Appendix D. Preliminary Water Quality Management Plan

Appendix

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County of Orange/Santa Ana Region Priority Project Preliminary Water Quality Management Plan (PWQMP)-Planning (Conceptual)

Project Name:

VIVANTE SENIOR HOUSING (PA2018-185)

FASHION ISLAND – SR. ASSISTED LIVING

850 & 856 SAN CLEMENTE DRIVE

NEWPORT BEACH, CA 92660

APN: 442-261-17 & 05

Prepared for:

NEXUS COMPANIES

1 MACARTHUR PLACE, SUITE 300

SANTA ANA, CA 92707

(714)546-5600

Prepared by:

Tait & Associates, Inc.

701 N. Parkcenter Drive

Santa Ana, CA 92705

(714)560-8200

Prepared: December 18,2018
Revision 1: May 8th, 2019

Project Owner's Certification			
Planning Application No.:	PA2018-185	Grading Permit No.	Pending
Tract/Parcel Map and Lot(s) No.:	12528	Building Permit No.	Pending
Address of Project Site and APN:		850 & 856 San Clemente Drive Newport Beach, CA 92660 APN: 442-261-17 & 05	

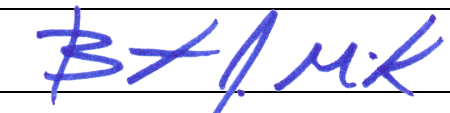
This Preliminary Water Quality Management Plan (WQMP) has been prepared for Vivante Fashion Island – Sr. Assisted Living by Tait & Associates, Inc. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

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:			
Title	Owner		
Company	Nexus Companies		
Address	1 MacArthur Place, Suite 300, Santa Ana, CA 92707		
Email			
Telephone #	(714)546-5600		
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	

Preparer (Engineer):			
Title	Project Manager	PE Registration #	C82953
Company	Tait & Associates, Inc.		
Address	701 N. Parkcenter Drive, Santa Ana, CA 92705		
Email	bmink@tait.com		
Telephone #	714-560-8200		

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	05/08/2019
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Attachments

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 Infomation			
Permit/Application No.	PA2018-185	Grading or Building Permit No.	Pending
Address of Project Site and APN	850 & 856 San Clemente Drive, Newport Beach, CA 92660 442-261-17 & 05		
Water Quality Conditions of Approval or Issuance			
Discretionary Permit(s):	Pending – to be provided in Final WQMP upon issuance.		
Water Quality Conditions of Approval:	Pending issuance by the City of Newport Beach. To be provided in Attachment F of the Final WQMP upon issuance.		
Conceptual WQMP			
Was a Conceptual Water Quality Management Plan previously approved for this project?	No. This is the Conceptual WQMP.		
Watershed-Based Plan Conditions			
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	**WIHMP:** Not applicable. An approved WIHMP is not available for the Newport Bay, Upper (Ecological Reserve). **TMDLs for Newport Bay, Upper (Ecological Reserve):** Chlordane, Copper, DDT, Indicator Bacteria, Metals, Nutrients, PCBs (Polychlorinated biphenyls), Pesticides, Sediment Toxicity, and Sedimentation/Siltation. The information provided in attachment C provides data for the level of efficiency for treatment of the pollutants of concern.		

Section II Project Description

II.1 Project Description

Description of Proposed Project				
Development Category (From Model WQMP, Table 7.11-2; or -3):	Category 1 (Model WQMP)			
Project Area (ft^2): On-site= 126,619 Off-site =7,743 Building footprint :26,718sf	Number of Dwelling Units: 99 units with 141 beds		SIC Code: 8361	
Project Area	Pervious		Impervious	
	Area (acres)	Percentage	Area (acres)	Percentage
Pre-Project Site Conditions	0.77 acres	26.4%	2.14 acres	73.6%
Post-Project Site Conditions	0.54 acres	18.7%	2.36 acres	81.3%
Pre-Project Off-site Condition	0.11 ac	68.4%	0.06ac	31.5%
Post-Project Off-site Condition	0.14ac	79.5%	0.03ac	20.5%

Drainage Patterns/Connections	Current runoff sheet flows to the southwest along v-gutters towards private catch basin lwhich connects to a private 18" storm drain line which conveys runoff to the Orange County storm drain system located in Bombero Drive & Santa Barbara Dr. From there runoff is conveyed via storm drain to the receiving water body, Newport upper bay. A small area off-site of the project will be disturbed to close an existing drive entrance at the southwest of the site. This area drains to a private catch basin northwest of the site. This catch basin is part of the private storm drain that conveys runoff to the 24" storm drain along Bombero Drive.
Narrative Project Description:	This project is a residential redevelopment. Total Project Area: 2.91± acres Disturbed Area: 2.91± acres Impervious Area: 2.36 ± acres (81.3%) Off-site Disturbance : 0.17ac Off-site Impervious area: 0.03ac The project site consists of the demolition of two existing buildings, paved parking lot, and certain utilities. The proposed includes the construction of a multi-story building above an underground parking garage. Proposed BMP, location as shown on WQMP plan in Attachment C, will treat runoff for the entire site. Entrances will be constructed for ingress/egress along Bombero Drive and a private street off of Santa Cruz Drive.

II.2 Potential Stormwater Pollutants

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 ☒	N ☐	Landscaping is proposed on-site.
Nutrients	E ☒	N ☐	Landscaping is proposed on-site.
Heavy Metals	E ☒	N ☐	Roof materials undetermined for project.
Pathogens (Bacteria/Virus)	E ☒	N ☐	Owner's land use involve animal waste products.
Pesticides	E ☒	N ☐	Landscaping is proposed on-site.
Oil and Grease	E ☒	N ☐	Project has dedicated outdoor parking area.
Toxic Organic Compounds	E ☒	N ☐	Landscaping maintenance areas are proposed on-site.
Trash and Debris	E ☒	N ☐	Trash generation is expected from the presence of residential units.

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- Map is included in Appendix B.

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

TBD in post-development runoff volume for the 2-yr, 24-hr storm event exceeds the pre-development runoff volume for the 2-yr, 24-hr storm by more than 5 percent.

See Map on Attachment B. The site discharges to a Private 18" storm drain that connects a 24" RCP Public storm drain along Bombero drive that then connects to a Public Storm Drain System along Santa Barvara Drive and from there runoff is conveyed via storm drain and PCC channel for a portion of the flow path to the receiving water body , Upper Newport Bay.

Additionally, The 2 year ,24hr post-development runoff volume does not exceed the pre-development runoff volume by more than 5 percent.

Pre-Development: 4.57 cfs

Post-Development: 4.01 cfs

II.4 Post Development Drainage Characteristics

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

The project consist of 5 drainage management areas. The proposed drainage is shown on the Preliminary WQMP Plan in Attachment C. A treatment train is provided for stormwater treatment which consist of stormwater being collected at each drainage area via catch basins and/or grated inlets. Each inlet will have a filter insert to collect large trash and debris. The proposed inlets will be part of a private storm drain system that conveys runoff to a proposed underground basin that will then discharge to Modular Wetland Systems where bio-filtration will occur. A connection to an existing 18" private storm drain system will be provided downstream of the MWS.

A diversion manhole will be provided upstream of the MWS unit to convey overflow to the existing 18" private storm drain system. After treatment, the water will continue on the private storm drain which conveys runoff from the site a Public 24" RCP Storm drain on Bombero Dr. and Santa Barbara Drive which ultimately discharges to Newport Bay, Upper (Ecological Reserve).

A small drainage area off-site will be disturbed to close out an existing driveway southwest of the site. Runoff from this area will keep the existing drainage patterns and will sheet flow to a private catch basin northwest of the site. This catch basin will be retrofitted with a filter insert and the calculated DCV for this area will be store and treated on-site as a trade off approach. This area is primarily a vegetated slope so it is mostly pervious with the exception of a walkway that provides connectivity with other adjacent buildings.

The catch basin that receives runoff from the off-site area is connected to the same 18" private storm drain than the site that conveys runoff to the public storm drain along Bombero Drive.

II.5 Property Ownership/Management

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

Ownership: Nexus Companies

Maintenance of project site.

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	
Location/Address	850 & 856 San Clemente Drive Newport Beach, CA 92660
General Plan Land Use Designation	Residential
Zoning	Private Institutional Zoning
Acreage of Project Site	2.91± Acres (Entire Project Site) 0.17ac off-site area
Predominant Soil Type	Soils are per Geotechnical Report. The maps in the TGD also indicate that the site has soil type D. (per soils report silty sands and clayey sands) A copy of the soils group map is included in Attachment C and further information regarding the soils encountered and the soils study is included in Attachment E.

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	The rainfall zone for the site has a design capture storm depth of 0.7" based on the Rainfall Zones map in the TGD on figure XVI-1 and also included in Attachment C.
Topography	The site ranges from 165' to 181' above sea level.
Drainage Patterns/Connections	Runoff will sheet flow to multiple onsite drain inlets that are part of a proposed private storm drain system that conveys runoff to a proposed detention basin that will discharge the treatment volume to a Modular Wetland System (MWS-L-8-12) . The overflow and treated stomwater will be conveyed to an existing private 18" storm drain. The private storm drain conveys runoff to a Public 24" RCP storm drain along Bombero Drive. The storm drain will ultimately discharge to the Newport Bay, Upper (Ecological Reserve).
Soil Type, Geology, and Infiltration Properties	The soil encountered in the Geotechnical Report consisted marine terrace deposits overlying weathered claystone and siltstone bedrock of the Monterey Formation. The deposits consist of silty sands and clayey sands. The bedrock is claystone which is not feasible for infiltration. The maps in the TGD indicate that the site has soil type D. Based on the soils existing soils information infiltration is not feasible for this project.
Hydro-geologic (Groundwater) Conditions	Groundwater was encountered at approximately 42 feet below site grade. A week, post boring sample, ground elevation rose to a depth of 23 feet below site grade. Refer to the Geotechnical Report in Attachment E.
Geotechnical Conditions (relevant to infiltration)	Per the geotechnical report, the soils below the groundwater are not susceptible to liquefaction during a design seismic event.
Off-Site Drainage	A small off-site area ,0.17ac, will be disturbed to close an existing drive entrance to southwest of the site. The area will consist of a proposed vegetated slope that drains to a private catch basin northwest of the site. The catch basin will be retrofitted with a Filter insert and the DCV for the required treatment will be accounted for in the on-site treatment system.

Utility and Infrastructure Information	Sewer, Storm Drain, Fire , irrigation and domestic water related infrastructure as well as dry utilities such us gas, electrical and communications to service the proposed assisted living building will be constructed as part of the proposed improvements.

Receiving Waters	Newport Bay, Upper (Ecological Reserve)
303(d) Listed Impairments	Chlordane, Copper, DDT, Indicator Bacteria, Metals, Nutrients, PCBs (Polychlorinated biphenyls), Pesticides, Sediment Toxicity, and Sedimentation/Siltation.
Applicable TMDLs	DDT (Dichlorodiphenyltrichloroethane), Fecal Coliform, PCBs (Organochlorine Compounds), Chlordane (Organochlorine Compounds), Nutrient, Sedimentation/Siltation
Pollutants of Concern for the Project	Sediments, Nutrients, Indicator Bacteria
Environmentally Sensitive and Special Biological Significant Areas	None are known at this time.

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).*

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

- Determine applicable hydro-modification 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 ☐	NO ☒
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 is not applicable for the project. The map on appendix B shows a stable storm drain /channel from the project site to the receiving watershed, upper Newport bay. Additionally the project does not increase peak flows.
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	The required DCV will be detained and store in an underground basin which will convey the required treatment volume to proposed Modular Wetland units where bio-filtration will occur. The MWS will remove stormwater pollutants through physical and biological processes. Pollutants removed from stormwater include particulate organic matter, phosphorus, suspended solids, nitrogen, metals, TKN, and bacteria. Refer to the info sheet in Attachment D.
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Treatment control BMP's will not be utilized for this project.
Calculate LID design storm capture volume for Project.	The project will detail and treat volumes that exceed the required DCV. The required DCV for the project on-site disturbance is **5,610 cf** and for the off-site disturbance is **138 cf.** For a total DCV of **5,748** cf for the entire project. The proposed detention for the project consist of **6,300cf** which will be treated by the proposed MWS-L-8-12 See Attachment B for DCV calculations.

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).

The proposed drainage will consist of five drainage management areas as shown on the Preliminary WQMP Plan in Attachment C.

Below is summary table with the drainage areas information and DCV calculations.

On-site Drainage Areas Summary:

Drainage Area Name	DMA A		DMA B		DMA C		DMA D		DMA E	
Area (SF)	21,857	SF	96,603	SF	5,917	SF	2,147	SF	95	SF
Area (AC)	0.50	AC	2.22	AC	0.14	AC	0.05	AC	0.002	AC
Pervious	2,918	SF	13,134	SF	5,512	SF	2,081	SF	61	SF
% Pervious	13.4%		13.6%		93.2%		96.9%		64.2%	
% Impervious	86.6%		86.4%		6.8%		3.1%		35.8%	
Runoff Coefficient, C	0.80		0.80		0.20		0.17		0.42	
24 Hr, 85th Percentile Rainfall (in)	0.7	in	0.7	in	0.7	in	0.7	in	0.7	in
Required DCV for LID	1,020	CF	4,497	CF	69	CF	22	CF	2	CF

Off-site Drainage Area Summary:

Area	BMA O	
Area (SF)	7743	SF
Area (AC)	0.17	AC
Pervious	6155	SF
% Pervious	79.49%	
% Impervious	20.51%	
Runoff Coefficient, C	0.30	
24 Hr, 85th Percentile Rainfall (in)	0.7	in
Required DCV for LID	137.23	CF

TOTAL DCV =5,748CF

The total DCV for this project is 5,748 CF.

The proposed BMP's consist of a treatment train as described below:

The Main Drainage areas A and B which consist of the majority of the site, 2.72acres, will consist of runoff being collected via catch basins or grated inlets. Each of this inlets will have a filter insert to collect trash and debris. The inlets will be part of a private storm drain system that will convey runoff to a proposed StomCapture Detention Basin, this basin will be designed to store 6,300 CF and a proposed MWS , MWS-L-8-12-unit is proposed downstream of the basin to provide bio-filtration to the stormwater runoff. The proposed MWS-L-8-12 has capacity to treat up to 7,554cf in the 24hr drawdown period which exceeds the project DCV.

A diversion manhole will be provided upstream of the MWS to divert high flows directly to the private storm drain system. Clean water leaving the MWS will be then conveyed via storm drain to an existing 18" private storm drain that connects to a Public 24" on Bombero Drive.

Drainage areas C, D and E are small drainage areas that area mostly vegetated areas that can't be treated directly due to existing drainage patterns.

Additionally, a small drainage area off-site will be disturbed to close out an existing driveway southwest of the site. Runoff from this area will keep the existing drainage patterns and will sheet flow to a private catch basin northwest of the site. This catch basin will be retrofitted with a filter insert and the calculated DCV for this area will be store and treated on-site as a trade off approach. This area is primarily a vegetated slope so it is mostly pervious with the exception of a walkway that provides connectivity with other adjacent buildings.

Although direct treatment for drainage areas C, D, E and O is not provided; the proposed basin and MWS unit will be designed to handle the DCV for these areas which consist of 231 CF which is a very small percentage of the project required DCV. (4%).

GIS Coordinates for the project BMP area:

Underground basin: LAT 33d 37'18"; LONG -117d 52' 44"

MWS –L-8-12: LAT 33d37"17"; LONG -117d 52' 44"

Filter Inserts located throughout the site. Site address GIS below

LAT 33d 37'18"; LONG -117d 52' 41"

IV.3 LID BMP Selection and Project Conformance Analysis

IV.3.1 Hydrologic Source Controls (HSCs)

HSC's are not utilized for the project. The total DCV will be treated by Bio-filtration.

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

IV.3.2 Infiltration BMPs

Name	Included?
Bioretention without underdrains	☐
Rain gardens	☐
Porous landscaping	☐
Infiltration planters	☐
Retention swales	☐
Infiltration trenches	☐
Infiltration basins	☐
Drywells	☐
Subsurface infiltration galleries	☐
French drains	☐
Permeable asphalt	☐
Permeable concrete	☐
Permeable concrete pavers	☐
Other:	☐
Other:	☐

Per the soils infiltration is not feasible due to proximity to existing bedrock which consist of still to hard claystone. The TGD map in appendix E further indicate presences of D soils which are not suitable for infiltration.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

Name	Included?
All HSCs; *See Section IV.3.1*	☐
Surface-based infiltration BMPs	☐
Biotreatment BMPs	☐
Above-ground cisterns and basins	☐
Underground detention	☐
Other:	☐
Other:	☐
Other:	☐

Evapotranspiration, Rainwater Harvesting BMPs are not proposed; however, the proposed treatment BMPs may result in subsequent evapotranspiration.

It is anticipated the project proposed landscape will not have enough demand to use the required DCV.

See section IV3.4.

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 bio-retention BMPs included. Include sections for selection, suitability, sizing, and infeasibility, as applicable.

Name	Included?
Bio-retention with underdrains	☐
Stormwater planter boxes with underdrains	☐
Rain gardens with underdrains	☐
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated bio-treatment systems	☐
Wet extended detention basin	☐
Dry extended detention basins	☐
Other: MWS Linear/ Bio-filtration	☒
Other:	☐

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.

Since the project soils are not suitable for infiltration and the required DCV is anticipated to exceed the landscape irrigation, bio-filtration is proposed for the project.

The project will utilize bio-filtration in the form of a Linear Modular Wetlands System , the proposed unit model MWS –L-8-12 has the capacity to treat up to 7,754cf in the 24hr drawdown period. A underground basin will store the DCV upstream of the MWS.

As described in section IV. 2, the proposed DCV for the project is 5,748cf; however and storage is provided upstream of the MWS with total capacity of 6,300cf.

See attachment B for calculations.

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).

Hydromodifications Control BMP's are not proposed for the project.

Hydromodification Control BMPs	
BMP Name	**BMP Description**

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
Regional/Sub Regional LID BMP's are not applicable for this project.

IV.3.7 Treatment Control BMPs

The DVC will be treated with Bio-filtration BMP's; therefore, treatment control BMP's will not be utilized for the project.

Treatment Control BMPs	
BMP Name	**BMP Description**

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	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☒	☐	
N6	Local Industrial Permit Compliance	☐	☒	Project is not industrial.
N7	Spill Contingency Plan	☐	☒	Project will not have amount of liquids for a contingency plan.
N8	Underground Storage Tank Compliance	☐	☒	Project does not have an underground storage tank.
N9	Hazardous Materials Disclosure Compliance	☒	☐	
N10	Uniform Fire Code Implementation	☒	☐	
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	Project does not include loading docks.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	Project does not have retail gasoline outlets.

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	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outdoor storage is proposed for this site.
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☒	☐	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☐	☒	Project does not have any slopes or channels to protect.
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☐	
S6	Dock areas	☐	☒	Project does not have docks areas.
S7	Maintenance bays	☐	☒	Project does not have maintenance bays.
S8	Vehicle wash areas	☐	☒	Project does not include vehicle wash areas.
S9	Outdoor processing areas	☐	☒	Project does not include outdoor processing areas.
S10	Equipment wash areas	☐	☒	Project does not include equipment wash areas.
S11	Fueling areas	☐	☒	Project does not include fueling areas.
S12	Hillside landscaping	☐	☒	Project does not include hillside landscaping.
S13	Wash water control for food preparation areas	☐	☒	
S14	Community car wash racks	☐	☒	Project does not include car wash racks.

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

Water quality credits are not applicable for the project.

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td colspan="5">Project Types that Qualify for Water Quality Credits (Select all that apply):</td></tr>
<tr><td>☐Redevelopment projects that reduce the overall impervious footprint of the project site.</td><td colspan="2">☐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.</td><td colspan="2">☐ 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).</td></tr>
<tr><td colspan="2">☐ 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).</td><td colspan="2">☐ 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</td><td>☐ 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).</td></tr>
<tr><td>☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.</td><td>☐ Developments in a city center area.</td><td>☐ Developments in historic districts or historic preservation areas.</td><td>☐ 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.</td><td>☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.</td></tr>
<tr><td>Calculation of Water Quality Credits
(if applicable)</td><td colspan="4"></td></tr>
</table>

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	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Modular Wetland System (MWS) Linear Unit	Owner	-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).	Prior and following the rainy season After each rain event
Education for Property Owners, tenants and occupants & Employee training Food service and	Owner	The association shall prepare a training manual for existing and future employees. The manual should include information on non-point source pollution and how to use Best Management Practices. Training shall be provided upon hire and at regular intervals thereafter.	Quarterly

Common Area Landscape Management	Owner	Ongoing maintenance is conducted to minimize erosion and over-irrigation, conserve water and reduce pesticide and fertilizer applications.	Weekly
Common Area Litter control	Owner	The Owner will be required to implement trash management and litter control procedures in the common areas aimed at reducing pllution of drainage water. The Owner may contract with their landscape maintenace firm to provide this service with regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations and reporting the violations to the Owner for investigation. Install covers on trash enclosure to prevent additional pollution to the sewer system.	Continual
Catch Basin/Inlet Inspection	Owner	The Owner must ensure that the on-site drain inlets, grates, and drainpipes will be periodically inspected visually. Cleaning should take place in the late summer/early fall prior to the start of the rainy season. If necessary, clean, repair, or replace any drainage facility prior to the start of each rainy season (no later than October 15 of each year).	Monthly -Before and after predicted storm events
Street Sweeping Private Streets and Parking Lots	Owner	The Owner must sweep outdoor lots regularyly (minimum monthly), and prior to the storm season (no later than October 15 each year). Sweeping shall be done with a vacuum-type sweeper. Under no circumstances are outdoor areas/lots to be rinsed or washed with water unless said rinse/wash water is collected and disposed of properly (i.e. into the sewer)	Monthly

Storm Capture	Owner	-Inpsect inlets contributing to system and clear Debris. -Check for sediment within the module. Anything over 6" deep shall be removed manually or mechanically (vcamun is recommended) -See appendix F with manufacturer specifciations for additional information	Quarterly and following significant storm events within first year of operation
FloGard Filter Insert	Owner	-Inspect basin for any illegal dumping (notify authoritis if illegal dumping is appearent) -Using an industrial vacum, remove collected materials from the liner. -Remove filter pocuhes and inspected and replaced as necessary. -See appendix F for manufacturer specificatoins for additional information	Regularly Minimum 3 times per year

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.

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) and City of Newport Beach Stormwater Program (cleanwaternewport.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	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☒
Tips for the Home Mechanic	☒	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☒	Proper Maintenance Practices for Your Business	☐
Household Tips	☒	**Other Material**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☒		
Recycle at Your Local Used Oil Collection Center (North County)	☐	Building and Ground Maintenance Guidelines	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	Housekeeping Practices	☒
Recycle at Your Local Used Oil Collection Center (South County)	☐	Plaza and Sidewalk Cleaning	☒
Tips for Maintaining a Septic Tank System	☐	Efficient Irrigation	☒
Responsible Pest Control	☒	Trash Storage Areas	☒
Sewer Spill	☐	Drainage System Maintenance	☒
Tips for the Home Improvement Projects	☒		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☒		☐
Tips for Pet Care	☒		☐
Tips for Pool Maintenance	☒		☐
Tips for Residential Pool, Landscape and Hardscape Drains	☒		☐
Tips for Projects Using Paint	☒		☐

Attachment A

Educational Materials

The Ocean Begins at Your Front Door

Never allow pollutants to enter the street, gutter or storm drain!

Even if you live miles from the Pacific Ocean, you may be unknowingly polluting it.

Dumping one quart of motor oil into a storm drain can contaminate 250,000 gallons of water.

