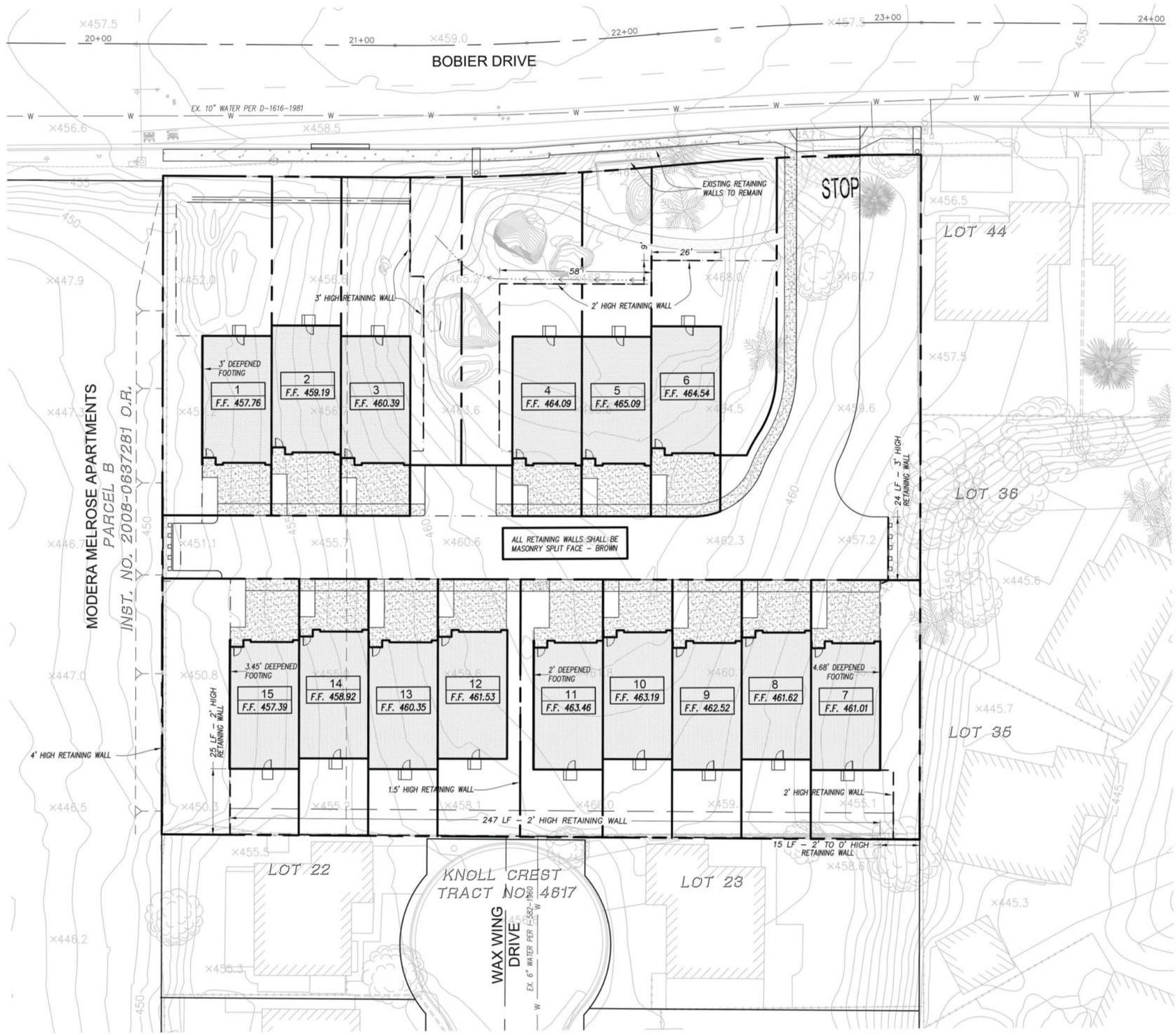
SLOPE ANALYSIS PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE SHEET 7 OF 16

DATE: Dec 18, 24 10:28am by:Mike.Schweitzer
FILE:C:\Users\mike.schweitzer.SWSENGINEERING\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Planning\TSM\23-299_TSM07.dwg



SCALE IN FEET
GRAPHIC SCALE

CITY of VISTA						SHEET
P24-0164 - TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330						
OWNER: MCRT MELROSE VISTA, LLC					PHONE: (760) 744-0011	
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122						
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.					PHONE: (760) 744-0011	
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078						
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES						
ZONE: R-1-8					APN(S): 161-030-07	
SITE DATA				DWELLING UNITS		OPEN SPACE DATA
AREA (SQ. FT.)			COVERAGE %	STUDIO	0	COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF		100%	1 BDRM	0	0	0
BLDG:	37,800		26%	2 BDRM	0	0	0
PARKING:	7,410		10%	3 BDRM	15	1,264	1,067
LOADING: (DRIVES)	10,424		14.3%	TOTAL UNITS	15	18,958	16,014
LANDSCAPE:	17,454		24%	DRIVEWAY (SIZE & SLOPE)			
PARKING		ORD. REQ.	60			SETBACKS	
GARAGE	30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY N.A.	FRONT 20'	REAR 20'
COVERED	0	HANDICAP	0		2 WAY 24'	L. SIDE 0'	SPECIAL
OPEN	35	TOTAL	65	0	SLOPE 3-7%	R. SIDE 0'	ACCES. BLDG

