



WQ XX-XXXX

**County of Orange/Santa Ana Region
Priority Project
Preliminary Water Quality Management
Plan
(WQMP)**

Project Name:

Slater Avenue

APN: 169-121-01, 169-121-02, 169-121-11

Prepared for:

Slater Investments, LLC.

190 Newport Center Drive, Suite 100

Newport California, CA 92660

(494) 706-2042

Prepared by:

Huitt-Zollars

2603 Main Street, Suite 400

Irvine, CA 92614


(949) 988-5815

Date Prepared 08/17/2021

Project Owner's Certification			
Planning Application No. (If applicable)		Grading Permit No.	T.B.D.
Tract/Parcel Map and Lot(s) No.		Building Permit No.	T.B.D.
Address of Project Site and APN (If no address, specify Tract/Parcel Map and Lot Numbers)			APN 169-121-01, 169-121-02, 169-121-11

This Preliminary Water Quality Management Plan (WQMP) has been prepared for Slater Investments, LLC. by Huitt-Zollars. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan, including the ongoing operation and maintenance of all best management practices (BMPs), and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

Owner: Peggy Tabas				
Title	Managing Member			
Company	Slater Investments, LLC, a Delaware LLC			
Address	1501 Quail Street, Suite 100A. Newport Beach, CA 92660			
Email	ptabas@slaterinvestmentsllc.com			
Telephone #	(949) 433-1410			
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.				
Owner Signature			Date	8/17/2021

Preliminary Water Quality Management Plan (WQMP)
Slater Avenue

Preparer (Engineer): Jeffrey Okamoto

Title	Principle In Charge/Vice President	PE Registration #	46049
Company	Huitt-Zollars		
Address	2603 Main Street, Suite 400, Irvine, CA 92614		
Email	okamoto@huitt-zollars.com		
Telephone #	(949) 988-5815		

I hereby certify that this Water Quality Management Plan is in compliance with, and meets the requirements set forth in, Order No. R8-2009-0030/NPDES No. CAS618030, of the Santa Ana Regional Water Quality Control Board.

Preparer Signature		Date	8/17/2021
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Contents

Page No.

Section I	Permit(s) and Water Quality Conditions of Approval or Issuance	1
Section II	Project Description	3
Section III	Site Description	8
Section IV	Best Management Practices (BMPs)	11
Section V	Inspection/Maintenance Responsibility for BMPs	31
Section VI	BMP Exhibit (Site Plan)	35
Section VII	Educational Materials	36

Attachments

Attachment 1 .	Vicinity Map & WQMP Exhibit
Attachment 2 .	Site Plans
Attachment 3 .	Soils Information
Attachment 4 .	BMP Design Details
Attachment 5 .	Hydromodification
Attachment 6 .	Source Control
Attachment 7 .	O&M
Attachment 8 .	Educational Materials

Section I Permit(s) and Water Quality Conditions of Approval or Issuance

Provide discretionary or grading/building permit information and water quality conditions of approval, or permit issuance, applied to the project. If conditions are unknown, please request applicable conditions from staff. Refer to Section 2.1 in the Technical Guidance Document (TGD) available on the OC Planning website (ocplanning.net).

Project Information	
Permit/Application No. (If applicable)	Grading or Building Permit No. (If applicable) T.B.D.
Address of Project Site (or Tract Map and Lot Number if no address) and APN	APNs 169-121-01, 169-121-02, 169-121-11
Water Quality Conditions of Approval or Issuance	
Water Quality Conditions of Approval or Issuance applied to this project. (Please list verbatim.)	T.B.D.
Conceptual WQMP	
Was a Conceptual Water Quality Management Plan previously approved for this project?	Conditions of Approval are not available at this time. This section will be completed as part of final engineering.

Watershed-Based Plan Conditions	
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	N/A

Section II Project Description

II.1 Project Description

Provide a detailed project description including:

- Project areas;
- Land uses;
- Land cover;
- Design elements;
- A general description not broken down by drainage management areas (DMAs).

Include attributes relevant to determining applicable source controls. Refer to Section 2.2 in the Technical Guidance Document (TGD) for information that must be included in the project description.

Description of Proposed Project				
Development Category (From Model WQMP, Table 7.11-2; or -3):	Priority Project Category for North County Permit Area: <ul style="list-style-type: none"> • New Development project that creates 10,000 square feet or more of impervious surface; • Parking lots 5,000 square feet or more; • Significant redevelopment project 			
Project Area (ft ²): <u>145,500</u>	Number of Dwelling Units: TBD		SIC Code(s): 7521, 5821, 6513, 7999, 1771	
Project Area	Pervious		Impervious	
	Area (sq ft)	Percentage	Area (sq ft)	Percentage
Pre-Project Conditions	20,978	14.5%	124,522	85.5%
Post-Project Conditions	12,417	8.86%	133,083	91.14%
Drainage Patterns/Connections	Drainage runoff from the existing site flows, via sheet flow, toward Corazon Avenue, San Mateo Street and Slater Avenue where it is captured by inlets that outlet into the existing underground storm drain infrastructure. There is minimal on-site underground drainage infrastructure, which has been identified from site walks and aerial topography.			
	Drainage in the proposed condition is to maintain the same ultimate direction			

	<p>of flow (South east to the existing 48" storm drain pipe along Slater Avenue). Proposed site improvements include the construction of drain inlets and multiple bio treatment planter boxes to capture and convey runoff to the existing 48" storm drain line along Slater Avenue.</p>
<p>Narrative Project Description: (Use as much space as necessary.)</p>	<p>In the existing condition, the Project Site is comprised of General Commercial parcels (APNs 169-121-01, 169-121-02, 169-121-11). The Project Site is fully built-out, nearly 100% impervious, and mainly consists of asphalt parking lots, commercial buildings, and minor landscape areas. The Project will demolish and remove the existing parking lots and buildings and proposes a Mixed-use development with apartments, restaurants, associated utilities, a parking lot, a recreational facility that includes a swimming pool, pocket parks, landscape areas and concrete walkways. It was calculated that the proposed site will consist of 91.1% (133,083 square feet) of impervious surfaces (roofs, concrete sidewalks, parking and hardscape) and 8.9% (12,417 square feet) of pervious surfaces (open space, trees, plants and grass).</p> <p>Drainage from the roofs, hardscape, landscape and recreational facility will sheet flow via downspouts and proposed inlets and into biotreatment planter box units. No infiltration will be allowed due shallow groundwater depth (less than or equal to 5 feet) on the Project Site. Stormwater runoff will be treated by the biotreatment planter box units and discharge into the existing underground storm drain infrastructure located on the south east of the site. The proposed swimming pool will drain via a sanitary sewer line (grey water).</p> <p>Trash receptacles will be provided to the residents and trash enclosures will be proposed for the development.</p>

II.2 Potential Stormwater Pollutants

Determine and list expected stormwater pollutants based on land uses and site activities. *Refer to Section 2.2.2 and Table 2.1 in the Technical Guidance Document (TGD) for guidance.*

Pollutants of Concern		
Pollutant	Check One for each: E=Expected to be of concern N=Not Expected to be of concern	Additional Information and Comments
Suspended-Solid/ Sediment	E <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Nutrients	E <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Heavy Metals	E <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Pathogens (Bacteria/Virus)	E <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Pesticides	E <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Oil and Grease	E <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Toxic Organic Compounds	E <input type="checkbox"/> N <input checked="" type="checkbox"/>	
Trash and Debris	E <input checked="" type="checkbox"/> N <input type="checkbox"/>	

II.3 Hydrologic Conditions of Concern

Determine if streams located downstream from the project area are potentially susceptible to hydromodification impacts. Refer to Section 2.2.3.1 in the Technical Guidance Document (TGD) for North Orange County or Section 2.2.3.2 for South Orange County.

No – Show map

Yes – Describe applicable hydrologic conditions of concern below. Refer to Section 2.2.3 in the Technical Guidance Document (TGD).

Per the Orange County Watershed Master Planning Susceptibility Analysis Santa Ana River exhibit, dated April 30, 20210), the Project Site is not within an area of “Potential Areas of Erosion, Habitat & Physical Structure Susceptibility”. The exhibit shows that the runoff from the site is discharged onto “Earth (Stabilized)”, and “Stabilized” portions of channel infrastructure downstream of the Project Site.

Susceptibility Mapping Summary

Stream Name	Bed and Banks Composition	Susceptibility to Hydromodification
City 51” RCP	RCP	No
City 57” RCP	RCP	No
City 60” RCP	RCP	No
City 66” RCP	RCP	No
City 72” RCP	RCP	No
Talbert Channel	Stabilized segments	No
Pacific Ocean	n/a	n/a

The implementation of the hydromodification BMPs are not required onsite. Proposed development of the site includes residential, retail, offices, restaurants, parking and drive aisles, community amenities, and associated utilities. The project will include on-site drainage improvements to capture and convey runoff to existing facilities. Proposed drainage infrastructure will maintain the existing pattern of runoff draining south to existing infrastructure.

For reference see Attachment 5 for Susceptibility Map and Drainage Facilities Map.

II.4 Post Development Drainage Characteristics

Describe post development drainage characteristics. *Refer to Section 2.2.4 in the Technical Guidance Document (TGD).*

In its proposed condition, underground storm drain facilities will be installed onsite. The surface runoff onsite will convey the flows to seven (7) drainage management areas. Surface flows will be directed into downspouts and area drain piping systems which will convey the flow to biotreatment modular wetland planter boxes. From each biotreatment planter box, the flows are conveyed into a proposed storm drain pipe that discharges into the existing storm drain system located south of the site.

II.5 Property Ownership/Management

Describe property ownership/management. *Refer to Section 2.2.5 in the Technical Guidance Document (TGD).*

The HOA is responsible for maintenance of private parking lot, plazas, courts, open space and underground private storm drains. HOA is responsible for maintenance of the modular wetlands systems.

The HOA will be formed upon completion of the development. Upon completion of the development, the owner (Peggy Tabas at Slater Investments, LLC, 190 Newport Drive, Suite 100, Newport, CA 92660) is responsible to transfer all operation and maintenance related activities until the HOA is funded.

1st Owner – Peggy Tabas at Slater Investments, LLC. will be responsible for all the operation and maintenance of water quality BMPs until the HOA is formed.

2nd Owner - HOA will be responsible for maintenance of the private parking lot, plazas, courts, open space, private storm drains, and modular wetland systems.

Section III Site Description

III.1 Physical Setting

Fill out table with relevant information. *Refer to Section 2.3.1 in the Technical Guidance Document (TGD).*

Name of Planned Community/Planning Area (if applicable)	Slater Avenue
Location/Address	North east intersection of Slater Avenue and San Mateo Street
General Plan Land Use Designation	Commercial
Zoning	"G-C" (General Commercial)
Acreage of Project Site	3.34 acres
Predominant Soil Type	NRCS Hydrologic Soils - Hueneme fine sandy loam. Hydrologic soil type B per OC TGM NRCS Hydrologic Soils Group Map.

III.2 Site Characteristics

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable. *Refer to Section 2.3.2 in the Technical Guidance Document (TGD).*

Site Characteristics	
Precipitation Zone	0.75
Topography	The site is generally flat, with slopes ranging from 0% - 2%.

Priority Project Preliminary Water Quality Management Plan (WQMP)
Slater Avenue

<p>Drainage Patterns/Connections</p>	<p>Drainage runoff from the existing site flows, via sheet flow, toward Corazon Avenue, San Mateo Street and Slater Avenue where it is captured by inlets that outlet into the existing underground storm drain infrastructure. There is minimal on-site underground drainage infrastructure, which has been identified from site walks and aerial topography.</p> <p>Drainage in the proposed condition is to maintain the same ultimate direction of flow. Proposed site improvements include the construction of drain inlets, downspouts and multiple biotreatment planter boxes to capture, treat and convey runoff to the existing underground storm drain system along Slater Avenue.</p>
<p>Soil Type, Geology, and Infiltration Properties</p>	<p>Hueneme fine sandy loam.</p>
<p>Hydrogeologic (Groundwater) Conditions</p>	<p>Per the OC TGM North Orange County Mapped Shallow Groundwater Map the proposed development is located within a region that encounters groundwater depth equal to or less than 5 feet.</p>
<p>Geotechnical Conditions (relevant to infiltration)</p>	<p>Pending Geotechnical report.</p>
<p>Off-Site Drainage</p>	<p>The Project Site does not receive any off-site drainage.</p>
<p>Utility and Infrastructure Information</p>	<p>The proposed Project will include the installation of on-site storm drain, water quality, domestic water, sanitary sewer, electricity, natural gas, and telecommunications infrastructure systems to serve the proposed development. The on-site utility infrastructure would connect to existing utilities in the vicinity of the Project site or new utility lines that would be installed in the roadways adjacent to or within the project site.</p>

III.3 Watershed Description

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable. *Refer to Section 2.3.3 in the Technical Guidance Document (TGD).*

<p>Receiving Waters</p>	<p>Talbert Channel & Pacific Ocean</p>
<p>303(d) Listed Impairments</p>	<p>According to the 2010 303(d) list, the impaired water bodies that are downstream to the project include:</p> <p>Talbert Channel – None</p>

Priority Project Preliminary Water Quality Management Plan (WQMP)
Slater Avenue

	Pacific Ocean – None
Applicable TMDLs	Talbert Channel – None Pacific Ocean – None
Pollutants of Concern for the Project	Suspended Solid/Sediments, Nutrients, Pathogens (Bacteria/Virus) Pesticides, Oil & Grease, Trash & Debris
Environmentally Sensitive and Special Biological Significant Areas	The project is not located within 200 feet or adjacent to an Environmentally Sensitive Area (ESA).

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

Describe project performance criteria. Several steps must be followed in order to determine what performance criteria will apply to a project. These steps include:

- If the project has an approved WIHMP or equivalent, then any watershed specific criteria must be used and the project can evaluate participation in the approved regional or sub-regional opportunities. (Please ask your assigned planner or plan checker regarding whether your project is part of an approved WIHMP or equivalent.)
- Determine applicable hydromodification control performance criteria. *Refer to Section 7.II-2.4.2.2 of the Model WQMP.*
- Determine applicable LID performance criteria. *Refer to Section 7.II-2.4.3 of the Model WQMP.*
- Determine applicable treatment control BMP performance criteria. *Refer to Section 7.II-3.2.2 of the Model WQMP.*
- Calculate the LID design storm capture volume for the project. *Refer to Section 7.II-2.4.3 of the Model WQMP.*

(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?		YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.	N/A		

Project Performance Criteria

If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)

HCOC does not exist.

List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)

- Priority Projects must infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume).
 - A properly designed biotreatment system may only be considered if infiltration, harvest and use, and evapotranspiration (ET) cannot be feasibly implemented for the full design capture volume. In this case, infiltration, harvest and use, and ET practices must be implemented to the greatest extent feasible and biotreatment may be provided for the remaining design capture volume. A diversity of controls will be provided, if feasible, to achieve the greatest feasible retention of the Design Capture Volume, then if necessary, biotreatment of the remaining design capture volume.
- Equivalent performance criteria have been synthesized from permit requirements with consideration of the MEP standard and analysis of local precipitation and ET patterns. The following performance criteria result in capture and retention and/or biotreatment of 80 percent of average annual stormwater runoff volume. The performance criteria for LID are stated as follows:
- LID BMPs must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspire) stormwater runoff up to 80 percent average annual capture efficiency
 - LID BMPs must be designed to:
 - o Retain, on-site, (infiltrate, harvest and use, or evapotranspire) stormwater runoff as feasible up to the Design Capture Volume, and
 - o Recover (i.e., draw down) the storage volume as soon as possible after a storm event (see criteria for maximizing drawdown rate in the TGD Appendix XI), and, if necessary
 - o Biotreat, on-site, additional runoff, as feasible, up to 80 percent average annual capture efficiency (cumulative, retention plus biotreatment), and, if necessary
 - o NOC Permit Area only – retain or biotreat, in a regional facility, the remaining runoff up to 80 percent average annual capture efficiency (cumulative, retention plus biotreatment, on-site plus off-site), and, if necessary
 - o Fulfill alternative compliance obligations for runoff volume not retained or biotreated up to 80 percent average annual capture efficiency using treatment controls or other alternative approaches as described in Section 7.II-3.

<p>List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)</p>	<p>If it is not feasible to meet LID performance criteria through retention and/or biotreatment provided on-site or at a sub-regional/regional scale, then treatment control BMPs shall be provided on-site or offsite prior to discharge to waters of the US. Sizing of treatment control BMP(s) shall be based on either the unmet volume after claiming applicable water quality credits.</p>														
<p>Calculate LID design storm capture volume for Project.</p>	<p> $DCV = C \times d \times A \times 43560 \text{ sf/ac} \times 1/12 \text{ in/ft}$ $Q=CiA$ Where: DCV = design storm capture volume, cu-ft C = runoff coefficient = $(0.75 \times \text{imp} + 0.15)$ Imp = impervious fraction of drainage area (ranges from 0 to 1) d = storm depth (inches) A = tributary area (acres) Q_{Design} = Design Flow Rate </p> <table border="1" data-bbox="461 1045 1474 1285"> <thead> <tr> <th>DMA A-1 DCV & Q_{Design} Calculations</th> </tr> </thead> <tbody> <tr> <td>C=0.713</td> </tr> <tr> <td>d= 0.75 inches = 0.0625 ft</td> </tr> <tr> <td>i=0.26 in/hour</td> </tr> <tr> <td>A=0.40 acres</td> </tr> <tr> <td>$DCV=(0.713) \times (0.0625 \text{ ft}) \times (0.40 \text{ acres} \times 43560 \text{ ft}^2 / \text{acres}) = 776 \text{ ft}^3$</td> </tr> <tr> <td>$Q_{\text{Design}}= (0.713) \times (0.26 \text{ in}) \times (0.40 \text{ AC})= 0.075 \text{ cfs}$</td> </tr> </tbody> </table> <table border="1" data-bbox="461 1318 1474 1558"> <thead> <tr> <th>DMA A-2 DCV & Q_{Design} Calculations</th> </tr> </thead> <tbody> <tr> <td>C=0.825</td> </tr> <tr> <td>d= 0.75 inches = 0.0625 ft</td> </tr> <tr> <td>i=0.26 in/hour</td> </tr> <tr> <td>A=0.98 acres</td> </tr> <tr> <td>$DCV=(0.825) \times (0.0625 \text{ ft}) \times (0.98 \text{ acres} \times 43560 \text{ ft}^2 / \text{acres}) = 2,201 \text{ ft}^3$</td> </tr> <tr> <td>$Q_{\text{Design}}= (0.825) \times (0.26 \text{ in}) \times (0.98 \text{ AC})= 0.212 \text{ cfs}$</td> </tr> </tbody> </table>	DMA A-1 DCV & Q _{Design} Calculations	C=0.713	d= 0.75 inches = 0.0625 ft	i=0.26 in/hour	A=0.40 acres	$DCV=(0.713) \times (0.0625 \text{ ft}) \times (0.40 \text{ acres} \times 43560 \text{ ft}^2 / \text{acres}) = 776 \text{ ft}^3$	$Q_{\text{Design}}= (0.713) \times (0.26 \text{ in}) \times (0.40 \text{ AC})= 0.075 \text{ cfs}$	DMA A-2 DCV & Q _{Design} Calculations	C=0.825	d= 0.75 inches = 0.0625 ft	i=0.26 in/hour	A=0.98 acres	$DCV=(0.825) \times (0.0625 \text{ ft}) \times (0.98 \text{ acres} \times 43560 \text{ ft}^2 / \text{acres}) = 2,201 \text{ ft}^3$	$Q_{\text{Design}}= (0.825) \times (0.26 \text{ in}) \times (0.98 \text{ AC})= 0.212 \text{ cfs}$
DMA A-1 DCV & Q _{Design} Calculations															
C=0.713															
d= 0.75 inches = 0.0625 ft															
i=0.26 in/hour															
A=0.40 acres															
$DCV=(0.713) \times (0.0625 \text{ ft}) \times (0.40 \text{ acres} \times 43560 \text{ ft}^2 / \text{acres}) = 776 \text{ ft}^3$															
$Q_{\text{Design}}= (0.713) \times (0.26 \text{ in}) \times (0.40 \text{ AC})= 0.075 \text{ cfs}$															
DMA A-2 DCV & Q _{Design} Calculations															
C=0.825															
d= 0.75 inches = 0.0625 ft															
i=0.26 in/hour															
A=0.98 acres															
$DCV=(0.825) \times (0.0625 \text{ ft}) \times (0.98 \text{ acres} \times 43560 \text{ ft}^2 / \text{acres}) = 2,201 \text{ ft}^3$															
$Q_{\text{Design}}= (0.825) \times (0.26 \text{ in}) \times (0.98 \text{ AC})= 0.212 \text{ cfs}$															