Did You Know?

- Most people believe that the largest source of water pollution in urban areas comes from specific sources such as factories and sewage treatment plants. In fact, the largest source of water pollution comes from city streets, neighborhoods, construction sites and parking lots. This type of pollution is sometimes called “non-point source” pollution.
- There are two types of non-point source pollution: stormwater and urban runoff pollution.
- Stormwater runoff results from rainfall. When rainstorms cause large volumes of water to rinse the urban landscape, picking up pollutants along the way.
- Urban runoff can happen any time of the year when excessive water use from irrigation, vehicle washing and other sources carries trash, lawn clippings and other urban pollutants into storm drains.

Where Does It Go?

- Anything we use outside homes, vehicles and businesses – like motor oil, paint, pesticides, fertilizers and cleaners – can be blown or washed into storm drains.
- A little water from a garden hose or rain can also send materials into storm drains.
- Storm drains are separate from our sanitary sewer systems; unlike water in sanitary sewers (from sinks or toilets), water in storm drains is not treated before entering our waterways.

Sources of Non-Point Source Pollution

- Automotive leaks and spills.
- Improper disposal of used oil and other engine fluids.
- Metals found in vehicle exhaust, weathered paint, rust, metal plating and tires.
- Pesticides and fertilizers from lawns, gardens and farms.
- Improper disposal of cleaners, paint and paint removers.
- Soil erosion and dust debris from landscape and construction activities.
- Litter, lawn clippings, animal waste, and other organic matter.
- Oil stains on parking lots and paved surfaces.

The Effect on the Ocean

Non-point source pollution can have a serious impact on water quality in Orange County. Pollutants from the storm drain system can harm marine life as well as coastal and wetland habitats. They can also degrade recreation areas such as beaches, harbors and bays.

Stormwater quality management programs have been developed throughout Orange County to educate and encourage the public to protect water quality, monitor runoff in the storm drain system, investigate illegal dumping and maintain storm drains.

Support from Orange County residents and businesses is needed to improve water quality and reduce urban runoff pollution. Proper use and disposal of materials will help stop pollution before it reaches the storm drain and the ocean.

Follow these simple steps to help reduce water pollution:

Household Activities

- Do not rinse spills with water. Use dry cleanup methods such as applying cat litter or another absorbent material, sweep and dispose of in the trash. Take items such as used or excess batteries, oven cleaners, automotive fluids, painting products and cathode ray tubes, like TVs and computer monitors, to a Household Hazardous Waste Collection Center (HHWCC).
- For a HHWCC near you call (714) 834-6752 or visit www.oclandfills.com.
- Do not hose down your driveway, sidewalk or patio to the street, gutter or storm drain. Sweep up debris and dispose of it in the trash.

Automotive

- Take your vehicle to a commercial car wash whenever possible. If you wash your vehicle at home, choose soaps, cleaners, or detergents labeled non-toxic, phosphate- free or biodegradable. Vegetable and citrus-based products are typically safest for the environment.
- Do not allow washwater from vehicle washing to drain into the street, gutter or storm drain. Excess washwater should be disposed of in the sanitary sewer (through a sink or toilet) or onto an absorbent surface like your lawn.
- Monitor your vehicles for leaks and place a pan under leaks. Keep your vehicles well maintained to stop and prevent leaks.
- Never pour oil or antifreeze in the street, gutter or storm drain. Recycle these substances at a service station, a waste oil collection center or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.1800cleanup.org.

Pool Maintenance

- Pool and spa water must be dechlorinated and free of excess acid, alkali or color to be allowed in the street, gutter or storm drain.
- When it is not raining, drain dechlorinated pool and spa water directly into the sanitary sewer.
- Some cities may have ordinances that do not allow pool water to be disposed of in the storm drain. Check with your city.

Landscape and Gardening

- Do not over-water. Water your lawn and garden by hand to control the amount of water you use or set irrigation systems to reflect seasonal water needs. If water flows off your yard onto your driveway or sidewalk, your system is over-watering. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of waste by composting, hauling it to a permitted landfill, or as green waste through your city's recycling program.
- Follow directions on pesticides and fertilizer, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Take unwanted pesticides to a HHWCC to be recycled. For locations and hours of HHWCC, call (714) 834-6752 or visit www.oclandfills.com.

Trash

- Place trash and litter that cannot be recycled in securely covered trash cans.
- Whenever possible, buy recycled products.
- Remember: Reduce, Reuse, Recycle.

Pet Care

- Always pick up after your pet. Flush waste down the toilet or dispose of it in the trash. Pet waste, if left outdoors, can wash into the street, gutter or storm drain.
- If possible, bathe your pets indoors. If you must bathe your pet outside, wash it on your lawn or another absorbent/permeable surface to keep the washwater from entering the street, gutter or storm drain.
- Follow directions for use of pet care products and dispose of any unused products at a HHWCC.

Common Pollutants

Home Maintenance

- Detergents, cleaners and solvents
- Oil and latex paint
- Swimming pool chemicals
- Outdoor trash and litter

Lawn and Garden

- Pet and animal waste
- Pesticides
- Clippings, leaves and soil
- Fertilizer

Automobile

- Oil and grease
- Radiator fluids and antifreeze
- Cleaning chemicals
- Brake pad dust

For More Information

California Environmental Protection Agency
www.calepa.ca.gov

- **Air Resources Board**
  www.arb.ca.gov
- **Department of Pesticide Regulation**
  www.cdpr.ca.gov
- **Department of Toxic Substances Control**
  www.dtsc.ca.gov
- **Integrated Waste Management Board**
  www.ciwmb.ca.gov
- **Office of Environmental Health Hazard Assessment**
  www.oehha.ca.gov
- **State Water Resources Control Board**
  www.waterboards.ca.gov

Earth 911 - Community-Specific Environmental Information 1-800-cleanup or visit www.1800cleanup.org

Health Care Agency's Ocean and Bay Water Closure and Posting Hotline
(714) 433-6400 or visit www.ocbeachinfo.com

Integrated Waste Management Dept. of Orange County (714) 834-6752 or visit www.oclandfills.com for information on household hazardous waste collection centers, recycling centers and solid waste collection

O.C. Agriculture Commissioner
(714) 447-7100 or visit www.ocagcomm.com

Stormwater Best Management Practice Handbook
Visit www.cabmphandbooks.com

UC Master Gardener Hotline
(714) 708-1646 or visit www.uccemg.com

The Orange County Stormwater Program has created and moderates an electronic mailing list to facilitate communications, take questions and exchange ideas among its users about issues and topics related to stormwater and urban runoff and the implementation of program elements. To join the list, please send an email to ocstormwaterinfo-join@list.ocwatersheds.com

Orange County Stormwater Program

Aliso Viejo	(949)	425-2535
Anaheim Public Works Operations	(714)	765-6860
Brea Engineering	(714)	990-7666
Buena Park Public Works	(714)	562-3655
Costa Mesa Public Services	(714)	754-5323
Cypress Public Works	(714)	229-6740
Dana Point Public Works	(949)	248-3584
Fountain Valley Public Works	(714)	593-4441
Fullerton Engineering Dept.	(714)	738-6853
Garden Grove Public Works	(714)	741-5956
Huntington Beach Public Works	(714)	536-5431
Irvine Public Works	(949)	724-6315
La Habra Public Services	(562)	905-9792
La Palma Public Works	(714)	690-3310
Laguna Beach Water Quality	(949)	497-0378
Laguna Hills Public Services	(949)	707-2650
Laguna Niguel Public Works	(949)	362-4337
Laguna Woods Public Works	(949)	639-0500
Lake Forest Public Works	(949)	461-3480
Los Alamitos Community Dev.	(562)	431-3538
Mission Viejo Public Works	(949)	470-3056
Newport Beach, Code & Water Quality Enforcement	(949)	644-3215
Orange Public Works	(714)	532-6480
Placentia Public Works	(714)	993-8245
Rancho Santa Margarita	(949)	635-1800
San Clemente Environmental Programs	(949)	361-6143
San Juan Capistrano Engineering	(949)	234-4413
Santa Ana Public Works	(714)	647-3380
Seal Beach Engineering	(562)	431-2527 x317
Stanton Public Works	(714)	379-9222 x204
Tustin Public Works/Engineering	(714)	573-3150
Villa Park Engineering	(714)	998-1500
Westminster Public Works/Engineering	(714)	898-3311 x446
Yorba Linda Engineering	(714)	961-7138
Orange County Stormwater Program	(877)	897-7455

Orange County 24-Hour
Water Pollution Problem Reporting Hotline
1-877-89-SPILL (1-877-897-7455)

On-line Water Pollution Problem Reporting Form
www.ocwatersheds.com

Printed on Recycled Paper

The Ocean Begins at Your Front Door

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, not properly disposing of used oil is illegal and can lead to fines. If you pour or drain oil onto driveways, sidewalks or streets, it can be washed into the storm drain.

Help prevent water pollution by taking your used oil and oil filters to a used oil collection center. Most major automotive maintenance centers will accept up to five gallons of used motor oil at no cost. For a list of locations, please visit www.cleanup.org.

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For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL (1-877-897-7455)** or visit **www.ocwatersheds.com.**

For information about the proper disposal of household hazardous waste, call the **Household Waste Hotline** at **1-877-89-SPILL (1-877-897-7455)** or visit **www.oclandfills.com.**

For additional information about the nearest oil recycling center, call the **Used Oil Program** at **1-800-CLEANUP** or visit **www.cleanup.org.**

RECYCLE USED OIL

emc/rev9/08

Help Prevent Ocean Pollution:

Tips for the Home Mechanic

PROJECT Pollution PREVENTION

The Ocean Begins at Your Front Door

Tips for the Home Mechanic

WORK SITE

- Locate the storm drains on or near your property. Do not allow used oil or any materials to flow into these drains.
- Examine your home for sources of pollution.
- Perform automotive projects under cover and in a controlled area to prevent stormwater runoff.
- Sweep or vacuum your automotive workspace regularly
- Use a damp mop to clean work areas. Never hose down surfaces into the street, gutter or storm drain.

- Pour mop water into a sink or toilet. Never dispose of water in a parking lot, street, gutter or storm drain.

PREVENT LEAKS AND SPILLS

- Keep absorbent materials such as rags and/or cat litter in the work area
- Empty drip pans into a labeled, seal container before they are full
- Wipe up any spills or repair leaks as they happen. Don't let them sit.
- Place large pans under any wrecked cars until all fluids are drained.
- Promptly dispose of collected fluids into a hazardous waste drum or deliver them to an oil recycling center. Used oil recycling locations can be found at http://www.ochealthinfo.com/regulatory/usedoil.htm

CLEANING SPILLS

- Clean up spills immediately by using absorbent material such as rags, cat litter or sand. If the material spilled is hazardous, dispose of the rag, litter or sand in the same manner as hazardous waste. If the material spill is non-hazardous, dispose of it in the trash.

- Immediately report spills that have entered the street, gutter or storm drain to the County's 24-Hour Water Pollution Problem Reporting Hotline at 1-877-89-SPILL (1-877-897-7455) or visit www.ocwatersheds.com to fill out an incident report.
- Report emergencies to 911.

VEHICLE FLUID MANAGEMENT

- Vehicle fluids are hazardous waste and must be stored and disposed of in accordance with all local, state and federal laws.
- Designate an area to drain vehicle fluids away from storm drains and sanitary drains.
- When possible, drain vehicle fluids indoors or within covered areas, and only over floors that are constructed of a non-porous material such as concrete. Asphalt and dirt floors absorb spilled or leaked fluids, making the cleanup extremely difficult.

PROJECT Pollution PREVENTION

Homeowners Guide for Sustainable Water Use

Low Impact Development, Water Conservation & Pollution Prevention

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

UC CE University of California Cooperative Extension

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

The Pollution Solution

Several residential activities can result in water pollution. Among these activities are car washing and hosing off driveways and sidewalks. Both activities can waste water and result in excess runoff. Water conservation methods described in this pamphlet can prevent considerable amounts of runoff and conserve water. By taking your car to a commercial car wash and by sweeping driveways and sidewalks, you can further prevent the transport of pollutants to Orange County waterways. Here are some of the common pollutants for which you can be part of the solution:

1 Pesticides and Fertilizer

- **Pollution:** The same pesticides that are designed to be toxic to pests can have an equally lethal impact on our marine life. The same fertilizer that promotes plant growth in lawns and gardens can also create nuisance algae blooms, which remove oxygen from the water and clog waterways when it decomposes.

- **Solution:** Never use pesticides or fertilizer within 48 hours of an anticipated rainstorm. Use only as much as is directed on the label and keep it off driveways and sidewalks.

2 Dirt and Sediment

- **Pollution:** Dirt or sediment can impede the flow of the stormwater and negatively impact stream habitat as it travels through waterways and deposits downstream. Pollutants can attach to sediment, which can then be transported through our waterways.

- **Solution:** Protect dirt stockpiles by covering them with tarps or secure plastic sheets to prevent wind or rain from allowing dirt or sediment to enter the storm drain system.

3 Metals

- **Pollution:** Metals and other toxins present in car wash water can harm important plankton, which forms the base of the aquatic food chain.

- **Solution:** Take your car to a commercial car wash where the wash water is captured and treated at a local wastewater treatment plant.

DID YOU KNOW?

Did you know that most of the pollution found in our waterways is not from a single source, but from a "non-point" source meaning the accumulation of pollution from residents and businesses throughout the community

4 Pet Waste

- **Pollution:** Pet waste carries bacteria through our watersheds and eventually will be washed out to the ocean. This can pose a health risk to swimmers and surfers.

- **Solution:** Pick up after your pets!

5 Trash and Debris

- **Pollution:** Trash and debris can enter waterways by wind, littering and careless maintenance of trash receptacles. Street sweeping collects some of this trash; however, much of what isn't captured ends up in our storm drain system where it flows untreated out to the ocean.

- **Solution:** Don't litter and make sure trash containers are properly covered. It is far more expensive to clean up the litter and trash that ends up in our waterways than it is to prevent it in the first place. Come out to one of Orange County's many locations for Coastal and Inner-Coastal Cleanup Day, which is held in September.

6 Motor Oil / Vehicle Fluids

- **Pollution:** Oil and petroleum products from our vehicles are toxic to people, wildlife and plants.

- **Solution:** Fix any leaks from your vehicle and keep the maintenance up on your car. Use absorbent material such as cat litter on oil spills, then sweep it up and dispose of it in the trash. Recycle used motor oil at a local Household Hazardous Waste Collection Center.

A TEAM EFFORT

The Orange County Stormwater Program has teamed with the Municipal Water District of Orange County (MWDOC) and the University of California Cooperative Extension Program (UCCE) to develop this pamphlet.

Low Impact Development (LID) and sustainable water use prevents water pollution and conserves water for drinking and reuse. Reducing your water use and the amount of water flowing from your home protects the environment and saves you money.

Thank you for making water protection a priority!

For more information, please visit www.ocwatersheds.com/publiced/

www.mwdoc.com

www.uccemg.com

To report a spill, call the Orange County 24-Hour Water Pollution Prevention Reporting Hotline at 1-877-89-SPILL \ (1-877-897-7455)

Special Thanks to
The City of Los Angeles Stormwater Program for the use of its artwork

The Metropolitan Water District of Southern California for the use of the California-Friendly Plant and Native Habitat photos

PROJECT Pollution PREVENTION

UCCE University of California Cooperative Extension

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

RUNOFF, RAINWATER AND REUSE

Where Does Water Runoff Go?

Stormwater, or water from rainfall events, and runoff from outdoor water use such as sprinklers and hoses flows from homes directly into catch basins and the storm drain system. After entering the storm drain, the water flows untreated into streams, rivers, bays and ultimately the Pacific Ocean. Runoff can come from lawns, gardens, driveways, sidewalks and roofs. As it flows over hard, impervious surfaces, it picks up pollutants. Some pollutants carried by the water runoff include trash, pet waste, pesticides, fertilizer, motor oil and more.

Water Conservation

Pollution not only impairs the water quality for habitat and recreation, it can also reduce the water available for reuse. Runoff allowed to soak into the ground is cleaned as it percolates through the soil, replenishing depleted groundwater supplies. Groundwater provides at least 50% of the total water for drinking and other indoor household activities in north and central Orange County. When land is covered with roads, parking lots, homes, etc., there is less land to take in the water and more hard surfaces over which the water can flow.

In Orange County, 60-70% of water used by residents and businesses goes to irrigation and other outdoor uses. Reusing rainwater to irrigate our lawn not only reduces the impact of water pollution from runoff, but it also is a great way to conserve our precious water resources and replenish our groundwater basin.

What is Low Impact Development (LID)?

Low Impact Development (LID) is a method of development that seeks to maintain the natural hydrologic character of an area. LID provides a more sustainable and pollution-preventative approach to water management.

New water quality regulations require implementation of LID in larger new developments and encourage implementation of LID and other sustainable practices in existing residential areas. Implementing modifications to your lawn or garden can reduce pollution in our environment, conserve water and reduce your water bill.

Permeable pavement allows water runoff to infiltrate through the soil and prevents most pollutants from reaching the storm drain system.

OPTIONS FOR RAINWATER HARVESTING AND REUSE

Rainwater harvesting is a great way to save money, prevent pollution and reduce potable water use. To harvest your rainwater, simply redirect the runoff from roofs and downspouts to rain barrels. Rain gardens are another option; these reduce runoff as well as encourage infiltration.

Downspout Disconnection/Redirection

Disconnecting downspouts from pipes running to the gutter prevents runoff from transporting pollutants to the storm drain. Once disconnected, downspouts can be redirected to rain gardens or other vegetated areas, or be connected to a rain barrel.

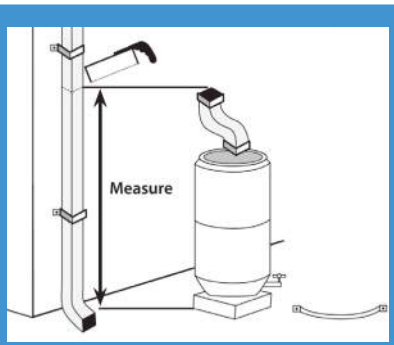
Rain Barrels

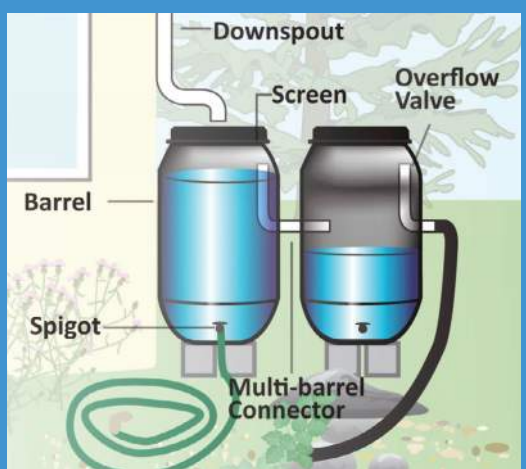
Rain barrels capture rainwater flow from roofs for reuse in landscape irrigation. Capacity of rain barrels needed for your home will depend on the amount of roof area and rainfall received. When purchasing your rain barrel, make sure it includes a screen, a spigot to siphon water for use, an overflow tube to allow for excess water to run out and a connector if you wish to connect multiple barrels to add capacity of water storage.

Mosquito growth prevention is very important when installing a rain barrel. The best way to prevent mosquito breeding is to eliminate entry points by ensuring all openings are sealed tightly. If these methods are unsuccessful, products are available to kill mosquito larvae, but that are harmless to animals and humans. Regular application of these products is essential. Please visit the Orange County Vector Control website for more information at www.ocvcd.org/mosquitoes3.php.

Rain Gardens

Rain gardens allow runoff to be directed from your roof downspout into a landscaped area. Vegetation and rocks in the garden will slow the flow of water to allow for infiltration into the soil. Plants and soil particles will absorb pollutants from the roof runoff. By utilizing a native plant palate, rain gardens can be maintained all year with minimal additional irrigation. These plants are adapted to the semi-arid climate of Southern California, require less water and can reduce your water bill.





Before modifying your yard to install a rain garden, please consult your local building and/or planning departments to ensure your garden plan follows pertinent building codes and ordinances. Besides codes and ordinances, some home owner associations also have guidelines for yard modifications. If your property is in hill areas or includes engineered slopes, please seek professional advice before proceeding with changes.

For information on how to disconnect a downspout or to install and maintain a rain barrel or rain garden at your home, please see the Los Angeles Rainwater Harvesting Program, A Homeowner's "How-To" Guide, November 2009 at www.larainwaterharvesting.org/

OTHER WATER CONSERVATION AND POLLUTION PREVENTION TECHNIQUES

Native Vegetation and Maintenance

"California Friendly" plants or native vegetation can significantly reduce water use. These plants often require far less fertilizers and pesticides, which are two significant pollutants found in Orange County waterways. Replacing water "thirsty" plants and grass types with water efficient natives is a great way to save water and reduce the need for potentially harmful pesticides and fertilizer.

Please see the California Friendly Garden Guide produced by the Metropolitan Water District of Southern California and associated Southern California Water Agencies for a catalog of California friendly plants and other garden resources at www.bewaterwise.com/Gardensoft.

Weed Free Yards

Weeds are water thieves. They often reproduce quickly and rob your yard of both water and nutrients. Weed your yard by hand if possible. If you use herbicides to control the weeds, use only the amount recommended on the label and never use it if rain is forecast within the next 48 hours.

Soil Amendments

Soil amendments such as green waste (e.g. grass clippings, compost, etc.) can be a significant source of nutrients and can help keep the soil near the roots of plants moist. However, they can cause algal booms if they get into our waterways, which reduces the amount of oxygen in the water and impacts most aquatic organisms. It is important to apply soil amendments more than 48 hours prior to predicted rainfall.

IRRIGATE EFFICIENTLY

Water runoff from sprinklers left on too long will carry pollutants into our waterways.

Smart Irrigation Controllers

Smart Irrigation Controllers have internal clocks as well as sensors that will turn off the sprinklers in response to environmental changes. If it is raining, too windy or too cold, the smart irrigation control sprinklers will automatically shut off.

Check with your local water agency for available rebates on irrigation controllers and smart timers.

- Aim your sprinklers at your lawn, not the sidewalk – By simply adjusting the direction of your sprinklers you can save water, prevent water pollution from runoff, keep your lawn healthy and save money.
- **Set a timer for your sprinklers** – lawns absorb the water they need to stay healthy within a few minutes of turning on the sprinklers. Time your sprinklers; when water begins running off your lawn, you can turn them off. Your timer can be set to water your lawn for this duration every time.
- **Water at Sunrise** – Watering early in the morning will reduce water loss due to evaporation. Additionally, winds tend to die down in the early morning so the water will get to the lawn as intended.
- **Water by hand** – Instead of using sprinklers, consider watering your yard by hand. Hand-watering ensures that all plants get the proper amount of water and you will prevent any water runoff, which wastes water and carries pollutants into our waterways.
- **Fix leaks** - Nationwide, households waste one trillion gallons of water a year to leaks – that is enough water to serve the entire state of Texas for a year. If your garden hose is leaking, replace the nylon or rubber hose washer and ensure a tight connection. Fix broken sprinklers immediately.

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common household activities can lead to water pollution if you're not careful.

Remember the Water in Your Storm Drain is Not Treated BEFORE It Enters Our Waterways

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Litter, oil, chemicals and other substances that are left on your yard or driveway can be blown or washed into storm drains that flow to the ocean. Over-watering your lawn and washing your car can also flush materials into the storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated.

You would never pour soap, fertilizers or oil into the ocean, so don't let them enter streets, gutters or storm drains. Follow the easy tips in this brochure to help prevent water pollution.