RETAINING WALL AND DEEPENED FOOTING PLAN PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

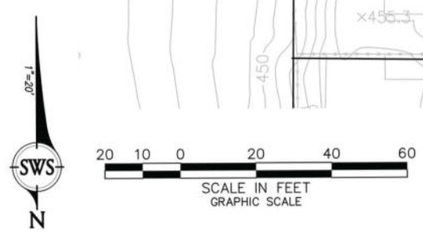
ADDRESS: 552 W. BOBIER DRIVE SHEET 8 OF 16

REGISTERED PROFESSIONAL ENGINEER MICHAEL D. SCHWEITZER No. 59658 Exp. 12-31-2025 CIVIL STATE OF CALIFORNIA

SWS ENGINEERING, INC.
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DATE: Dec 18, 24 10:28am by:Mike.Schweitzer
FILE:C:\Users\mike.schweitzer.SWSENGINEERING\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Planning\TSM\23-299_TSMGB.dwg





CITY of VISTA						SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330						
OWNER: MCRT MELROSE VISTA, LLC					PHONE: (760) 744-0011	
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122						
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.					PHONE: (760) 744-0011	
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078						
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES						
ZONE: R-1-8					APN(S): 161-030-07	
SITE DATA				DWELLING UNITS		OPEN SPACE DATA
AREA (SQ. FT.)		COVERAGE %		STUDIO	0	COMMON/BDRM / PRIVATE/UNIT
LOT:	72,745 SF	100%		1 BDRM	0	0 / 0
BLDG:	37,800	26%		2 BDRM	0	0 / 0
PARKING:	7,410	10%		3 BDRM	15	1,264 / 1,067
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LANDSCAPE:	17,454	24%		DRIVEWAY (SIZE & SLOPE)		
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GARAGE 30	LOADING 0	REC. VEH. STORAGE SPACES 0		1 WAY N.A.	FRONT 20'	REAR 20'
COVERED 0	HANDICAP 0			2 WAY 24'	L. SIDE 0'	SPECIAL
OPEN 35	TOTAL 65			SLOPE 3-7%	R. SIDE 0'	ACCES. BLDG

FIRE ACCESS PLAN — PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

BOBIER DRIVE 15-LOT SUBDIVISION VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE — SHEET 9 OF 16

REGISTERED PROFESSIONAL ENGINEER — MICHAEL D SCHWEITZER — No. 59658 — Exp. 12-31-2025 — CIVIL — STATE OF CALIFORNIA

SWS ENGINEERING, INC.
CIVIL ENGINEERING • LAND PLANNING • SURVEYING
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

DATE: Dec 18, 24 10:29am by:Mike.Schweitzer
FILE:C:\Users\mike.schweitzer.SWSENGINEERING\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Planning\TSM\23-299_TSM09.dwg

CITY OF VISTA
PLANNING CASE #24-0164
SITE DEVELOPMENT PLAN

15-LOTS

ASSESSOR'S PARCEL NUMBER
161-030-07

ZONING
EXISTING: R-1-B
PROPOSED: R-1-B

SITE AREA
1.67 ACRES EXISTING/PROPOSED

PROJECT DESCRIPTION
15-LOT SUBDIVISION

DENSITY
8.98 DU/ACRE
ALLOWABLE DENSITY MEDIUM DENSITY RESIDENTIAL (MD) - 10 DU/AC
1.67 AC * 10 = 16.7 DU
PROPOSED - 15 DU / 1.67 = 8.98 DU / AC

SITE ADDRESS
552 WEST BOBIER DRIVE
VISTA, CA

ENGINEER
SWS ENGINEERING, INC.
1635 LAKE SAN MARCOS DRIVE, SUITE 200
SAN MARCOS, CA 92069
P: (760) 744-0011
F: (760) 744-0046

OWNER
MCRT MELROSE VISTA LLC, A DELAWARE LLC
4320 La Jolla Village Drive | Suite 205 | San Diego, California, 92122

ARCHITECT
PSKISD
731 HGWY 101 #14
SOLANA BEACH, CA 92075
P: (858) 342-2185
PHILIP SZYMANSKI

LANDSCAPE ARCHITECT
GROUNDLEVEL
2605 STATE STREET b
SAN DIEGO, CA 92103
P: (619) 325-1992
BRAD LENAHAN

EARTHWORK QUANTITIES

CUT:	400 CY
FILL:	7,300 CY
IMPORT:	6,900 CY

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF OCEANSIDE, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

ALL THAT CERTAIN REAL PROPERTY SITUATED IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

THE SOUTHEAST QUARTER OF LOT 6 AND THE EAST 70 FEET OF THE SOUTHWEST QUARTER OF LOT 6, LYING NORTHERLY OF THE ATCHISON, TOPEKA AND SANTA FE RAILWAY RIGHT OF WAY IN SECTION 13, TOWNSHIP 11 SOUTH, RANGE 4 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF VISTA, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF.

EXCEPTING THEREFROM THAT PORTION THEREOF LYING WITHIN KNOLL CREST, ACCORDING TO MAP THEREOF NO. 4617, FILED IN THE OFFICE OK THE COUNTY RECORDER OF SAN DIEGO COUNTY.