Priority Project Preliminary Water Quality Management Plan (WQMP)
Slater Avenue

DMA A-3 DCV & Q _{Design} Calculations	
C=	0.795
d=	0.75 inches = 0.0625 ft
i=	0.26 in/hour
A=	0.290 acres
DCV=	$(0.795) * (0.0625 \text{ ft}) * (0.290 \text{ acres} * 43560 \text{ ft}^2 / \text{acres}) = 628 \text{ ft}^3$
Q _{Design} =	$(0.795) * (0.26 \text{ in}) * (0.290 \text{ AC}) = 0.061 \text{ cfs}$
DMA B-1 DCV & Q _{Design} Calculations	
C=	0.765
d=	0.75 inches = 0.0625 ft
i=	0.26 in/hour
A=	0.410 acres
DCV=	$(0.765) * (0.0625 \text{ ft}) * (0.410 \text{ acres} * 43560 \text{ ft}^2 / \text{acres}) = 854 \text{ ft}^3$
Q _{Design} =	$(0.765) * (0.26 \text{ in}) * (0.410 \text{ AC}) = 0.082 \text{ cfs}$
DMA B-2 DCV & Q _{Design} Calculations	
C=	0.90
d=	0.75 inches = 0.0625 ft
i=	0.26 in/hour
A=	0.80 acres
DCV=	$(0.90) * (0.0625 \text{ ft}) * (0.80 \text{ acres} * 43560 \text{ ft}^2 / \text{acres}) = 1,960 \text{ ft}^3$
Q _{Design} =	$(0.90) * (0.26 \text{ in}) * (0.80 \text{ AC}) = 0.189 \text{ cfs}$
DMA B-3 DCV & Q _{Design} Calculations	
C=	0.773
d=	0.75 inches = 0.0625 ft
i=	0.26 in/hour
A=	0.17 acres
DCV=	$(0.773) * (0.0625 \text{ ft}) * (0.17 \text{ acres} * 43560 \text{ ft}^2 / \text{acres}) = 358 \text{ ft}^3$
Q _{Design} =	$(0.773) * (0.26 \text{ in}) * (0.17 \text{ AC}) = 0.034 \text{ cfs}$
DMA B-4 DCV & Q _{Design} Calculations	
C=	0.90
d=	0.75 inches = 0.0625 ft
i=	0.26 in/hour
A=	0.290 acres
DCV=	$(0.90) * (0.0625 \text{ ft}) * (0.290 \text{ acres} * 43560 \text{ ft}^2 / \text{acres}) = 711 \text{ ft}^3$
Q _{Design} =	$(0.90) * (0.26 \text{ in}) * (0.290 \text{ AC}) = 0.069 \text{ cfs}$

IV.2. Site Design and Drainage

Describe site design and drainage including

- A narrative of site design practices utilized or rationale for not using practices;
- A narrative of how site is designed to allow BMPs to be incorporated to the MEP
- A table of DMA characteristics and list of LID BMPs proposed in each DMA.
- Reference to the WQMP “BMP Exhibit.”
- Calculation of Design Capture Volume (DCV) for each drainage area.
- A listing of GIS coordinates for LID and Treatment Control BMPs.

Refer to Section 2.4.2 in the Technical Guidance Document (TGD).

Impervious surfaces have been minimized by incorporating landscaped areas over portions of the site including common areas, parkways and open space areas. Infiltration is not recommended because the depth of ground water is equal to or less than 5 feet. Runoff from the site will continue to flow similar to existing conditions. Low-flows and first-flush runoff will drain to a Modular Wetland Systems for water quality treatment. Landscaping will be provided adjacent to the building and between the proposed courts and plazas. Where feasible, sidewalks will drain to adjacent landscaping.

The project site has been divided into 7 Drainage Management Areas (DMAs) to be utilized for defining drainage areas and sizing LID and other treatment control BMPs. DMAs have been delineated based on the proposed site grading patterns, drainage patterns and storm drain. The design capture volumes (DCV) and treatment flow rates (Q_{Design}) for each DMA are summarized in the table below. These have been derived utilizing North Orange County TGD. Locations of DMAs and associated treatment BMPs are identified on the WQMP Exhibit (See Attachment 1).

DMA A-1 DCV & Q_{Design} Calculations
$C=0.713$
$d= 0.75 \text{ inches} = 0.0625 \text{ ft}$
$i=0.26 \text{ in/hour}$
$A=0.40 \text{ acres}$
$DCV=(0.713)*(0.0625 \text{ ft})*(0.40 \text{ acres}*43560 \text{ ft}^2 / \text{acres}) = 776 \text{ ft}^3$
$Q_{Design}= (0.713)*(0.26 \text{ in})*(0.40 \text{ AC})= 0.075 \text{ cfs}$

DMA A-2 DCV & Q_{Design} Calculations
$C=0.825$
$d= 0.75 \text{ inches} = 0.0625 \text{ ft}$
$i=0.26 \text{ in/hour}$
$A=0.98 \text{ acres}$
$DCV=(0.825)*(0.0625 \text{ ft})*(0.98 \text{ acres}*43560 \text{ ft}^2 / \text{acres}) = 2,201 \text{ ft}^3$
$Q_{Design}= (0.825)*(0.26 \text{ in})*(0.98 \text{ AC})= 0.212 \text{ cfs}$

Priority Project Preliminary Water Quality Management Plan (WQMP)
Slater Avenue

DMA A-3 DCV & Q _{Design} Calculations
C=0.795
d= 0.75 inches = 0.0625 ft
i=0.26 in/hour
A=0.290 acres
DCV=(0.795)*(0.0625 ft)*(0.290 acres*43560 ft ² /acres) = 628 ft ³
Q _{Design} = (0.795)*(0.26 in)*(0.290 AC)= 0.061 cfs

DMA B-1 DCV & Q _{Design} Calculations
C=0.765
d= 0.75 inches = 0.0625 ft
i=0.26 in/hour
A=0.410 acres
DCV=(0.765)*(0.0625 ft)*(0.410 acres*43560 ft ² /acres) = 854 ft ³
Q _{Design} = (0.765)*(0.26 in)*(0.410 AC)= 0.082 cfs

DMA B-2 DCV & Q _{Design} Calculations
C=0.90
d= 0.75 inches = 0.0625 ft
i=0.26 in/hour
A=0.80 acres
DCV=(0.90)*(0.0625 ft)*(0.80 acres*43560 ft ² /acres) = 1,960 ft ³
Q _{Design} = (0.90)*(0.26 in)*(0.80 AC)= 0.189 cfs

DMA B-3 DCV & Q _{Design} Calculations
C=0.773
d= 0.75 inches = 0.0625 ft
i=0.26 in/hour
A=0.17 acres
DCV=(0.773)*(0.0625 ft)*(0.17 acres*43560 ft ² /acres) = 358 ft ³
Q _{Design} = (0.773)*(0.26 in)*(0.17 AC)= 0.034 cfs

DMA B-4 DCV & Q _{Design} Calculations
C=0.90
d= 0.75 inches = 0.0625 ft
i=0.26 in/hour
A=0.290 acres
DCV=(0.90)*(0.0625 ft)*(0.290 acres*43560 ft ² /acres) = 711 ft ³
Q _{Design} = (0.90)*(0.26 in)*(0.290 AC)= 0.069 cfs

The northing (N) and easting (E) coordinates for the biotreatment planter boxes will be provided in the Final Engineering WQMP report.

IV.3 LID BMP Selection and Project Conformance Analysis

Each sub-section below documents that the proposed design features conform to the applicable project performance criteria via check boxes, tables, calculations, narratives, and/or references to worksheets. Refer to Section 2.4.2.3 in the Technical Guidance Document (TGD) for selecting LID BMPs and Section 2.4.3 in the Technical Guidance Document (TGD) for conducting conformance analysis with project performance criteria.

IV.3.1 Hydrologic Source Controls (HSCs)

If required HSCs are included, fill out applicable check box forms. If the retention criteria are otherwise met with other LID BMPs, include a statement indicating HSCs not required.

Name	Included?
Localized on-lot infiltration	<input type="checkbox"/>
Impervious area dispersion (e.g. roof top disconnection)	<input type="checkbox"/>
Street trees (canopy interception)	<input type="checkbox"/>
Residential rain barrels (not actively managed)	<input type="checkbox"/>
Green roofs/Brown roofs	<input type="checkbox"/>
Blue roofs	<input type="checkbox"/>
Impervious area reduction (e.g. permeable pavers, site design)	<input type="checkbox"/>
Other:	<input type="checkbox"/>
Other:	<input type="checkbox"/>
Other:	<input type="checkbox"/>
Other:	<input type="checkbox"/>

HSCs not required.

IV.3.2 Infiltration BMPs

Identify infiltration BMPs to be used in project. If design volume cannot be met, state why.

Name	Included?
Bioretention without underdrains	<input type="checkbox"/>
Rain gardens	<input type="checkbox"/>
Porous landscaping	<input type="checkbox"/>
Infiltration planters	<input type="checkbox"/>
Retention swales	<input type="checkbox"/>
Infiltration trenches	<input type="checkbox"/>
Infiltration basins	<input type="checkbox"/>
Drywells	<input type="checkbox"/>
Subsurface infiltration galleries	<input type="checkbox"/>
French drains	<input type="checkbox"/>
Permeable asphalt	<input type="checkbox"/>
Permeable concrete	<input type="checkbox"/>
Permeable concrete pavers	<input type="checkbox"/>
Other:	<input type="checkbox"/>
Other:	<input type="checkbox"/>

Show calculations below to demonstrate if the LID Design Storm Capture Volume can be met with infiltration BMPs. If not, document how much can be met with infiltration and document why it is not feasible to meet the full volume with infiltration BMPs.

Infiltration not applicable.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, describe any evapotranspiration and/or rainwater harvesting BMPs included.

Name	Included?
<i>All HSCs; See Section IV.3.1</i>	<input type="checkbox"/>
Surface-based infiltration BMPs	<input type="checkbox"/>
Biotreatment BMPs	<input type="checkbox"/>
Above-ground cisterns and basins	<input type="checkbox"/>
Underground detention	<input type="checkbox"/>
Other:	<input type="checkbox"/>
Other:	<input type="checkbox"/>
Other:	<input type="checkbox"/>

Show calculations below to demonstrate if the LID Design Storm Capture Volume can be met with evapotranspiration and/or rainwater harvesting BMPs in combination with infiltration BMPs. If not, document below how much can be met with either infiltration BMPs, evapotranspiration, rainwater harvesting BMPs, or a combination, and document why it is not feasible to meet the full volume with these BMP categories.

Evapotranspiration, Rainwater Harvesting BMPs not applicable.

IV.3.4 Biotreatment BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, and/or evapotranspiration and rainwater harvesting BMPs, describe biotreatment BMPs included. Include sections for selection, suitability, sizing, and infeasibility, as applicable.

Name	Included?
Bioretention with underdrains	<input checked="" type="checkbox"/>
Stormwater planter boxes with underdrains	<input type="checkbox"/>
Rain gardens with underdrains	<input type="checkbox"/>
Constructed wetlands	<input type="checkbox"/>
Vegetated swales	<input type="checkbox"/>
Vegetated filter strips	<input type="checkbox"/>
Proprietary vegetated biotreatment systems	<input type="checkbox"/>
Wet extended detention basin	<input type="checkbox"/>
Dry extended detention basins	<input type="checkbox"/>
Other:	<input type="checkbox"/>
Other:	<input type="checkbox"/>

Show calculations below to demonstrate if the LID Design Storm Capture Volume can be met with infiltration, evapotranspiration, rainwater harvesting and/or biotreatment BMPs. If not, document how much can be met with either infiltration BMPs, evapotranspiration, rainwater harvesting BMPs, or a combination, and document why it is not feasible to meet the full volume with these BMP categories.

Multiple biotreatment planter boxes will be employed for treatment of required runoff volumes. The biotreatment planter boxes will be in line with the proposed storm drain system and will be located prior to where the onsite storm drain system enters the existing storm drain lines.

Simple Sizing Method - Biotreatment BMP					
DMA	dp (Feet)	K _{Media} (in/hr)	DDp (Hours)	d Filtered=(K _{Media} * T Routing)/12	Required Surface Area (Ft ²)
A-1	1.5	2.5	7.2	0.625	365.14
A-2	1.5	2.5	7.2	0.625	1035.83
A-3	1.5	2.5	7.2	0.625	295.38
B-1	1.5	2.5	7.2	0.625	401.84
B-2	1.5	2.5	7.2	0.625	922.45
B-3	1.5	2.5	7.2	0.625	168.25
B-4	1.5	2.5	7.2	0.625	334.39
	N/A	N/A	N/A	N/A	3523.27

A total of 3,523 ft² of biotreatment planter boxes are required and a total of 3,681 ft² of biotreatment planter

boxes has been provided.

IV.3.5 Hydromodification Control BMPs

Describe hydromodification control BMPs. *See Section 5 of the Technical Guidance Document (TGD).* Include sections for selection, suitability, sizing, and infeasibility, as applicable. Detail compliance with Prior Conditions of Approval (if applicable). N/A

Hydromodification Control BMPs	
BMP Name	BMP Description
N/A	N/A

IV.3.6 Regional/Sub-Regional LID BMPs

Describe regional/sub-regional LID BMPs in which the project will participate. *Refer to Section 7.II-2.4.3.2 of the Model WQMP.*

Regional/Sub-Regional LID BMPs
N/A

IV.3.7 Treatment Control BMPs

Treatment control BMPs can only be considered if the project conformance analysis indicates that it is not feasible to retain the full design capture volume with LID BMPs. Describe treatment control BMPs including sections for selection, sizing, and infeasibility, as applicable.

Treatment Control BMPs	
BMP Name	BMP Description
N/A	N/A

IV.3.8 Non-structural Source Control BMPs

Fill out non-structural source control check box forms or provide a brief narrative explaining if non-structural source controls were not used.

Non-Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N1	Education for Property Owners, Tenants and Occupants	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N2	Activity Restrictions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N3	Common Area Landscape Management	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N4	BMP Maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N5	Title 22 CCR Compliance (How development will comply)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project does not include recycled water.
N6	Local Industrial Permit Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
N7	Spill Contingency Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
N8	Underground Storage Tank Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
N9	Hazardous Materials Disclosure Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
N10	Uniform Fire Code Implementation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The proposed residential project will not store toxic or highly toxic compressed gases.
N11	Common Area Litter Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N12	Employee Training	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
N13	Housekeeping of Loading Docks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
N14	Common Area Catch Basin Inspection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N15	Street Sweeping Private Streets and Parking Lots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N16	Retail Gasoline Outlets	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use

N1 Education of Property Owners, Tenants and Occupants:

Practical information will be provided to the tenants by the Property Manager on general housekeeping practices for each type of site occupancy that contribute to protection of storm water quality. Information will include, but not limited to the attachments provided in Attachment 8. The following resources can be contacted to obtain updated educational information at the County of Orange Stormwater Program website (<http://ocwatersheds.com/PublicED/>) and the California Storm water Quality Association's (CASQA) BMP Handbooks (<http://www.casqa.org/resources/bmphandbooks>).

N2 Activity Restrictions:

The owners/HOA is to develop continuous activity restrictions that include potential impacts to stormwater quality. The following is a list of activity restrictions, but are not limited:

- Do not wash water from concrete, mortar or other construction activities to enter the storm drain system.
- No unauthorized car washing will be permitted on the premises.
- No changing of car oil or other auto repairs will be permitted on the premises.
- On-Site Cleaning of trash dumpsters with water is prohibited.
- Do not sweep grass clippings, dead leaves into catch basins or other landscaping related debris into catch basins.
- Keep trash container areas, free of litter.
- Do not perform paint cleanup activities in paved areas or allow rinse water from these activities to enter the storm drain system.
- Do not use detergents or other chemicals additives when washing concrete sidewalks or building exteriors, use potable water only when and collect wash water runoff using a vacuum truck, for proper offsite disposal.

N3 Common Area Landscape Management:

Maintenance activities for landscape areas shall be consistent with County/City and manufacturer guidelines for fertilizer and pesticide use. Maintenance includes trimming, weeding and debris removal and vegetation planting and replacement. Stockpiled materials during maintenance activities shall be placed away from drain inlets and runoff conveyance devices. Wastes shall be properly disposed of or recycled. Maintenance for common areas and landscape parking islands is scheduled by future HOA

N4 BMP Maintenance:

Responsibility for implementation, inspection and maintenance of all BMPs (structural and non-structural) shall be consistent with the BMP Inspection and Maintenance Responsibilities Matrix provided in Section V of this WQMP, with documented records of inspections and maintenance activities completed. Cleaning of all structural BMP Facilities is scheduled by future HOA.

N11 Common Area Litter Control:

Litter control onsite will include the use of litter patrols, violation reporting and clean up during landscaping maintenance activities and as needed to ensure good housekeeping of the project's common areas.

N14 Catch Basin Inspection Program:

All catch basin inlets and drainage facilities are to be inspected and maintained by the HOA/Owner at least once a year before the start of the rainy season.

N15 Street Sweeping Private Streets and Parking Lots:

The project's private streets shall be swept, prior to the start of the traditional rainy season at minimum quarterly.

IV.3.9 Structural Source Control BMPs

Fill out structural source control check box forms or provide a brief narrative explaining if structural source controls were not used.

Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
S3	Design and construct trash and waste storage areas to reduce pollution introduction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
S5	Protect slopes and channels and provide energy dissipation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project does not include slopes or channels
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
S6	Dock areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
S7	Maintenance bays	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
S8	Vehicle wash areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
S9	Outdoor processing areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
S10	Equipment wash areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
S11	Fueling areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
S12	Hillside landscaping	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project does not include hillside landscaping
S13	Wash water control for food preparation areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use
S14	Community car wash racks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A to Mixed-Use

S1 Provide Storm Drain Systems Stenceling and Signage:

Storm drain stencils or signage prohibiting dumping and discharge of materials (“No Dumping – Drains to Ocean”) shall be provided adjacent to each of the project’s proposed inlets. The stencils shall be inspected and re-stenciled as needed to maintain legibility.

S3 Design and Construct Trash and Waste Storage Areas to Reduce Pollution

Introduction :

Trash and waste shall be stored in containers that have lids to decrease direct precipitation into the containers. Trash storage areas are to be designed per City standards.

S4 Use Efficient Irrigation Systems & Landscape Design, Water Conservation, Small Controllers and Source Control:

In conjunction with routine landscaping maintenance activities, inspect irrigation for signs of leaks, overspray and repair or adjust accordingly. Adjust system cycle to accommodate seasonal fluctuations in water demand and temperatures. Ensure use of native or drought tolerant/non-invasive plant species to minimize water consumption.

IV.4 Alternative Compliance Plan (If Applicable)

Describe an alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures. *Refer to Section 7.II 3.0 in the WQMP.*

IV.4.1 Water Quality Credits

Determine if water quality credits are applicable for the project. *Refer to Section 3.1 of the Model WQMP for description of credits and Appendix VI of the Technical Guidance Document (TGD) for calculation methods for applying water quality credits.*

Description of Proposed Project				
Project Types that Qualify for Water Quality Credits (Select all that apply):				
<input type="checkbox"/> Redevelopment projects that reduce the overall impervious footprint of the project site.	<input type="checkbox"/> Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface WQ if not redeveloped.	<input type="checkbox"/> Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).		
<input type="checkbox"/> Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).	<input type="checkbox"/> Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned	<input type="checkbox"/> Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).		
<input type="checkbox"/> Developments with dedication of undeveloped portions to parks, preservation areas and other previous uses.	<input type="checkbox"/> Developments in a city center area.	<input type="checkbox"/> Developments in historic districts or historic preservation areas.	<input type="checkbox"/> Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	<input type="checkbox"/> In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.

Calculation of Water Quality Credits (if applicable)	Project site will not apply for Water Quality Credits.
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IV.4.2 Alternative Compliance Plan Information

Describe an alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures. *Refer to Section 7.II 3.0 in the Model WQMP.*

N/A

Section V Inspection/Maintenance Responsibility for BMPs

Fill out information in table below. Prepare and attach an Operation and Maintenance Plan. Identify the funding mechanism through which BMPs will be maintained. Inspection and maintenance records must be kept for a minimum of five years for inspection by the regulatory agencies. Refer to Section 7.II 4.0 in the Model WQMP.