For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline 1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while performing everyday household activities. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

GENUINE RECYCLED PAPER
50% PRE-CONSUMER AND 15% POST-CONSUMER

RECYCLE USED OIL

Help Prevent Ocean Pollution:

Household Tips

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Pollution Prevention

Household Activities

- **Do not rinse spills with water!** Sweep outdoor spills and dispose of in the trash. For wet spills like oil, apply cat litter or another absorbent material, then sweep and bring to a household hazardous waste collection center (HHWCC).
- Securely cover trash cans.
- Take household hazardous waste to a household hazardous waste collection center.
- Store household hazardous waste in closed, labeled containers inside or under a cover.
- Do not hose down your driveway, sidewalk or patio. Sweep up debris and dispose of in trash.
- Always pick up after your pet. Flush waste down the toilet or dispose of in the trash.
- Bathe pets indoors or have them professionally groomed.

Household Hazardous Wastes include:

- ▲ **Batteries**
- ▲ **Paint thinners, paint strippers and removers**
- ▲ **Adhesives**
- ▲ **Drain openers**
- ▲ **Oven cleaners**
- ▲ **Wood and metal cleaners and polishes**
- ▲ **Herbicides and pesticides**
- ▲ **Fungicides/wood preservatives**
- ▲ **Automotive fluids and products**
- ▲ **Grease and rust solvents**
- ▲ **Thermometers and other products containing mercury**
- ▲ **Fluorescent lamps**
- ▲ **Cathode ray tubes, e.g. TVs, computer monitors**
- ▲ **Pool and spa chemicals**

Gardening Activities

- Follow directions on pesticides and fertilizers, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Water your lawn and garden by hand to control the amount of water you use. Set irrigation systems to reflect seasonal water needs. If water flows off your yard and onto your driveway or sidewalk, your system is over-watering.
- Mulch clippings or leave them on the lawn. If necessary, dispose in a green waste container.
- Cultivate your garden often to control weeds.

Washing and Maintaining Your Car

- Take your car to a commercial car wash whenever possible.
- Choose soaps, cleaners, or detergents labeled "non-toxic," "phosphate free" or "biodegradable." Vegetable and citrus-based products are typically safest for the environment, **but even these should not be allowed into the storm drain.**
- Shake floor mats into a trash can or vacuum to clean.
- Do not use acid-based wheel cleaners and "hose off" engine degreasers at home. They can be used at a commercial facility, which can properly process the washwater.
- **Do not dump washwater onto your driveway, sidewalk, street, gutter or storm drain.** Excess washwater should be disposed of in the sanitary sewers (through a sink, or toilet) or onto an absorbent surface like your lawn.
- Use a nozzle to turn off water when not actively washing down automobile.
- Monitor vehicles for leaks and place pans under leaks. Keep your car well maintained to stop and prevent leaks.
- Use cat litter or other absorbents and sweep to remove any materials deposited by vehicles. Contain sweepings and dispose of at a HHWCC.
- Perform automobile repair and maintenance under a covered area and use drip pans or plastic sheeting to keep spills and waste material from reaching storm drains.
- **Never pour oil or antifreeze in the street, gutter or storm drains.** Recycle these substances at a service station, HHWCC, or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.ciwmb.ca.gov/UsedOil.

For locations and hours of Household Hazardous Waste Collection Centers in Anaheim, Huntington Beach, Irvine and San Juan Capistrano, call (714)834-6752 or visit www.oclandfills.com.

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, not properly disposing of household hazardous waste can lead to water pollution. Batteries, electronics, paint, oil, gardening chemicals, cleaners and other hazardous materials cannot be thrown in the trash. They also must never be poured or thrown into yards, sidewalks, driveways, gutters or streets. Rain or other water could wash the materials into the storm drain and eventually into our waterways and the ocean. In addition, hazardous waste must not be poured in the sanitary sewers (sinks and toilets).

NEVER DISPOSE OF HOUSEHOLD HAZARDOUS WASTE IN THE TRASH, STREET, GUTTER, STORM DRAIN OR SEWER.

D-51

For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

To Report Illegal Dumping of Household Hazardous Waste call 1-800-69-TOXIC

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline 1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

RECYCLE USED OIL

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Help Prevent Ocean Pollution:

Proper Disposal of Household Hazardous Waste

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

ORANGE COUNTY

Pollution Prevention

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste" or "HHW." HHW can be found throughout your home, including the bathroom, kitchen, laundry room and garage.

WHEN POSSIBLE, USE NON-HAZARDOUS OR LESS-HAZARDOUS PRODUCTS.

Disposal of HHW down the drain, on the ground, into storm drains, or in the trash is illegal and unsafe.

D-52

Proper disposal of HHW is actually easy. Simply drop them off at a Household Hazardous Waste Collection Center (HHWCC) for free disposal and recycling. Many materials including anti-freeze, latex-based paint, motor oil and batteries can be recycled. Some centers have a "Stop & Swap" program that lets you take partially used home, garden, and automobile products free of charge. There are four HHWCCs in Orange County:

Anaheim:.....1071 N. Blue Gum St
Huntington Beach:.....17121 Nichols St
Irvine:.....6411 Oak Canyon
San Juan Capistrano:... 32250 La Pata Ave

Centers are open Tuesday-Saturday, 9 a.m.-3 p.m. Centers are closed on rainy days and major holidays. For more information, call **(714) 834-6752** or visit **www.oclandfills.com.**

Common household hazardous wastes

- Batteries
- Paint and paint products
- Adhesives
- Drain openers
- Household cleaning products
- Wood and metal cleaners and polishes
- Pesticides
- Fungicides/wood preservatives
- Automotive products (antifreeze, motor oil, fluids)
- Grease and rust solvents
- Fluorescent lamps
- Mercury (thermometers & thermostats)
- All forms of electronic waste including computers and microwaves
- Pool & spa chemicals
- Cleaners
- Medications
- Propane (camping & BBQ)
- Mercury-containing lamps
- Television & monitors (CRTs, flatscreens)

Tips for household hazardous waste

- Never dispose of HHW in the trash, street, gutter, storm drain or sewer.
- Keep these materials in closed, labeled containers and store materials indoors or under a cover.
- When possible, use non-hazardous products.
- Reuse products whenever possible or share with family and friends.
- Purchase only as much of a product as you'll need. Empty containers may be disposed of in the trash.
- HHW can be harmful to humans, pets and the environment. Report emergencies to 911.

Did you know that just one quart of oil can pollute 250,000 gallons of water?

A clean ocean and healthy creeks, rivers, bays and beaches are important to Orange County. However, not properly disposing of used oil can lead to water pollution. If you pour or drain oil onto driveways, sidewalks or streets, it can be washed into the storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering the ocean. Help prevent water pollution by taking your used oil to a used oil collection center.

D-53

Included in this brochure is a list of locations that will accept up to five gallons of used motor oil at no cost. Many also accept used oil filters. Please contact the facility before delivering your used oil. This listing of companies is for your reference and does not constitute a recommendation or endorsement of the company.

Please note that used oil filters may not be disposed of with regular household trash. They must be taken to a household hazardous waste collection or recycling center in Anaheim, Huntington Beach, Irvine or San Juan Capistrano. For information about these centers, visit www.oclandfills.com.

Please do not mix your oil with other substances!

For more information, please call the Orange County Stormwater Program at 1-877-89-SPILL (1-877-897-7455) or visit www.watersheds.com.

For information about the proper disposal of household hazardous waste, call the Household Waste Hotline at (714) 834-6752 or visit www.oclandfills.com.

RECYCLE USED OIL

For additional information about the nearest oil recycling center, call the Used Oil Program at 1-800-CLEANUP or visit www.cleanup.org.

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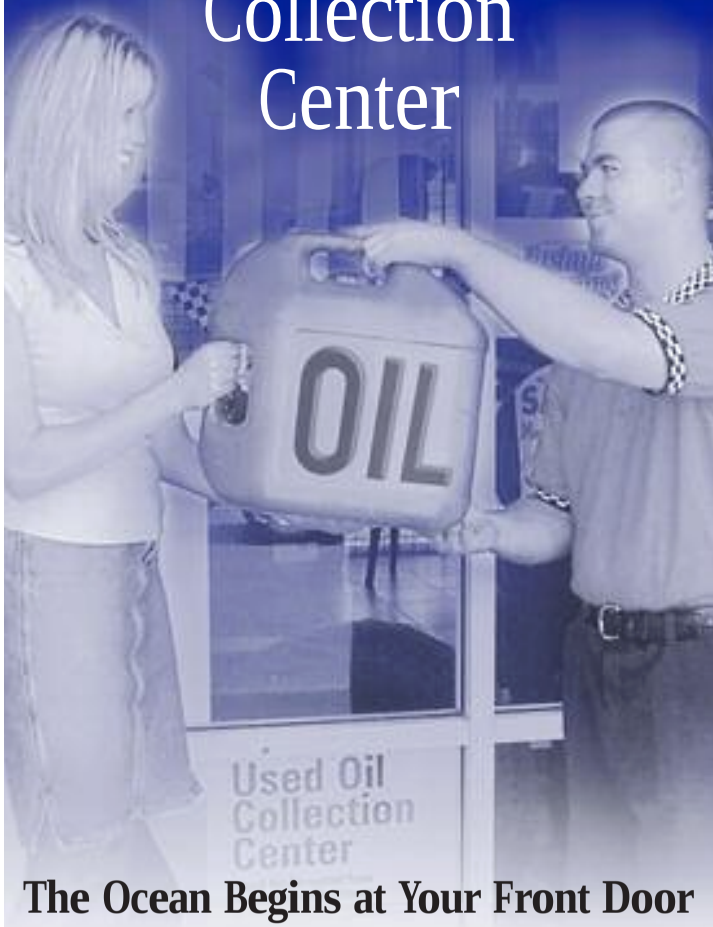
Help Prevent Ocean Pollution:

Recycle at Your Local Used Oil Collection Center



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

NORTH COUNTY

Used Oil Collection Centers

Anaheim

All Seasons Tire and Auto Center, Inc.
817 S Brookhurst St., Anaheim, CA 92804
(714)772-6090( )
CIWMB#: 30-C-03177

AutoZone #3317
423 N Anaheim Blvd., Anaheim, CA 92805
(714)776-0787( )
CIWMB#: 30-C-05263

AutoZone #5226
2145 W Lincoln Ave., Anaheim, CA 92801
(714)533-6599( )
CIWMB#: 30-C-04604

Bedard Automotive
3601 E Miraloma Ave., Anaheim, CA 92806
(714)528-1380( )
CIWMB#: 30-C-02205

Classic Chevrolet
1001 Weir Canyon Rd., Anaheim, CA 92807
(714)283-5400( )
CIWMB#: 30-C-05223

Econo Lube N' Tune #4
3201 W Lincoln Ave., Anaheim, CA 92801
(714)821-0128( )
CIWMB#: 30-C-01485

EZ Lube Inc - Savi Ranch #43
985 N Weir Canyon Rd., Anaheim, CA 92807
(714)556-1312( )
CIWMB#: 30-C-06011

Firestone Store #71C7
1200 S Magnolia Ave., Anaheim, CA 92804
(949)598-5520( )
CIWMB#: 30-C-05743

Great Western Lube Express
125 N Brookhurst St., Anaheim, CA 92801
(714)254-1300( )
CIWMB#: 30-C-05542

HR Pro Auto Service Center
3180 W Lincoln Ave., Anaheim, CA 92801
(714)761-4343( )
CIWMB#: 30-C-05927

Ira Newman Automotive Services
1507 N State College Blvd., Anaheim, CA 92806
(714)635-2392( )
CIWMB#: 30-C-01482

Jiffy Lube #1028
2400 W Ball Rd., Anaheim, CA 92804
(714)761-5211( )
CIWMB#: 30-C-00870

Jiffy Lube #1903
2505 E Lincoln Ave., Anaheim, CA 92806
(714)772-4000( )
CIWMB#: 30-C-05511

Jiffy Lube #2340
2181 W Lincoln Ave., Anaheim, CA 92801
(714)533-1000( )
CIWMB#: 30-C-04647

Kragen Auto Parts #1303
1088 N State College Blvd., Anaheim, CA 92806
(714)956-7351( )
CIWMB#: 30-C-03438

Kragen Auto Parts #1399
2245 W Ball Rd., Anaheim, CA 92804
(714)490-1274( )
CIWMB#: 30-C-04094

Kragen Auto Parts #1565
2072 Lincoln Ave., Anaheim, CA 92806
(714)502-6992( )
CIWMB#: 30-C-04078

Kragen Auto Parts #1582
3420 W Lincoln Ave., Anaheim, CA 92801
(714)828-7977( )
CIWMB#: 30-C-04103

Pep Boys #613
10912 Katella Ave., Anaheim, CA 92804
(714)638-0863( )
CIWMB#: 30-C-01756

Pep Boys #663
3030 W Lincoln Anaheim, CA 92801
(714)826-4810( )
CIWMB#: 30-C-03417

Pep Boys #809
8205 E Santa Ana Cyn Rd., Anaheim, CA 92808
(714)974-0105( )
CIWMB#: 30-C-03443

Pick Your Part
1235 S Beach Blvd., Anaheim, CA 92804
(714)527-1645( )
CIWMB#: 30-C-03744

PK Auto Performance
3106 W. Lincoln Ave., Anaheim, CA 92801
(714)826-2141( )
CIWMB#: 30-C-05628

Quick Change Lube and Oil
2731 W Lincoln Ave., Anaheim, CA 92801
(714)821-4464( )
CIWMB#: 30-C-04363

Saturn of Anaheim
1380 S Auto Center Dr., Anaheim, CA 92806
(714)648-2444( )
CIWMB#: 30-C-06332

Sun Tech Auto Service
105 S State College Blvd., Anaheim, CA 92806
(714)956-1389( )
CIWMB#: 30-C-06455

Vonic Truck Services
515 S Rose St., Anaheim, CA 92805
(714)533-3333( )
CIWMB#: 30-C-01142

Anaheim Hills

Anaheim Hills Car Wash & Lube
5810 E La Palma Ave., Anaheim Hills, CA 92807
(714)777-6605( )
CIWMB#: 30-C-01387

Brea

Firestone Store #27A9
891 E Imperial Hwy., Brea, CA 92821
(714)529-8404( )
CIWMB#: 30-C-01221

Oil Can Henry's
230 N Brea Blvd., Brea, CA 92821
(714)990-1900( )
CIWMB#: 30-C-04273

Buena Park

Firestone Store #71F7
6011 Orangethorpe Buena Park, CA 90620
(714)670-7912( )
CIWMB#: 30-C-01218

Firestone Store #71T8
8600 Beach Blvd., Buena Park, CA 90620
(714)827-5300( )
CIWMB#: 30-C-02121

Kragen Auto Parts #1204
5303 Beach Blvd., Buena Park, CA 90621
(714)994-1320( )
CIWMB#: 30-C-02623

Cypress

AutoZone #5521
5471 Lincoln Ave., Cypress, CA 90630
(714)995-4644( )
CIWMB#: 30-C-00836

Big O Tires
6052 Cerritos Ave., Cypress, CA 90630
(714)826-6334( )
CIWMB#: 30-C-04245

Econo Lube N' Tune #213
5497 Cerritos Ave., Cypress, CA 90630
(714)761-0456( )
CIWMB#: 30-C-06240

Jiffy Lube #851
4942 Lincoln Ave., Cypress, CA 90630
(626)965-9689( )
CIWMB#: 30-C-06182

M & N Coastline Auto & Tire Service
4005 Ball Rd., Cypress, CA 90630
(714)826-1001( )
CIWMB#: 30-C-04387

Masterlube #103
5904 Lincoln Cypress, CA 90630
(714)826-2323( )
CIWMB#: 30-C-01071

Masterlube #104
5971 Ball Rd., Cypress, CA 90630
(714)220-1555( )
CIWMB#: 30-C-04682

Metric Motors of Cypress
6042 Cerritos Ave., Cypress, CA 90630
(714)821-4702( )
CIWMB#: 30-C-05157

Fullerton

AutoZone #2898
146 N. Raymond Ave., Fullerton, CA 92831
(714)870-9772( )
CIWMB#: 30-C-04488

AutoZone #5522
1801 Orangethorpe W. Fullerton, CA 92833
(714)870-8286( )
CIWMB#: 30-C-06062

AutoZone #5523
102 N Euclid Fullerton, CA 92832
(714)870-8286( )
CIWMB#: 30-C-04755

EZ Lube #17
4002 N Harbor Blvd., Fullerton, CA 92835
(714)871-9980( )
CIWMB#: 30-C-03741

Firestone Store #27EH
1933 N Placentia Ave., Fullerton, CA 92831
(714)993-7100( )
CIWMB#: 30-C-02122

Fox Service Center
1018 W Orangethorpe Fullerton, CA 92833
(714)879-1430( )
CIWMB#: 30-C-02318

Fullerton College Automotive Technology
321 E Chapman Ave., Fullerton, CA 92832
(714)992-7275( )
CIWMB#: 30-C-03165

Kragen Auto Parts #0731
2978 Yorba Linda Fullerton, CA 92831
(714)996-4780( )
CIWMB#: 30-C-02628

Kragen Auto Parts #4133
904 W Orangethorpe Ave., Fullerton, CA 92832
(714)526-3570( )
CIWMB#: 30-C-06256

Pep Boys #642
1530 S Harbor Blvd., Fullerton, CA 92832
(714)870-0700( )
CIWMB#: 30-C-01755

Sunnyside 76 Car Care Center
2701 N Brea Blvd., Fullerton, CA 92835
(714)256-0773( )
CIWMB#: 30-C-01381

Garden Grove

76 Pro Lube Plus
9001 Trask Ave., Garden Grove, CA 92844
(714)393-0590( )
CIWMB#: 30-C-05276

AutoZone #5527
13190 Harbor Blvd., Garden Grove, CA 92843
(714)636-5665( )
CIWMB#: 30-C-04760

David Murray Shell
12571 Vly View St., Garden Grove, CA 92845
(714)898-0170( )
CIWMB#: 30-C-00547

Express Lube & Wash
8100 Lampson Ave., Garden Grove, CA 92841
(909)316-8261( )
CIWMB#: 30-C-06544

Firestone Store #7180
10081 Chapman Ave., Garden Grove, CA 92840
(714)530-4630( )
CIWMB#: 30-C-01224

Firestone Store #71W3
13961 Brookhurst St., Garden Grove, CA 92843
(714)590-2741( )
CIWMB#: 30-C-03690

Jiffy Lube #1991
13970 Harbor Blvd., Garden Grove, CA 92843
(714)554-0610( )
CIWMB#: 30-C-05400

Kragen Auto Parts #1251
13933 N Harbor Blvd., Garden Grove, CA 92843
(714)554-3780( )
CIWMB#: 30-C-02663

Kragen Auto Parts #1555
9851 Chapman Ave., Garden Grove, CA 92841
(714)741-8030( )
CIWMB#: 30-C-04079

Nissan of Grarden Grove
9670 Trask Ave., Garden Grove, CA 92884
(714)537-0900( )
CIWMB#: 30-C-06553

Toyota of Garden Grove
9444 Trask Ave., Garden Grove, CA 92844
(714)895-5595( )
CIWMB#: 30-C-06555

La Habra

AutoZone #5532
1200 W Imperial Hwy., La Habra, CA 90631
(562)694-5337( )
CIWMB#: 30-C-04784

Burch Ford
201 N Harbor Blvd., La Habra, CA 90631
(562)691-3225( )
CIWMB#: 30-C-05179

Firestone Store #2736
1071 S Beach Blvd., La Habra, CA 90631
(562)691-1731( )
CIWMB#: 30-C-01169

Kragen Auto Parts #1569
1621 W Whittier Blvd., La Habra, CA 90631
(562)905-2538( )
CIWMB#: 30-C-04076

Pep Boys #997
125 W Imperial Hwy., La Habra, CA 90631
(714)447-0601( )
CIWMB#: 30-C-04026

SpeeDee Oil Change & Tune-Up
1580 W Imperial Hwy., La Habra, CA 90631
(562)697-3513( )

Los Alamitos

Jiffy Lube #1740
3311 Katella Ave., Los Alamitos, CA 90720
(562)596-1827( )
CIWMB#: 30-C-03529

Midway City

Bolsa Transmission
8331 Bolsa Ave., Midway City, CA 92655
(714)799-6158( )
CIWMB#: 30-C-05768

Placentia

Advanced Auto & Diesel
144 S Bradford Placentia, CA 92870
(714)996-8222( )
CIWMB#: 30-C-06242

Castner's Auto Service
214 S. Bradford Ave., Placentia, CA 92870
(714)528-1311( )
CIWMB#: 30-C-06452

Econo Lube N' Tune
100 W Chapman Ave., Placentia, CA 92870
(714)524-0424( )
CIWMB#: 30-C-06454

Fairway Ford
1350 E Yorba Linda Blvd., Placentia, CA 92870
(714)524-1200( )
CIWMB#: 30-C-01863

Seal Beach

M & N Coastline Auto & Tire Service
12239 Seal Beach Blvd., Seal Beach, CA 90740
(714)826-1001( )
CIWMB#: 30-C-04433

Seal Beach Chevron
12541 Seal Beach Blvd., Seal Beach, CA 90740
(949)495-0774(14)
CIWMB#: 30-C-06425

Stanton

AutoZone #2806
11320 Beach Blvd., Stanton, CA 90680
(714)895-7665( )
CIWMB#: 30-C-04563

Joe's Auto Clinic
11763 Beach Blvd., Stanton, CA 90680
(714)891-7715( )
CIWMB#: 30-C-03253

Kragen Auto Parts #1742
11951 Beach Blvd., Stanton, CA 90680
(714)799-7574( )
CIWMB#: 30-C-05231

Scher Tire #20
7000 Katella Ave., Stanton, CA 90680
(714)892-9924( )
CIWMB#: 30-C-05907

USA 10 Minute Oil Change
8100 Lampson Ave., Stanton, CA 92841
(714)373-4432( )
CIWMB#: 30-C-05909

Westminster

AutoZone #5543
6611 Westminster Blvd., Westminster, CA 92683
(714)898-2898( )
CIWMB#: 30-C-04964

AutoZone #5544
8481 Westminster Blvd., Westminster, CA 92683
(714)891-3511( )
CIWMB#: 30-C-04966

City of Westminster Corporate Yard
14381 Olive St., Westminster, CA 92683
(714)895-2876(292)
CIWMB#: 30-C-02008

Honda World
13600 Beach Blvd., Westminster, CA 92683
(714)890-8900( )
CIWMB#: 30-C-03639

Jiffy Lube #1579
6011 Westminster Blvd., Westminster, CA 92683
(714)899-2727( )
CIWMB#: 30-C-02745

John's Brake & Auto Repair
13050 Hoover St., Westminster, CA 92683
(714)379-2088( )
CIWMB#: 30-C-05617

Kragen Auto Parts #0762
6562 Westminster Blvd., Westminster, CA 92683
(714)898-0810( )
CIWMB#: 30-C-02590

Midway City Sanitary District
14451 Cedarwood St., Westminster, CA 92683
(714)893-3553( )
CIWMB#: 30-C-01626

Pep Boys #653
15221 Beach Blvd., Westminster, CA 92683
(714)893-8544( )
CIWMB#: 30-C-03415

Yorba Linda

AutoZone #5545
18528 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)970-8933( )
CIWMB#: 30-C-04971

Econo Lube N' Tune
22270 La Palma Ave., Yorba Linda, CA 92887
(714)692-8394( )
CIWMB#: 30-C-06513

EZ Lube Inc. #41
17511 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)556-1312( )
CIWMB#: 30-C-05739

Firestone Store #27T3
18500 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)779-1966( )
CIWMB#: 30-C-01222

Jiffy Lube #1532
16751 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)528-2800( )
CIWMB#: 30-C-03777

Mike Schultz Import Service
4832 Eureka Ave., Yorba Linda, CA 92886
(714)528-4411( )
CIWMB#: 30-C-04313

This information was provided by the County of Orange Integrated Waste Management Department and the California Integrated Waste Management Board (CIWMB).