ALSO EXCEPTING THEREFROM THAT PORTION THEREOF LYING WITHIN A STRIP OF LAND 50.00 FEET WIDE, LYING SOUTHERLY OF AND PARALLEL TO THE FOLLOWING DESCRIBED LINE:

BEGINNING AT THE NORTHWEST CORNER OF THE ABOVE DESCRIBED PROPERTY; THENCE SOUTH 89°48'32" EAST ALONG THE NORTH LINE OF THE SOUTHWEST QUARTER AND THE SOUTHEAST QUARTER OF LOT 6, 87.92 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE NORTH, SAID CURVE HAVING A 1000.00 FOOT RADIUS AND CENTRAL ANGLE OF 5°43'55"; THENCE ALONG THE ARC OF SAID CURVE 100.04 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE SOUTH, SAID CURVE HAVING A 1000.00 FOOT RADIUS AND A CENTRAL ANGLE OF 5°43'55";

THENCE ALONG THE ARC OF SAID CURVE 100.04 FEET TO A POINT FROM WHICH THE NORTHEAST CORNER THEREOF BEARS SOUTH 0°01'28" WEST, 10.00 FEET. THE SOUTHERLY LINE OF THE ABOVE DESCRIBED PARCEL OF LAND IS TO BE EXTENDED OR SHORTENED SO AS TO INTERSECT WITH THE EASTERLY AND WESTERLY LINES OF THE ABOVE DESCRIBED PROPERTY.

LAT. - 33°3'14" N
LONG. - 117°15'20" W
TOWNSHIP - T11S
RANGE - R4W
SECTION - S13

SIGNATURES CONSTITUTE THAT ALL PLANS, SPECIFICATIONS GUARANTEES, AND OTHER REQUIREMENTS NECESSARY FOR ISSUANCE OF A BUILDING PERMIT CONFORMING TO THIS SITE DEVELOPMENT PLAN HAVE BEEN COMPLETED AND APPROVED BY THE APPROPRIATE DEPARTMENT.

PLANNING DEPARTMENT	DATE
ENGINEERING DEPARTMENT	DATE
FIRE DEPARTMENT	DATE
PUBLIC WORKS DEPARTMENT	DATE



Lot Number	Lot Size (SF)
1	5323
2	3687
3	5202
4	5544
5	3462
6	5768
7	4067
8	2586
9	2583
10	2580
11	3065
12	3060
13	2568
14	2564
15	5057
A	15629
Avg. Residential Lot Size	3808

FEMA INFORMATION
FIRM MAP NUMBER - 06073C0757G
FLOOD ZONE - X

SOURCE OF TOPOGRAPHY
THE EXISTING TOPOGRAPHY AS SHOWN ON THESE PLANS IS BASED ON A FIELD SURVEY ON 2/15/22 BY C&V CONSULTING..

BENCHMARK
CITY OF OCEANSID BENCHMARK NO. GPS 1049.
ELEV = 417.22 NAVD88
DESCRIBED AS: 2.5" BRASS DISK SET IN CURB INLET ON TOP OF WESTERLY CURB INLET OF MELROSE DRIVE (+/-) 150' SOUTH OF SPRINTER RAIL ROAD TRACKS.

BASIS OF BEARINGS
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA SPATIAL REFERENCE SYSTEM (CSRS) ZONE 6, EPOCH 2017.50, AS DETERMINED LOCALLY BY G.P.S. MEASUREMENTS TAKEN ON 01/28/21 FROM CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS) CLBD AND VTOR OF THE CALIFORNIA REAL TIME NETWORK. I.E. N 48°24'33" E

PUBLIC SERVICE
WATER: VISTA IRRIGATION DISTRICT
1391 ENGINEER ST, VISTA, CA 92081
(760) 597-3100

REFUSE DISPOSAL: CITY OF VISTA
200 CIVIC CENTER DRIVE, VISTA, CA 92084
(760) 639-6177

SCHOOLS: VISTA UNIFIED SCHOOL DISTRICT
234 ARCADIA AVENUE, VISTA CA 92084
(760) 726-2170

FIRE: CITY OF VISTA FIRE DEPARTMENT
200 CIVIC CENTER DRIVE, VISTA, CA 92084
(760) 643-2801

POLICE: CITY OF VISTA
325 SOUTH MELROSE DR., STE. 210, VISTA, CA 92081
(760) 940-4551

ELECTRIC & NATURAL GAS: SDG&E
P.O. BOX 129831, SAN DIEGO, CA 92112-9831
1(800) 411-7343

TELEPHONE: PACIFIC BELL, COX
6205-B PEACHTREE DUNWOODY ROAD NE, ATLANTA, GA 30328
1(800) 234-3993

SANITARY SEWERS: CITY OF VISTA
200 CIVIC CENTER DRIVE, VISTA, CA 92084
(760) 639-6115

STORMDRAIN: CITY OF VISTA SPECIFICATIONS
200 CIVIC CENTER DRIVE, VISTA, CA 92084
(760) 639-6111

CABLE TV: COX CABLE
6205-B PEACHTREE DUNWOODY ROAD NE, ATLANTA, GA 30328
1(800) 234-3993

NOTES:

1. BUILDING SITE AREA IS THE TOTAL OF THE TWO FLOORS.
2. LANDSCAPE SITE AREA IS THE TOTAL OF THE AREA TO BE LANDSCAPED BY THE BUILDER, EXCLUDING THE BACKYARDS.
3. PARKING AREA INCLUDES DRIVEWAYS AND THE STREET PARKING STALLS.
4. PRIVATE OPEN SPACE VARIOUS PER LOT. SF SHOWN PER 3 BDRM HOUSE IS AN AVERAGE.