BMP Inspection/Maintenance			
BMP	Responsible Party(s)	Inspection/Maintenance Activities Required	Minimum Frequency of Activities
Biotreatment Planter Boxes	HOA/Owner	Vegetation management required; occasional removal of debris.	BMPs shall be inspected, cleaned-out, and where necessary, repaired, at the following minimum frequencies: 1) prior to October 15 TH each year; 2) during each month between October 15 TH and April 15 TH of each year and, 3) at least twice during the dry season (between April 16 and October 14 of every year).
Non-Structural Source Control BMPs			
N-1 Provide storm drain system stenciling and signage	HOA/Owner	Educational Materials will be provided to the tenants. HOA/Owner shall distribute appropriate materials to owners and/or occupants via language, mailings, website or meeting. Educational materials	Annually

Priority Project Preliminary Water Quality Management Plan (WQMP)
Slater Avenue

		can be downloaded from www.ocwatersheds.com	
N-2 Activity Restrictions	HOA/Owner	Conditions, covenants and restrictions must be prepared by the developer or building operator though terms and conditions to protect surface water quality.	On-going
N-3 Common Landscape Areas	HOA/Owner	On-going landscape maintenance requirements that are consistent with the County/City.	Monthly
N-4 BMP Maintenance	HOA/Owner	Scheduled by the future HOA for cleaning of all (structural and non-structural) BMP facilities. Maintenance of BMP's implemented at the project site shall be performed at the frequency prescribed in the final WQMP. Records of inspections and BMP maintenance shall be maintained by the HOA and documented in the final WQMP, and shall be available for review upon request.	Monthly
N-11 Common Area Litter Control	HOA/Owner	Litter patrol, violation inspections, reporting and other litter control activities shall be in conjunction with	Weekly

Priority Project Preliminary Water Quality Management Plan (WQMP)
Slater Avenue

		<p>maintenance activities to ensure good housekeeping of the project's common areas. Litter collection and removal shall be performed on a weekly basis</p>	
<p>N-14 Common Area Catch Basin Inspection</p>	<p>HOA/Owner</p>	<p>On-site catch basin inlets and other drainage facilities shall be inspected at four times per year, including prior to the start of the rainy season (October 1st). Inlets and other facilities shall be cleaned when the sump is 40% full and annually at a minimum.</p>	<p>Once a month to clean debris and silt in the bottom of drainage facilities. Intensified around October 1st of each year prior to the "first flush" storm.</p>
<p>N-15 Street Sweeping Private Streets and Parking Lots</p>	<p>HOA/Owner</p>	<p>The project's private streets shall be swept, quarterly, prior to the start of the traditional rainy season and as needed.</p>	<p>Annually as needed.</p>
<p>Structural Source Control BMPs</p>			
<p>S-1 Provide storm drain system stenciling and signage</p>	<p>HOA/Owner</p>	<p>Storm drains shall be inspected for legibility, at a minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be re-stenciled as soon as possible. Storm Drain should be stenciled</p>	<p>Inspect for re-stencilling needs and re-stencil as necessary annually. Re-stencil every other year.</p>

Priority Project Preliminary Water Quality Management Plan (WQMP)
Slater Avenue

		every other year.	
S-4 Use efficient irrigation systems & landscape design, water conservation, smart controllers and source control	HOA/Owner	In conjunction with routine landscaping maintenance activities, inspect irrigation for signs of leaks, overspray and repair or adjust accordingly. Adjust system cycle to accommodate seasonal fluctuations in water demand and temperatures. Ensure use of native or drought tolerant/non-invasive plant species to minimize water consumption. Inspection shall be done annually.	On-going

Section VI BMP Exhibit (Site Plan)

VI.1 BMP Exhibit (Site Plan)

Include a BMP Exhibit (Site Plan), at a size no less than 24" by 36," which includes the following minimum information:

- Insert in the title block (lower right hand corner) of BMP Exhibit: the WQMP Number (assigned by staff) and the grading/building or Planning Application permit numbers
- Project location (address, tract/lot number(s), etc.)
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural BMP locations
- Drainage delineations and flow information
- Delineate the area being treated by each structural BMP
- GIS coordinates for LID and Treatment Control BMPs
- Drainage connections
- BMP details
- Preparer name and stamp

Please do not include any areas outside of the project area or any information not related to drainage or water quality. The approved BMP Exhibit (Site Plan) shall be submitted as a plan sheet on all grading and building plan sets submitted for plan check review and approval. The BMP Exhibit shall be at the same size as the rest of the plan sheets in the submittal and shall have an approval stamp and signature prior to plan check submittal.

See Appendix 1 for WQMP Exhibit.

VI.2 Submittal and Recordation of Water Quality Management Plan

Following approval of the Final Project-Specific WQMP, three copies of the approved WQMP (including BMP Exhibit, Operations and Maintenance (O&M) Plan, and Appendices) shall be submitted. In addition, these documents shall be submitted in a PDF format.

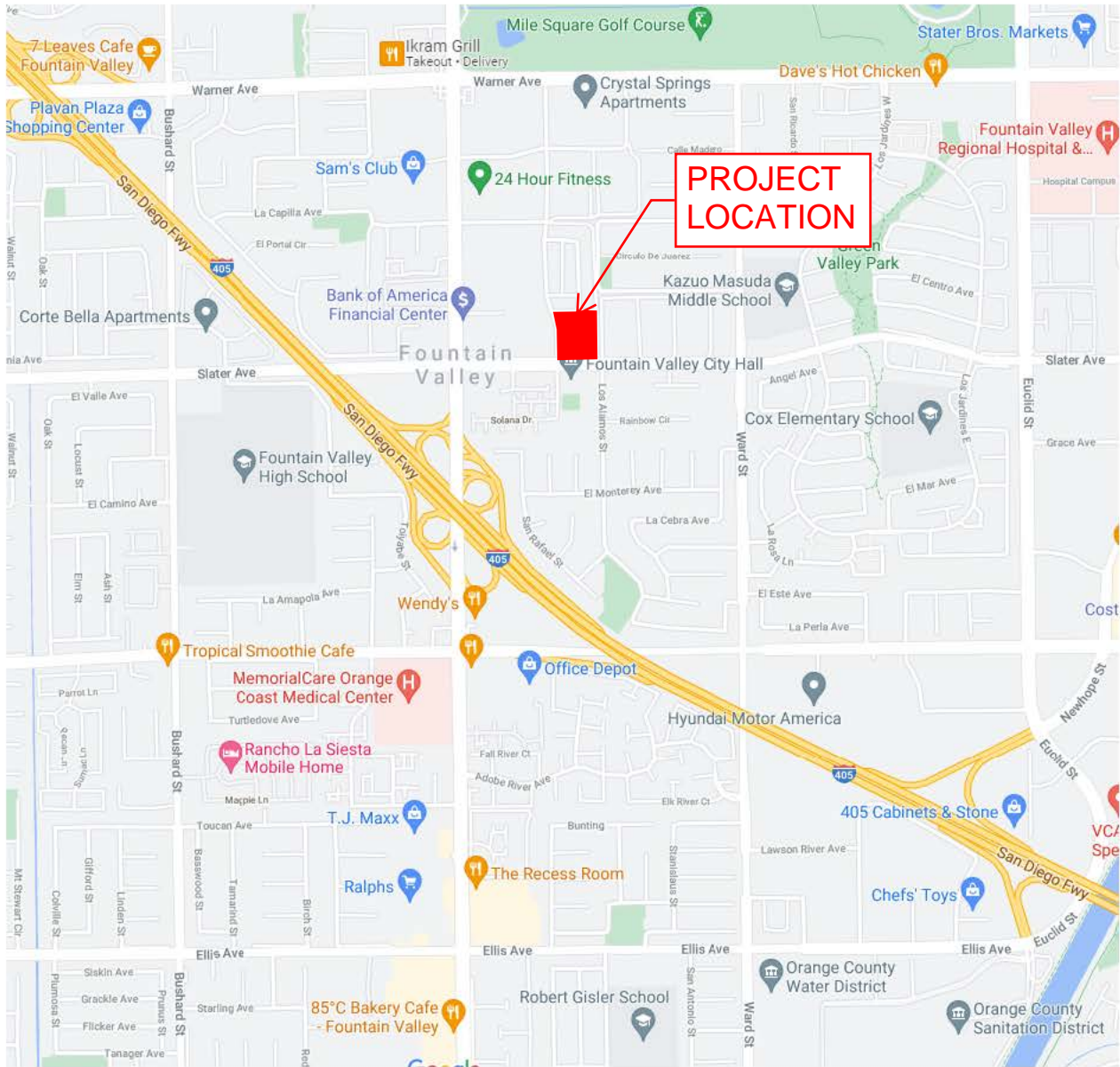
Each approved WQMP (including BMP Exhibit, Operations and Maintenance (O&M) Plan, and Appendices) shall be recorded in the Orange County Clerk-Recorder's Office, prior to close-out of grading and/or building permit. Educational Materials are not required to be included.

Section VII Educational Materials

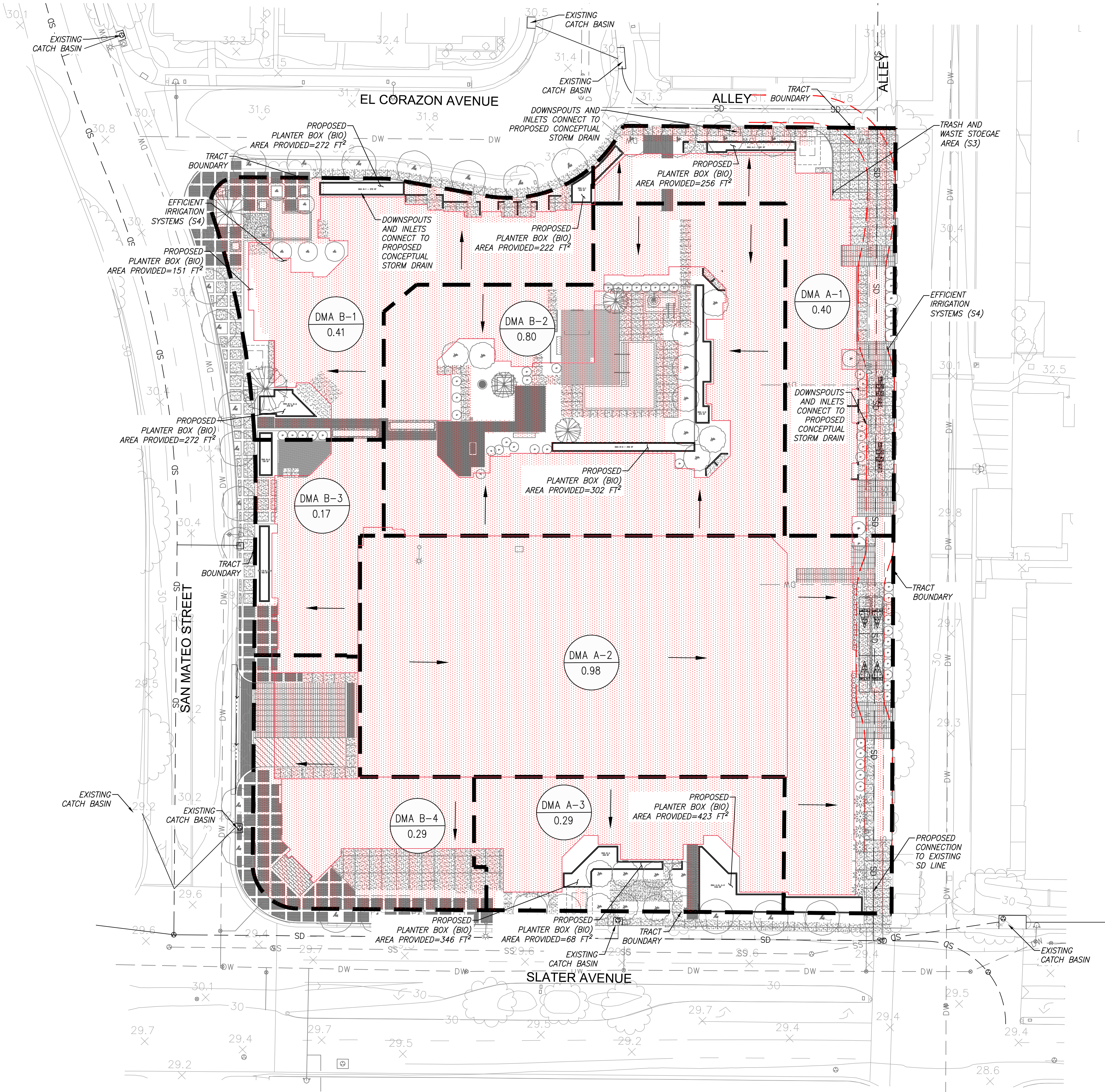
Refer to the Orange County Stormwater Program (ocwatersheds.com) for a library of materials available. Please only attach the educational materials specifically applicable to this project. Other materials specific to the project may be included as well and must be attached.

Education Materials			
Residential Material (http://www.ocwatersheds.com)	Check If Applicable	Business Material (http://www.ocwatersheds.com)	Check If Applicable
The Ocean Begins at Your Front Door	<input checked="" type="checkbox"/>	Tips for the Automotive Industry	<input type="checkbox"/>
Tips for Car Wash Fund-raisers	<input type="checkbox"/>	Tips for Using Concrete and Mortar	<input type="checkbox"/>
Tips for the Home Mechanic	<input type="checkbox"/>	Tips for the Food Service Industry	<input type="checkbox"/>
Homeowners Guide for Sustainable Water Use	<input checked="" type="checkbox"/>	Proper Maintenance Practices for Your Business	<input type="checkbox"/>
Household Tips	<input checked="" type="checkbox"/>	Other Material (http://www.ocwatersheds.com) (http://www.casqa.org/resources/bmp-handbooks)	Check If Attached
Proper Disposal of Household Hazardous Waste	<input checked="" type="checkbox"/>		
Recycle at Your Local Used Oil Collection Center (North County)	<input checked="" type="checkbox"/>	R-3 Automobile Parking	<input checked="" type="checkbox"/>
Recycle at Your Local Used Oil Collection Center (Central County)	<input type="checkbox"/>	R-4 Home & Garden Care Activities	<input checked="" type="checkbox"/>
Recycle at Your Local Used Oil Collection Center (South County)	<input type="checkbox"/>	R-5 Disposal of Pet Waste	<input checked="" type="checkbox"/>
Tips for Maintaining a Septic Tank System	<input type="checkbox"/>	R-6 Disposal of Green Waste	<input checked="" type="checkbox"/>
Responsible Pest Control	<input checked="" type="checkbox"/>	R-7 Household Hazardous Waste	<input checked="" type="checkbox"/>
Sewer Spill	<input type="checkbox"/>	R-8 Water Conservation	<input checked="" type="checkbox"/>
Tips for the Home Improvement Projects	<input checked="" type="checkbox"/>	SD-10 Site Design & Landscape Planning	<input checked="" type="checkbox"/>
Tips for Horse Care	<input type="checkbox"/>	SD-11 Roof Runoff Controls	<input checked="" type="checkbox"/>
Tips for Landscaping and Gardening	<input checked="" type="checkbox"/>	SD-12 Efficient Irrigation	<input checked="" type="checkbox"/>
Tips for Pet Care	<input checked="" type="checkbox"/>	SD-13 Storm Drain Signage	<input checked="" type="checkbox"/>
Tips for Pool Maintenance	<input checked="" type="checkbox"/>	SD-32 Trash Storage Areas	<input checked="" type="checkbox"/>
Tips for Residential Pool, Landscape and Hardscape Drains	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Tips for Projects Using Paint	<input checked="" type="checkbox"/>		<input type="checkbox"/>

Attachment 1

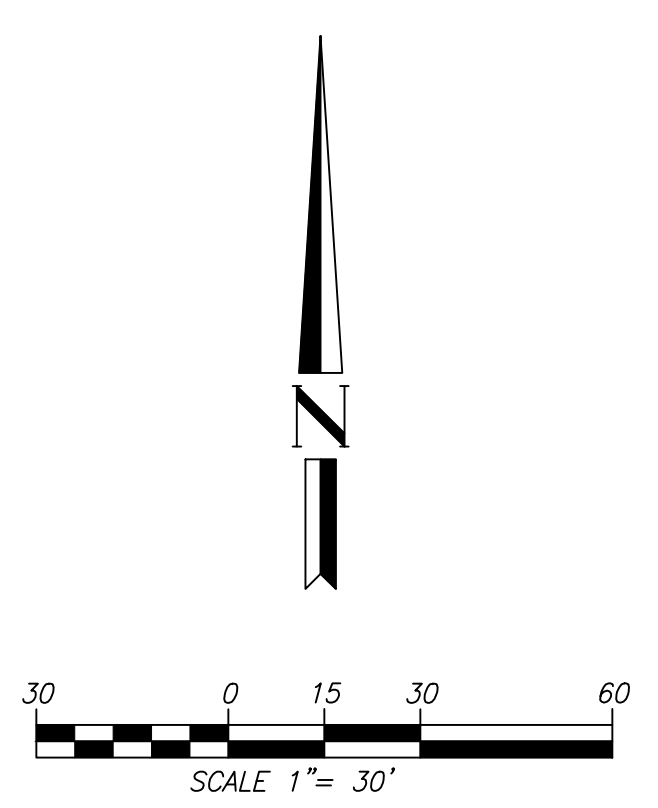


VICINITY MAP



LEGEND

EXISTING IMPERVIOUS AREA		PROJECT BOUNDARY	
DIRECTION OF FLOW		DRAINAGE MANAGEMENT AREA DESIGNATION - SUBAREA ACREAGE	



APPLICANT/OWNER:

SLATER INVESTMENTS

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NEWPORT BEACH, CA 92660
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PREPARED BY:

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DESIGNED BY	
DRAWN BY	
CHECKED BY	JTO
DATE	09/14/2021