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities such as pest control can lead to water pollution if you're not careful. Pesticide treatments must be planned and applied properly to ensure that pesticides do not enter the street, gutter or storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump pesticides into the ocean, so don't let it enter the storm drains. Pesticides can cause significant damage to our environment if used improperly. If you are thinking of using a pesticide to control a pest, there are some important things to consider.

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For more information, please call University of California Cooperative Extension Master Gardeners at (714) 708-1646 or visit these Web sites:
www.uccemg.org
www.ipm.ucdavis.edu

For instructions on collecting a specimen sample visit the Orange County Agriculture Commissioner's website at:
http://www.ocagcomm.com/ser_lab.asp

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline at 1-877-89-SPILL (1-877-897-7455).**

For emergencies, dial 911.

Information From:
Cheryl Wilen, Area IPM Advisor; Darren Haver, Watershed Management Advisor; Mary Louise Flint, IPM Education and Publication Director; Pamela M. Geisel, Environmental Horticulture Advisor; Carolyn L. Unruh, University of California Cooperative Extension staff writer. Photos courtesy of the UC Statewide IPM Program and Darren Haver.

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Help Prevent Ocean Pollution:

Responsible Pest Control

Tips for Pest Control

Key Steps to Follow:

Step 1: Correctly identify the pest (insect, weed, rodent, or disease) and verify that it is actually causing the problem.

Three life stages of the common lady beetle, a beneficial insect.

This is important because beneficial insects are often mistaken for pests and sprayed with pesticides needlessly.

Consult with a Certified Nursery Professional at a local nursery or garden center or send a sample of the pest to the Orange County Agricultural Commissioner's Office.

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Determine if the pest is still present – even though you see damage, the pest may have left.

Step 2: Determine how many pests are present and causing damage.

Small pest populations may be controlled more safely using non-pesticide techniques. These include removing food sources, washing off leaves with a strong stream of water, blocking entry into the home using caulking and replacing problem plants with ones less susceptible to pests.

Integrated Pest Management (IPM) usually combines several least toxic pest control methods for long-term prevention and management of pest problems without harming you, your family, or the environment.

UC CE University of California Cooperative Extension

Step 3: If a pesticide must be used, choose the least toxic chemical.

Obtain information on the least toxic pesticides that are effective at controlling the target pest from the UC Statewide Integrated Pest Management (IPM) Program's Web site at www.ipm.ucdavis.edu.

Seek out the assistance of a Certified Nursery Professional at a local nursery or garden center when selecting a pesticide. Purchase the smallest amount of pesticide available.

Apply the pesticide to the pest during its most vulnerable life stage. This information can be found on the pesticide label.

Step 4: Wear appropriate protective clothing.

Follow pesticide labels regarding specific types of protective equipment you should wear. Protective clothing should always be washed separately from other clothing.

Step 5: Continuously monitor external conditions when applying pesticides such as weather, irrigation, and the presence of children and animals.

Never apply pesticides when rain is predicted within the next 48 hours. Also, do not water after applying pesticides unless the directions say it is necessary.

Apply pesticides when the air is still; breezy conditions may cause the spray or dust to drift away from your targeted area.

In case of an emergency call 911 and/or the regional poison control number at (714) 634-5988 or (800) 544-4404 (CA only).

For general questions you may also visit www.calpoison.org.

Step 6: In the event of accidental spills, sweep up or use an absorbent agent to remove any excess pesticides. Avoid the use of water.

Be prepared. Have a broom, dust pan, or dry absorbent material, such as cat litter, newspapers or paper towels, ready to assist in cleaning up spills.

Contain and clean up the spill right away. Place contaminated materials in a doubled plastic bag. All materials used to clean up the spill should be properly disposed of according to your local Household Hazardous Waste Disposal site.

Step 7: Properly store and dispose of unused pesticides.

Purchase Ready-To-Use (RTU) products to avoid storing large concentrated quantities of pesticides.

Store unused chemicals in a locked cabinet.

Unused pesticide chemicals may be disposed of at a Household Hazardous Waste Collection Center.

Empty pesticide containers should be triple rinsed prior to disposing of them in the trash.

Household Hazardous Waste Collection Center
(714) 834-6752
www.oclandfills.com

PROJECT Pollution PREVENTION

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Home improvement projects and work sites must be maintained to ensure that building materials do not enter the street, gutter or storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump building materials into the ocean, so don't let them enter the storm drains. Follow these tips to help prevent water pollution.

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For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline** at **1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while performing home improvement projects. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

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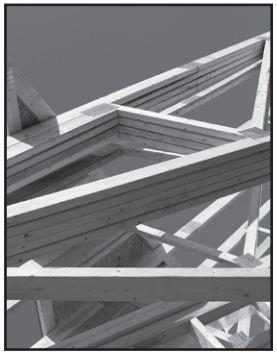
Help Prevent Ocean Pollution:

Tips for Home Improvement Projects

Tips for Home Improvement Projects

Home improvement projects can cause significant damage to the environment. Whether you hire a contractor or work on the house yourself, it is important to follow these simple tips while renovating, remodeling or improving your home:

General Construction



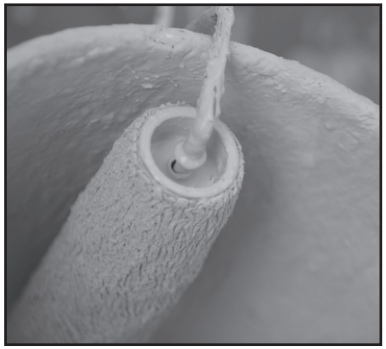
- Schedule projects for dry weather.
- Keep all construction debris away from the street, gutter and storm drain.
- Store materials under cover with temporary roofs or plastic sheets to eliminate or reduce the possibility that rainfall, runoff or wind will carry materials from the project site to the street, storm drain or adjacent properties.

Building Materials

- Never hose materials into a street, gutter or storm drain.
- Exposed piles of construction material should not be stored on the street or sidewalk.
- Minimize waste by ordering only the amount of materials needed to complete the job.
- Do not mix more fresh concrete than is needed for each project.
- Wash concrete mixers and equipment in a designated washout area where the water can flow into a containment area or onto dirt.
- Dispose of small amounts of dry excess materials in the trash. Powdery waste, such as dry concrete, must be properly contained within a box or bag prior to disposal. Call your local trash hauler for weight and size limits.

Paint

- Measure the room or object to be painted, then buy only the amount needed.
- Place the lid on firmly and store the paint can upside-down in a dry location away from the elements.
- Tools such as brushes, buckets and rags should never be washed where excess water can drain into the street, gutter or storm drain. All tools should be rinsed in a sink connected to the sanitary sewer.
- When disposing of paint, never put wet paint in the trash.
- Dispose of water-based paint by removing the lid and letting it dry in the can. Large amounts must be taken to a Household Hazardous Waste Collection Center (HHWCC).



- Oil-based paint is a household hazardous waste. All leftover paint should be taken to a HHWCC.
- For HHWCC locations and hours, call **(714) 834-6752** or visit **www.oclandfills.com**.

Erosion Control

- Schedule grading and excavation projects for dry weather.
- When temporarily removing soil, pile it in a contained, covered area where it cannot spill into the street, or obtain the required temporary encroachment or street closure permit and follow the conditions instructed by the permit.
- When permanently removing large quantities of soil, a disposal location must be found prior to excavation. Numerous businesses are available to handle disposal needs. For disposal options, visit **www.ciwmb.ca.gov/SWIS**.
- Prevent erosion by planting fast-growing annual and perennial grasses. They will shield and bind the soil.

Recycle

- Use a construction and demolition recycling company to recycle lumber, paper, cardboard, metals, masonry (bricks, concrete, etc.), carpet, plastic, pipes (plastic, metal and clay), drywall, rocks, dirt and green waste.

- For a listing of construction and demolition recycling locations in your area, visit **www.ciwmb.ca.gov/recycle.**

Spills

- Clean up spills immediately by using an absorbent material such as cat litter, then sweep it up and dispose of it in the trash.
- Immediately report spills that have entered the street, gutter or storm drain to the County's 24-Hour Water Pollution Problem Reporting Hotline at **(714) 567-6363** or visit **www.ocwatersheds.com** to fill out an incident reporting form.

PROJECT Pollution PREVENTION

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Fertilizers, pesticides and other chemicals that are left on yards or driveways can be blown or washed into storm drains that flow to the ocean. Overwatering lawns can also send materials into storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour gardening products into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

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For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

UCCE Master Gardener Hotline: (714) 708-1646

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline 1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while landscaping or gardening. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

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Help Prevent Ocean Pollution:

Tips for Landscape & Gardening

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Landscape & Gardening

Never allow gardening products or polluted water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.
- Plant native vegetation to reduce the amount of water, fertilizers, and pesticide applied to the landscape.

- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro spray systems. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.

- Use slow-release fertilizers to minimize leaching, and use organic fertilizers.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.

- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting. For more information, visit **www.ipm.ucdavis.edu**.
- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Hazardous Waste Collection Center to be recycled. Locations are provided below.

Household Hazardous Waste Collection Centers

Anaheim:	1071 N. Blue Gum St.
Huntington Beach:	17121 Nichols St.
Irvine:	6411 Oak Canyon
San Juan Capistrano:	32250 La Pata Ave.

For more information, call (714) 834-6752 or visit www.oclandfills.com

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Pet waste and pet care products can be washed into the storm drains that flow to the ocean. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never put pet waste or pet care products into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

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For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

To report a spill,
call the
Orange County 24-Hour
Water Pollution Problem
Reporting Hotline
1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while caring for your pet. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

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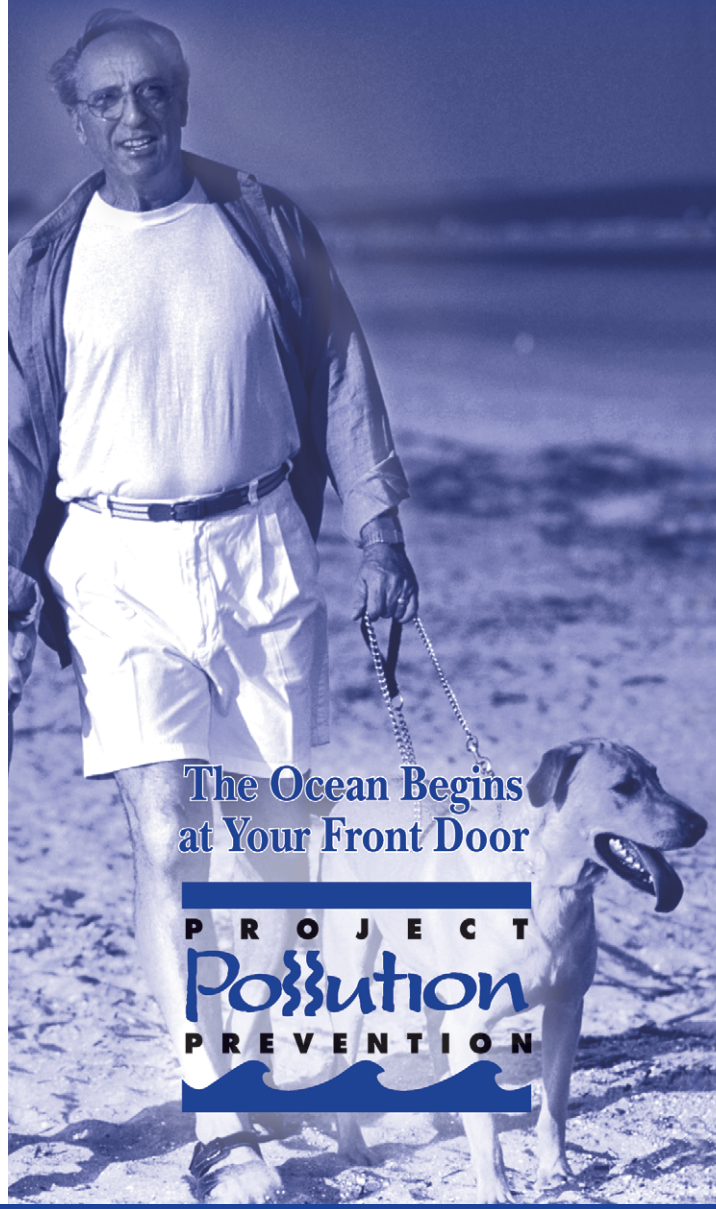
Help Prevent Ocean Pollution:

Tips for Pet Care



Tips for Pet Care

Never let any pet care products or washwater run off your yard and into the street, gutter or storm drain.

Washing Your Pets

Even biodegradable soaps and shampoos can be harmful to marine life and the environment.

- If possible, bathe your pets indoors using less-toxic shampoos or have your pet professionally groomed. Follow instructions on the products and clean up spills.

- If you bathe your pet outside, wash it on your lawn or another absorbent/ permeable surface to keep the washwater from running into the street, gutter or storm drain.

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Flea Control

- Consider using oral or topical flea control products.

- If you use flea control products such as shampoos, sprays or collars, make sure to dispose of any unused products at a Household Hazardous Waste Collection Center. For location information, call **(714) 834-6752**.

Why You Should Pick Up After Your Pet

It's the law! Every city has an ordinance requiring you to pick up after your pet. Besides being a nuisance, pet waste can lead to water pollution, even if you live inland. During rainfall, pet waste left outdoors can wash into storm drains. This waste flows directly into our waterways and the ocean where it can harm human health, marine life and the environment.

As it decomposes, pet waste demands a high level of oxygen from water. This decomposition can contribute to killing marine life by reducing the amount of dissolved oxygen available to them.

Have fun with your pets, but please be a responsible pet owner by taking care of them and the environment.

- Take a bag with you on walks to pick up after your pet.

- Dispose of the waste in the trash or in a toilet.

PROJECT Pollution PREVENTION

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities such as painting can lead to water pollution if you're not careful. Paint must be used, stored and disposed of properly to ensure that it does not enter the street, gutter or storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump paint into the ocean, so don't let it enter the storm drains. Follow these easy tips to help prevent water pollution.

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For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline** at **1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while using, storing and disposing of paint. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Tips for Projects Using Paint

Tips for Projects Using Paint

Paint can cause significant damage to our environment. Whether you hire a contractor or do it yourself, it is important to follow these simple tips when purchasing, using, cleaning, storing and disposing of paint.

Purchasing Paint

- Measure the room or object to be painted, then buy only the amount needed.
- Whenever possible, use water-based paint since it usually does not require hazardous solvents such as paint thinner for cleanup.

Painting

- Use only one brush or roller per color of paint to reduce the amount of water needed for cleaning.
- Place open paint containers or trays on a stable surface and in a position that is unlikely to spill.
- Always use a tarp under the area or object being painted to collect paint drips and contain spills.

Cleaning

- Never clean brushes or rinse paint containers in the street, gutter or storm drain.
- For oil-based products, use as much of the paint on the brushes as possible. Clean brushes with thinner. To reuse thinner, pour it through a fine filter (e.g. nylon, metal gauze or filter paper) to remove solids such as leftover traces of paint.
- For water-based products, use as much of the paint on the brushes as possible, then rinse in the sink.
- Collect all paint chips and dust. Chips and dust from marine paints or paints containing lead, mercury or tributyl tin are hazardous waste. Sweep up and dispose of at a Household Hazardous Waste Collection Center (HHWCC).

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Storing Paint

- Store paint in a dry location away from the elements.
- Store leftover water-based paint, oil-based paint and solvents separately in original or clearly marked containers.
- Avoid storing paint cans directly on cement floors. The bottom of the can will rust much faster on cement.
- Place the lid on firmly and store the paint can upside-down to prevent air from entering. This will keep the paint usable longer. Oil-based paint is usable for up to 15 years. Water-based paint remains usable for up to 10 years.

Alternatives to Disposal

- Use excess paint to apply another coat, for touch-ups, or to paint a closet, garage, basement or attic.
- Give extra paint to friends or family. Extra paint can also be donated to a local theatre group, low-income housing program or school.
- Take extra paint to an exchange program such as the **"Stop & Swap"** that allows you to drop off or pick up partially used home care products free of charge. **"Stop & Swap"** programs are available at most HHWCCs.
- For HHWCC locations and hours, call **(714) 834-6752** or visit **www.oclandfills.com**.

Disposing of Paint

- Never put wet paint in the trash.

For water-based paint:

- If possible, brush the leftover paint on cardboard or newspaper. Otherwise, allow the paint to dry in the can with the lid off in a well-ventilated area protected from the elements, children and pets. Stirring the paint every few days will speed up the drying.
- Large quantities of extra paint should be taken to a HHWCC.
- Once dried, paint and painted surfaces may be disposed of in the trash. When setting a dried paint can out for trash collection, leave the lid off so the collector will see that the paint has dried.

For oil-based paint:

- Oil-based paint is a household hazardous waste. All leftover paint should be taken to a HHWCC.

Aerosol paint:

- Dispose of aerosol paint cans at a HHWCC.

Spills

- Never hose down pavement or other impermeable surfaces where paint has spilled.
- Clean up spills immediately by using an absorbent material such as cat litter. Cat litter used to clean water-based paint spills can be disposed of in the trash. When cleaning oil-based paint spills with cat litter, it must be taken to a HHWCC.
- Immediately report spills that have entered the street, gutter or storm drain to the County's 24-Hour Water Pollution Problem Reporting Hotline at **(714) 567-6363** or visit **www.ocwatersheds.com** to fill out an incident reporting form.

PROJECT Pollution PREVENTION

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Materials and excess concrete or mortar can be blown or washed into the storm drains that flow to the ocean. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never throw building materials into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

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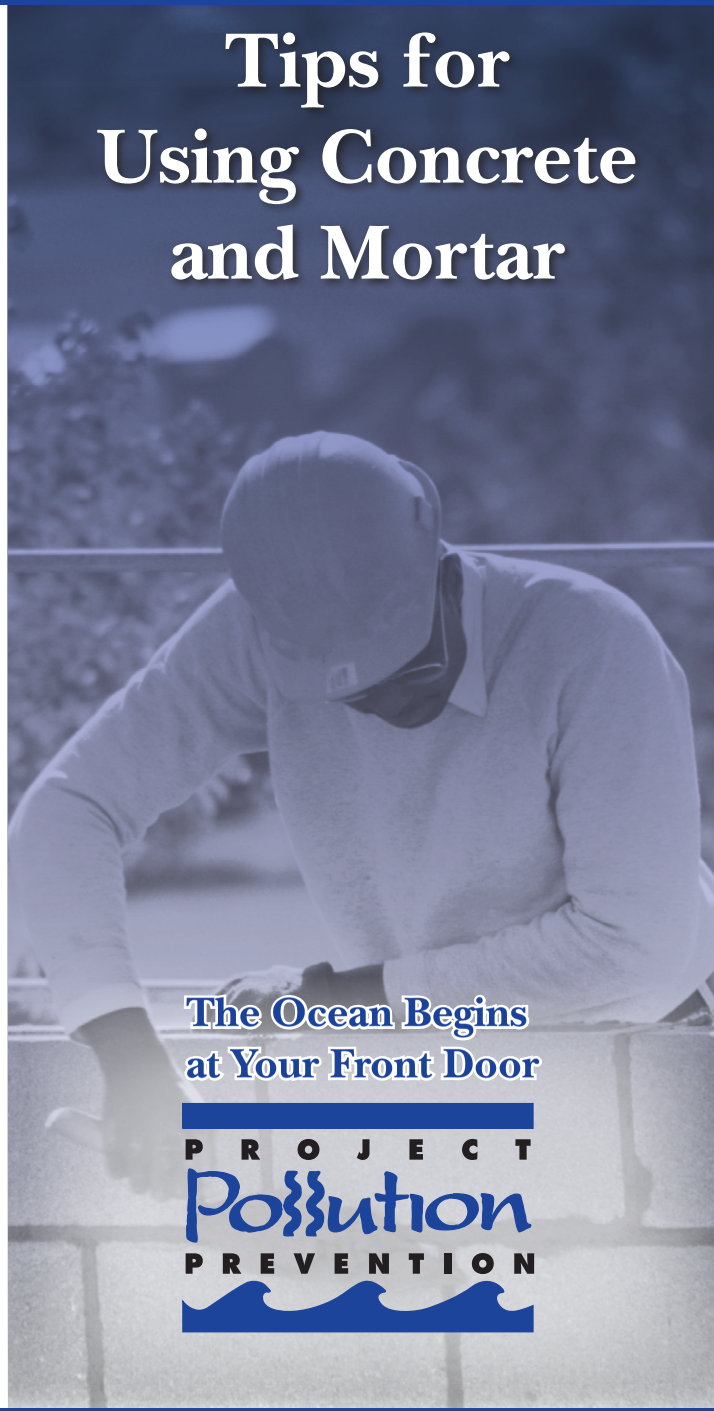
For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com.**

To report a spill, call the **Orange County 24-Hour Water Pollution Reporting Hotline** at **1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The Tips contained in this brochure provide useful information about how you can keep materials and washwater from entering the storm drain system. If you have other suggestions for how water and materials may be contained, please contact your city's stormwater representative or call the Orange County Stormwater Program.

Tips for Using Concrete and Mortar



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Using Concrete and Mortar

Never allow materials or washwater to enter the street or storm drain.

Before the Project

- Schedule projects for dry weather.
- Store materials under cover, with temporary roofs or plastic sheets, to eliminate or reduce the possibility that the materials can be carried from the project site to streets, storm drains or adjacent properties via rainfall, runoff or wind.
- Minimize waste by ordering only the amount of materials needed to complete the job.
- Take measures to block nearby storm drain inlets.

During the Project

- Set up and operate small mixers on tarps or heavy drop cloths.
- Do not mix more fresh concrete or cement than is needed for the job.

- When breaking up pavement, pick up all chunks and pieces and recycle them at a local construction and demolition recycling company. (See information to the right)
- When making saw cuts in pavement, protect nearby storm drain inlets during the saw-cutting operation and contain the slurry. Collect the slurry residue from the pavement or gutter and remove from the site.

Clean-Up

- Dispose of small amounts of dry concrete, grout or mortar in the trash.
- Never hose materials from exposed aggregate concrete, asphalt or similar treatments into a street, gutter, parking lot, or storm drain.
- Wash concrete mixers and equipment in designated washout areas where the water can flow into a containment area or onto dirt. Small amounts of dried material can be disposed of in the trash. Large amounts should be recycled at a local construction and demolition recycling company. (See information below)

- Recycle cement wash water by pumping it back into cement mixers for reuse.

Spills

- Never hose down pavement or impermeable surfaces where fluids have spilled. Use an absorbent material such as cat litter to soak up a spill, then sweep and dispose in the trash.
- Clean spills on dirt areas by digging up and properly disposing of contaminated dry soil in trash.
- Immediately report significant spills to the County's 24-Hour Water Pollution Problem Reporting Hotline at 714-567-6363 or log onto the County's website at www.ocwatersheds.com and fill out an incident reporting form.

For a list of construction and demolition recycling locations in your area visit www.ciwmb.ca.gov/Recycle/.

For additional information on how to control, prevent, remove, and reduce pollution refer to the Stormwater Best Management Practice Handbook, available on-line at www.cabmphandbooks.com.

Building & Grounds Maintenance SC-41

Objectives

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

Targeted Constituents

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

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.

CASQA California Stormwater Quality Association

- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- 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 less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

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.

Training

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Cost will vary depending on the type and size of facility.
- Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles. Wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

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

Housekeeping Practices SC-60

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.