CITY of VISTA SHEET

P24-0164 - TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330
OWNER: MCRT MELROSE VISTA, LLC PHONE: (760) 744-0011
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC. PHONE: (760) 744-0011
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES
ZONE: R-1-B APN(S): 161-030-07

SITE DATA AREA (SQ. FT.)		COVERAGE %	DWELLING UNITS		OPEN SPACE DATA	
					COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF	100%	STUDIO	0	0	0
BLDG:	37,800	26%	1 BDRM	0	0	0
PARKING:	7,410	10%	2 BDRM	0	0	0
LOADING:(DRIVES)	10,424	14.3%	3 BDRM	15	1,264	1,067
LANDSCAPE:	17,454	24%	TOTAL UNITS	15	18,958	16,014

PARKING		ORD. REQ.	60		DRIVEWAY (SIZE & SLOPE)	SETBACKS	
GARAGE	30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY N.A.	FRONT 20'	REAR 20'
COVERED	0	HANDICAP	0		2 WAY 24'	L. SIDE 0'	SPECIAL
OPEN	35	TOTAL	65	0	SLOPE 3-7%	R. SIDE 0'	ACCES. BLDG

PLANNING CASE #P24-0164

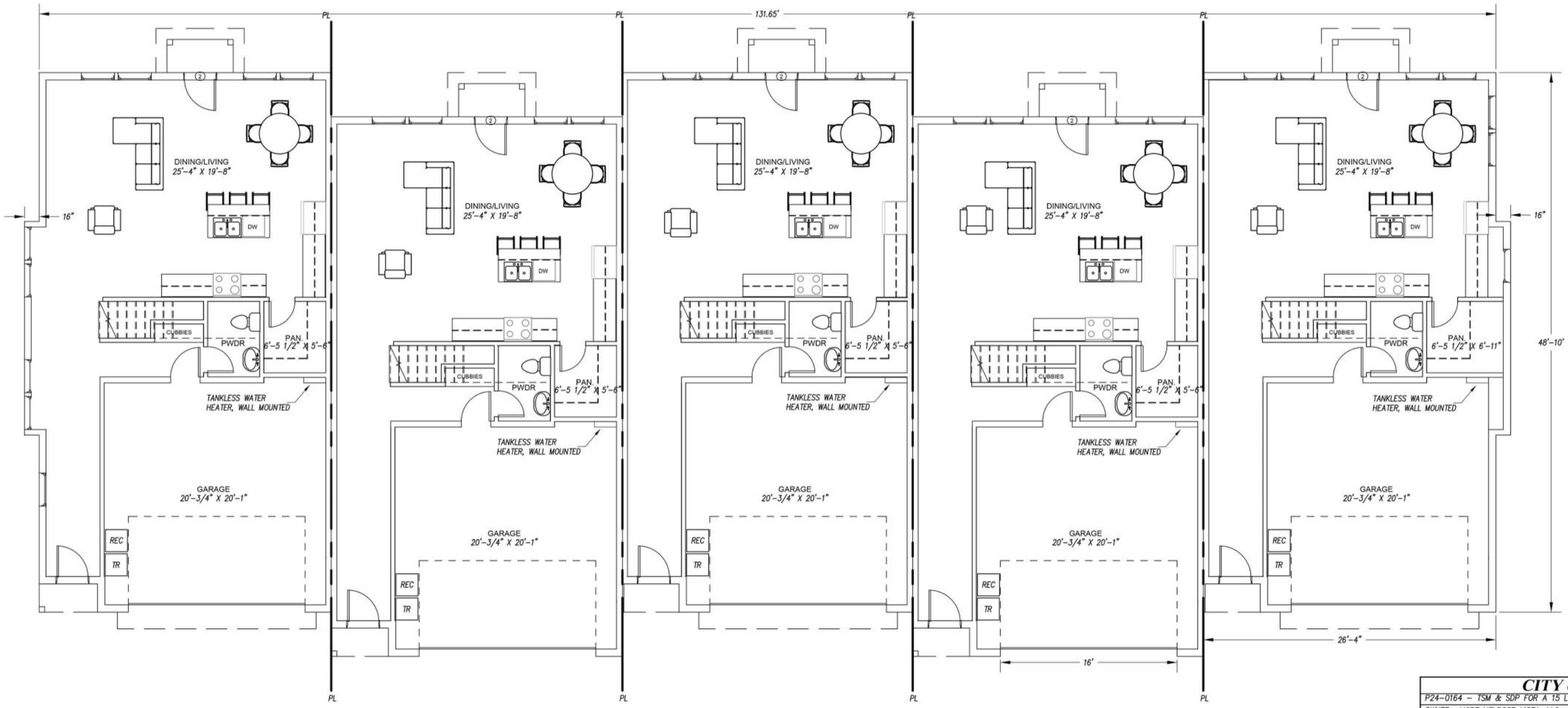
TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:
BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE SHEET 10 OF 16

REGISTERED PROFESSIONAL ENGINEER MITCHELL D SCHWEITZER No. 59658 Exp.12-31-2025 STATE OF CALIFORNIA CIVIL

SWS ENGINEERING, INC.
CIVIL ENGINEERING • LAND PLANNING • SURVEYING
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

DATE: Jan 02, 25 7:32am by: Mike.Schweitzer
FILE: C:\Users\mike.schweitzer.SWSENGINEERING\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Planning\SDP\23-299_SDP01.dwg