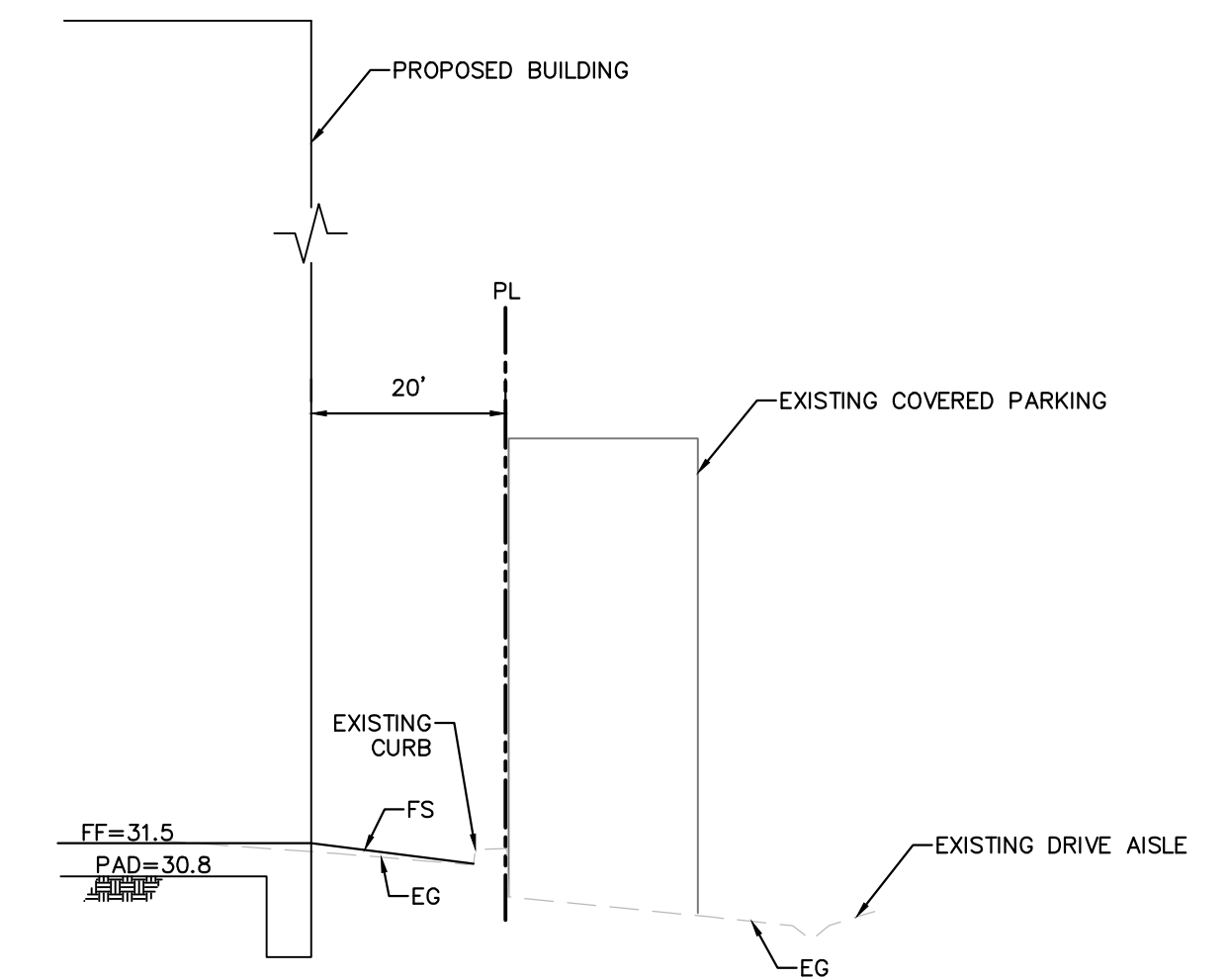
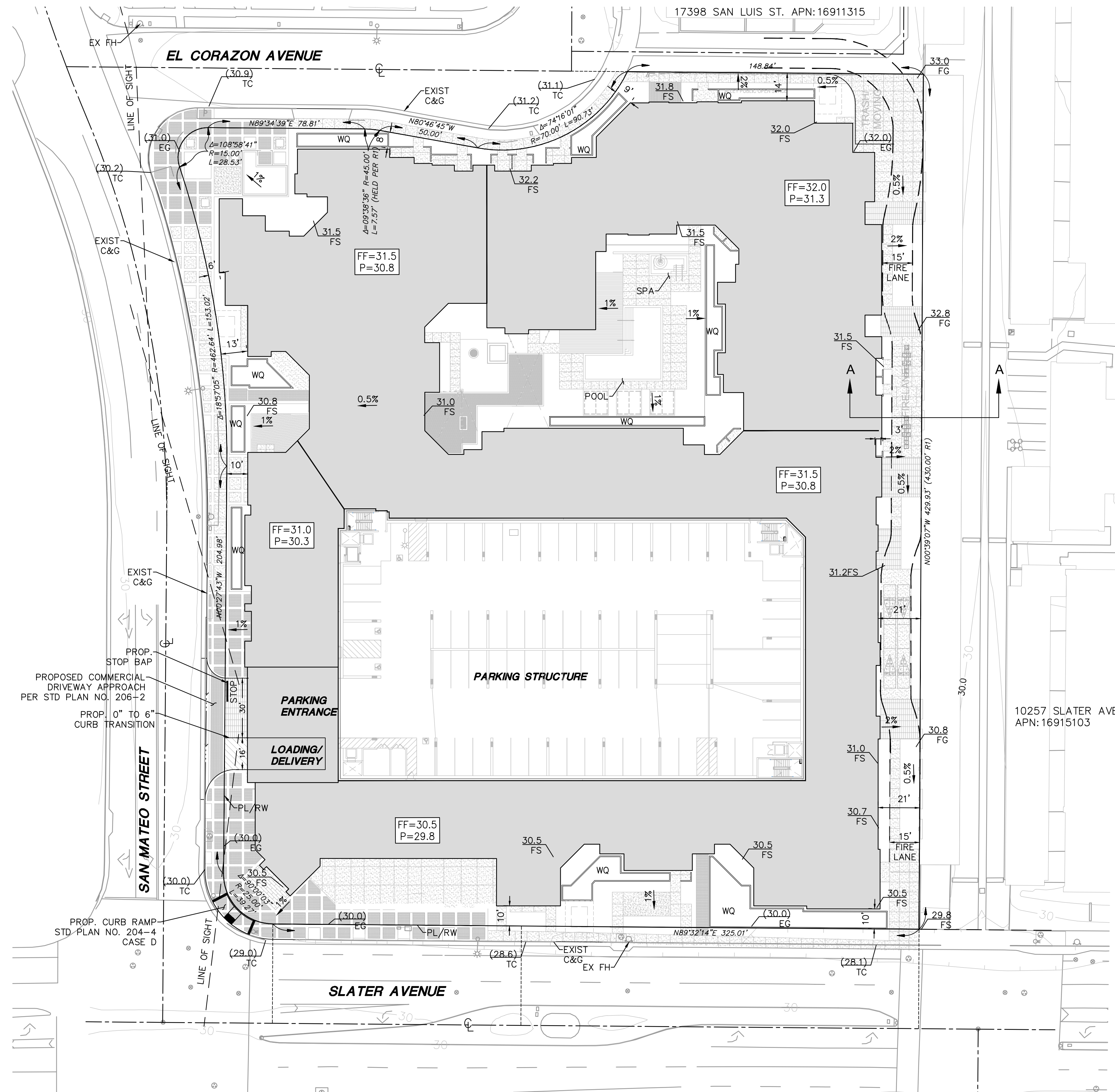
SLATER AVENUE
FOUNTAIN VALLEY, CA
PRELIMINARY WQMP EXHIBIT
PROPOSED CONDITION

SHEET 1 of 1 SHEETS

JOB NO. R308793.02

G:\P313364\01 - FY for OC Urban Ventures\10 CAD & BMA\10.13 Civil\EXHIBIT\Proposed Condition WQMP Exhibit.dwg Jun 22 2021 11:32am

Attachment 2

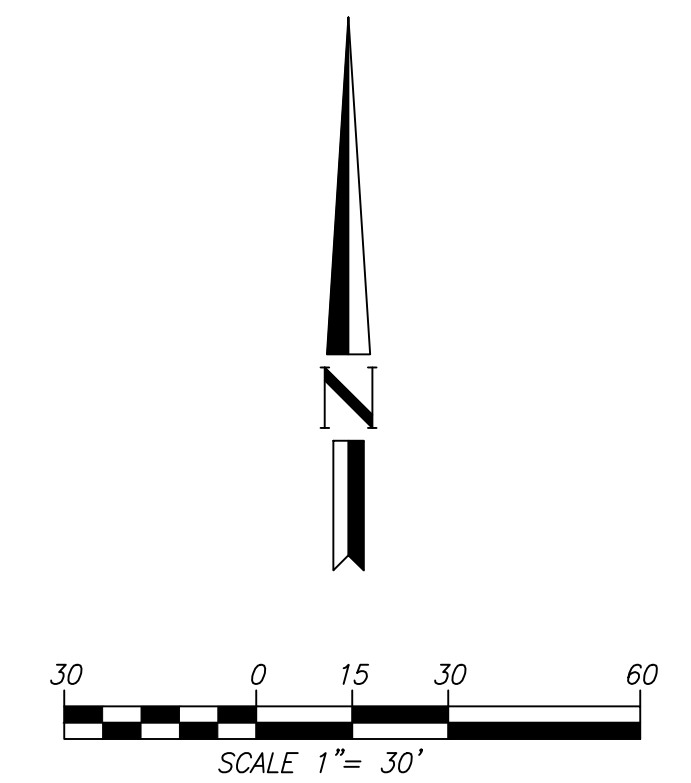


SECTION A - A
SCALE: VERT 1"=5'
HORZ 1"=20'

LEGEND

	PROPOSED BUILDING OUTLINE
FS	FINISHED SURFACE
FG	FINISHED GRADE
PAD	PROPOSED PAD ELEVATION
FF	PROPOSED FINISH FLOOR ELEVATION
CL	CENTER LINE
PL/RW	PROPERTY LINE/ RIGHT OF WAY
TC	TOP OF CURB
C&G	CURB AND GUTTER
(XX.X)	EXISTING GRADE
	PROPOSED WATER QUALITY PLANTER

NOTE: FINAL DESIGN TO HAVE ON SITE AREA DRAINS.



SLATER AVENUE

SLATER INVESTMENTS, LLC., A DELAWARE LLC.
1501 QUAIL STREET, SUITE 100A, NEWPORT BEACH, CA 92660
(949) 520-7181

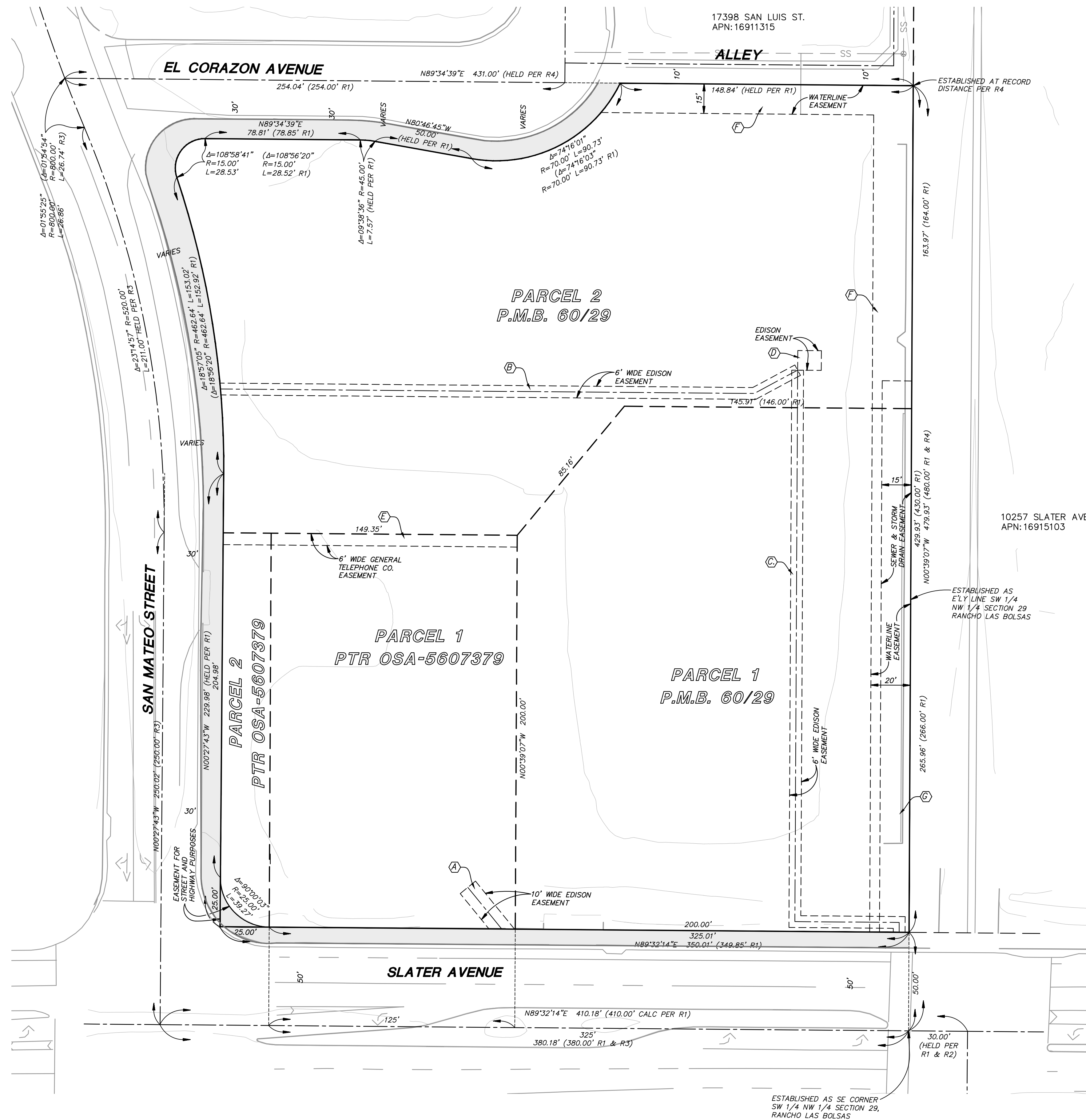
FOUNTAIN VALLEY, CA



SITE PLAN / GRADING PLAN

DATE: 09-14-21
JOB NO.: R313364.01

HUITT-ZOLLARS
Huit-Zollars, Inc. Irvine
2603 Main Street, Suite 400
Irvine, California 92614
Phone (949) 988-5815 Fax (949) 988-5820



LEGEND

- PROPOSED OFF-SITE SIDEWALK 10,000 SF
- PROPOSED OFF-SITE CURB AND GUTTER 1,000 LF

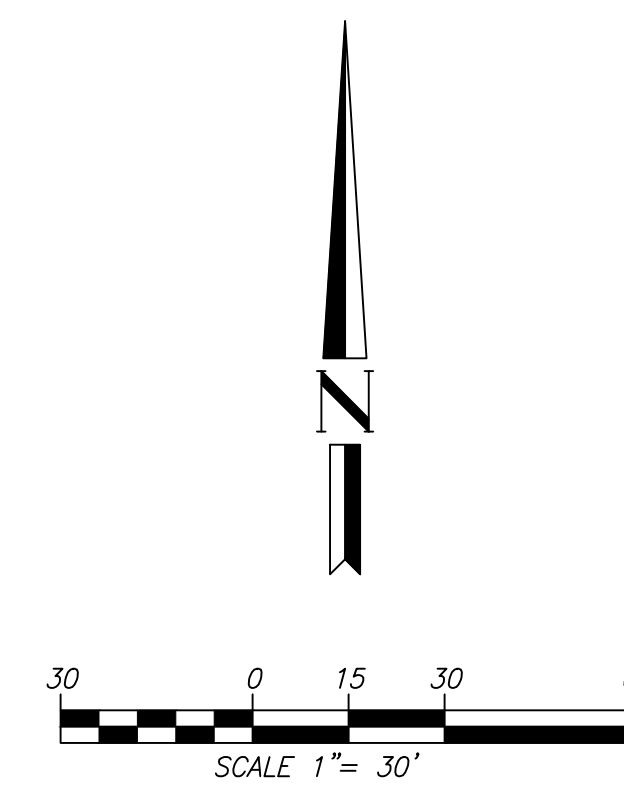
QUANTITY

EASEMENTS:

- (A)** EXISTING 10' WIDE EASEMENT FOR EDISON TO BE QUITCLAIMED
- (B)** EXISTING 6' WIDE EASEMENT FOR EDISON TO BE QUITCLAIMED
- (C)** EXISTING 6' WIDE EASEMENT FOR EDISON TO BE QUITCLAIMED
- (D)** EXISTING 10'X12' WIDE EASEMENT FOR EDISON TO BE QUITCLAIMED
- (E)** EXISTING 6' WIDE EASEMENT FOR GENERAL TELEPHONE COMPANY TO BE QUITCLAIMED
- (F)** EXISTING EASEMENT FOR DOMESTIC WATER PURPOSES TO REMAIN
- (G)** EXISTING EASEMENT FOR SEWER AND STORM DRAIN PURPOSES TO REMAIN

AREA TABLE

NAME	PER DOCUMENT	AREA (AC)
PARCEL 1	P.M.B.60/29	1.48
PARCEL 2	P.M.B.60/29	1.18
PARCEL 1	PTR OSA-5807379	0.57
PARCEL 2	PTR OSA-5807379	0.11
TOTAL		3.34



SLATER AVENUE

SLATER INVESTMENTS, LLC., A DELAWARE LLC.
 1501 QUAIL STREET, SUITE 100A, NEWPORT BEACH, CA 92660
 (949) 520-7181

FOUNTAIN VALLEY, CA



EXISTING LOTS / EASEMENTS

DATE: 09-14-21
 JOB NO.: R313364.01

HUITT-ZOLLARS
 Huitt-Zollars, Inc. Irvine
 2603 Main Street, Suite 400
 Irvine, California 92614
 Phone (949) 988-5815 Fax (949) 988-5820

Attachment 3



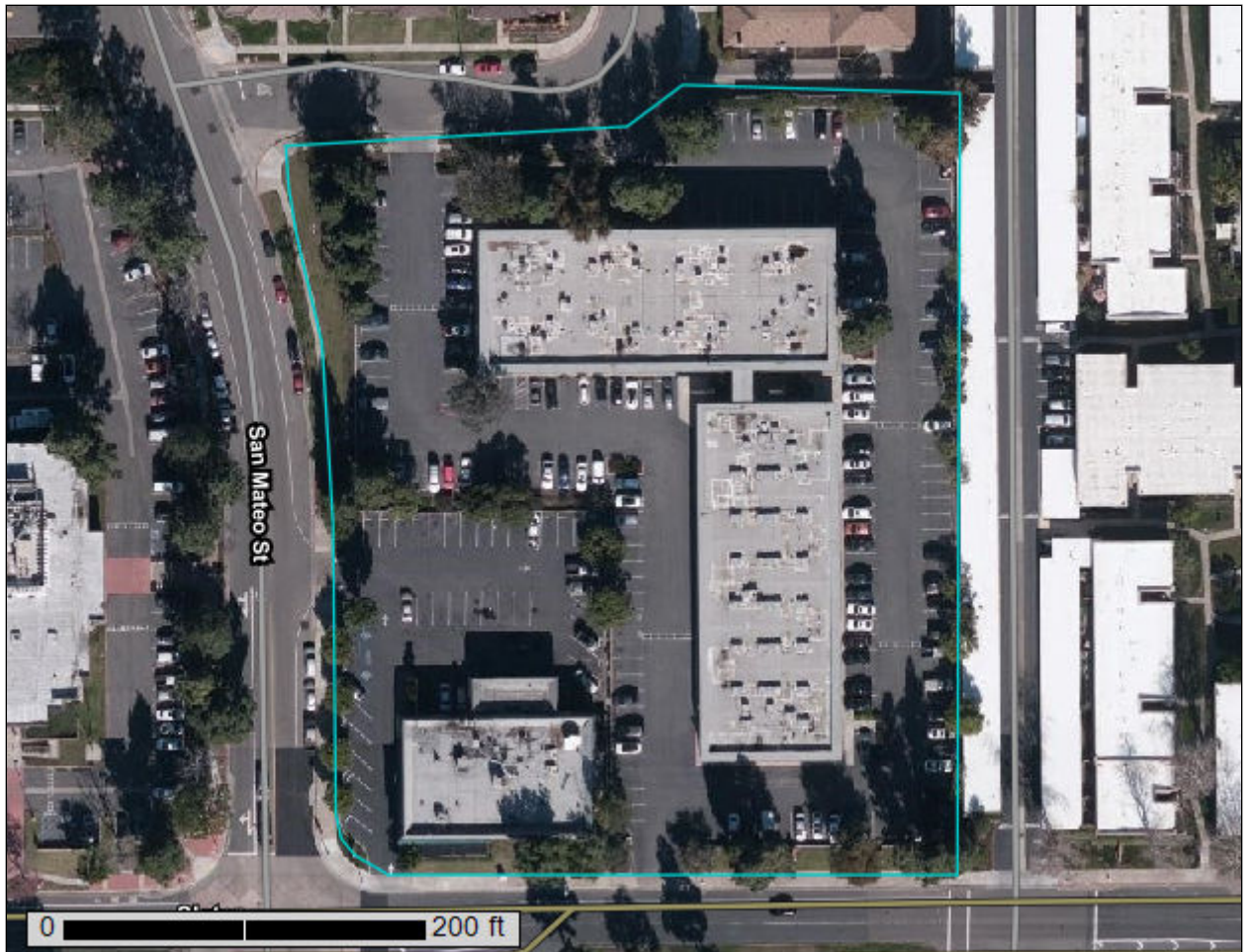
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Orange County and Part of Riverside County, California



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	12
Map Unit Descriptions.....	12
Orange County and Part of Riverside County, California.....	14
158—Hueneme fine sandy loam, drained.....	14
References	16

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

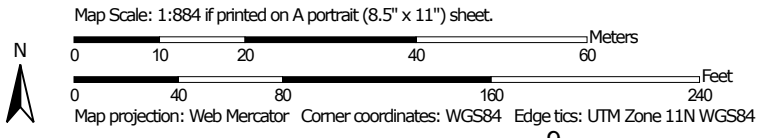
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map




Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County and Part of Riverside County, California
 Survey Area Data: Version 14, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 13, 2018—Jan 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
158	Hueneme fine sandy loam, drained	3.4	100.0%
Totals for Area of Interest		3.4	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County and Part of Riverside County, California

158—Hueneme fine sandy loam, drained

Map Unit Setting

National map unit symbol: hcn3
Elevation: 0 to 430 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 64 degrees F
Frost-free period: 300 to 350 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hueneme and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hueneme

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Stratified alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 27 inches: fine sandy loam
H2 - 27 to 60 inches: stratified sand to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: A
Hydric soil rating: Yes