Objectives

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

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.

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

- 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) plant 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)

Plaza and Sidewalk Cleaning SC-71

Objectives

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

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Pollutants on sidewalks and other pedestrian traffic areas and plazas are typically due to littering and vehicle use. This fact sheet describes good housekeeping practices that can be incorporated into the municipality's existing cleaning and maintenance program.

Approach

Pollution Prevention

- Use dry cleaning methods whenever practical for surface cleaning activities.
- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal).

Suggested Protocols

Surface Cleaning

- Regularly broom (dry) sweep sidewalk, plaza and parking lot areas to minimize cleaning with water.
- Dry cleanup first (sweep, collect, and dispose of debris and trash) when cleaning sidewalks or plazas, then wash with or without soap.
- Block the storm drain or contain runoff when cleaning with water. Discharge wash water to landscaping or collect water and pump to a tank or discharge to sanitary sewer if allowed. (Permission may be required from local sanitation district.)

- Block the storm drain or contain runoff when washing parking areas, driveways or drive-throughs. Use absorbents to pick up oil; then dry sweep. Clean with or without soap. Collect water and pump to a tank or discharge to sanitary sewer if allowed. Street Repair and Maintenance.

Graffiti Removal

- Avoid graffiti abatement activities during rain events.
- Implement the procedures under Painting and Paint Removal in SC-70 Roads, Streets, and Highway Operation and Maintenance fact sheet when graffiti is removed by painting over.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a dirt or landscaped area after treating with an appropriate filtering device.
- Plug nearby storm drain inlets and vacuum/pump wash water to the sanitary sewer if authorized to do so if a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound). Ensure that a non-hazardous cleaning compound is used or dispose as hazardous waste, as appropriate.

Surface Removal and Repair

- Schedule surface removal activities for dry weather if possible.
- Avoid creating excess dust when breaking asphalt or concrete.
- Take measures to protect nearby storm drain inlets prior to breaking up asphalt or concrete (e.g. place hay bales or sand bags around inlets). Clean afterwards by sweeping up as much material as possible.
- Designate an area for clean up and proper disposal of excess materials.
- Remove and recycle as much of the broken pavement as possible to avoid contact with rainfall and stormwater runoff.
- When making saw cuts in pavement, use as little water as possible. Cover each storm drain inlet completely with filter fabric 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.
- Always dry sweep first to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains. Once dry sweeping is complete, the area may be hosed down if needed. Wash water should be directed to landscaping or collected and pumped to the sanitary sewer if allowed.

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 san bags 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.
- Protect applications of fresh concrete from rainfall and runoff until the material has dried.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.
- Cover litter receptacles and clean out frequently to prevent leaking/spillage or overflow.
- Clean parking lots on a regular basis with a street sweeper.

Training

- Provide regular training to field employees and/or contractors regarding surface cleaning and proper operation of equipment.
- Train employee and contractors in proper techniques for spill containment and cleanup.
- 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

- Limitations related to sweeping activities at large parking facilities may include current sweeper technology to remove oil and grease.
- Surface cleaning activities that require discharges to the local sewering agency will require coordination with the agency.
- Arrangements for disposal of the swept material collected must be made, as well as accurate tracking of the areas swept and the frequency of sweeping.

Requirements

Costs

- The largest expenditures for sweeping and cleaning of sidewalks, plazas, and parking lots are in staffing and equipment. Sweeping of these areas should be incorporated into street sweeping programs to reduce costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Community education, such as informing residents about their options for recycling and waste disposal, as well as the consequences of littering, can instill a sense of citizen responsibility and potentially reduce the amount of maintenance required by the municipality.

Additional BMPs that should be considered for parking lot areas include:

- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Structural BMPs such as storm drain inlet filters can be very effective in reducing the amount of pollutants discharged from parking facilities during periods of rain.

References and Resources

Bay Area Stormwater Management Agencies Association (BASMAA). 1996. Pollution From Surface Cleaning Folder http://www.basmaa.org

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.

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

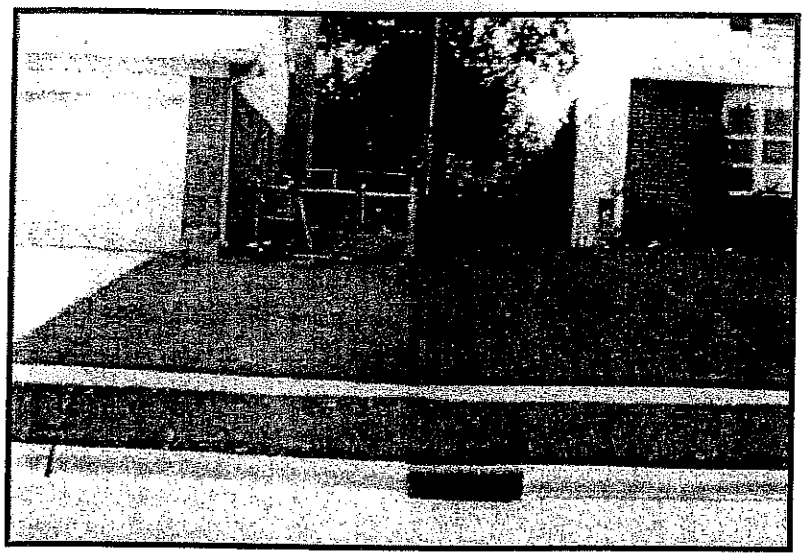
Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

Santa Clara Valley Urban Runoff Pollution Prevention Program. Maintenance Best Management Practices for the Construction Industry. Brochures: Landscaping, Gardening, and Pool; Roadwork and Paving; and Fresh Concrete and Mortar Application. June 2001.

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Plan. 2001. Municipal Activities Model Program Guidance. November.

Efficient Irrigation

SD-12



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 bar) 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.

Trash Storage Areas SD-32

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.

Design Objectives

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

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.

- 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

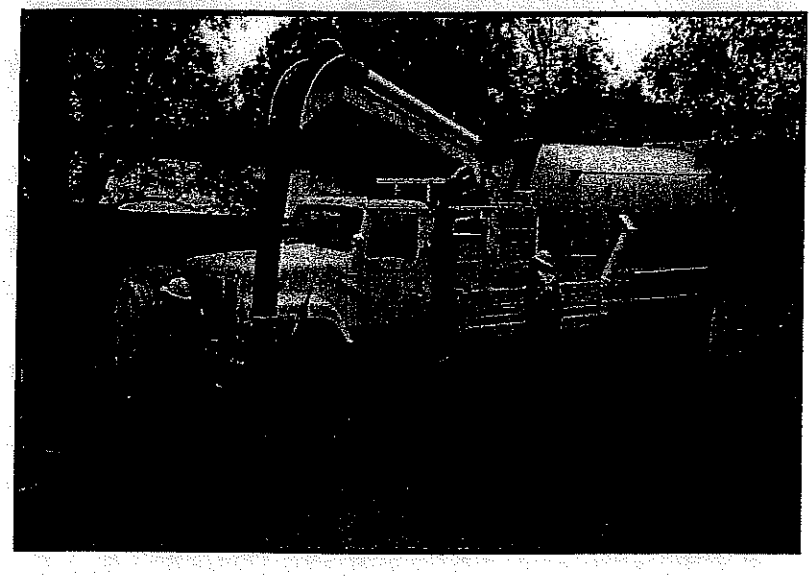
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

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.

Drainage System Maintenance SC-44



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

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

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with 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 SC34 Waste Handling and Disposal).

CASQA California Stormwater Quality Association

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- 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.
- 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 if necessary 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. Do not dewater near a storm drain or stream.

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 and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and 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 Steam 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

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - 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 upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate 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

- Inspect and clean up hot spots and other storm drainage areas regularly 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.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up 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 prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
  - Purchase and installation of signs.
  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.

- 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.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. 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 cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect 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 recollect 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% for organics and 55-65% 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 sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

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

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Attachment B

HCOC's supportive maps, Hydrology & and BMP Calculations

E 6057906.963
N 2187745.000

E 6079407.037
N 2187745.056

47

54

56

Project Site Discharges to Public storm drain.

Stormwater runoff continues on storm drain pipe up pass Jamboree Road where runoff crosses via PCC channel and back to to a Public 30" line that ultimately discharges into the Upper Newport Bay.

(See next page for PCC channel).

Since project conveys runoff to receiving water body via stable channel/storm drain, HSCOC's are not a concern.

N 2165945.056
E 6057906.805

N 2165945.034
E 6079406.847

55

55

Scale: 1"=600'

NOTICE

This drainage map has been prepared for information purposes only. The location and ownership of facilities have been determined from available information provided by public agencies, but may not be exact. The user of this map is responsible for verifying exact location, ownership and regional versus local character of drainage facilities.
Additional information may be obtained from public plans and recorded deeds.
Character designations shown on this map are for convenience only and are not controlling. Neither the County of Orange nor The Orange County Flood Control District (OCFCD) assume any liabilities for inaccuracy of this map.

Call Alan Vu at (714) 834-5986 to notify Public Facility and Resources Department (PFRD) of additions or corrections.

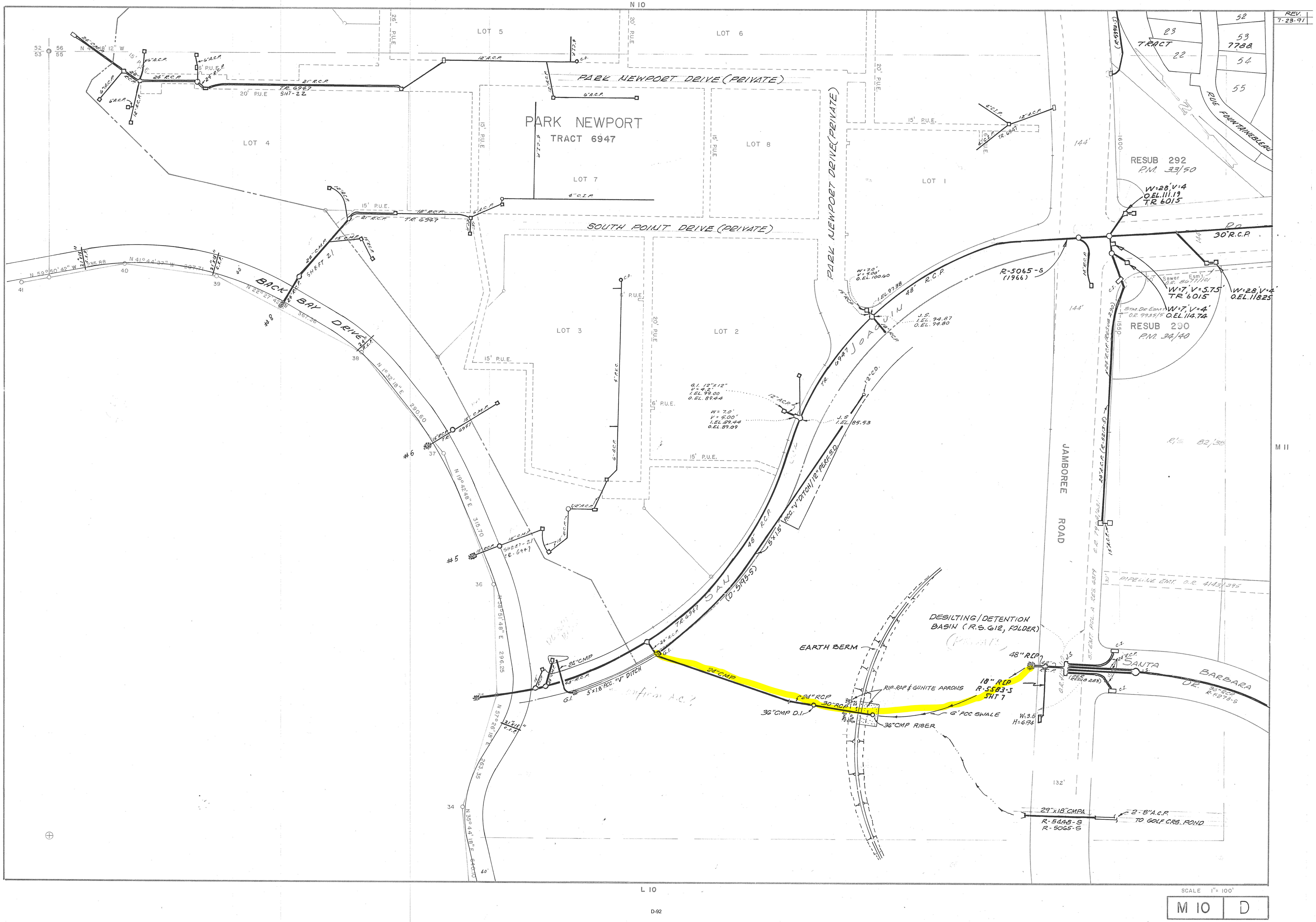
ORANGE COUNTY FLOOD CONTROL DISTRICT

BASEMAP
OF DRAINAGE FACILITIES
IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
AVU	JANUARY 2000	55	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
- G G Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Otter Entry
- Ownership (if other than city or county)
- P Private
- S State
- F Federal

Existing O.C.F.C.D.	Existing 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 by height in feet)
	Reinforced Concrete Pipe (RCP) (diameter in inches)
	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)


N 10
REV. 7-23-91
LOT 5
LOT 6
PARK NEWPORT DRIVE (PRIVATE)
PARK NEWPORT
TRACT 6947
LOT 4
LOT 7
LOT 8
LOT 1
LOT 3
LOT 2
SOUTH POINT DRIVE (PRIVATE)
PARK NEWPORT DRIVE (PRIVATE)
TRACT
23
22
52
53
7788
54
55
RUE FOUNTAINEBLEAU
RESUB 292
P.M. 33/50
RESUB 290
P.M. 34/40
W=28, V=4
O.EL.111.19
TR 6015
R-5065-S
(1966)
30" R.C.P.
BACK BAY DRIVE
SAN JOAQUIN
48" R.C.P.
(D-5195-S)
JAMBOREE ROAD
M 9
M 11
EARTH BERM
DESILTING / DETENTION BASIN (R.S. 612, FOLDER)
48" RCP
18" RCP
R-5583-S
SHT 7
24" CMP
24" RCP
30" RCP
36" CMP D.I.
36" CMP RISER
6' PCC SWALE
RIP-RAP & GUNITE APRONS
SANTA BARBARA DR.
PIPELINE ESMT. O.R. 4143/395
29" x 18" CMPA
R-5448-S
R-5065-S
2 - 8" A.C.P.
TO GOLF CRS. POND
#8
#6
#5
L 10
SCALE 1" = 100'
M 10
D

Preliminary Hydrology Report

VIVANTE – SENIOR ASSISTED LIVING

850 AND 856 SAN CLEMENTE DRIVE

Newport Beach, CA

May 8th, 2019

This Hydraulic Study has been prepared by, and under the direction of, the undersigned, a duly Registered Civil Engineer in the State of California. Except as noted, the undersigned attests to the technical information contained herein, and has judged to be acceptable the qualifications of any technical specialists providing engineering data for this report, upon which findings, conclusions, and recommendations are based.

Bart J. Mink, P.E.
Registered Civil Engineer No. C82953
Exp.: 09/30/20

Prepared for:

Nexus Company
1 MacArthur Place, Suite 300
Santa Ana, CA 92707

Prepared by:

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RISING TO THE CHALLENGE

Tait & Associates, Inc.
701 N. Parkcenter Drive
Santa Ana, CA 92705
(714) 560-8200

TAIT JOB # **SP8384**

Table of Contents

Section 1 Purpose and Scope

This hydrology study presents an analysis of the hydrologic effects of the development of a 2.9 acre Multi-Residential development known as Vivante - Senior Assisted Living in the City of Newport Beach, California.

This report addresses runoff from the project site and its impact to the existing downstream storm drainage system. This hydrology study was prepared in accordance with the Orange County Drainage Area Management Plan (DAMP 2011) and the Orange County Hydrology Manual (October 1986 and 1996 Addendum). The study includes calculations for the 2, 25 and 100-year storms for both the existing and the proposed developments. The study also details the general project characteristics, the design, criteria and methodology applied to the analysis of the project. The report provides a design analysis for the drainage facilities proposed as part of the project, with the drainage improvements being designed to convey all rainfall event frequencies up to a 24-hour, 25-year storm event.

The plans and specifications in the Hydrology Study are not for construction purposes; the contractor shall refer to final approved construction documents for plans and specifications.

Section 2 Project Information

2.1 Project Description

The proposed construction involves the demolition of two existing buildings, concrete flatwork parking lot and conflicting underground utilities located on two existing developed parcels totaling approximately 2.91 Acres. Furthermore, the proposed Project includes the construction of a multi-story senior assisted living facility above and below grade as well as surface parking and associated appurtenances.

2.1.1 Project Location

The project is located at 850 and 856 San Clemente Drive in the City of Newport Beach, California. The site is currently occupied by the Orange County Museum of Art and its associated administration building. The site is roughly bounded by Bombero Street/Private Drive to the north, San Clemente Drive to the south, Santa Barbara Drive to the west and Santa Cruz Drive to the east as graphically shown in Figure 1, below.

Figure 1 – Vicinity Map (Not To Scale)

2.2 Hydrologic Setting

This section summarizes the project's size and location in the context of the larger watershed perspective, topography, soil and vegetation conditions, percent impervious area, natural and infrastructure drainage features, and other relevant hydrologic and environmental factors to be protected specific to the project area's watershed.

2.2.1 Watershed

The project site is located within the Santa Ana Watershed, located between the cities of Huntington Beach and Newport Beach, and locally drains into to the Upper Newport Bay (the Back Bay) which ultimately flows to Pacific Ocean.

2.2.2 Existing Topography and Facilities

The site currently consists of two existing buildings with surrounding sidewalk, parking lot, drive isles and landscaping. The ground surface elevation at the site varies from approximately 164 feet to 180 feet based on the NAVD 88 Survey Datum. Existing ground generally slopes from the northeast corner to the southeast corner at an approximate slope of 1%. The site then slopes from this southeast corner to the southwest corner at an approximate slope of 3%. The existing easterly 1.996 AC parcel (850 San Clemente Drive) contains the Orange County Museum (OCMA) Building which is approximately 23,900 sf. The existing westerly 0.910 AC parcel (856 San Clemente Drive) contains the approximate 14,556 sf OCMA Galleries/Administration Building.

2.2.3 Adjacent Land Use

The project is bounded by an existing multi-level parking structure to the east and northwest, a multi-level office building to the west and south and an apartment community to the north.

Per the City of Newport Beach zoning map, the proposed area is zoned “PC-19” Planned Community “San Joaquin Plaza”. The project site is bounded by “PC-56, PC-23” and “OR” which are planned Communities “North Newport Center”, “Block 800 Newport Center” and Office Regional Commercial, respectively.

2.2.4 Soil Conditions

In accordance with the Natural Resources Conservation Service Soil Survey published in 2006, the project is within soil group B.

The project site location has been graphically shown on a soil group map and a USDA Soil Resource map, which have been included in *Appendix A*.

2.2.5 Impervious Cover

In the current condition, this property is part of an existing commercial development and its impervious cover is approximately 74%. The proposed residential development's impervious cover is approximately 81%.

Minor improvements are proposed in portion adjacent to the project site to close an existing drive entrance. The proposed improvements consist of adding landscape at previous location of paved aisle. A breakdown of the cover is provided on the table below.

Summary of Pervious vs. Impervious Cover

	Total Area (sf)	Impervious Cover (sf)	Pervious Cover (sf)	% Impervious	% Pervious
Existing On-Site	126,619	93,192	33,427	73.6%	26.4%
Proposed On-Site	126,619	102,879	23,740	81%	19%
Existing Off-site	7,743	2,677	5,066	31.5%	68.4%
Proposed Off-site	7,743	1,588	6,155	20.5%	79.5%

2.2.6 Existing Drainage Patterns

Currently, storm water runoff sheet flows from the northeast to the southwest along V-gutters/curb & gutters and discharges to a private storm drain catch basin located offsite (888 San Clemente Drive) near the southwest corner of the proposed project property. This existing private catch basin and storm drain system flows to the local storm drain located in Bombero Drive. Storm water runoff behind the existing buildings drains toward the north and west onto the adjacent parcels where it is then picked up in concrete swales which ultimately drain to offsite storm drain systems, thence to public storm drain systems located in Santa Barbara Drive and thence ultimately to the Back Bay.

2.2.7 Proposed Drainage Patterns

In general, the proposed on-site surface water runoff mimics that of the existing conditions. Storm water runoff sheet flows from the parking lot into curb and gutter and V-gutters which flow to onsite catch basins that are part of the private storm drain system. An underground detention basin will detain the 98th percentile storm and downstream of the basin a Modular

Wetland bio-filtration basins is proposed that provide water quality treatment before releasing treated storm water to the private storm drain system. The on-site storm drain system will consist of onsite concrete swales and HDPE pipes that range in sizes from 6-inch to 15-inch. Hydraulic calculations can be found in Appendix C.

A small drainage area off-site will be disturbed to close out an existing driveway southwest of the site. Runoff from this area will keep the existing drainage patterns and will sheet flow to a private catch basin northwest of the site. This area will be primarily a vegetated slope so it is mostly pervious with the exception of a walkway that provides connectivity with other adjacent buildings.

Both off-site catch basins that receive runoff from the project improvements area part of a private storm drain system that ultimately discharges runoff to a Public 24" RCP along Bombero Drive. The proposed condition Hydrology map and the AES calculation results are included in Appendix B.

2.2.8 Downstream Conditions

Mimicking the existing onsite storm drain system, the proposed project conditions discharge directly to a local private storm drain catch basin and storm drain system (18" RCP) adjacent to the southwest corner of the property via curb & gutter/V-Gutter and piped flow. The site eventually flows into Upper Newport Bay (the Back Bay), thence ultimately to the Pacific Ocean. Furthermore, the City have reported that there have been no issues with the downstream storm drain system.

Section 3 Design Criteria and Methodology

3.1 Design Criteria

This section summarizes the design criteria and methodology applied to the drainage analysis of the project site. The design criteria and methodology follow the DAMP 2011 and the Orange County Hydrology Manual (OCHM) requirements.

3.1.1 Drainage Design Criteria

The project storm drain facilities discussed in *Section 2.2.7 Proposed Drainage Patterns* (catch basins, storm drain piping and modular wetland systems) have been designed to conform to the Orange County standards outlined above.

3.1.2 Runoff Calculation Method

Runoff calculations for this study were accomplished using the Rational Method. The Rational Method is used to determine peak storm water runoff flows for watershed areas that are less than 640 acre in accordance with the recommendations of the Orange County Hydrology Manual. This method was used to determine storm water runoff through each subarea using elevations, slopes, flow lengths, soil type, land use and area inputs to calculate time of concentration for the 2-, 25- and 100-year storm events. The Rational Method was modeled using the Advance Engineering Software (AES) program which is based on the equation below:

The Rational Method is based on the equation: $(Q = C \times I \times A)$
Where:

Q = runoff (cfs)
C = runoff coefficient representing the ratio of runoff depth to rainfall depth
I = the time-averaged rainfall intensity in inches per hour corresponding to the time of concentration
A = drainage area (acres).

3.1.3 Runoff and Detention

The calculations per this report result in post-development runoff values less than the existing; however, per record plans and reports, it has been documented that the storm drain system that receives runoff from the site was designed for a 25 year storm of 8.2cfs peak for the project site. See referenced Hydrology map on appendix B. T

The project has a proposed detention system that will store stormwater to be treated as required for the project Water Quality Management Plan. The total detention consist of an underground basin with storage capacity of 6,300cf. This detention system has been design to mitigate the project peak flows so the 25 year peak does not exceed 8.25cfs.