1ST FLOOR - FLOOR PLAN

CITY of VISTA							SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330							
OWNER: MCRT MELROSE VISTA, LLC						PHONE: (760) 744-0011	
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122							
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.						PHONE: (760) 744-0011	
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078							
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES							
ZONE: R-1-B						APN(S): 161-030-07	
SITE DATA AREA (SQ. FT.)			COVERAGE %	DWELLING UNITS		OPEN SPACE DATA	
						COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF		100%	STUDIO	0	0	0
BLDG:	37,800		26%	1 BDRM	0	0	0
PARKING:	7,410		10%	2 BDRM	0	0	0
LOADING:(DRIVES)	10,424		14.3%	3 BDRM	15	1,264	1,067
LANDSCAPE:	17,454		24%	TOTAL UNITS	15	18,958	16,014
PARKING		ORD. REQ.	60	DRIVEWAY (SIZE & SLOPE)			
GARAGE	30	LOADING	0	REC. VEH. STORAGE SPACES	0	SETBACKS	
COVERED	0	HANDICAP	0			1 WAY N.A.	FRONT 20' REAR 20'
OPEN	35	TOTAL	65			2 WAY 24'	L. SIDE 0' SPECIAL
						SLOPE 3-7%	R. SIDE 0' ACCES. BLDG

REGISTERED PROFESSIONAL ENGINEER MITCHELL D SCHWEITZER No. 59658 Exp.12-31-2025 CIVIL STATE OF CALIFORNIA

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SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

PLANNING CASE #P24-0164

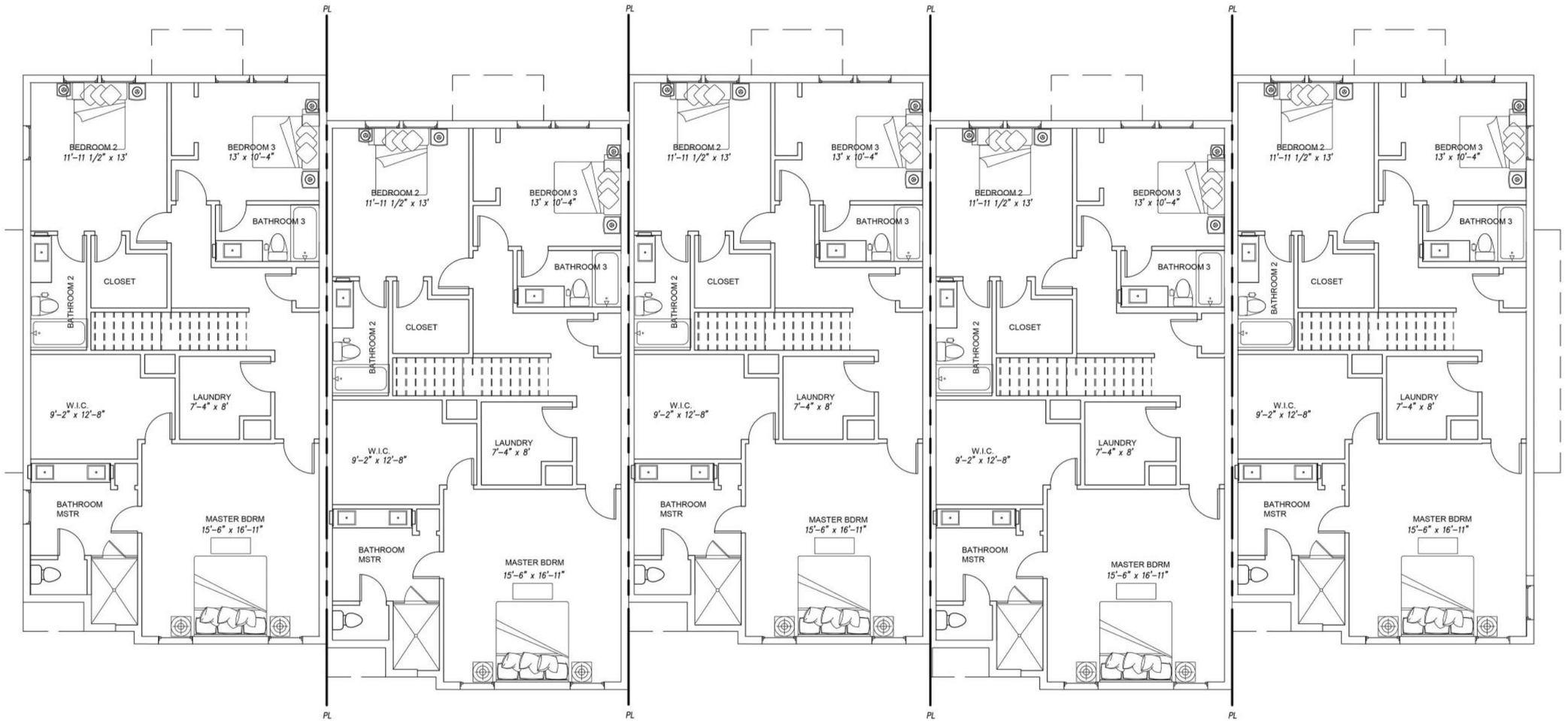
TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE

SHEET 11 OF 16

DATE: Jan 02, 25 7:16am by:Mike Schweitzer
FILE:C:\Users\mike.schweitzer.SWSENGINEERING\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PRCD\Planning\SDP\23-299_SDP02.dwg