Minor Components

San emigdio, fine sandy loam

Percent of map unit: 5 percent
Hydric soil rating: No

Custom Soil Resource Report

Bolsa, silt loam, drained

Percent of map unit: 5 percent

Hydric soil rating: No

Hueneme, fine sandy loam

Percent of map unit: 5 percent

Hydric soil rating: No

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Custom Soil Resource Report

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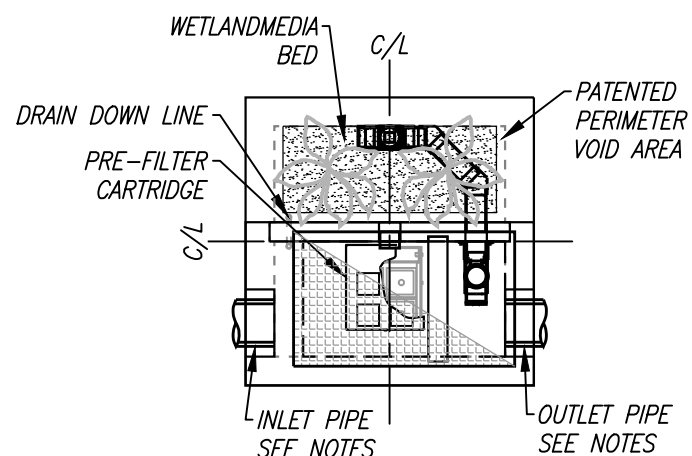
Attachment 4

Capture Efficiency Method for Flow-based BMP's (OC TGD III.3.3)

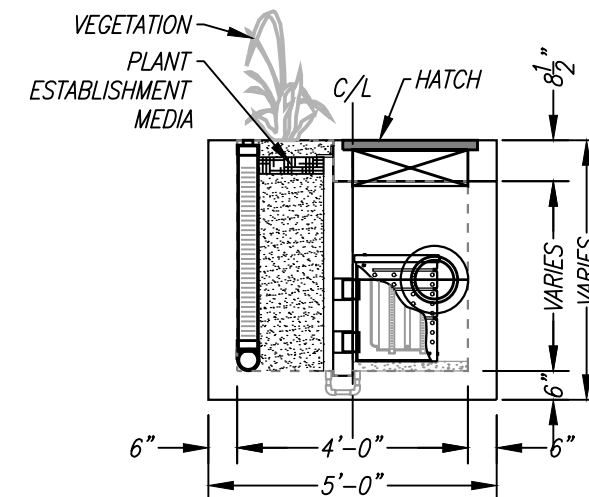
DMA	Total Area (ac)	Impervious area (ac)	Effective Imperviousness, <i>imp</i>	Runoff Coefficient, <i>C</i> = (0.75 x <i>imp</i> + 0.15)	Design Storm depth, <i>d</i> (in) *From OC TGD 85th percentile, 24-hr storm depth	Design Capture Volume, DCV (cu-ft) = $C \times d \times A \times 43,560$ <i>sf/ac</i> x 1/12 in/ft	Design Storm Intensity, <i>i</i> (in/hr)	Design Flow Rate, <i>Q</i> (cfs) = $C \times i \times A$	BMP Design	Treated Flow (cfs)
A-1	0.400	0.300	0.750	0.713	0.75	3,918	0.2625	0.075	MWS-L-4-6-V	0.073
A-2	0.980	0.882	0.900	0.825	0.75	2,884	0.2625	0.212	MWS-L-8-8-V	0.231
A-3	0.290	0.249	0.860	0.795	0.75	4,201	0.2625	0.061	MWS-L-4-6-V	0.073
B-1	0.410	0.336	0.820	0.765	0.75	4,201	0.2625	0.082	MWS-L-4-8-V	0.115
B-2	0.800	0.800	1.000	0.900	0.75	3,043	0.2625	0.189	MWS-L-8-8-V	0.231
B-3	0.170	0.141	0.830	0.773	0.75	417	0.2625	0.034	MWS-L-4-4-V	0.052
B-4	0.290	0.290	1.000	0.900	0.75	738	0.2625	0.069	MWS-L-4-6-V	0.073
TOTAL	3.340	2.999	6.160	4.770	0.75	19,403	0.2625	0.722		#N/A

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.052	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE		OFFLINE	
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD		PEDESTRIAN	
FRAME & COVER	24" X 42"	OPEN PLANTER	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



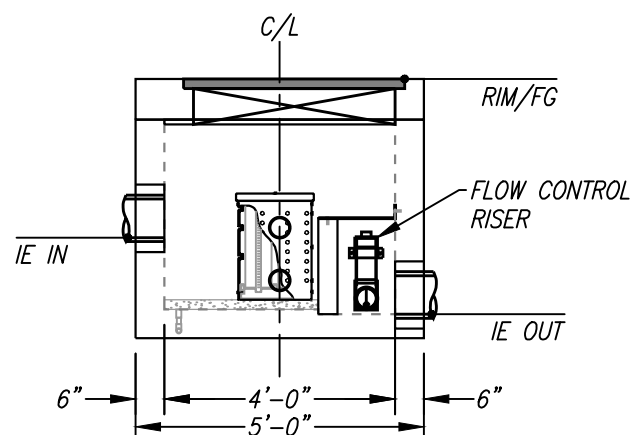
LEFT END VIEW

INSTALLATION NOTES

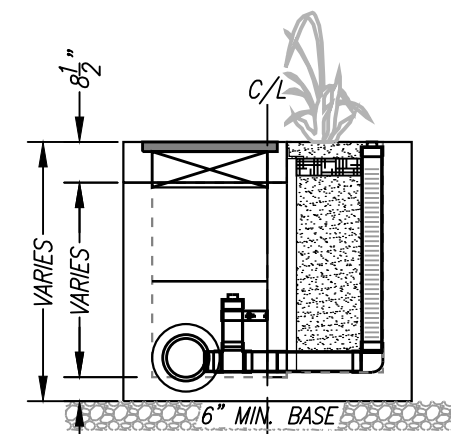
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ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.052
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0



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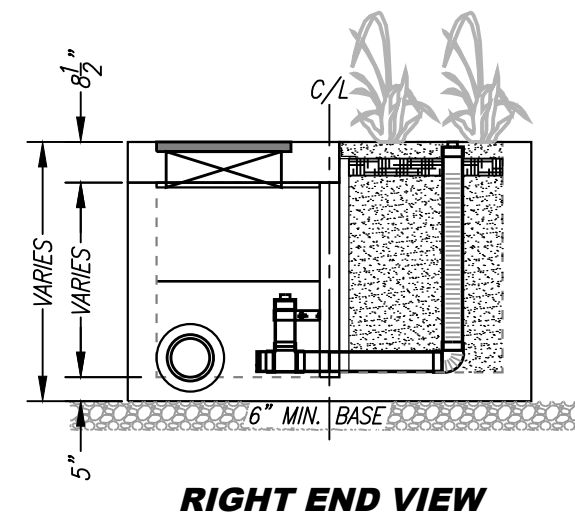
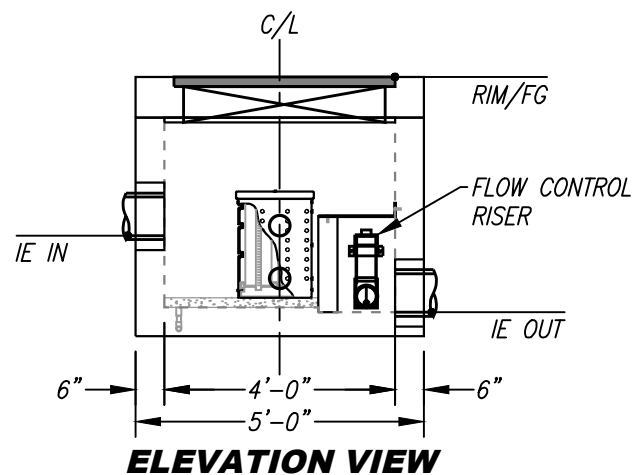
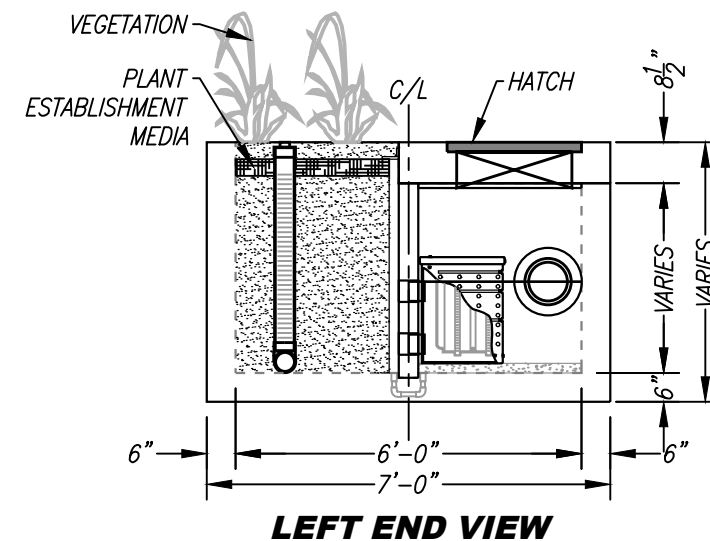
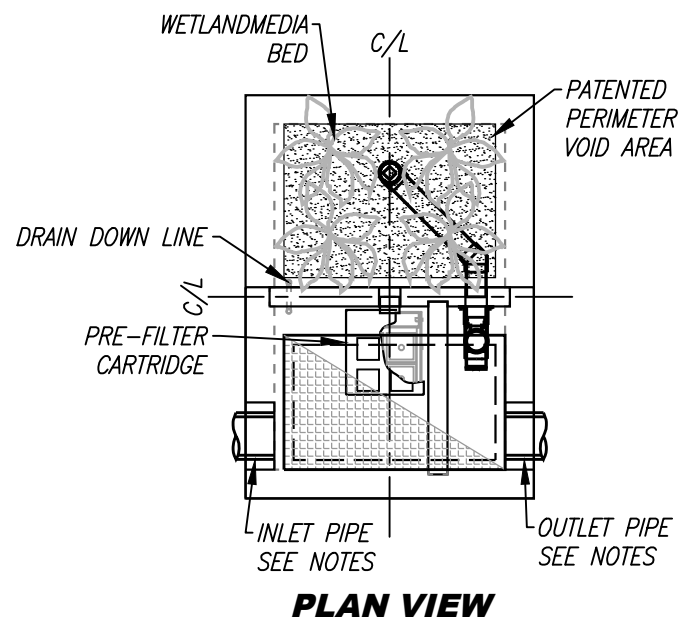
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MWS-L-4-4-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.073	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE		OFFLINE	
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	24" X 42"	OPEN PLANTER	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



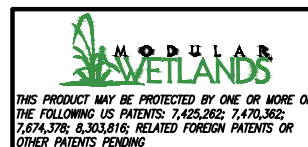
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TREATMENT FLOW (CFS)	0.073
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.3
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0



PROPRIETARY AND CONFIDENTIAL:

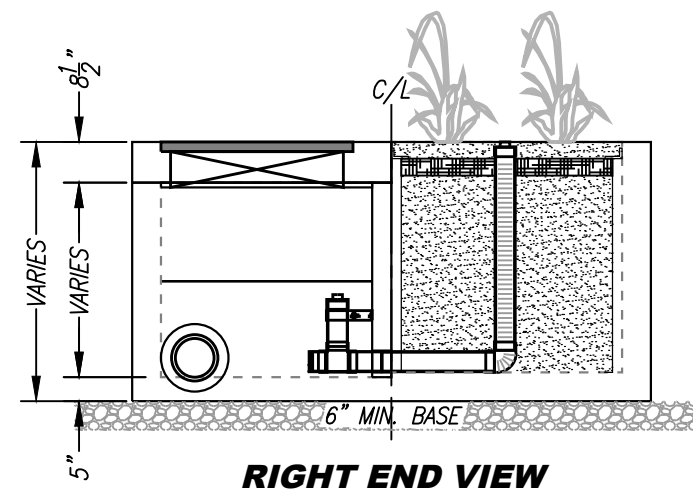
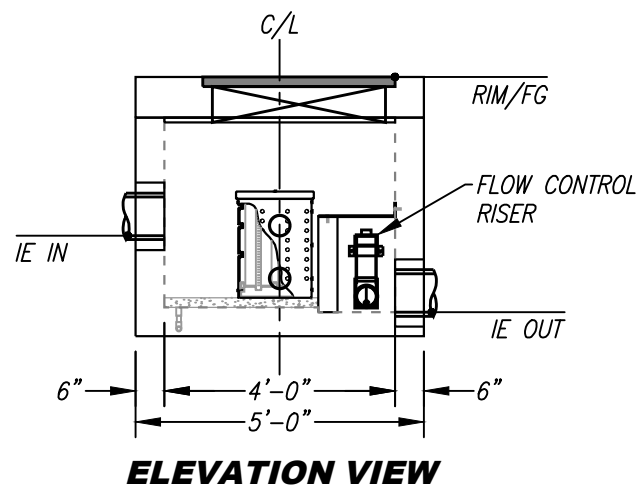
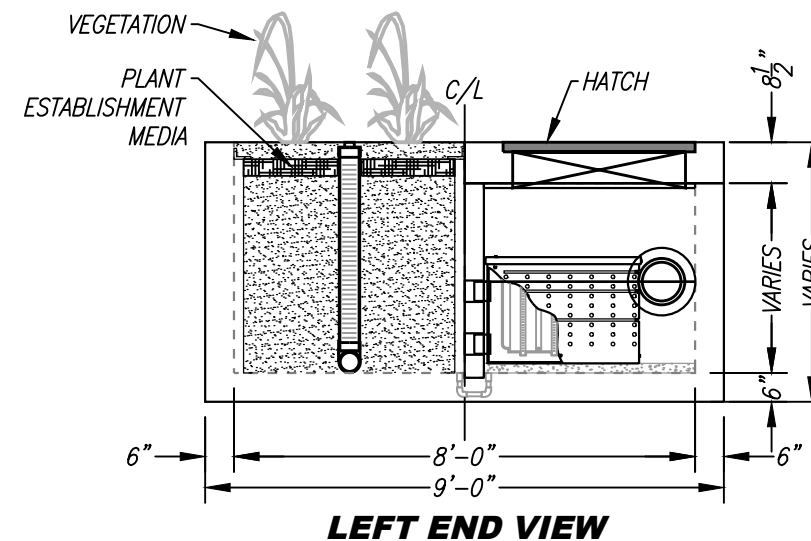
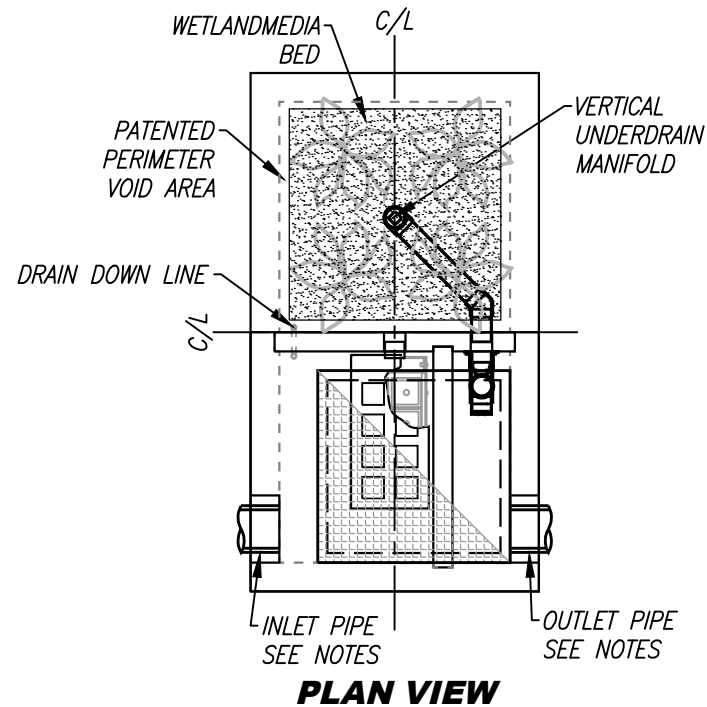
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MWS-L-4-6-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.115	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE		OFFLINE	
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	36" X 36"	OPEN PLANTER	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



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TREATMENT FLOW (CFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0



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A Forterra Company

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

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.231	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE		OFFLINE	
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	ø30"	OPEN PLANTER	ø24"
NOTES:			

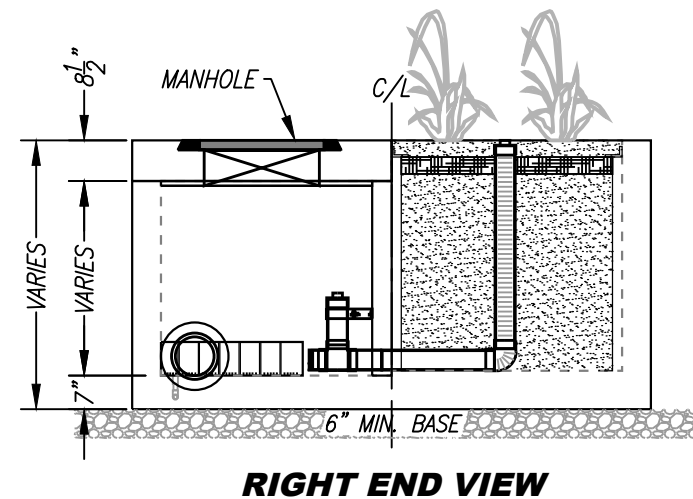
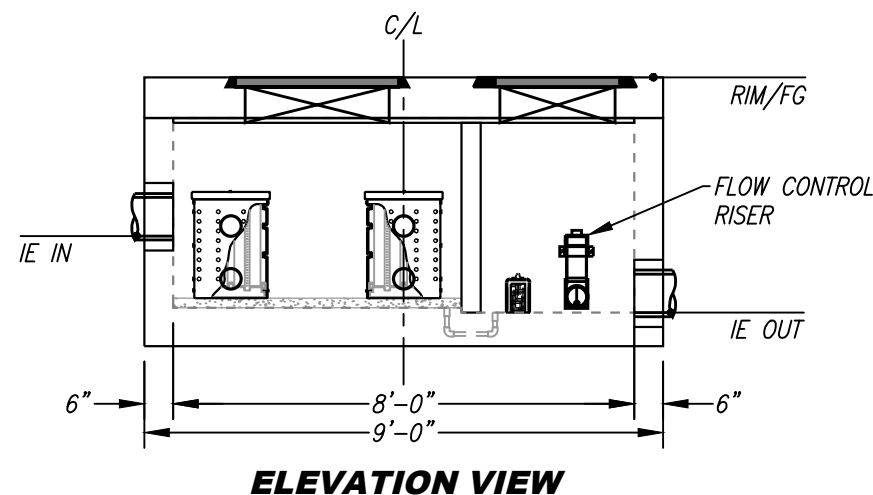
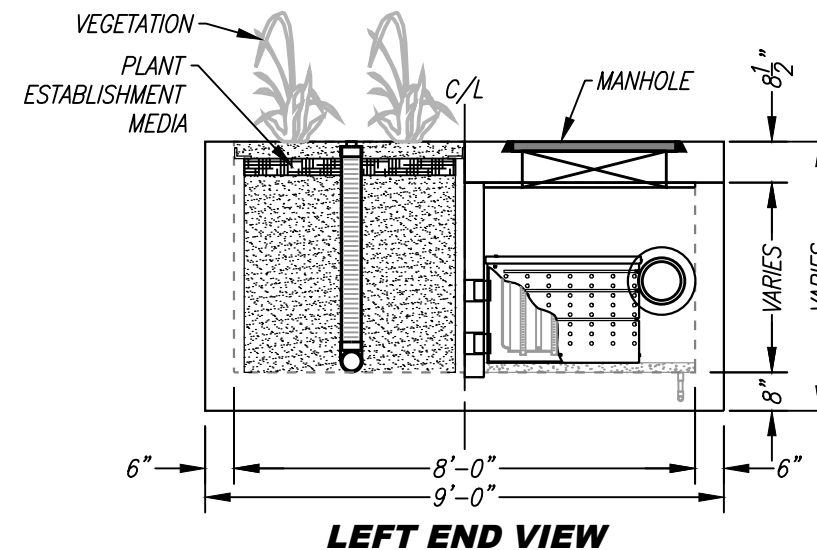
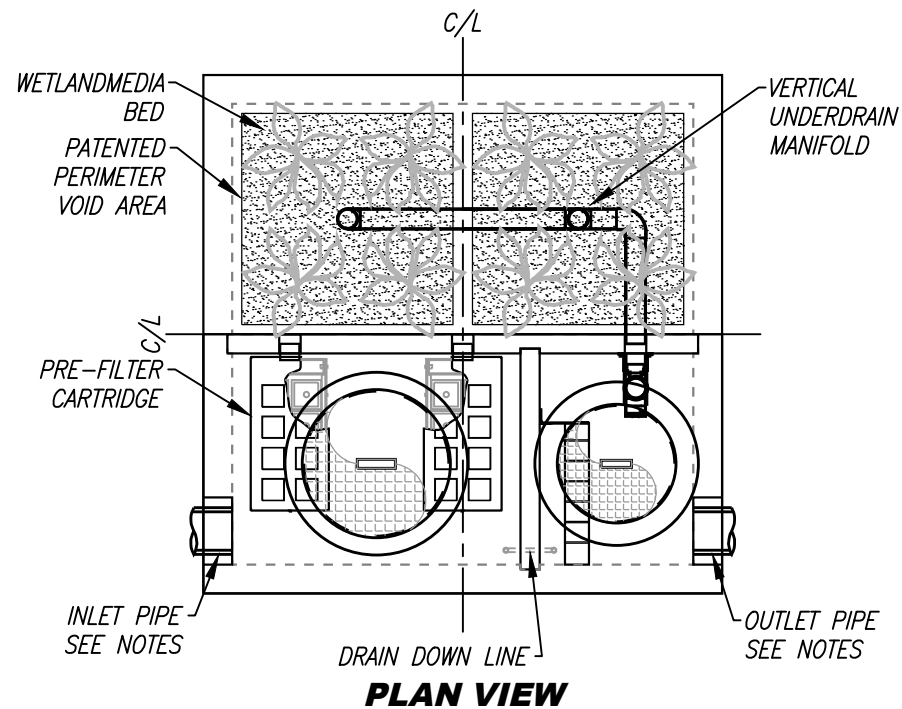
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INSTALLATION NOTES