Flow-through Detention Basin modeling hydrographs calculations produced by AES are included in *Appendix E* and demonstrate the detention basin is adequately sized for the 25-year storm while reducing the peak flow to less than the existing condition as indicated on the record documents.

Section 4 Hydrology and Drainage Analysis

This section summarizes the quantitative hydrologic analysis of the existing and proposed conditions of the site.

4.1 Summary of Results

The hydrology analysis was prepared for the 2-, 25- and 100-year storm events for both the existing and proposed conditions as outlined in Appendix B. A summary of the development flows are provided below:

TABLE 4.1
Existing vs. Proposed Development Flowrate Comparison

Outfall #1: Existing Catch basin	2 Year Storm (cfs)	25 Year Storm (cfs)	100 Year Storm (cfs)
Pre-developed Condition Flowrate	4.57	10.32	13.33
Post-developed Condition Flowrate (Unmitigated)	4.01	8.76	12.29
Post-development (mitigated)	--	4.27	--
Outfall for Off-site area:			
Existing	0.34	0.76	0.97
Proposed	0.31	0.71	0.91

In conclusion, this report demonstrates that the development of Vivante-Senior Assisted Living will not increase the amount of storm water runoff over the current existing site's storm water runoff. Furthermore, as the proposed storm drain system mimics the existing site's storm drain system, no detrimental conditions are expected in the existing downstream storm drain system.

Also, as described on section 3.1.3, record documents indicate that the catch basin/private storm drain that receives runoff from the site was designed for a 25 year peak flow of 8.25cfs. Since the runoff calculations for the proposed 25 year results in 8.75cfs, the proposed detention will mitigate the peak flow increase. The peak mitigated runoff is **4.27. CFS** for the 25 year storm.

A small drainage area off-site will be disturbed to close out an existing driveway southwest of the site. Runoff from this area will keep the existing drainage patterns and will sheet flow to a

private catch basin northwest of the site. This area will be primarily a vegetated slope so it is mostly pervious with the exception of a walkway that provides connectivity with other adjacent buildings. In the existing condition the off-site area has a small portion, O-1a with total area of 896sf that drains to the catch basin that serves the project (SW of the site) ; the remaining off-site area consist of aprox. 6,847sf that drain to an existing catch basin west of the site. In the proposed condition all off-site drainage area drains to the catch basin to the west. Although the drainage area directly contributing to the western catch basin increased by 896sf; there is no negative impact to the system since overall there is a decrease of peak flow to the private storm drain from the off-site area due to increase in pervious area.

In conclusion the proposed improvements will not result in a increase of the project calculated peak flows. Additionally, the project proposed detention will further reduce peak flows to ensure the existing private storm drain system can handle the project stormwater runoff.

85th Percentile Calculations for DCV												
	DMA A		DMA B		DMA C		DMA D		DMA E		DMA TOTAL	
Area (SF)	21,857	SF	96,603	SF	5,917	SF	2,147	SF	95	SF	**126,619**	**SF**
Area (AC)	0.50	AC	2.22	AC	0.14	AC	0.05	AC	0.002	AC	**2.91**	**AC**
Pervious	2,918	SF	13,134	SF	5,512	SF	2,081	SF	61	SF	**23,706**	**SF**
% Pervious	13.4%		13.6%		93.2%		96.9%		64.2%		**18.7%**	
% Impervious	86.6%		86.4%		6.8%		3.1%		35.8%		**81.3%**	
Runoff Coefficient, C	0.80		0.80		0.20		0.17		0.42		**0.76**	
24 Hr, 85th Percentile Rainfall (in)	0.7000	in	0.7000	in	0.7000	in	0.7000	in	0.7000	in	0.7000	in
Required DCV for LID	1,020	CF	4,497	CF	69	CF	22	CF	2	CF	**5,610**	**CF**

DCV=(C x 24 Hr Rainfall (in)/12 x Area (SF))

Off-site 85th Percentile Calculations for DCV

Area	BMA O	
Area (SF)	7743	SF
Area (AC)	0.17	AC
Pervious	6155	SF
% Pervious	79.49%	
% Impervious	20.51%	
Runoff Coefficient, C	0.30	
24 Hr, 85th Percentile Rainfall (in)	0.7	in
Required DCV for LID	137.23	CF

TOTAL DCV	5,747.59	CF

Attachment C

Supporting Maps & Exhibits

-Rainfall zones (Figure XVI-1)

-NRCS Hydrologic Soil Groups (Figure XVI-2a)

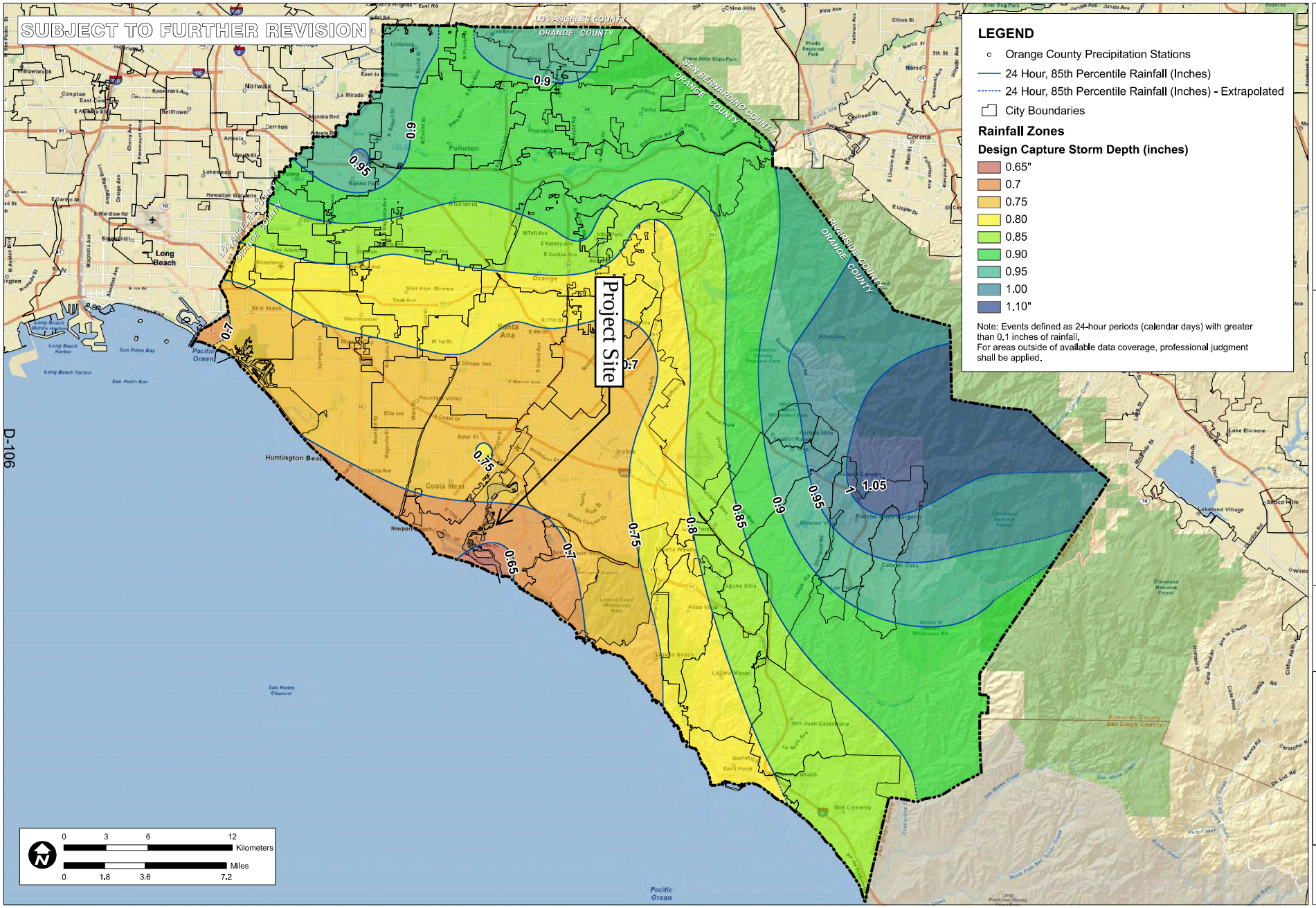
-North OC Ground Water Protection Areas (Figure XVI-2f)

-Infiltration Analysis Overlap Constraint Locations (Figure XVI-2g)

-2010 CA 303(d) List of Water Quality Limited Segments

-Existing & Proposed Drainage Pattern Maps

-Preliminary WQMP Plot Plan



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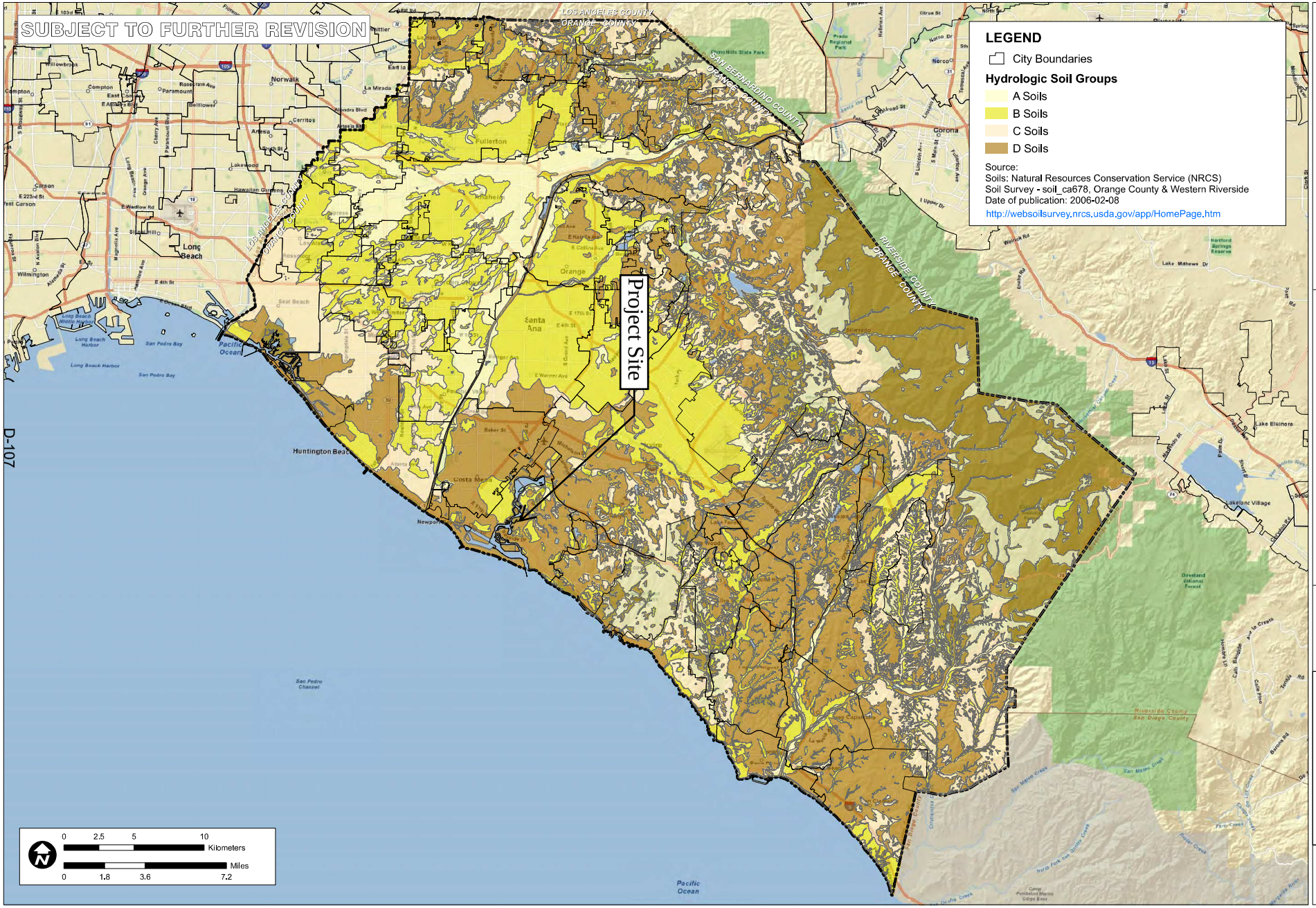
TITLE
RAINFALL ZONES

JOB
ORANGE COUNTY
TECHNICAL GUIDANCE
DOCUMENT
CA
ORANGE CO.

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-1



TITLE
NRCS HYDROLOGIC SOILS GROUPS

JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.5 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE
XVI-2a

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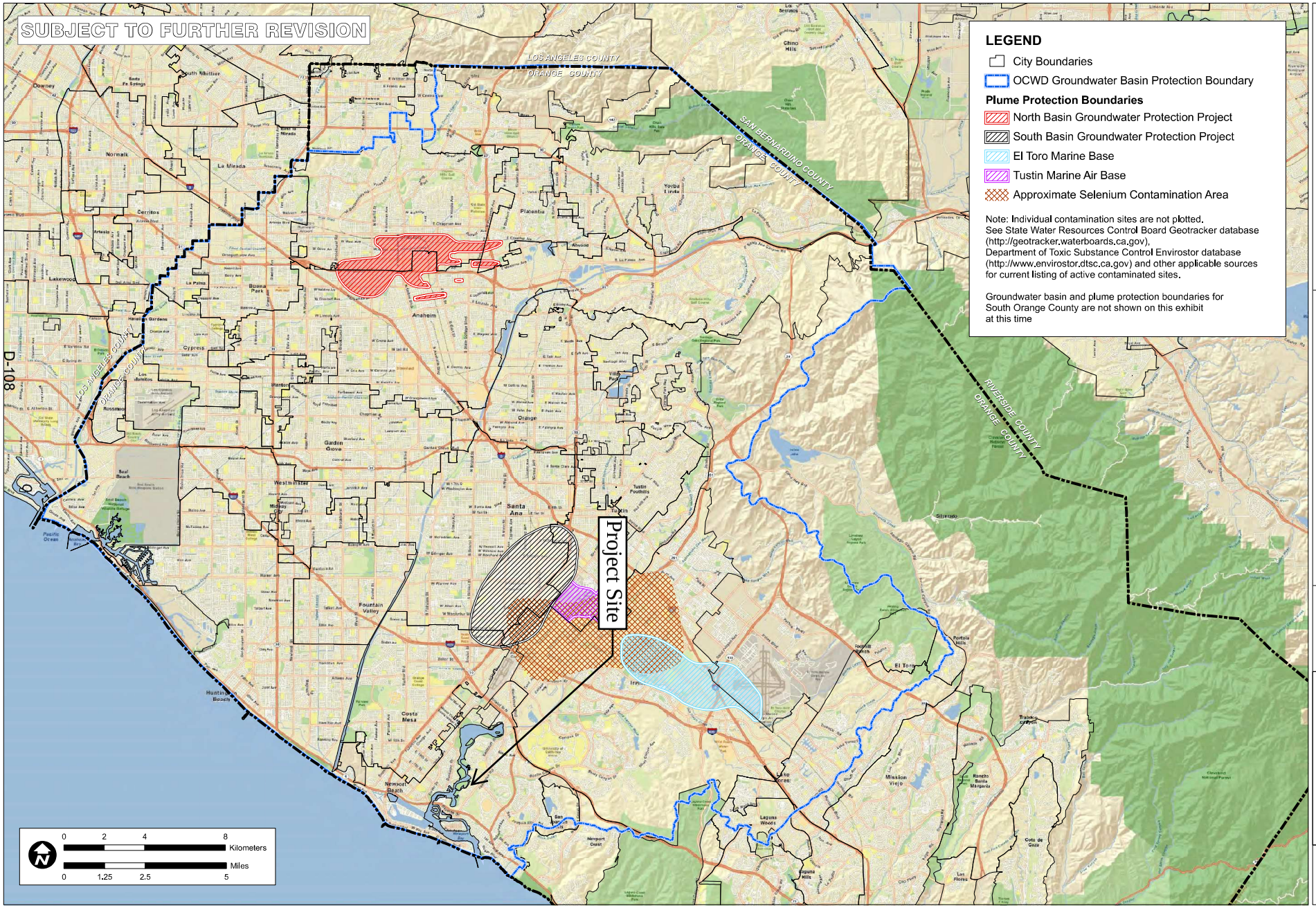

TITLE
NORTH ORANGE COUNTY GROUNDWATER PROTECTION AREAS

JOB
ORANGE COUNTY INFILTRATION STUDY
CA
ORANGE CO.

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE
XVI-2f

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SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

Advanced Water Engineering

FIGURE XVI-2d

JOB ORANGE COUNTY INFILTRATION STUDY ORANGE CO. CA

TITLE NORTH ORANGE COUNTY MAPPED DEPTH TO FIRST GROUNDWATER

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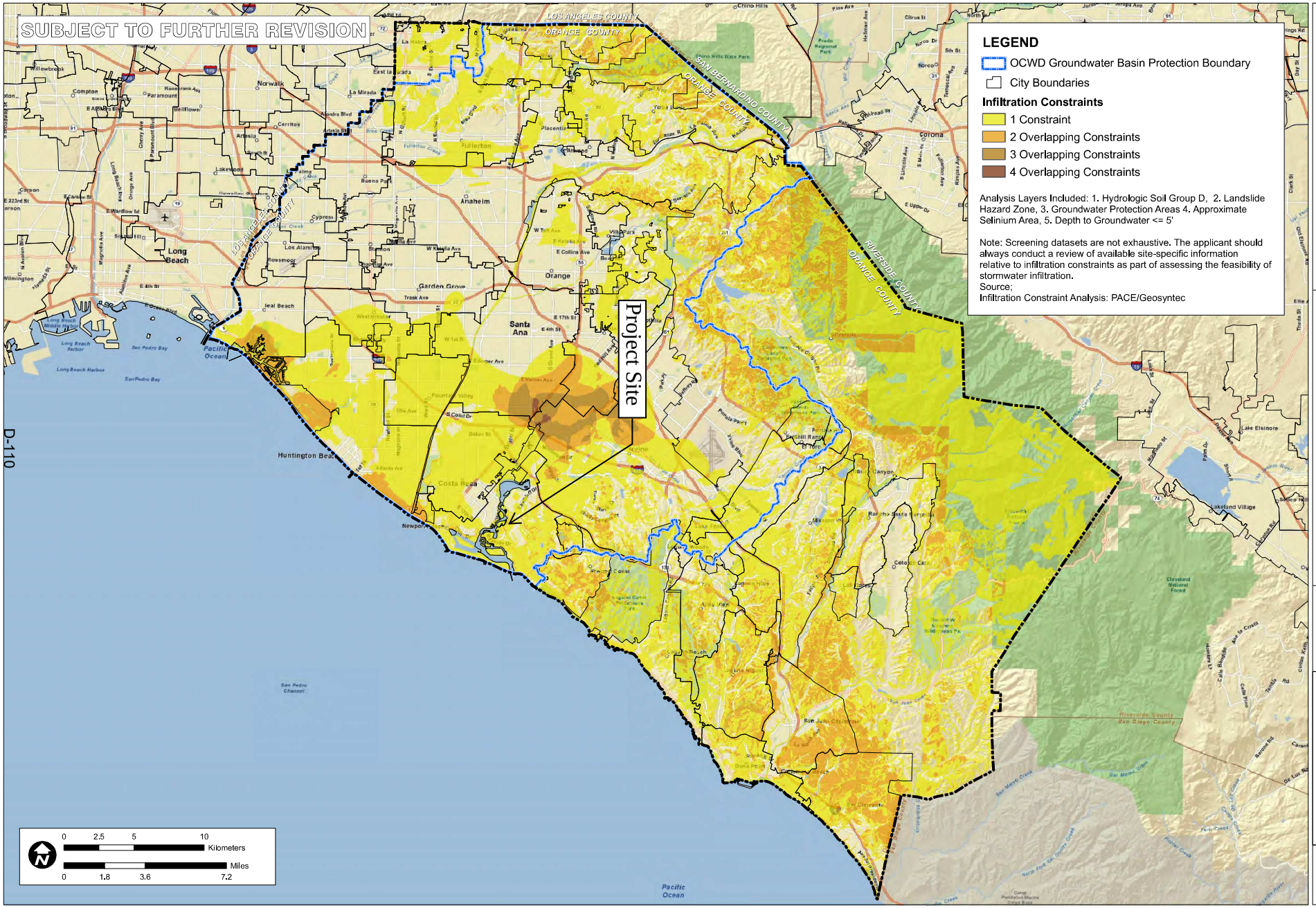


TITLE
INFILTRATION ANALYSIS
OVERLAPPING CONSTRAINT
LOCATIONS

JOB
ORANGE COUNTY
INFILTRATION STUDY
CA
ORANGE CO.