2ND FLOOR - FLOOR PLAN

CITY of VISTA							SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330							
OWNER: MCRT MELROSE VISTA, LLC						PHONE: (760) 744-0011	
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122							
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.						PHONE: (760) 744-0011	
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078							
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES							
ZONE: R-1-B						APN(S): 161-030-07	
SITE DATA AREA (SQ. FT.)				DWELLING UNITS		OPEN SPACE DATA	
		COVERAGE %		STUDIO	0	COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF	100%		1 BDRM	0	0	0
BLDG:	37,800	26%		2 BDRM	0	0	0
PARKING:	7,410	10%		3 BDRM	15	1,264	1,067
LOADING: (DRIVES)	10,424	14.3%		TOTAL UNITS	15	18,958	16,014
LANDSCAPE:	17,454	24%		DRIVEWAY (SIZE & SLOPE)			
PARKING	ORD. REQ. 60			SETBACKS			
GARAGE 30	LOADING 0	REC. VEH. STORAGE SPACES 0		1 WAY N.A.	FRONT 20'	REAR 20'	
COVERED 0	HANDICAP 0			2 WAY 24'	L. SIDE 0'	SPECIAL	
OPEN 35	TOTAL 65			SLOPE 3-7%	R. SIDE 0'	ACCES. BLDG	

REGISTERED PROFESSIONAL ENGINEER MICHAEL D SCHWEITZER No. 59058 Exp. 12-31-2025 CIVIL STATE OF CALIFORNIA

SWS ENGINEERING, INC.
CIVIL ENGINEERING • LAND PLANNING • SURVEYING
1635 Lake San Marcos Drive, Suite 200
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P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

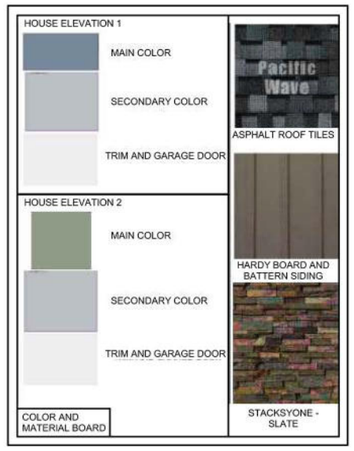
BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE

DATE: Jan 02, 25 7:17am by: Mike Schweitzer
FILE: C:\Users\mike.schweitzer.SWSENGINEERING\DC\ACCDocs\SWS Engineering\2023\Project Files\23-299\PROD\Planning\SDP\23-299_SDP02.dwg



1 EXTERIOR ELEVATION
3/16" = 1'-0"



CITY of VISTA							SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330							
OWNER: MCRT MELROSE VISTA, LLC				PHONE:			(760) 744-0011
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ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.				PHONE: (760) 744-0011			
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078							
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES							
ZONE: R-1-8				APN(S): 161-030-07			
SITE DATA				DWELLING UNITS		OPEN SPACE DATA	
AREA (SQ. FT.)		COVERAGE %		STUDIO	0	COMMON/BORN	PRIVATE/UNIT
LOT:	72,745 SF	100%		1 BORN	0	0	0
BLDG:	37,800	26%		2 BORN	0	0	0
PARKING:	7,410	10%		3 BORN	15	1,264	1,067
LOADING/DRIVES)	10,424	14.3%		TOTAL UNITS	15	18,958	16,014
LANDSCAPE:	17,454	24%					
PARKING	DIS. REQ.	60		DRIVEWAY (SCE & SLOPE)		SETBACKS	
GARAGE 30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY N.A.		FRONT 20'	REAR 20'
COVERED 0	HANDICAP	0		2 WAY 24'		L. SIDE 0'	SPECIAL
OPEN 35	TOTAL	65		SLOPE 5-7%		R. SIDE 0'	ACCES BLDG

PROPOSED EXTERIOR ELEVATION

SWS ENGINEERING, INC.
• LAND PLANNING • SURVEYING
1635 Lake San Marcos Drive, Suite 200
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SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330
FOR:
BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE

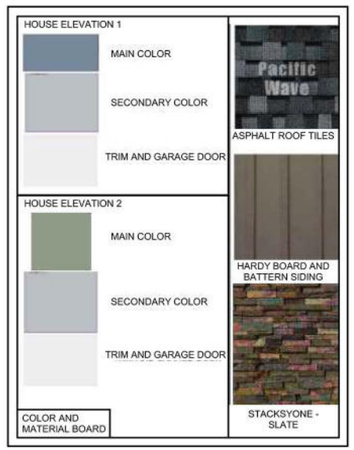
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2 EXTERIOR ELEVATION
3/16" = 1'-0"



1 EXTERIOR ELEVATION
3/16" = 1'-0"



PROPOSED EXTERIOR ELEVATIONS

SWS ENGINEERING, INC.
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TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES							
ZONE: R-1-8					APN(S): 161-030-07		
SITE DATA					DWELLING UNITS		OPEN SPACE DATA
AREA (SQ. FT.)			COVERAGE %		STUDIO	0	COMMON/BORN PRIVATE/UNIT
LOT:	72,745 SF		100%		1 BDRM	0	0 0
BLDG:	37,800		26%		2 BDRM	0	0 0
PARKING:	7,410		10%		3 BDRM	15	1,264 1,067
LOADING (DRIVES):	10,424		14.3%		TOTAL UNITS	15	18,958 16,014
LANDSCAPE:	17,454		24%		DRIVEWAY (SIZE & SLOPE):		
PARKING		ORD. REQ.	60		SETBACKS		
GARAGE	30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY: N.A.	FRONT: 20'	REAR: 20'
COVERED	0	HANDICAP	0		2 WAY: 24'	L. SIDE: 0'	SPECIAL
OPEN	35	TOTAL	65		SLOPE: 5-7%	R. SIDE: 0'	ACCES. BLDG