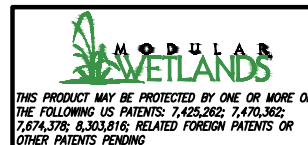
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TREATMENT FLOW (CFS)	0.231
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

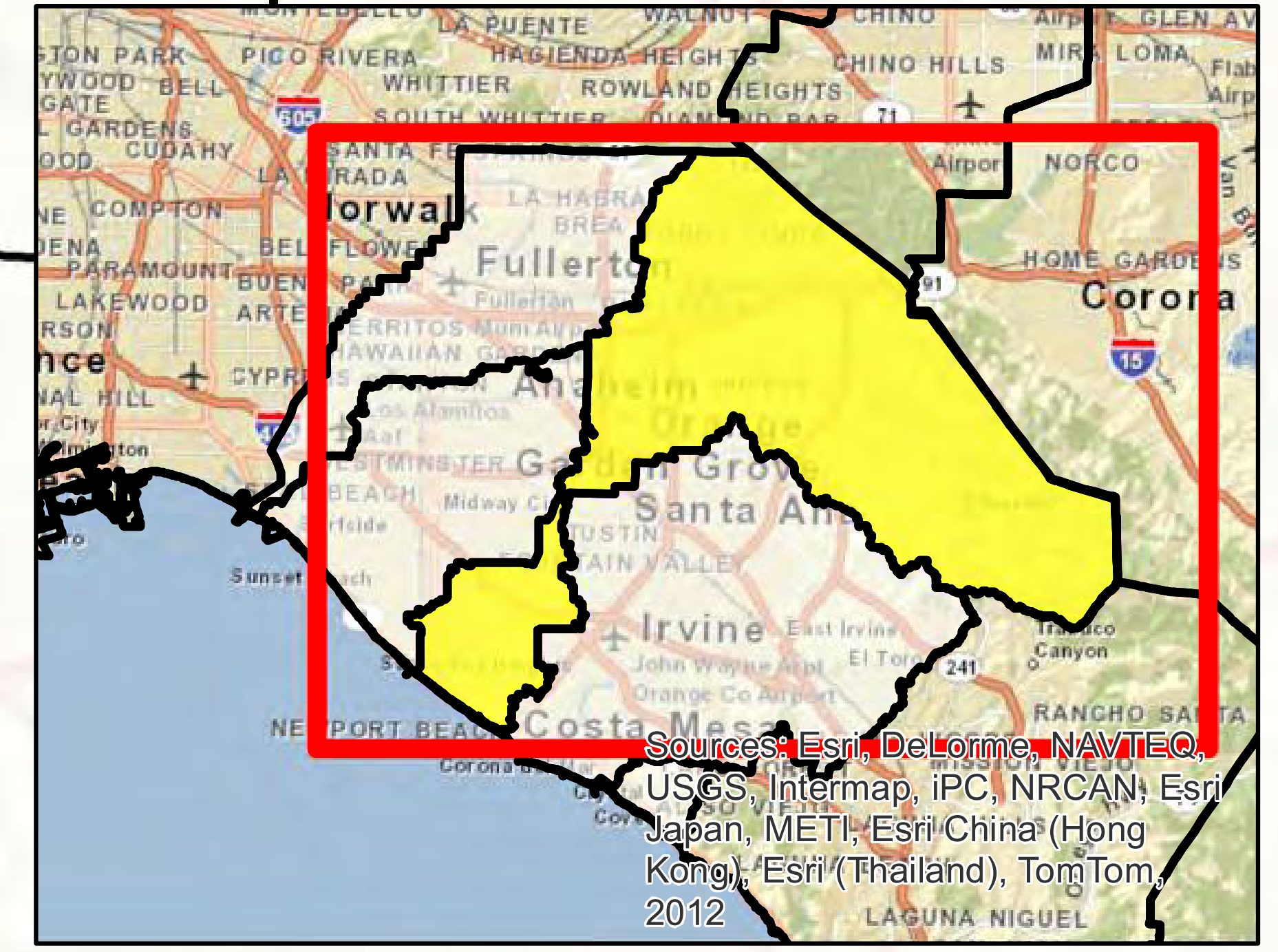
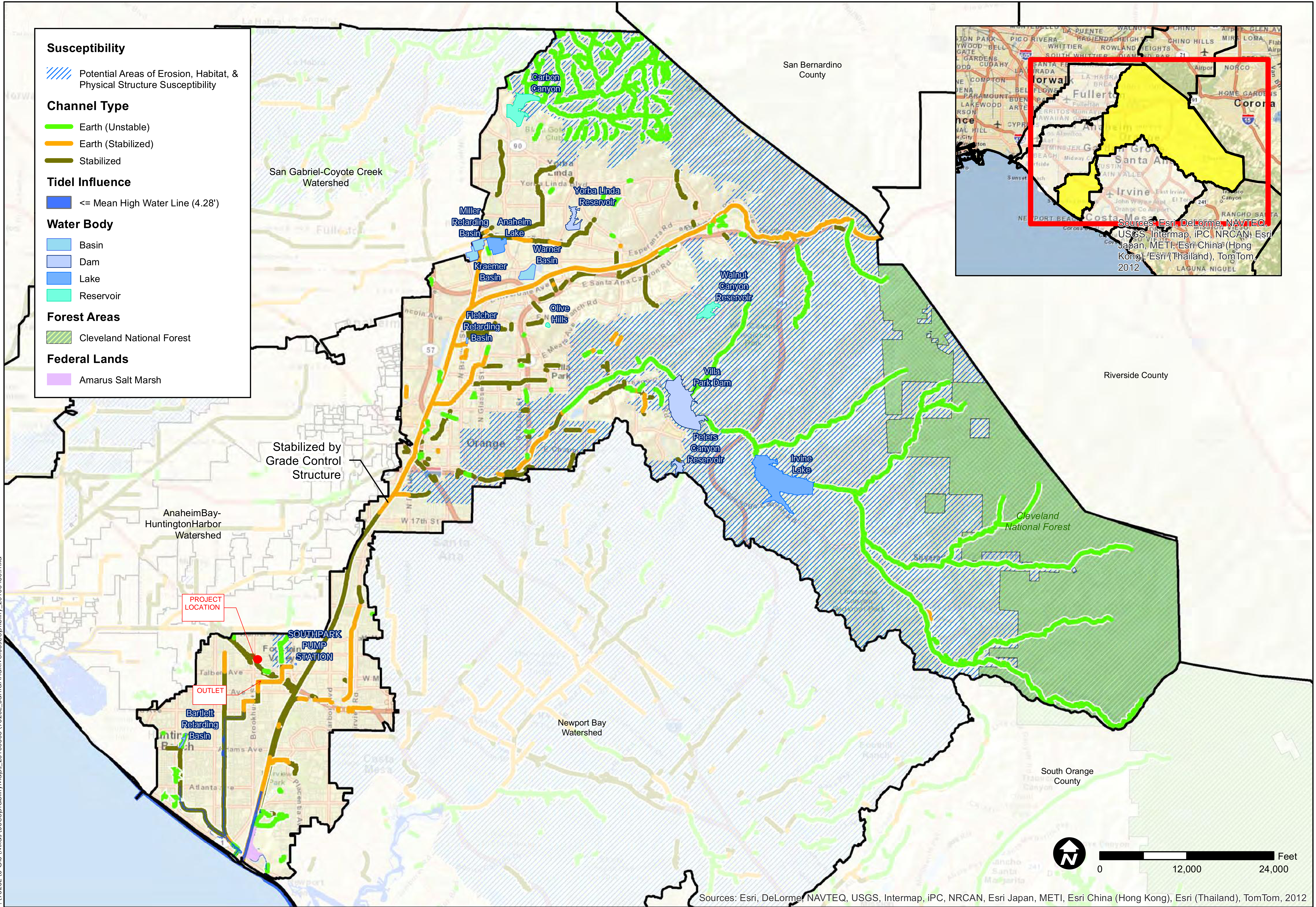


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MWS-L-8-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

Attachment 5



Susceptibility

- Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

- Earth (Unstable)
- Earth (Stabilized)
- Stabilized

Tidel Influence

- <= Mean High Water Line (4.28')

Water Body

- Basin
- Dam
- Lake
- Reservoir

Forest Areas

- Cleveland National Forest

Federal Lands

- Amarus Salt Marsh

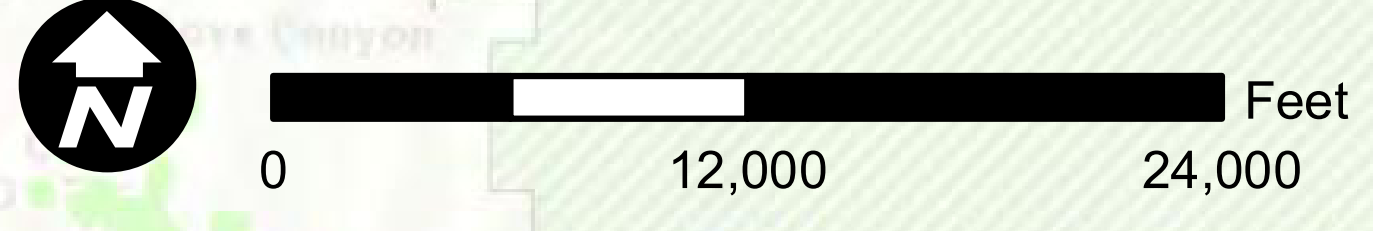
TITLE
**SUSCEPTIBILITY ANALYSIS
 SANTA ANA RIVER**

JOB
**ORANGE COUNTY
 WATERSHED
 MASTER PLANNING**

ORANGE CO. CA

SCALE	1" = 12000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526-E

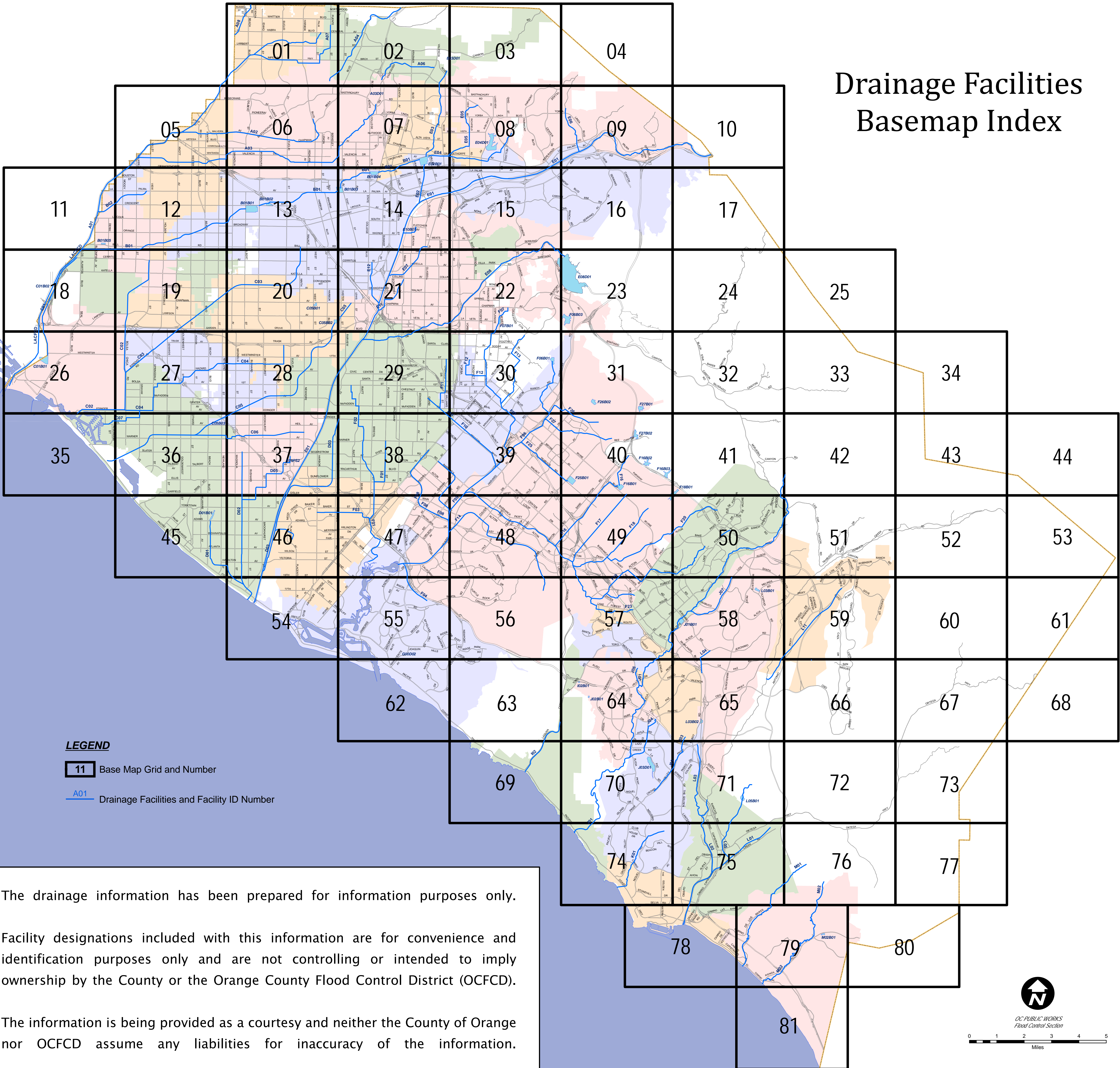
FIGURE



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012

P:\9526E\GIS\Mxd\SusceptibilityMaps_20100505_9526E_SantaAnaRiverSusceptibility_20100430.mxd

Drainage Facilities Basemap Index



LEGEND

- 11 Base Map Grid and Number
- A01 Drainage Facilities and Facility ID Number

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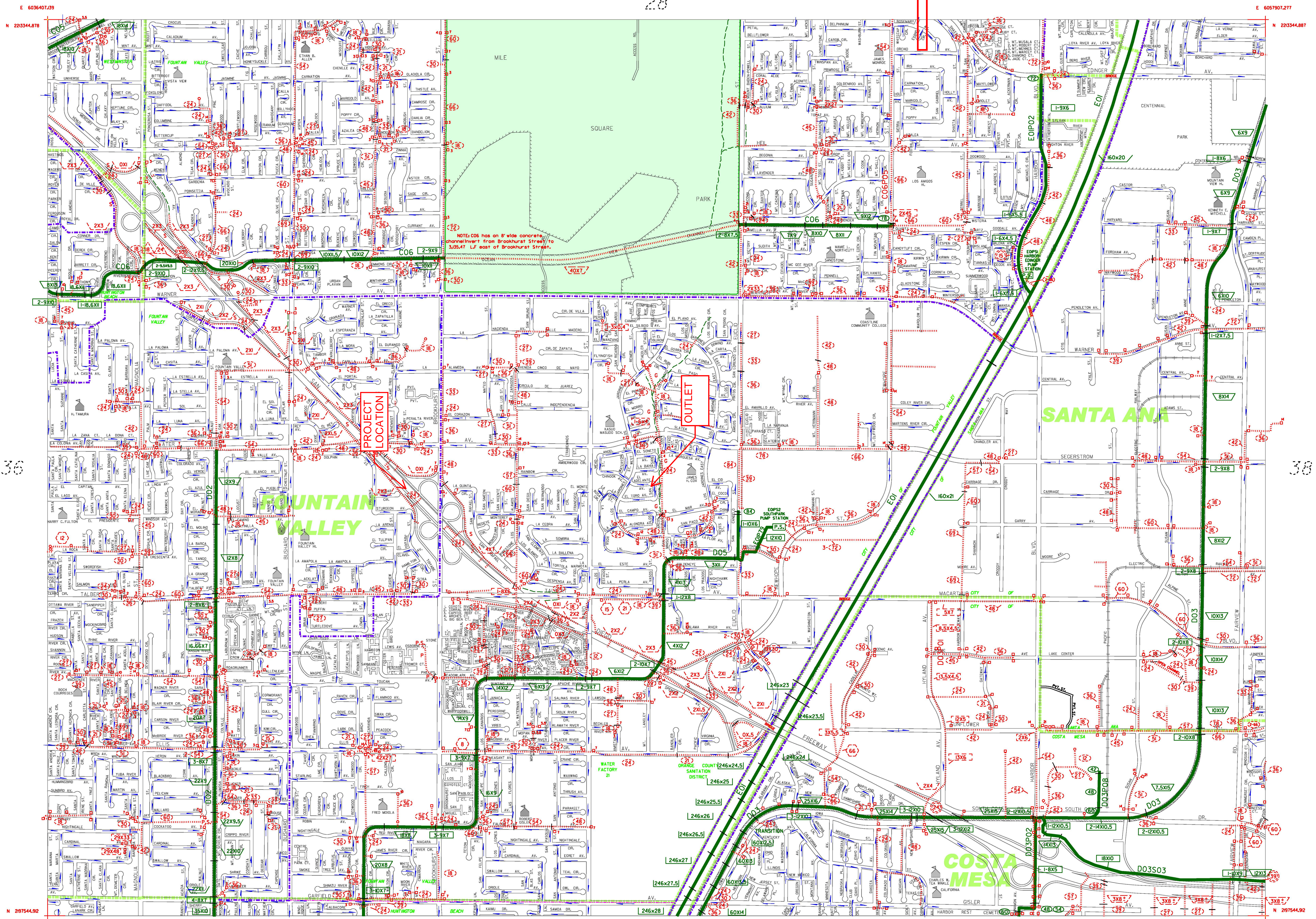
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OC PUBLIC WORKS
Flood Control Section

0 1 2 3 4 5
Miles

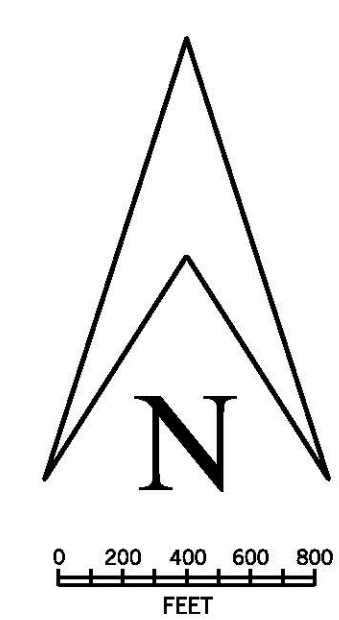


36

38

37

37



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ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION: 8. GUTIERREZ DATE: JAN. 12, 2000 SHEET NO.: 37 DRAWING NO.: MAPS-113-3