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2g

P:\9526E\6-GIS\mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2g_InfiltrationFind_20110215.mxd

REGION	WATER BODY NAME	WATER TYPE	WATERSHED* CALWATER / USGS HUC	• POLLUTANT ◦ POTENTIAL SOURCES *Relevant Notes*	ESTIMATED AREA ASSESSED	FIRST YEAR LISTED	TMDL REQUIREMENT STATUS**	DATE***
8	Mill Creek (Prado Area)	River & Stream	80121000 / 18070203	• Indicator Bacteria ◦ Dairies	1.6 Miles	2014	5B	2007
				• Nutrients ◦ Source Unknown	1.6 Miles	1996	5A	2019
				• Total Suspended Solids (TSS) ◦ Source Unknown	1.6 Miles	1996	5A	2019
8	Mill Creek Reach 1	River & Stream	80156000 / 18070203	• Indicator Bacteria ◦ Source Unknown	12 Miles	2014	5A	2019
8	Morning Canyon Creek	River & Stream	80111000 / 18070201	• Indicator Bacteria ◦ Source Unknown	1.1 Miles	2010	5A	2021
8	Mountain Home Creek	River & Stream	80158000 / 18070203	• Indicator Bacteria ◦ Source Unknown	3.7 Miles	2014	5A	2019
				Data collected by Regional Board staff in 2012 (outside of the 2014 Listing Cycle data solicitation) support the delisting of Mountain Home Creek for Indicator Bacteria in the next listing cycle.				
8	Mountain Home Creek, East Fork	River & Stream	80158000 / 18070203	• Indicator Bacteria ◦ Source Unknown	5.1 Miles	2014	5A	2019
8	Newport Bay, Lower (entire lower bay, including Rhine Channel, Turning Basin and South Lido Channel to east end of H-J Moorings)	Bay & Harbor	80114000 / 18070201	• Chlordane ◦ See TMDL documentation	767 Acres	2006	5B	2013
				• Copper ◦ Marinas and Recreational Boating	767 Acres	2006	5A	2019
				• DDT (Dichlorodiphenyltrichloroethane) ◦ See TMDL documentation	767 Acres	1990	5B	2013
				• Indicator Bacteria ◦ Source Unknown	767 Acres	2010	5B	2000
				The following LOEs had been incorrectly linked to Lower Newport Bay during the 2010 cycle : 8147, 8148, 8149, 8150, 8151, 8152, 8153, 8154, 8155, 8156, 8157, 8158, 8159, 8160, 8161, 8162, 28355, 28357, 28361, 28367, 28373, 28377, 28379, 28381, 28383. They have not been used in the Final Use Rating in the 2014 cycle and will be retired prior to the next cycle. They have been copied over to Upper Newport Bay (where the sampling points are located) and have new LOE #'s. LOE 26162 was created during the 2010 cycle and incorrectly combined sampling locations in both Upper and Lower Newport Bay. The data in LOE 26162 has been reanalyzed and 2 new LOEs have been created for those data in the proper waterbodies. LOE 26162 is not used in the Final Use Rating in the 2014 cycle and will be retired prior to the next cycle. In the 2010 cycle, the Shellfish Harvest Objective that was used in the LOEs was the Ocean Plan Total Coliform value, rather than the existing Region 8 Basin Plan Objective that was based on Fecal Coliform. While combining the LOEs written using the Ocean Plan Total Coliform objective results in a delisting for the Shellfish Harvest Beneficial Use, analysis of the 2008 -2010 Fecal Coliform data from the Beach Watch program resulted in 7 months of exceedance out of 23 months (where samples were collected) and based on weight of evidence, the decision was made to leave the Shellfish Harvest listing in place for Fecal Coliform.				
				• Nutrients ◦ Source Unknown	767 Acres	1992	5B	1999
				• PCBs (Polychlorinated biphenyls) ◦ See TMDL documentation	767 Acres	1990	5B	2013

REGION	WATER BODY NAME	WATER TYPE	WATERSHED* CALWATER / USGS HUC	POLLUTANT / POTENTIAL SOURCES / *Relevant Notes*	ESTIMATED AREA ASSESSED	FIRST YEAR LISTED	TMDL REQUIREMENT STATUS**	DATE***
8	Newport Bay, Upper (Ecological Reserve)	Estuary	80111000 / 18070201	• Toxicity ◦ Source Unknown	767 Acres	2014	5A	2019
				• Chlordane ◦ See TMDL documentation	653 Acres	2006	5B	2013
				• Copper ◦ Marinas and Recreational Boating	653 Acres	2006	5A	2007
				• DDT (Dichlorodiphenyltrichloroethane) ◦ See TMDL documentation	653 Acres	2006	5B	2013
				• Indicator Bacteria ◦ Source Unknown	653 Acres	2010	5B	2000
				The following LOEs had been incorrectly linked to Upper Newport Bay during the 2010 cycle : 8075, 8076, 8077 and 8078. They have not been used in the Final Use Rating in the 2014 cycle and will be retired prior to the next cycle. They have been copied over to Lower Newport Bay (where the sampling points are located) and have new LOE #'s.				
				• Malathion ◦ Source Unknown	653 Acres	2014	5A	2027
				• Nutrients ◦ Source Unknown	653 Acres	2006	5B	1999
				• PCBs (Polychlorinated biphenyls) ◦ See TMDL documentation	653 Acres	2006	5B	2013
				• Sedimentation/Siltation ◦ Agriculture ◦ Channel Erosion ◦ Construction/Land Development ◦ Erosion/Siltation	653 Acres	2006	5B	1999
				• Toxicity ◦ Source Unknown	653 Acres	2014	5A	2027
8	Newport Slough	River & Stream	80111000 / 18070201	• Indicator Bacteria ◦ Source Unknown	1.3 Miles	2014	5A	2021
8	Peters Canyon Channel	River & Stream	80111000 / 18070201	• Benthic Community Effects ◦ Source Unknown	3 Miles	2014	5A	2027
				• DDT (Dichlorodiphenyltrichloroethane) ◦ See TMDL documentation	3 Miles	2006	5B	2013
				The USEPA approved the Newport Bay Organochlorine compounds TMDL on November 12, 2013 which includes this pollutant (Total DDT-sum of 4,4'- and 2,4'- isomers of DDT, DDE, and DDD) for Peters Canyon Channel.				
				• Indicator Bacteria ◦ Source Unknown	3 Miles	2010	5A	2021
				While this Decision was based on a sufficient number of exceedances of the E. coli Single Sample objective, it should be noted that Enterococcus, Fecal Coliform and Total Coliform objectives no longer apply to the REC 1 Beneficial Use for fresh waters in Region 8. As such the Enterococcus, Fecal Coliform and Total Coliform LOEs will be retired. Further, the Single Sample objective was only used because of the lack of representative 30-day, 5-sample Geomean values. When representative 30-day, 5-sample Geomean values are collected the Single Sample E. coli LOE will be retired.				
				• Malathion ◦ Source Unknown	3 Miles	2014	5A	2027
				• Selenium ◦ Source Unknown	3 Miles	2014	5A	2027

Impaired Water Bodies

Click on the "2014/2016" bar to expand and retract the information.

2014/2016 Integrated Report Approval Documents

Listing a water body as impaired in California is governed by the Water Quality Control Policy for developing California's Clean Water Act Section 303(d) Listing Policy. The State and Regional Water Boards assess water quality data for California's waters every two years to determine if they contain pollutants at levels that exceed protective water quality criteria and standards. This biennial assessment is required under Section 303(d) of the Federal Clean Water Act.

Please allow time for the information below to appear. Tabs will be available to navigate to various topics.

Final 2014/2016 California Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report)

2014 and 2016 Integrated Report | Map | 303(d) List | Admin. Record | Data Download | Contact Us

2014 AND 2016 INTEGRATED REPORT — ALL ASSESSED WATERS

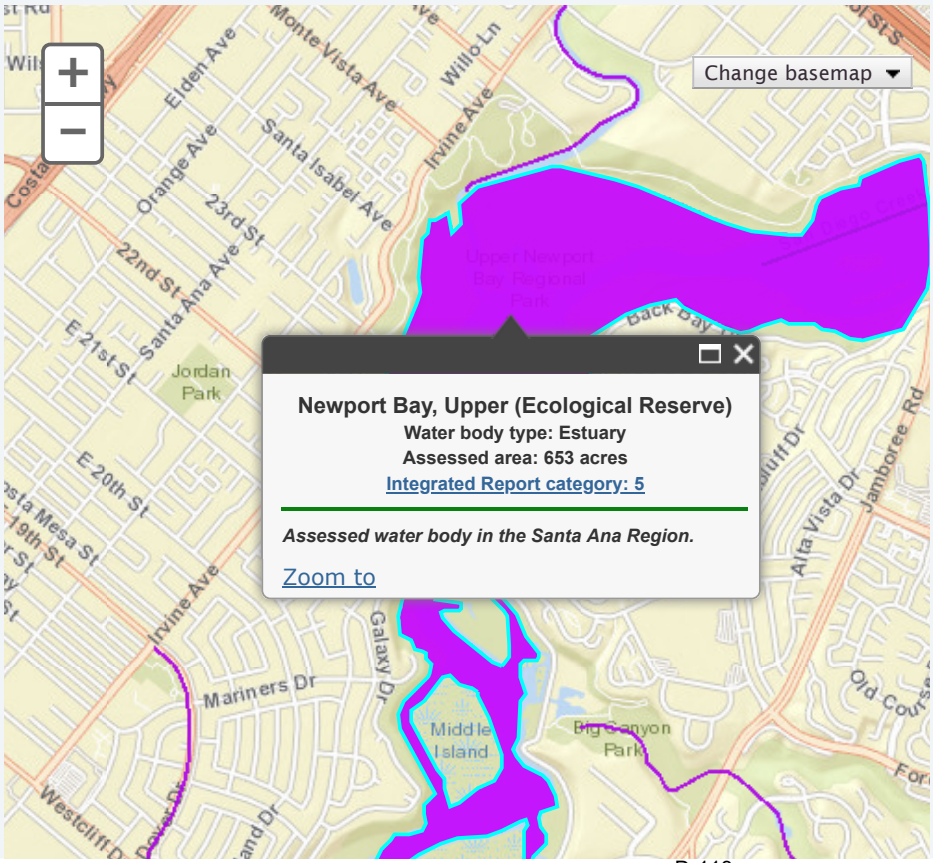
Zoom to county: All — Show county

Zoom to Regional Board: All — Show Regional Board

Map Help

Zoom to water body: *(Filter: All)*

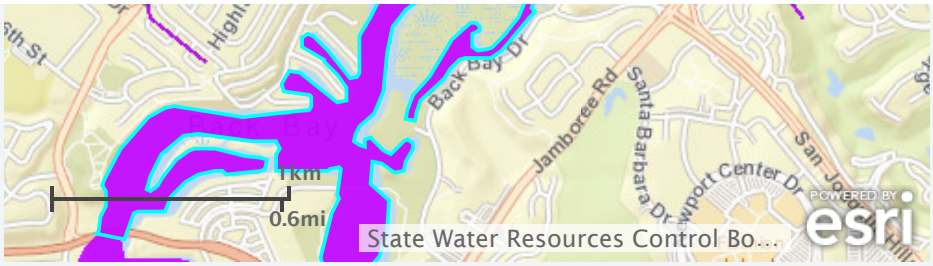
Filter list by: | Reset list



Newport Bay, Upper (Ecological Reserve) Close

Pollutant assessments

Pollutants	Listing Decision / Report Link / Potential Sources / Schedule / *Comments*
2-Methylnaphthalene | Antimony | Benzo(a)pyrene (3,4-Benzopyrene -7-d) | Chrysene (C1-C4) | Dieldrin | Endrin | PAHs (Polycyclic Aromatic Hydrocarbons) | Phenanthrene | Pyrene | Silver	Do Not List on 303(d) list (TMDL required list) 33661 n/a
Arsenic	Do Not List on 303(d) list (TMDL required list) 34070 n/a
Cadmium	Do Not List on 303(d) list (TMDL required list) 33877



	n/a
Chlordane	List on 303(d) list (being addressed by USEPA approved TMDL)
	33605
	n/a

(Updated 2/14/18)

Home ⋙ Water Issues ⋙ Programs ⋙ Tmdl

Impaired Water Bodies

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- **2014/2016 Integrated Report Approval Documents**

Listing a water body as impaired in California is governed by the Water Quality Control Policy for developing California's Clean Water Act Section 303(d) Listing Policy. The State and Regional Water Boards assess water quality data for California's waters every two years to determine if they contain pollutants at levels that exceed protective water quality criteria and standards. This biennial assessment is required under Section 303(d) of the Federal Clean Water Act.

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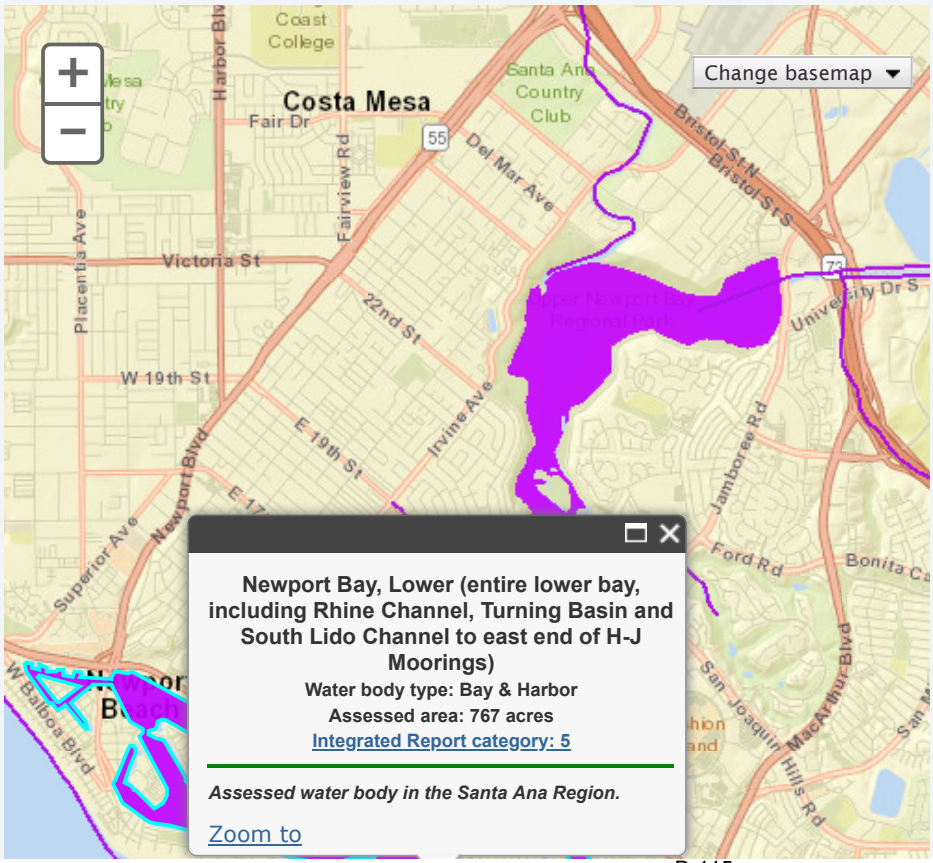
2014 AND 2016 INTEGRATED REPORT — ALL ASSESSED WATERS

Zoom to county: All — Show county

Zoom to Regional Board: All — Show Regional Board

Map Help

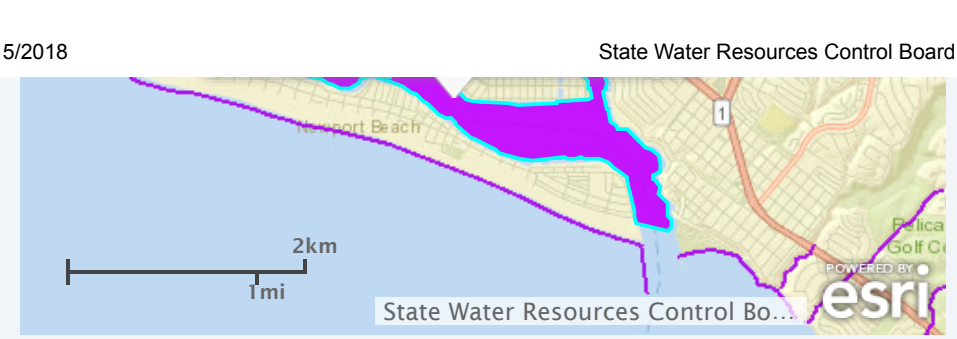
Zoom to water body: *(Filter: All)* — Filter list by: — Reset list



Newport Bay, Lower (entire lower bay, including Rhine Channel, Turning Basin and South Lido Channel to east end of H-J Moorings) Close

Pollutant assessments

Pollutants	Listing Decision / Report Link / Potential Sources / Schedule / *Comments*
2-Methylnaphthalene | Antimony | Benzo(a)pyrene (3,4-Benzopyrene -7-d) | Cadmium | Chrysene (C1-C4) | Endrin | Lead | PAHs (Polycyclic Aromatic Hydrocarbons) | Pyrene | Silver | Zinc	Do Not List on 303(d) list (TMDL required list) / 33800 / n/a / /
Arsenic	Do Not List on 303(d) list (TMDL required list) / 32492 / n/a / /
	Do Not List on 303(d) list (TMDL



	required list)
Cadmium	32968
	n/a
Chlordane	List on 303(d) list (being addressed by USEPA approved TMDL)
	32989
	n/a

(Updated 2/14/18)

8								
Newport Bay, Lower (entire lower bay, including Rhine Channel, Turning Basin and South Lido Channel to east end of H-J Moorings)	**Bay & Harbor**	**80114000 / 18070201**	**Chlordane** **See TMDL documentation**	**767 Acres**	**2006**	**5B**	**2013**
			Copper **Marinas and Recreational Boating**	**767 Acres**	**2006**	**5A**	**2019**
			DDT (Dichlorodiphenyltrichloroethane) **See TMDL documentation**	**767 Acres**	**1990**	**5B**	**2013**
			Indicator Bacteria **Source Unknown**	**767 Acres**	**2010**	**5B**	**2000**
			The following LOEs had been incorrectly linked to Lower Newport Bay during the 2010 cycle : 8147, 8148, 8149, 8150, 8151, 8152, 8153, 8154, 8155, 8156, 8157, 8158, 8159, 8160, 8161, 8162, 28355, 28357, 28361, 28367, 28373, 28377, 28379, 28381, 28383. They have not been used in the Final Use Rating in the 2014 cycle and will be retired prior to the next cycle. They have been copied over to Upper Newport Bay (where the sampling points are located) and have new LOE #'s. LOE 26162 was created during the 2010 cycle and incorrectly combined sampling locations in both Upper and Lower Newport Bay. The data in LOE 26162 has been reanalyzed and 2 new LOEs have been created for those data in the proper waterbodies. LOE 26162 is not used in the Final Use Rating in the 2014 cycle and will be retired prior to the next cycle. In the 2010 cycle, the Shellfish Harvest Objective that was used in the LOEs was the Ocean Plan Total Coliform value, rather than the existing Region 8 Basin Plan Objective that was based on Fecal Coliform. While combining the LOEs written using the Ocean Plan Total Coliform objective results in a delisting for the Shellfish Harvest Beneficial Use, analysis of the 2008 -2010 Fecal Coliform data from the Beach Watch program resulted in 7 months of exceedance out of 23 months (where samples were collected) and based on weight of evidence, the decision was made to leave the Shellfish Harvest listing in place for Fecal Coliform.				
			Nutrients **Source Unknown**	**767 Acres**	**1992**	**5B**	**1999**
			PCBs (Polychlorinated biphenyls)				

				See TMDL documentation	767 Acres	1990	5B	2013
				Toxicity Source Unknown	767 Acres	2014	5A	2019
8	Newport Bay, Upper (Ecological Reserve)	Estuary	80111000 / 18070201	Chlordane See TMDL documentation	653 Acres	2006	5B	2013
				Copper Marinas and Recreational Boating	653 Acres	2006	5A	2007
				DDT (Dichlorodiphenyltrichloroethane) See TMDL documentation	653 Acres	2006	5B	2013
				Indicator Bacteria Source Unknown	653 Acres	2010	5B	2000
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				Malathion Source Unknown	653 Acres	2014	5A	2027
				Nutrients Source Unknown	653 Acres	2006	5B	1999
				PCBs (Polychlorinated biphenyls) See TMDL documentation	653 Acres	2006	5B	2013
				Sedimentation/Siltation Agriculture Channel Erosion Construction/Land Development Erosion/Siltation	653 Acres	2006	5B	1999
				Toxicity Source Unknown	653 Acres	2014	5A	2027

LEGEND:

A / 0.74 — SUBAREA ID / SUBAREA AREA (AC)

10 — ELEV=76.9' / Q_{25}=3.4 — HYDROLOGY NODE ID / ELEVATION (FT) / Q/25= 25-YEAR STORM EVENT DISCHARGE (CFS)

DRAINAGE AREA BOUNDARY

FLOWPATH

EL.=171.9' 5 Q_{25}=4.2

A1 / 1.08

TOTAL AREA = 46,987 SF (1.08 AC)
IMPERVIOUS = 39,736 SF (0.91 AC)
PERVIOUS = 7,251 SF (0.17 AC)

PARCEL "A"
PARCEL 2,
P.M.B. 81/8-9
1.996 ACRES / 86,962 SQ. FT.
A.P.N. 442-261-05

ORANGE COUNTY MUSEUM OF ART
850 SAN CLEMENTE DRIVE
NEWPORT BEACH, CA

EXISTING SINGLE STORY CONCRETE BUILDING
BUILDING AREA = 23,745 SQ. FT. AT GROUND LEVEL

EL.=178.2' 1

B1 / 0.47

TOTAL AREA = 20,331 SF (0.47 AC)
IMPERVIOUS = 13,622 SF (0.35 AC)
PERVIOUS = 6709 SF (0.12 AC)

ORANGE COUNTY MUSEUM OF ART
856 SAN CLEMENTE DRIVE
NEWPORT BEACH, CA

EXISTING SINGLE STORY CONCRETE BUILDING
BUILDING AREA = 14,580 SQ. FT. AT GROUND LEVEL

PARCEL "B"
PARCEL 2
LL95-3 INST NO. 199500483821, O.R.
0.910 ACRE / 39,634 SQ. FT.
A.P.N. 442-261-17

EL.=176.7' 4

B2 / 1.36

TOTAL AREA = 59,242 SF (1.36 AC)
IMPERVIOUS = 39,692 SF (0.91 AC)
PERVIOUS = 19,550 SF (0.43 AC)

EL.=155' 20 ΣQ_{25}=

OFF-SITE CATCH BASIN RECEIVES RUNOFF FROM AREA O-1

O-1 / 0.15

TOTAL AREA = 6,847 SF (0.16AC)
IMPERVIOUS = 2,217 SF (0.91 AC)
PERVIOUS = 4,630 SF (0.11 AC)

EL.=176.1' 2 Q_{25}=1.3

EX. SEWER EASEMENT

EX. WATER EASEMENT

EX. SCE EASEMENT

EX. SCE EASEMENT

TOTAL AREA = 896 SF (0.02 AC)
IMPERVIOUS = 730 SF (0.0167 AC)
PERVIOUS = 166 SF (0.003 AC)

OFF-SITE CATCH BASIN RECEIVES RUNOFF FROM ALL ON-SITE AREAS AND FROM AREA O-1a

O-1a / 0.02

EL.=163.3' 3 ΣQ_{25}=4.5

EL.=162.00' 10 ΣQ_{25}=

EX. R/W

EX. R/W

BASIS OF BEARINGS
N 79°22'13" W 689.63' (689.72' R1)

SAN CLEMENTE DRIVE
(PUBLIC STREET)

(IN FEET)
1 INCH = 20 FEET

UNDERGROUND SERVICE ALERT
811
Call: TOLL FREE 1-800-422-4133
KNOW WHAT'S BELOW. CALL BEFORE YOU DIG.
TWO WORKING DAYS BEFORE YOU DIG

UNAUTHORIZED CHANGES & USES:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

ENGINEERS NOTE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON. IF THE CONTRACTOR ENCOUNTERS ANY DISCREPANCIES, CONFLICTS OR AREAS WHICH HE FEELS UNWORKABLE, HE SHALL NOTIFY THE GRADING ENGINEER IMMEDIATELY PRIOR TO CONTINUING OR DEVIATING FROM THIS PLAN.