PLANNING CASE #P24-0164

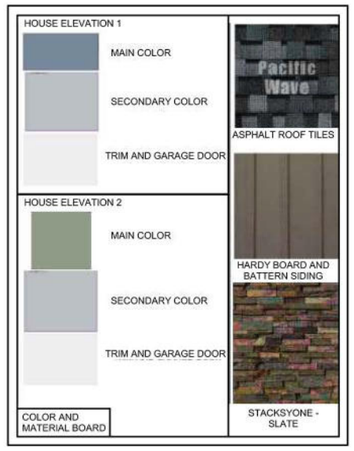
TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330
FOR:
BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE

12/27/2024 4:41:08 PM



1 EXTERIOR ELEVATION
3/16" = 1'-0"



CITY of VISTA							SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330							
OWNER: MCRT MELROSE VISTA, LLC				PHONE:			(760) 744-0011
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TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES							
ZONE: R-1-8				APN(S): 161-030-07			
SITE DATA				DWELLING UNITS		OPEN SPACE DATA	
AREA (SQ. FT.)		COVERAGE %		STUDIO	0	COMMON/BORN	PRIVATE/UNIT
LOT:	72,745 SF	100%		1 BDRM	0	0	0
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LANDSCAPE:	17,454	24%		DRIVEWAY (SCR & SLOPE):			
PARKING	DWL REQ:	60		SETBACKS			
GARAGE 30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY N.A.	FRONT 20'	REAR 20'	
CSVERED 0	HANDICAP	0		2 WAY 24'	L. SIDE 0'	SPECIAL	
OPEN 35	TOTAL	65		SLOPE 5-7%	R. SIDE 0'	ACCES BLDG	

PROPOSED EXTERIOR ELEVATION

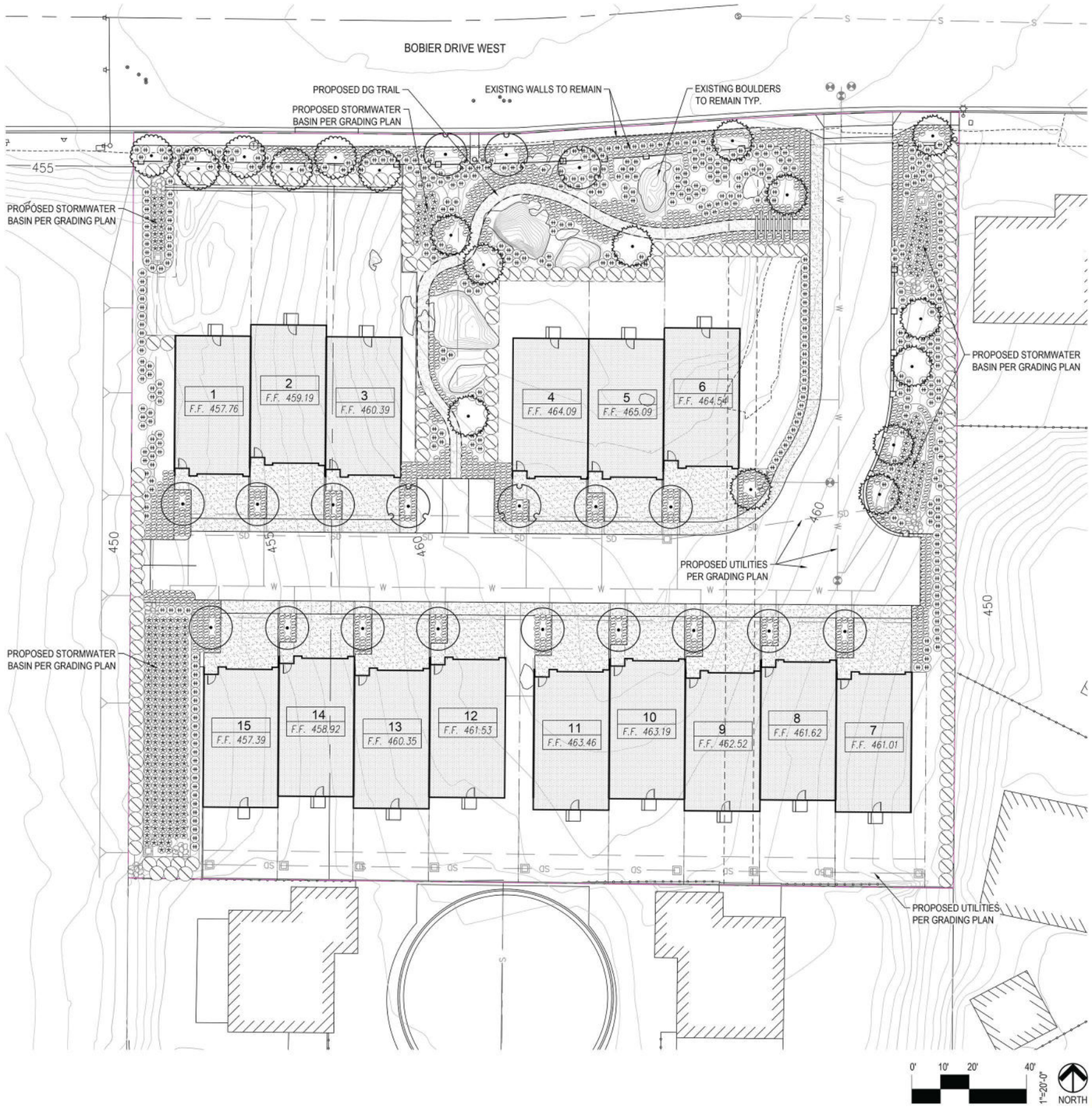
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PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:
BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE