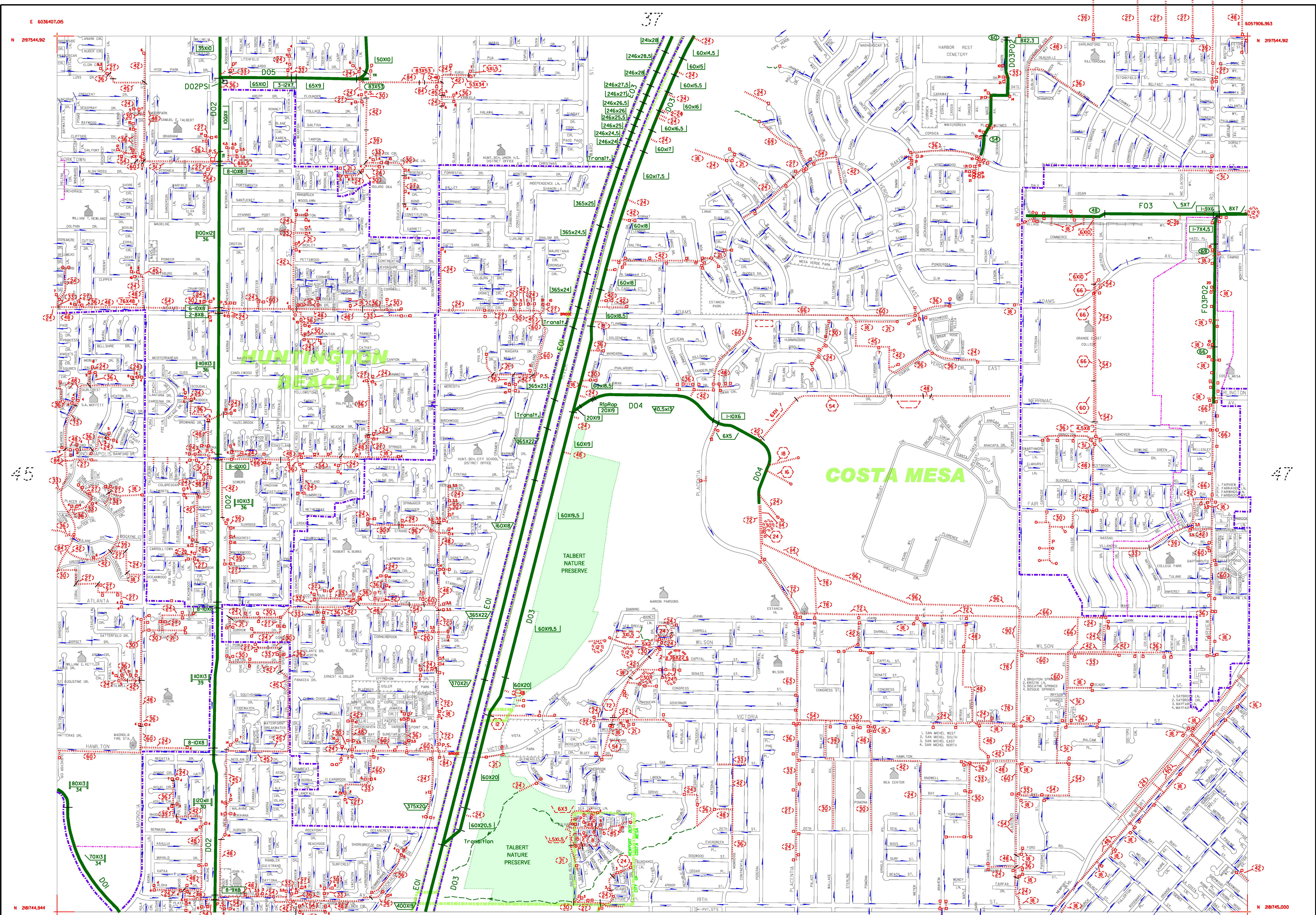
Channel Drainage Area Boundary
Major Sub-Area Drainage Boundary
Minor Sub-Area Drainage Boundary
Existing O.C.F.C.D. Facility
Existing Local Facility
Existing Retaining Basin or Reservoir
Natural Watercourse
City Limits
Greenbelt
Pump Station
Catch Basin (length in feet)
Drop Inlet or Entry
OCFCD Basins or Reservoirs

Ownership (if other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES

O.C.F.C.D. LOCAL

- Earth Trapezoidal Channel (base width by height in feet)
- Reinforced Concrete Trapezoidal Channel (base width by height in feet)
- Reinforced Concrete Rectangular Channel (base width by height in feet)
- Reinforced Concrete Box (RCB) (number of barrels-span in feet)
- Reinforced Concrete Pipe (RCP) (diameter in inches)
- Metal Sheet Channel (MSC) (base width by pile height in feet/Sheet pile total length)
- Corrugated Metal Pipe (CMP) (diameter in inches)
- Concrete Pipe (diameter in inches)
- Concrete Oval Pipe (width by height in inches)
- Steel Pipe (diameter in inches)
- Reinforced Concrete Arch (base span by height in inches)
- Corrugated Metal Arch (base span by height in inches)



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ORANGE COUNTY FLOOD CONTROL DISTRICT

**BASE MAP
OF DRAINAGE FACILITIES
IN ORANGE COUNTY**

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	JAN. 8 2007	46	MAPS-113-3

Channel Drainage Area Boundary

Major Sub-Area Drainage Boundary

Minor Sub-Area Drainage Boundary

Existing O.C.F.C.D. Facility

Existing Local Facility

Existing Retarding Basin or Reservoir

Natural Watercourse

City Limits

Greenbelt

Pump Station

Catch Basin (length in feet)

Drop Inlet or Other Entry

OCFCD Basins or Reservoirs

Ownership: (if other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES

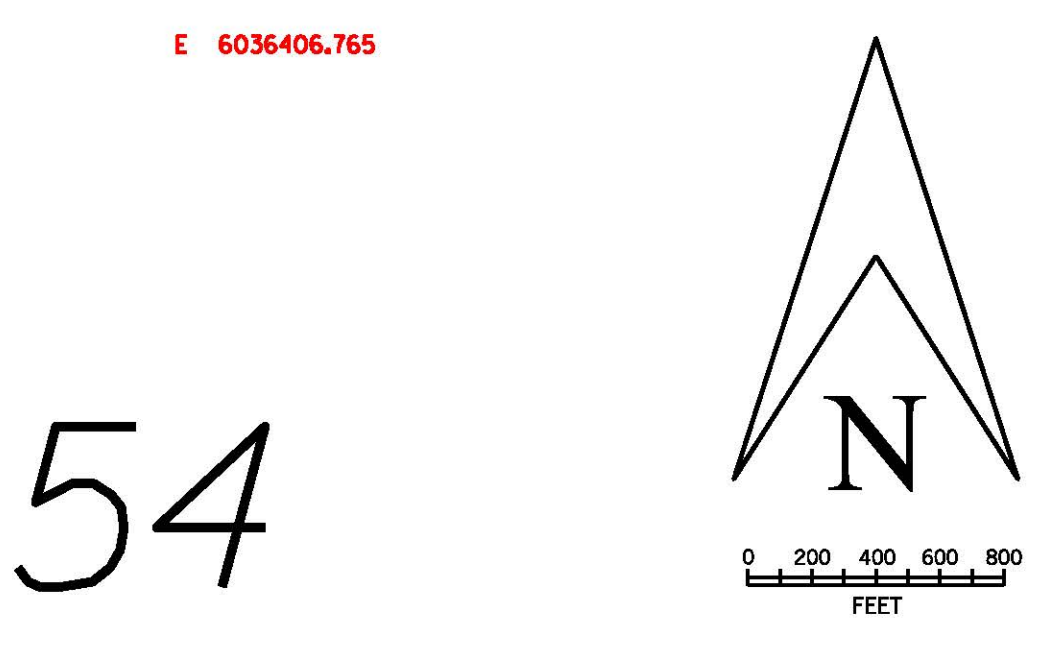
O.C.F.C.D. LOCAL

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- Reinforced Concrete Rectangular Channel (base width by height in feet)
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- Reinforced Concrete Pipe (RCP) (diameter in inches)
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- Corrugated Metal Pipe (CMP) (diameter in inches)
- Concrete Pipe (diameter in inches)
- Concrete Oval Pipe (width by height in inches)
- Steel Pipe (diameter in inches)
- Reinforced Concrete Arch (base span by height in inches)
- Corrugated Metal Arch (base span by height in inches)



46

46



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REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	JANUARY 2000	54	MAPS-113-3

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	Major Sub-Area Drainage Boundary
	Minor Sub-Area Drainage Boundary
	Existing O.C.F.C.D. Facility
	Existing Retarding Basin or Reservoir
	Natural Watercourse
	City Limits
	Greenbelt
	Pump Station
	Catch Basin (length in feet)
	Drop Inlet or Other Entry
	OCFCD Basins or Reservoirs
Ownership (if other than City or County): Private=P State=S Federal=F	

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	Reinforced Concrete Trapezoidal Channel (base width by height in feet)
	Reinforced Concrete Rectangular Channel (base width by height in feet)
	Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
	Reinforced Concrete Pipe (RCP) (diameter in inches)
	Metal Sheet Channel (MSC) (Base width by pile height in feet/Sheet pile total length)
	Corrugated Metal Pipe (CMP) (diameter in inches)
	Concrete Pipe (diameter in inches)
	Concrete Oval Pipe (width by height in inches)
	Steel Pipe (diameter in inches)
	Reinforced Concrete Arch (base span by height in inches)
	Corrugated Metal Arch (base span by height in inches)

Attachment 6



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.



- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
 - Using mulches (such as wood chips or bark) in planter areas without ground cover to minimize sediment in runoff
 - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
 - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
 - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING



– DRAINS TO OCEAN” and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of “redevelopment”, then the requirements stated under “designing new installations” above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner’s association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey



- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Additional Information***Maintenance Considerations***

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Description

Parking lots can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

BMPs for other outdoor areas on site (loading/unloading, material storage, and equipment operations) are described in SC-30 through SC-33.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- Encourage advanced designs and maintenance strategies for impervious parking lots. Refer to the treatment control BMP fact sheets in this manual for additional information.
- Keep accurate maintenance logs to evaluate BMP implementation.



Good Housekeeping

- Keep all parking areas clean and orderly. Remove debris, litter, and sediments in a timely fashion.
- Post “No Littering” signs and enforce anti-litter laws.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

	Good Housekeeping	✓
	Preventative Maintenance	✓
	Spill and Leak Prevention and Response	✓
	Material Handling & Waste Management	
	Erosion and Sediment Controls	
	Employee Training Program	✓
	Quality Assurance Record Keeping	✓



CALIFORNIA STORMWATER QUALITY ASSOCIATION®

- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.



Preventative Maintenance

Inspection

Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.

- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below if water is used to clean surfaces:
 - ✓ Block the storm drain or contain runoff.
 - ✓ Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
- Follow the procedures below when cleaning heavy oily deposits:
 - ✓ Clean oily spots with absorbent materials.
 - ✓ Use a screen or filter fabric over inlet, then wash surfaces.
 - ✓ Do not allow discharges to the storm drain.
 - ✓ Vacuum/pump discharges to a tank or discharge to sanitary sewer.
 - ✓ Dispose of spilled materials and absorbents appropriately.

Surface Repair

- Check local ordinance for SUSMP/LID ordinance.
- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in

place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- Use only as much water as necessary for dust control during sweeping to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.



Spill Response and Prevention Procedures

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.



Employee Training Program

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for parking area maintenance, types and quantities of waste disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital investments may be required at some sites to purchase sweeping equipment, train sweeper operators, install oil/water/sand separators, or implement advanced BMPs. These costs can vary significantly depending upon site conditions and the amount of BMPs required.

Maintenance

- Sweep and clean parking lots regularly to minimize pollutant transport into storm drains from stormwater runoff.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Maintain advanced BMPs such as vegetated swales, infiltration trenches, or detention basins as appropriate. Refer to the treatment control fact sheets for more information.

Supplemental Information

Advanced BMPs

Some parking areas may require advanced BMPs to further reduce pollutants in stormwater runoff, and a few examples are listed below. Refer to the Treatment Control Fact Sheets and the New Development and Redevelopment Manual for more information.

- When possible, direct sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*.

California Stormwater Quality Association, 2003. *New Development and Redevelopment Stormwater Best Management Practice Handbook*. Available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>.

Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook*. Available online at: http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: <http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities>.

Pollution from Surface Cleaning Folder, 1996, 2003. Bay Area Stormwater Management Agencies Association. Available online at:

<http://basmaa.org/Portals/0/documents/pdf/Pollution%20from%20Surface%20Cleaning.pdf>.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at:

<http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf>.

The Storm Water Managers Resource Center, <http://www.stormwatercenter.net>.

US EPA. *Post-Construction Stormwater Management in New Development and Redevelopment*. BMP Fact Sheets. Available online at:

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=5.

Description

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMP fact sheets SC-11 Spill Prevention, Control & Cleanup and SC-34 Waste Handling & Disposal.

Approach

Pollution Prevention

- Purchase only the amount of material that will be needed for foreseeable use. In most cases this will result in cost savings in both purchasing and disposal. See SC-61 Safer Alternative Products for additional information.
- Be aware of new products that may do the same job with less environmental risk and for less or the equivalent cost. Total cost must be used here; this includes purchase price, transportation costs, storage costs, use related costs, clean up costs and disposal costs.

Suggested Protocols

General

- Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Dispose of wash water, sweepings, and sediments, properly.
- Recycle or dispose of fluids properly.
- Establish a daily checklist of office, yard and plant areas to confirm cleanliness and adherence to proper storage and security. Specific employees should be assigned specific inspection responsibilities and given the authority to remedy any problems found.
- Post waste disposal charts in appropriate locations detailing for each waste its hazardous nature (poison, corrosive, flammable), prohibitions on its disposal (dumpster, drain, sewer) and the recommended disposal method (recycle, sewer, burn, storage, landfill).
- Summarize the chosen BMPs applicable to your operation and post them in appropriate conspicuous places.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>
Oxygen Demanding	<input checked="" type="checkbox"/>



- Require a signed checklist from every user of any hazardous material detailing amount taken, amount used, amount returned and disposal of spent material.
- Do a before audit of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating.
- Keep records of water, air and solid waste quantities and quality tests and their disposition.
- Maintain a mass balance of incoming, outgoing and on hand materials so you know when there are unknown losses that need to be tracked down and accounted for.
- Use and reward employee suggestions related to BMPs, hazards, pollution reduction, work place safety, cost reduction, alternative materials and procedures, recycling and disposal.
- Have, and review regularly, a contingency plan for spills, leaks, weather extremes etc. Make sure all employees know about it and what their role is so that it comes into force automatically.

Training

- Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.
- Train municipal employees who handle potentially harmful materials in good housekeeping practices.
- Train personnel who use pesticides in the proper use of the pesticides. The California Department of Pesticide Regulation license pesticide dealers, certify pesticide applicators and conduct onsite inspections.
- Train employees and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and Countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- There are no major limitations to this best management practice.
- There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials

Requirements

Costs

- Minimal cost associated with this BMP. Implementation of good housekeeping practices may result in cost savings as these procedures may reduce the need for more costly BMPs.

Maintenance

- Ongoing maintenance required to keep a clean site. Level of effort is a function of site size and type of activities.

Supplemental Information

Further Detail of the BMP

- The California Integrated Waste Management Board's Recycling Hotline, 1-800-553-2962, provides information on household hazardous waste collection programs and facilities.

Examples

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000.

<http://www.nalms.org/bclss/bmphome.html#bmp>

King County Stormwater Pollution Control Manual - <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities, Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, Revised by California Coastal Commission, February 2002.

Orange County Stormwater Program

http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Mateo STOPPP - (<http://stoppp.tripod.com/bmp.html>)



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>
Oxygen Demanding	<input checked="" type="checkbox"/>

Description

Streets, roads, and highways are significant sources of pollutants in stormwater discharges, and operation and maintenance (O&M) practices, if not conducted properly, can contribute to the problem. Stormwater pollution from roadway and bridge maintenance should be addressed on a site-specific basis. Use of the procedures outlined below, that address street sweeping and repair, bridge and structure maintenance, and unpaved roads will reduce pollutants in stormwater.

Approach

Pollution Prevention

- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal)
- Recycle paint and other materials whenever possible.
- Enlist the help of citizens to keep yard waste, used oil, and other wastes out of the gutter.

Suggested Protocols

Street Sweeping and Cleaning

- Maintain a consistent sweeping schedule. Provide minimum monthly sweeping of curbed streets.
- Perform street cleaning during dry weather if possible.



- Avoid wet cleaning or flushing of street, and utilize dry methods where possible.
- Consider increasing sweeping frequency based on factors such as traffic volume, land use, field observations of sediment and trash accumulation, proximity to water courses, etc. For example:
 - Increase the sweeping frequency for streets with high pollutant loadings, especially in high traffic and industrial areas.
 - Increase the sweeping frequency just before the wet season to remove sediments accumulated during the summer.
 - Increase the sweeping frequency for streets in special problem areas such as special events, high litter or erosion zones.
- Maintain cleaning equipment in good working condition and purchase replacement equipment as needed. Old sweepers should be replaced with new technologically advanced sweepers (preferably regenerative air sweepers) that maximize pollutant removal.
- Operate sweepers at manufacturer requested optimal speed levels to increase effectiveness.
- To increase sweeping effectiveness consider the following:
 - Institute a parking policy to restrict parking in problematic areas during periods of street sweeping.
 - Post permanent street sweeping signs in problematic areas; use temporary signs if installation of permanent signs is not possible.
 - Develop and distribute flyers notifying residents of street sweeping schedules.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- If available use vacuum or regenerative air sweepers in the high sediment and trash areas (typically industrial/commercial).
- Keep accurate logs of the number of curb-miles swept and the amount of waste collected.
- Dispose of street sweeping debris and dirt at a landfill.
- Do not store swept material along the side of the street or near a storm drain inlet.
- Keep debris storage to a minimum during the wet season or make sure debris piles are contained (e.g. by berming the area) or covered (e.g. with tarps or permanent covers).

Street Repair and Maintenance

Pavement marking

- Schedule pavement marking activities for dry weather.

- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.
- Provide drop cloths and drip pans in paint mixing areas.
- Properly maintain application equipment.
- Street sweep thermoplastic grindings. Yellow thermoplastic grindings may require special handling as they may contain lead.
- Paints containing lead or tributyltin are considered a hazardous waste and must be disposed of properly.
- Use water based paints whenever possible. If using water based paints, clean the application equipment in a sink that is connected to the sanitary sewer.
- Properly store leftover paints if they are to be kept for the next job, or dispose of properly.

Concrete installation and repair

- Schedule asphalt and concrete activities for dry weather.
- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place sandbags around inlets or work areas).
- Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.
- Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.
- Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile, or dispose in the trash.
- When making saw cuts in pavement, use as little water as possible and perform during dry weather. Cover each storm drain inlet completely with filter fabric or plastic during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site. Alternatively, a small onsite vacuum may be used to pick up the slurry as this will prohibit slurry from reaching storm drain inlets.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Patching, resurfacing, and surface sealing

- Schedule patching, resurfacing and surface sealing for dry weather.
- Stockpile materials away from streets, gutter areas, storm drain inlets or watercourses. During wet weather, cover stockpiles with plastic tarps or berm around them if necessary to prevent transport of materials in runoff.
- Pre-heat, transfer or load hot bituminous material away from drainage systems or watercourses.
- Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and maintenance holes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from covered maintenance holes and storm drain inlets when the job is complete.
- Prevent excess material from exposed aggregate concrete or similar treatments from entering streets or storm drain inlets. Designate an area for clean up and proper disposal of excess materials.
- Use only as much water as necessary for dust control, to avoid runoff.
- Sweep, never hose down streets to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Equipment cleaning maintenance and storage

- Inspect equipment daily and repair any leaks. Place drip pans or absorbent materials under heavy equipment when not in use.
- Perform major equipment repairs at the corporation yard, when practical.
- If refueling or repairing vehicles and equipment must be done onsite, use a location away from storm drain inlets and watercourses.
- Clean equipment including sprayers, sprayer paint supply lines, patch and paving equipment, and mud jacking equipment at the end of each day. Clean in a sink or other area (e.g. vehicle wash area) that is connected to the sanitary sewer.

*Bridge and Structure Maintenance**Paint and Paint Removal*

- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Do not transfer or load paint near storm drain inlets or watercourses.

- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint container.
- Plug nearby storm drain inlets prior to starting painting where there is significant risk of a spill reaching storm drains. Remove plugs when job is completed.
- If sand blasting is used to remove paint, cover nearby storm drain inlets prior to starting work.
- Perform work on a maintenance traveler or platform, or use suspended netting or tarps to capture paint, rust, paint removing agents, or other materials, to prevent discharge of materials to surface waters if the bridge crosses a watercourse. If sanding, use a sander with a vacuum filter bag.
- Capture all clean-up water, and dispose of properly.
- Recycle paint when possible (e.g. paint may be used for graffiti removal activities). Dispose of unused paint at an appropriate household hazardous waste facility.

Graffiti Removal

- Schedule graffiti removal activities for dry weather.
- Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks, or other structures needing graffiti abatement. Clean up afterwards by sweeping or vacuuming thoroughly, and/or by using absorbent and properly disposing of the absorbent.
- When graffiti is removed by painting over, implement the procedures under Painting and Paint Removal above.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a landscaped or dirt area. If such an area is not available, filter runoff through an appropriate filtering device (e.g. filter fabric) to keep sand, particles, and debris out of storm drains.
- If a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound), plug nearby storm drains and vacuum/pump wash water to the sanitary sewer.
- Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).

Repair Work

- Prevent concrete, steel, wood, metal parts, tools, or other work materials from entering storm drains or watercourses.
- Thoroughly clean up the job site when the repair work is completed.
- When cleaning guardrails or fences follow the appropriate surface cleaning methods (depending on the type of surface) outlined in SC-71 Plaza & Sidewalk Cleaning fact sheet.

- If painting is conducted, follow the painting and paint removal procedures above.
- If graffiti removal is conducted, follow the graffiti removal procedures above.
- If construction takes place, see the Construction Activity BMP Handbook.
- Recycle materials whenever possible.

Unpaved Roads and Trails

- Stabilize exposed soil areas to prevent soil from eroding during rain events. This is particularly important on steep slopes.
- For roadside areas with exposed soils, the most cost-effective choice is to vegetate the area, preferably with a mulch or binder that will hold the soils in place while the vegetation is establishing. Native vegetation should be used if possible.
- If vegetation cannot be established immediately, apply temporary erosion control mats/blankets; a comma straw, or gravel as appropriate.
- If sediment is already eroded and mobilized in roadside areas, temporary controls should be installed. These may include: sediment control fences, fabric-covered triangular dikes, gravel-filled burlap bags, biobags, or hay bales staked in place.

Non-Stormwater Discharges

Field crews should be aware of non-stormwater discharges as part of their ongoing street maintenance efforts.

- Refer to SC-10 Non-Stormwater Discharges
- Identify location, time and estimated quantity of discharges.
- Notify appropriate personnel.

Training

- Train employees regarding proper street sweeping operation and street repair and maintenance.
- Instruct employees and subcontractors to ensure that measures to reduce the stormwater impacts of roadway/bridge maintenance are being followed.
- Require engineering staff and/or consulting A/E firms to address stormwater quality in new bridge designs or existing bridge retrofits.
- Use a training log or similar method to document training.
- Train employees on proper spill containment and clean up, and in identifying non-stormwater discharges.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Densely populated areas or heavily used streets may require parking regulations to clear streets for cleaning.
- No currently available conventional sweeper is effective at removing oil and grease. Mechanical sweepers are not effective at removing finer sediments.
- Limitations may arise in the location of new bridges. The availability and cost of land and other economic and political factors may dictate where the placement of a new bridge will occur. Better design of the bridge to control runoff is required if it is being placed near sensitive waters.

Requirements

Costs

- The maintenance of local roads and bridges is already a consideration of most community public works or transportation departments. Therefore, the cost of pollutant reducing management practices will involve the training and equipment required to implement these new practices.
- The largest expenditures for street sweeping programs are in staffing and equipment. The capital cost for a conventional street sweeper is between \$60,000 and \$120,000. Newer technologies might have prices approaching \$180,000. The average useful life of a conventional sweeper is about four years, and programs must budget for equipment replacement. Sweeping frequencies will determine equipment life, so programs that sweep more often should expect to have a higher cost of replacement.
- A street sweeping program may require the following.
 - Sweeper operators, maintenance, supervisory, and administrative personnel are required.
 - Traffic control officers may be required to enforce parking restrictions.
 - Skillful design of cleaning routes is required for program to be productive.
 - Arrangements must be made for disposal of collected wastes.

- If investing in newer technologies, training for operators must be included in operation and maintenance budgets. Costs for public education are small, and mostly deal with the need to obey parking restrictions and litter control. Parking tickets are an effective reminder to obey parking rules, as well as being a source of revenue.

Maintenance

- Not applicable

Supplemental Information***Further Detail of the BMP******Street sweeping***

There are advantages and disadvantages to the two common types of sweepers. The best choice depends on your specific conditions. Many communities find it useful to have a compliment of both types in their fleet.

Mechanical Broom Sweepers - More effective at picking up large debris and cleaning wet streets. Less costly to purchase and operate. Create more airborne dust.

Vacuum Sweepers - More effective at removing fine particles and associated heavy metals. Ineffective at cleaning wet streets. Noisier than mechanical broom sweepers which may restrict areas or times of operation. May require an advance vehicle to remove large debris.

Street Flushers - Not affected by biggest interference to cleaning, parked cars. May remove finer sediments, moving them toward the gutter and stormwater inlets. For this reason, flushing fell out of favor and is now used primarily after sweeping. Flushing may be effective for combined sewer systems. Presently street flushing is not allowed under most NPDES permits.

Cross-Media Transfer of Pollutants

The California Air Resources Board (ARB) has established state ambient air quality standards including a standard for respirable particulate matter (less than or equal to 10 microns in diameter, symbolized as PM₁₀). In the effort to sweep up finer sediments to remove attached heavy metals, municipalities should be aware that fine dust, that cannot be captured by the sweeping equipment and becomes airborne, could lead to issues of worker and public safety.

Bridges

Bridges that carry vehicular traffic generate some of the more direct discharges of runoff to surface waters. Bridge scupper drains cause a direct discharge of stormwater into receiving waters and have been shown to carry relatively high concentrations of pollutants. Bridge maintenance also generates wastes that may be either directly deposited to the water below or carried to the receiving water by stormwater. The following steps will help reduce the stormwater impacts of bridge maintenance:

- Site new bridges so that significant adverse impacts to wetlands, sensitive areas, critical habitat, and riparian vegetation are minimized.

- Design new bridges to avoid the use of scupper drains and route runoff to land for treatment control. Existing scupper drains should be cleaned on a regular basis to avoid sediment/debris accumulation.
- Reduce the discharge of pollutants to surface waters during maintenance by using suspended traps, vacuums, or booms in the water to capture paint, rust, and paint removing agents. Many of these wastes may be hazardous. Properly dispose of this waste by referring to CA21 (Hazardous Waste Management) in the Construction Handbook.
- Train employees and subcontractors to reduce the discharge of wastes during bridge maintenance.

De-icing

- Do not over-apply deicing salt and sand, and routinely calibrate spreaders.
- Near reservoirs, restrict the application of deicing salt and redirect any runoff away from reservoirs.
- Consider using alternative deicing agents (less toxic, biodegradable, etc.).

References and Resources

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

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United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Roadway and Bridge Maintenance. On-line http://www.epa.gov/npdes/menuofbmeps/poll_13.htm



Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	<input checked="" type="checkbox"/>

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.



- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols***Mowing, Trimming, and Weeding***

- Whenever possible use mechanical methods of vegetation removal (e.g. mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.
- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.
- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.
- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.
- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).
- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.
- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.
- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.
- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.
- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.
- If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.
- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:
 - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
 - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
 - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
 - Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
 - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
 - Small mammals and birds can be excluded using fences, netting, tree trunk guards.
 - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.
- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).
- Do not mix or prepare pesticides for application near storm drains.
- Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a known location
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in “agricultural use” areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.
- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.
- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information***Further Detail of the BMP******Waste Management***

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

References and Resources

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Los Angeles County Stormwater Quality Model Programs. Public Agency Activities http://ladpw.org/wmd/npdes/model_links.cfm

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United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Landscaping and Lawn Care. Office of Water. Office of Wastewater Management. On-line: http://www.epa.gov/npdes/menuofbmps/poll_8.htm



Photo Credit: Geoff Brosseau

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Approach

Suggested Protocols

Catch Basins/Inlet Structures

- Municipal staff should regularly inspect facilities to ensure the following:
 - Immediate repair of any deterioration threatening structural integrity.
 - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
 - Stenciling of catch basins and inlets (see SC-75 Waste Handling and Disposal).
- Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.

Objectives

- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>
Oxygen Demanding	<input checked="" type="checkbox"/>



SC-74 Drainage System Maintenance

- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Record the amount of waste collected.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream.
- Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect flushed effluent and pump to the sanitary sewer for treatment.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge from cleaning a storm drain pump station or other facility to reach the storm drain system.
- Conduct quarterly routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.
- Sample collected sediments to determine if landfill disposal is possible, or illegal discharges in the watershed are occurring.

Open Channel

- Consider modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a stream or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies

(SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS

Illicit Connections and Discharges

- During routine maintenance of conveyance system and drainage structures field staff should look for evidence of illegal discharges or illicit connections:
 - Is there evidence of spills such as paints, discoloring, etc.
 - Are there any odors associated with the drainage system
 - Record locations of apparent illegal discharges/illicit connections
 - Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of up gradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
 - Once the origin of flow is established, require illicit discharger to eliminate the discharge.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
 - Illegal dumping hot spots
 - Types and quantities (in some cases) of wastes
 - Patterns in time of occurrence (time of day/night, month, or year)
 - Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills)
 - Responsible parties
- Post “No Dumping” signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

SC-74 Drainage System Maintenance

- The State Department of Fish and Game has a hotline for reporting violations called Cal TIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).
- The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Only properly trained individuals are allowed to handle hazardous materials/wastes.
- Train municipal employees from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report illegal dumping.
- Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.
- Train municipal staff regarding non-stormwater discharges (See SC-10 Non-Stormwater Discharges).

Spill Response and Prevention

- Refer to SC-11, Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Cleanup activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and disposal of flushed effluent to sanitary sewer may be prohibited in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.
- Private property access rights may be needed to track illegal discharges up gradient.

- Requirements of municipal ordinance authority for suspected source verification testing for illicit connections necessary for guaranteed rights of entry.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented. Catch basin cleaning costs are less expensive if vacuum street sweepers are available; cleaning catch basins manually can cost approximately twice as much as cleaning the basins with a vacuum attached to a sweeper.
- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary. Encouraging reporting of illicit discharges by employees can offset costs by saving expense on inspectors and directing resources more efficiently. Some programs have used funds available from “environmental fees” or special assessment districts to fund their illicit connection elimination programs.

Maintenance

- Two-person teams may be required to clean catch basins with vector trucks.
- Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

Supplemental Information

Further Detail of the BMP

Storm Drain flushing

Sanitary sewer flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in sanitary sewer systems. The same principles that make sanitary sewer flushing effective can be used to flush storm drains. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as to an open channel, to another point where flushing will be initiated, or over to the sanitary sewer and on to the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents “plug flow” discharges of concentrated pollutant loadings and sediments. The deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to

SC-74 Drainage System Maintenance

cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce the impacts of stormwater pollution, a second inflatable device, placed well downstream, may be used to re-collect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to re-collect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75 percent for organics and 55-65 percent for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm drain flushing.

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the stormwater quality goals in the stream corridor.

Downstream flood peaks can be suppressed by reducing through flow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing through flow velocity.

However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows we allowed to spread out.

Stream Corridor Planning

Urban streams receive and convey stormwater flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban stormwater management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for steam alteration or management should be investigated for its potential flow and stability effects on upstream, downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses.

Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of 1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.

Corridor reservation - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and over bank flows allows streams to find their own form and generate less ongoing erosion. In California, open stream corridors in recent urban developments have produced recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

Bank treatment - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

Geomorphic restoration – Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary.

A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

Grade Control - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels.

A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below which the upstream channel can not erode.

A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity.

SC-74 Drainage System Maintenance

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to be reclaimed.

Examples

The California Department of Water Resources began the Urban Stream Restoration Program in 1985. The program provides grant funds to municipalities and community groups to implement stream restoration projects. The projects reduce damages from streambank and watershed instability and floods while restoring streams' aesthetic, recreational, and fish and wildlife values.

In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetative lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

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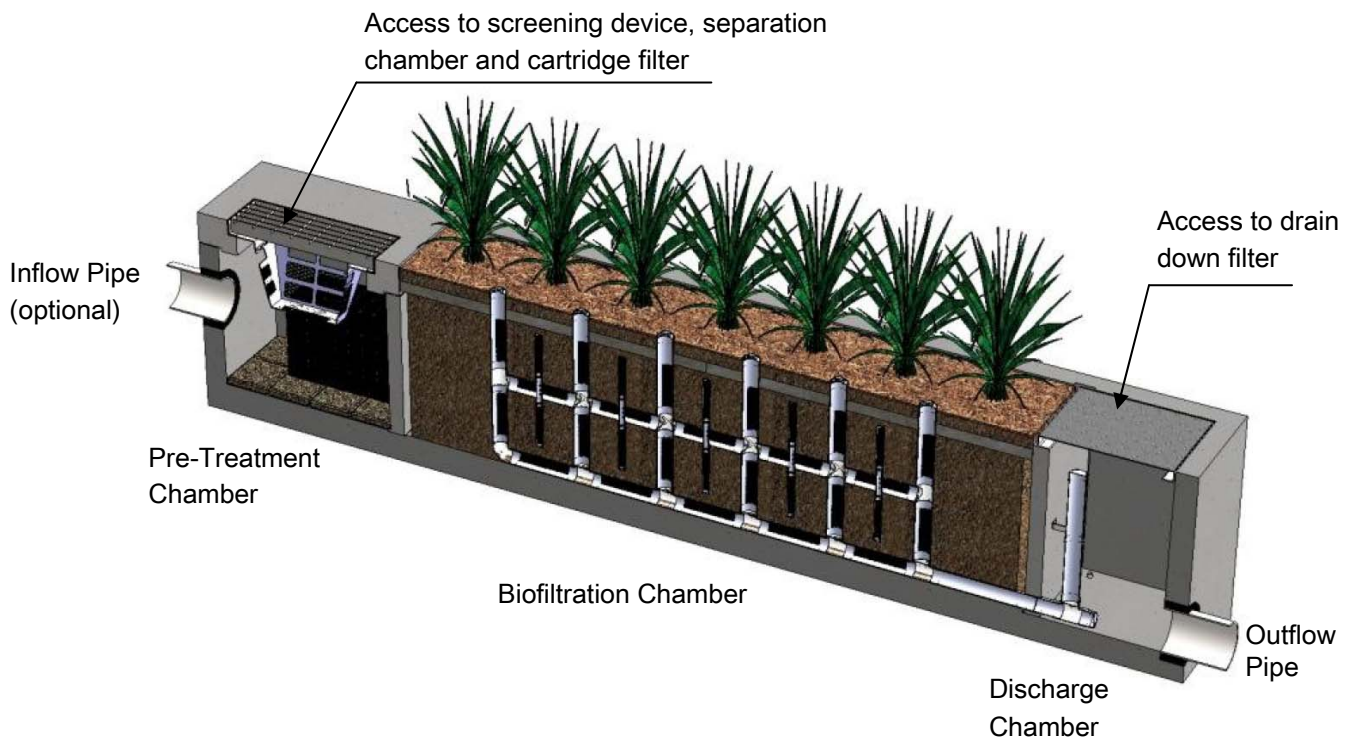
Attachment 7

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

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

System Diagram



Maintenance Procedures

Screening Device

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

Separation Chamber

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

Cartridge Filters

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

Drain Down Filter

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



Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the Biofiltration Chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

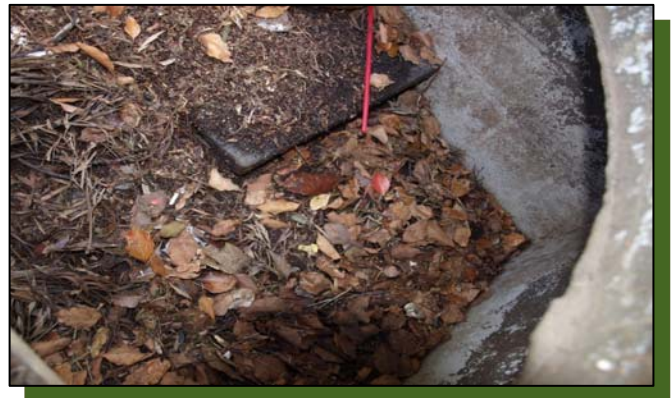
Screening Device

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



Separation Chamber

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



Cartridge Filters

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



Drain Down Filter

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



Trim Vegetation

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





Inspection Form



Modular Wetland System, Inc.

P. 760.433-7640

F. 760-433-3176

E. Info@modularwetlands.com

www.modularwetlands.com



Inspection Report Modular Wetlands System



Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____

Phone () -

Inspector Name _____

Date ____ / ____ / ____

Time _____ AM / PM

Type of Inspection Routine Follow Up Complaint

Storm

Storm Event in Last 72-hours? No Yes

Weather Condition _____

Additional Notes _____

For Office Use Only

(Reviewed By) _____

(Date) _____
Office personnel to complete section to the left.

Inspection Checklist

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

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

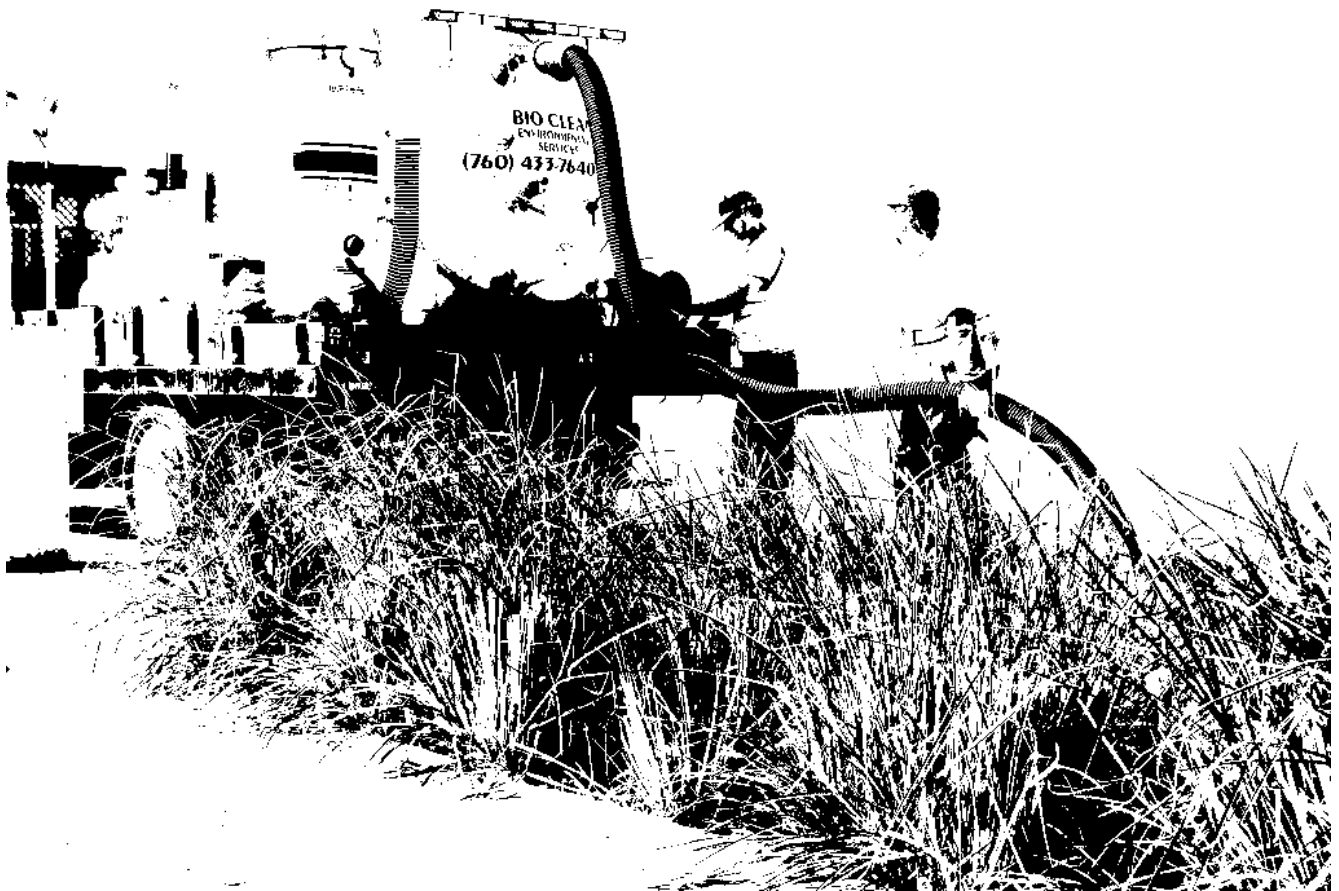
Waste:	Yes	No
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

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

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

Maintenance Report



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Cleaning and Maintenance Report Modular Wetlands System



Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone () -

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

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

Weather Condition _____ Additional Notes _____

For Office Use Only

(Reviewed By) _____

(Date) _____
Office personnel to complete section to the left.

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

Comments:

Attachment 8

For Educational Materials use:
<http://www.ocwatersheds.com>