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PLANT SCHEDULE

	BOTANICAL NAME	COMMON NAME	SIZE	WUCOLS	QTY
TREES					
	CHILOPSIS LINEARIS	DESERT WILLOW	24" BOX	VL	5
	LOPHOSTEMON CONFERTUS	BRISBANE BOX	24" BOX	M	6
	QUERCUS AGRIFOLIA	COAST LIVE OAK	24" BOX	VL	12
	ULMUS PARVIFOLIA 'TRUE GREEN'	TRUE GREEN LACEBARK ELM	24" BOX	L	14
				TOTAL=	37
5'-8' TALL/WIDE EVERGREEN SCREENING SHRUBS					
	HETEROMELES ARBUTIFOLIA	TOYON	15 GAL	VL	
	RHUS OVATA	SUGAR BUSH	15 GAL	VL	
2'-3' TALL/WIDE MID-GROUND SHRUBS			50% 5GAL/1GAL		
	BAHIOPSIS LACINIATA	SAN DIEGO COUNTY SUNFLOWER	50/50	VL	
	GALVEZIA SPECIOSA 'FIRECRACKER'	FIRECRACKER ISLAND SNAPDRAGON	50/50	VL	
	MUHLENBERGIA RIGENS	DEER GRASS	50/50	L	
	SALVIA CLEVELANDII 'WINNIFRED GILMAN'	WINNIFRED GILMAN CLEVELAND SAGE	50/50	VL	
	SALVIA LEUCANTHA 'SANTA BARBARA'	SANTA BARBARA MEXICAN BUSH SAGE	50/50	L	
1'-2' TALL/WIDE FOREGROUND GROUNDCOVERS & GRASSES			50% 5GAL/1GAL		
	BOUTELOUA GRACILIS 'BLONDE AMBITION'	BLONDE AMBITION BLUE GRAMA	50/50	L	
	DIANELLA REVOLUTA 'DR5000'	LITTLE REV™ FLAX LILY	50/50	L	
	ERIGERON GLAUCUS 'WAYNE RODERICK'	WAYNE RODERICK SEASIDE DAISY	50/50	L	
	LESSINGIA FILAGINIFOLIA 'SILVER CARPET'	SILVER CARPET ASTER	50/50	L	
	LOMANDRA CONFERTIFOLIA 'POM POM'	SHORTY MAT RUSH	50/50	L	
	ROSMARINUS OFFICINALIS 'HUNTINGTON CARPET'	HUNTINGTON CARPET ROSEMARY	50/50	L	
STORMWATER BASIN GRASSES & RUSHES			50% 5GAL/1GAL		
	CAREX PANSA	MEADOW SEDGE	50/50	M	
	CHONDROPETALUM TECTORUM	SMALL CAPE RUSH	50/50	L	
	JUNCUS PATENS	CALIFORNIA GRAY RUSH	50/50	L	

CITY of VISTA							SHEET
P24-0164 – TSM & SDP FOR A 15 LOTS SUBDIVISION PER SB330							
OWNER: MCRT MELROSE VISTA, LLC					PHONE: (760) 744-0011		
ADDRESS: 4320 LA JOLLA VILLAGE DRIVE, #205, LA JOLLA, CA 92122							
ARCHITECT, ENGINEER OR DESIGNER: SWS ENGINEERING, INC.					PHONE: (760) 744-0011		
ADDRESS: 1635 LAKE SAN MARCOS DRIVE, STE 200, SAN MARCOS, CA 92078							
TYPE OF DEVELOPMENT: 15-LOT TSM W/ 2 STORY HOMES							
ZONE: R-1-B					APN(S): 161-030-07		
SITE DATA				DWELLING UNITS		OPEN SPACE DATA	
AREA (SQ. FT.)		COVERAGE %		STUDIO	0	COMMON/BDRM	PRIVATE/UNIT
LOT:	72,745 SF	100%		1 BDRM	0	0	0
BLDG:	37,800	26%		2 BDRM	0	0	0
PARKING:	7,410	10%		3 BDRM	15	1,264	1,067
LOADING:(DRIVES)	10,424	14.3%		TOTAL UNITS	15	18,958	16,014
LANDSCAPE:	17,454	24%		DRIVEWAY (SIZE & SLOPE)			
PARKING	ORD. REQ.	60				SETBACKS	
GARAGE 30	LOADING	0	REC. VEH. STORAGE SPACES	1 WAY N.A.		FRONT 20'	REAR 20'
COVERED 0	HANDICAP	0		2 WAY 24'		L. SIDE 0'	SPECIAL
OPEN 35	TOTAL	65	0	SLOPE 3-7%		R. SIDE 0'	ACCES. BLDG

LANDSCAPE PLAN

PLANNING CASE #P24-0164

TENTATIVE SUBDIVISION MAP & SITE DEVELOPMENT PLAN W/ SB330 FOR:

BOBIER DRIVE 15-LOT SUBDIVISION
VISTA, CA

ADDRESS: 552 W. BOBIER DRIVE

SHEET 16 OF 16

REGISTERED PROFESSIONAL ENGINEER MITCHELL D SCHWEITZER No. 59658 Exp. 12-31-2025 CIVIL STATE OF CALIFORNIA

SWS ENGINEERING, INC.
CIVIL ENGINEERING • LAND PLANNING • SURVEYING
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

DATE: Dec 23, 24 8:51am by pgann
FILE:P:\2024\24149 – Schweitzer Vista\Dwgs\Plot Sheets\24149 – Planting Plan Sheet.dwg

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