AREA SUMMARY ON-SITE:

TOTAL AREA = 126,645 SF (2.91 AC)
IMPERVIOUS = 93,256 SF (2.14 AC) = 73.6%
PERVIOUS = 33,390 SF (0.77 AC) = 26.4%

AREA SUMMARY- OFF-SITE

TOTAL AREA = 7,743 SF (0.17 AC)
IMPERVIOUS = 2,677 SF (0.06 AC) = 31.5%
PERVIOUS = 5,066 SF (0.11 AC) = 68.4%

PLOT DATE: Friday, May 03, 2019 4:33:55 PM
VERSION: 3.0.0.20170623

D-119

HKS

ARCHITECT
HKS ARCHITECTS, INC.
539 BRYANT STREET, SUITE 100
SAN FRANCISCO, CA 94107

LANDSCAPE
PERRY BURR & ASSOCIATES
27 MARINITA AVENUE
SAN RAFAEL, CA 94901

STRUCTURAL ENGINEER
SIMPSON GUMPERTZ & HEGER
100 PINE STREET, SUITE 600
SAN FRANCISCO, CA 94111

MEP ENGINEER
SCHNACKEL ENGINEERS
80 SOUTH LAKE AVENUE, SUITE 640
PASADENA, CA 91101

OWNER
NEXUS COMPANIES
1 MacARARTHUR PLACE; SUITE 300
SANTA ANA, CA 92707

OWNER CONSULTANTS

CIVIL ENGINEER
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701 N. PARKCENTER DRIVE
SANTA ANA, CA 92705

UTILITY ENGINEER
BJ PALMER & ASSOCIATES, INC
ONE RIDGEGATE DRIVE SUITE 105
TEMECULA, CA 92590

GEOTECHINICAL ENGINEER
GEOTECHNICAL PROFESSIONALS INC. (GPI)
5736 CORPORATE AVENUE
CYPRES, CA 90630

VIVANTE - SENIOR ASSISTED LIVING
NEWPORT BEACH, CA

REVISION

HKS PROJECT NUMBER
22222

DATE
2019/04/12

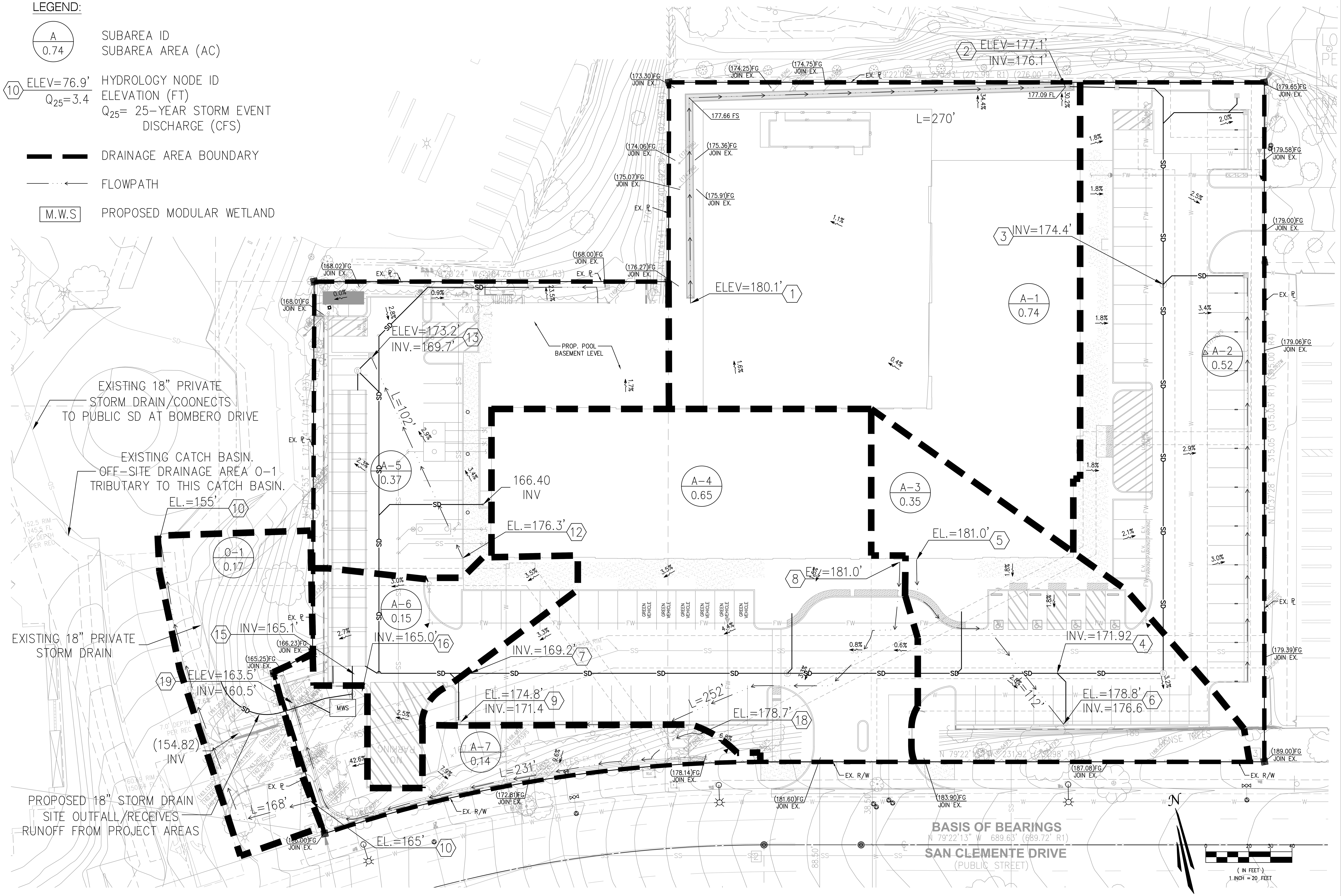
ISSUE
PLANNING RESUBMITAL 2

SHEET TITLE
EXISTING HYDROLOGY MAP

SHEET NO.
C1.03

LEGEND:

(A / 0.74)	SUBAREA ID SUBAREA AREA (AC)
(10) ELEV=76.9' Q_{25}=3.4	HYDROLOGY NODE ID ELEVATION (FT) Q_{25}= 25-YEAR STORM EVENT DISCHARGE (CFS)
▬ ▬ ▬	DRAINAGE AREA BOUNDARY
——·—←	FLOWPATH
M.W.S	PROPOSED MODULAR WETLAND



UNDERGROUND SERVICE ALERT

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AREA SUMMARY ON-SITE:

TOTAL AREA = 126,619 SF (2.91 AC)
IMPERVIOUS = 102,879 SF (2.36 AC)= 81%
PERVIOUS = 23,740 SF (0.55 AC)= 19%

AREA SUMMARY OFF-SITE:

TOTAL AREA = 7,743 (0.17 AC)
IMPERVIOUS = 1,588 SF (0.03 AC)= 20.5%
PERVIOUS = 6,155 SF (0.14 AC)= 79.5%

PLOT DATE: Friday, May 03, 2019 4:35:10 PM VERSION: 3.0.0.20170623

HKS

ARCHITECT
HKS ARCHITECTS, INC.
539 BRYANT STREET, SUITE 100
SAN FRANCISCO, CA 94107

LANDSCAPE
PERRY BURR & ASSOCIATES
27 MARINITA AVENUE
SAN RAFAEL, CA 94901

STRUCTURAL ENGINEER
SIMPSON GUMPERTZ & HEGER
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SAN FRANCISCO, CA 94111

MEP ENGINEER
SCHNACKEL ENGINEERS
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PASADENA, CA 91101

OWNER
NEXUS COMPANIES
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OWNER CONSULTANTS

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SANTA ANA, CA 92705

UTILITY ENGINEER
BJ PALMER & ASSOCIATES, INC
ONE RIDGEGATE DRIVE SUITE 105
TEMECULA, CA 92590

GEOTECHNICAL ENGINEER
GEOTECHNICAL PROFESSIONALS INC. (GPI)
5736 CORPORATE AVENUE
CYPRES, CA 90630

VIVANTE - SENIOR ASSISTED LIVING NEWPORT BEACH, CA

REVISION

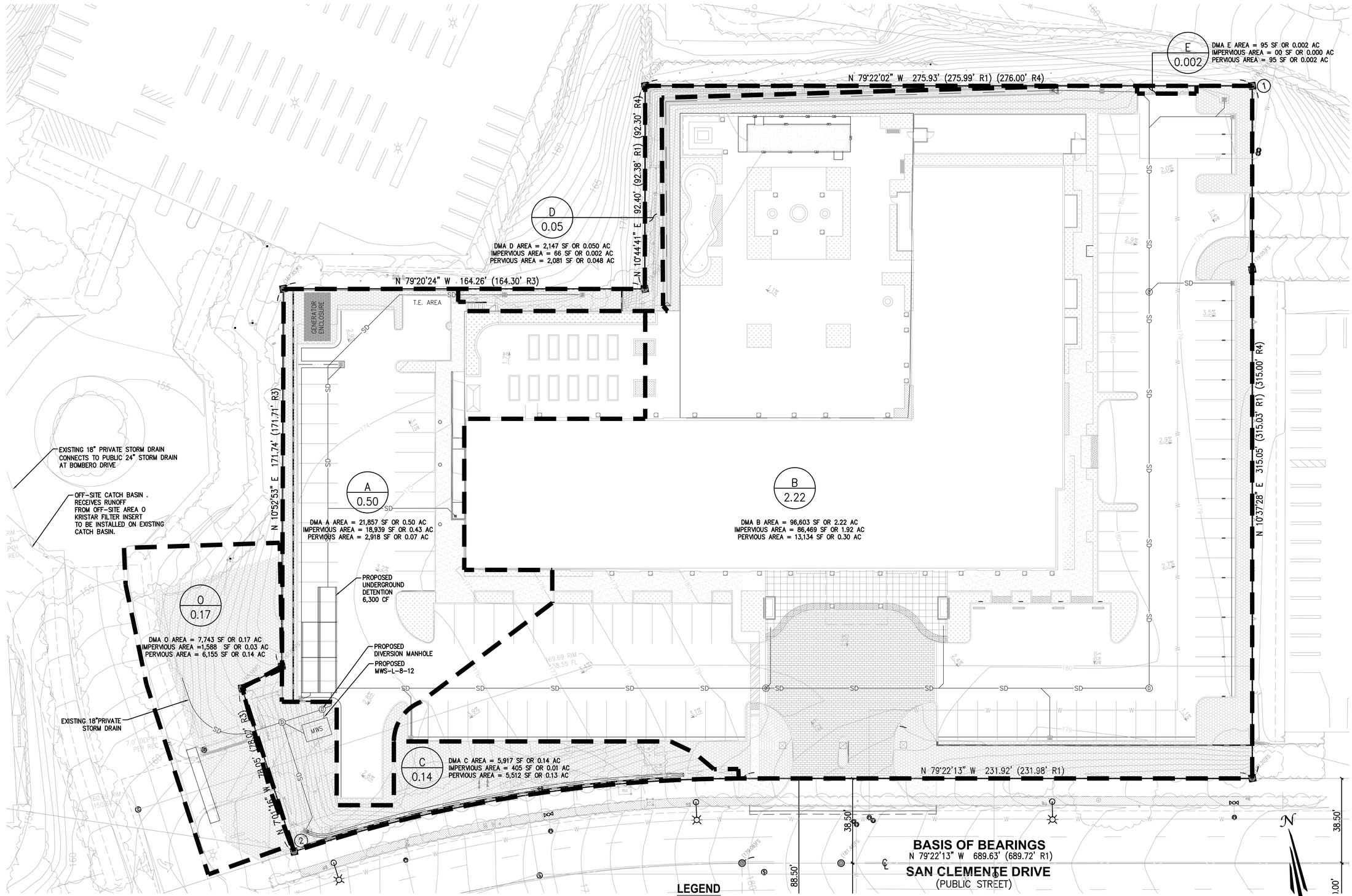
HKS PROJECT NUMBER
22222

DATE
2019/04/12

ISSUE
PLANNING RESUBMITAL 2

SHEET TITLE
PROPOSED HYDROLOGY MAP

SHEET NO.
C1.04



LEGEND

- PROPERTY LINE
- MWS — PROPOSED MODULAR WETLAND SYSTEM UNIT
- X / X.XX — DRAINAGE AREA / ACREAGE
- DRAINAGE AREAS
- SD — PROPOSED STORM DRAIN

UNDERGROUND SERVICE ALERT

811

Call: TOLL FREE 1-800-422-4133

KNOW WHAT'S BELOW. CALL BEFORE YOU DIG.

TWO WORKING DAYS BEFORE YOU DIG

UNAUTHORIZED CHANGES & USES:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

ENGINEERS NOTE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON. IF THE CONTRACTOR ENCOUNTERS ANY DISCREPANCIES, CONFLICTS OR AREAS WHICH HE FEELS UNWORKABLE, HE SHALL NOTIFY THE GRADING ENGINEER IMMEDIATELY PRIOR TO CONTINUING OR DEVIATING FROM THIS PLAN.

PLOT DATE: Wednesday, May 08, 2019 9:36:05 AM VERSION: 3.0.0.20170623

HKS

ARCHITECT
HKS ARCHITECTS, INC.
539 BRYANT STREET, SUITE 100
SAN FRANCISCO, CA 94107

LANDSCAPE
PERRY BURR & ASSOCIATES
27 MARINITA AVENUE
SAN RAFAEL, CA 94901

STRUCTURAL ENGINEER
SIMPSON GUMPERTZ & HEGER
100 PINE STREET, SUITE 600
SAN FRANCISCO, CA 94111

MEP ENGINEER
SCHNACKEL ENGINEERS
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PASADENA, CA 91101

OWNER
NEXUS COMPANIES
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SANTA ANA, CA 92707

OWNER CONSULTANTS

CIVIL ENGINEER
TAIT & ASSOCIATES, INC
701 N. PARKCENTER DRIVE
SANTA ANA, CA 92705

UTILITY ENGINEER
BJ PALMER & ASSOCIATES, INC
ONE RIDGEGATE DRIVE SUITE 105
TEMECULA, CA 92590

GEOTECHINICAL ENGINEER
GEOTECHNICAL PROFESSIONALS INC. (GPI)
5736 CORPORATE AVENUE
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VIVANTE - SENIOR ASSISTED LIVING
NEWPORT BEACH, CA

REVISION

HKS PROJECT NUMBER
22222

DATE
2019/04/12

ISSUE
PLANNING RESUBMITAL 2

SHEET TITLE
PRELIMINARY WQMP

SHEET NO.
C1.05

Attachment D

Proprietary BMP Information and Details

Bio Clean

A Forterra Company

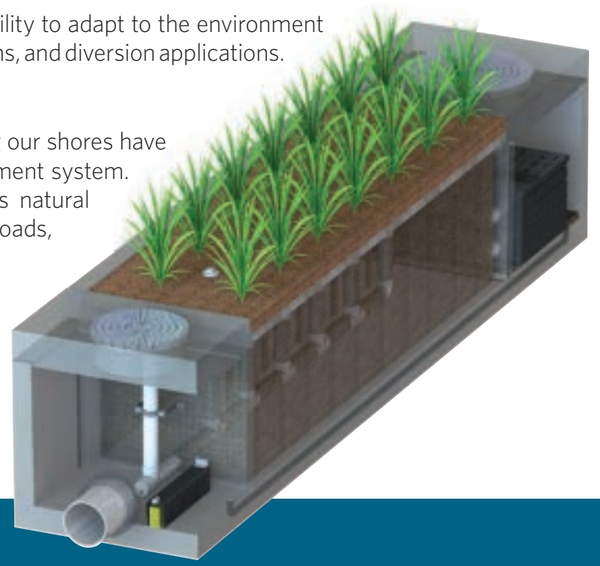
Modular Wetlands® System Linear

A Stormwater Biofiltration Solution

OVERVIEW

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

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.



The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the Modular Wetlands® System Linear.

PERFORMANCE

The Modular Wetlands® continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the Modular Wetlands® has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the Modular Wetlands® harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	**69%** REMOVAL OF TOTAL ZINC	**38%** REMOVAL OF DISSOLVED COPPER	**64%** REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	**50%** REMOVAL OF TOTAL COPPER	**95%** REMOVAL OF MOTOR OIL	**67%** REMOVAL OF ORTHO PHOSPHORUS	**85%** REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved
The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft² loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification
The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

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

Maryland Department of the Environment, Approved ESD
Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MASTEP Evaluation
The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

Rhode Island Department of Environmental Management, Approved BMP
Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

ADVANTAGES

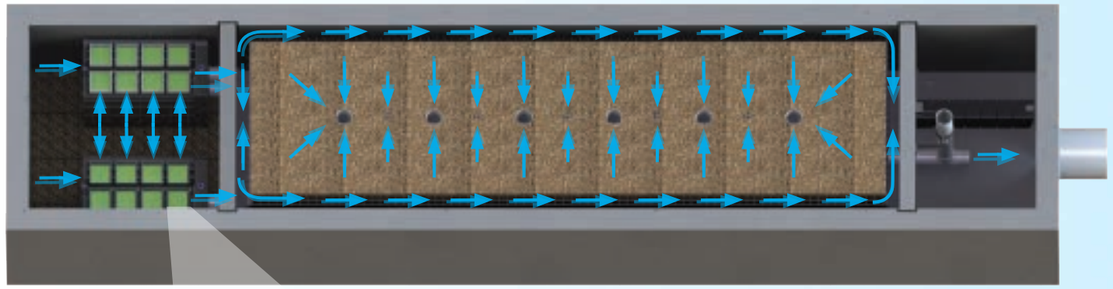
- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.



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

Figure 2, Top View

1 PRETREATMENT

SEPARATION

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

PRE-FILTER CARTRIDGES

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

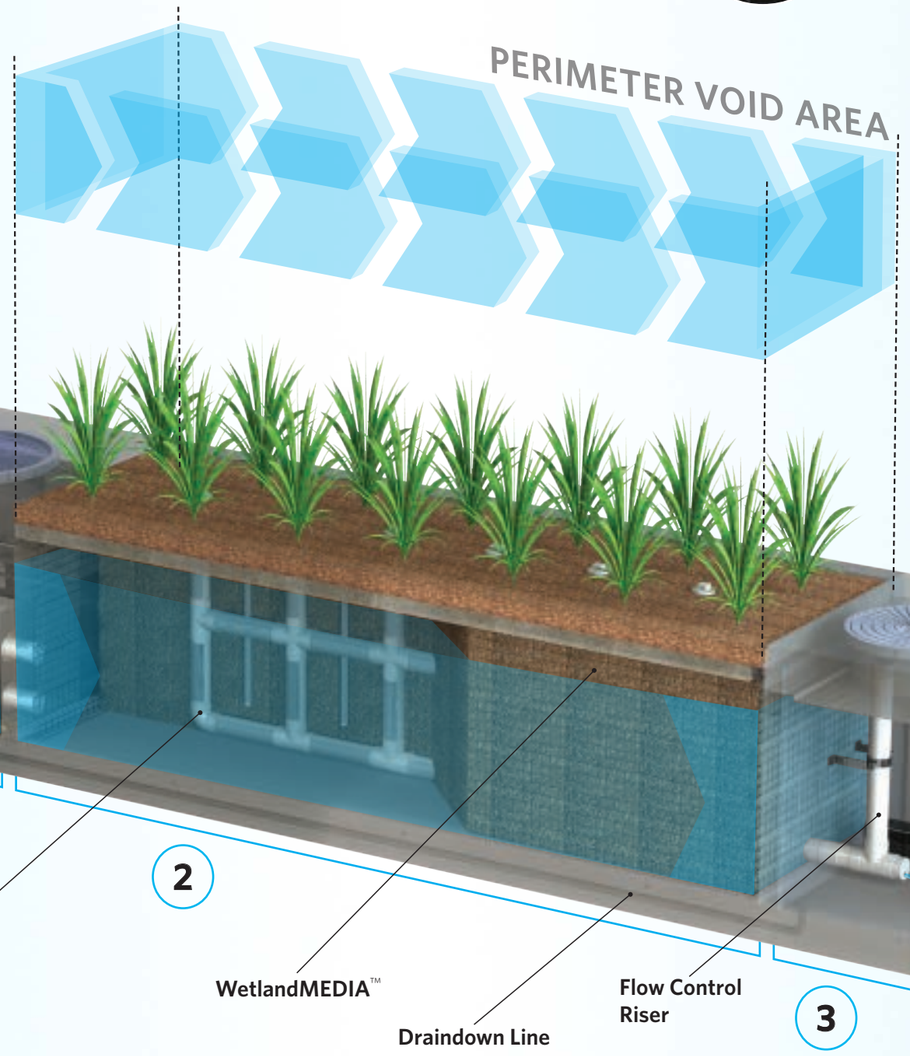


Figure 1

2 BIOFILTRATION

HORIZONTAL FLOW

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

PATENTED PERIMETER VOID AREA

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

WETLANDMEDIA

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

3 DISCHARGE

FLOW CONTROL

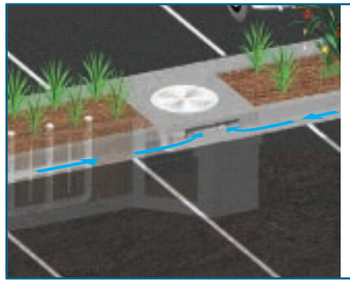
- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated

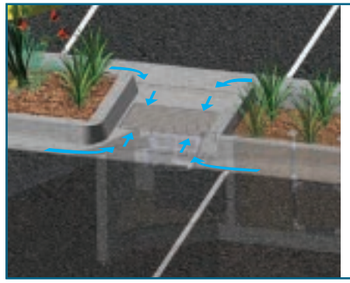
CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



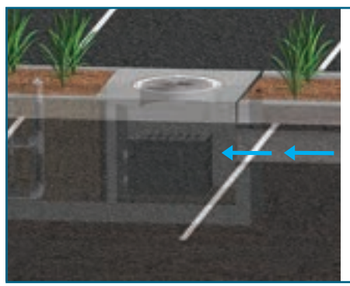
CURB TYPE

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



GRATE TYPE

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



VAULT TYPE

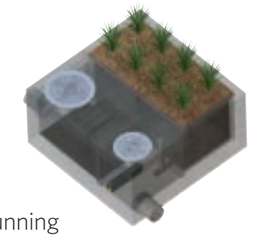
The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/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

DOWNSPOUT TYPE

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

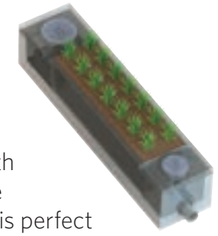
ORIENTATIONS

SIDE-BY-SIDE



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

END-TO-END



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

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

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

EXTERNAL DIVERSION WEIR STRUCTURE

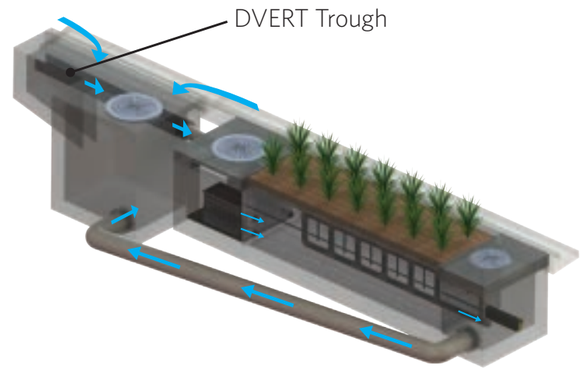
This traditional offline diversion method can be used with the Modular Wetlands® in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert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

FLOW-BY-DESIGN

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

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over



to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the Modular Wetlands® to be installed anywhere space is available.

SPECIFICATIONS

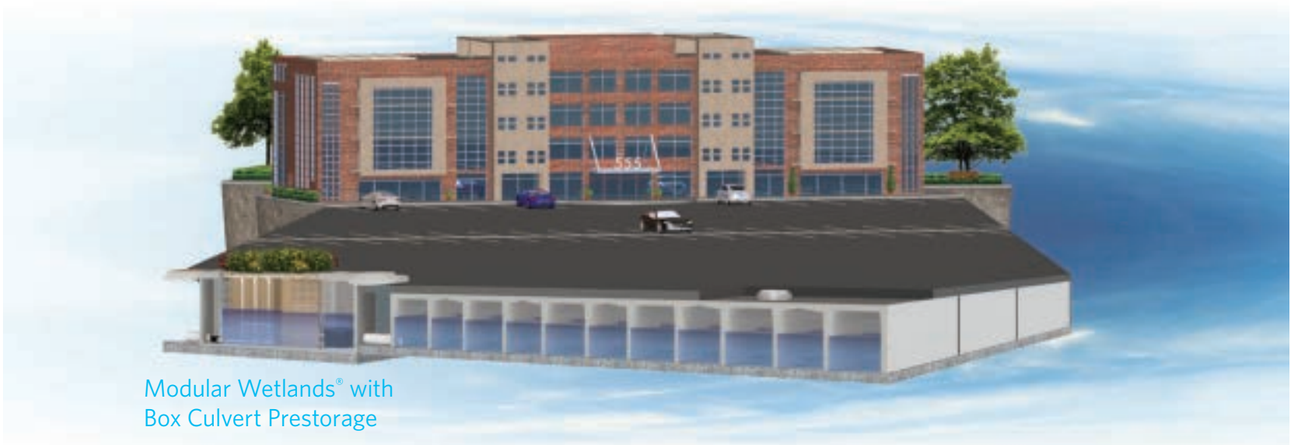
FLOW-BASED DESIGNS

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

MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117	0.268
MWS-L-6-8	7′ x 9′	64	0.147
MWS-L-8-8	8′ x 8′	100	0.230
MWS-L-8-12	8′ x 12′	151	0.346
MWS-L-8-16	8′ x 16′	201	0.462
MWS-L-8-20	9′ x 21′	252	0.577
MWS-L-8-24	9′ x 25′	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

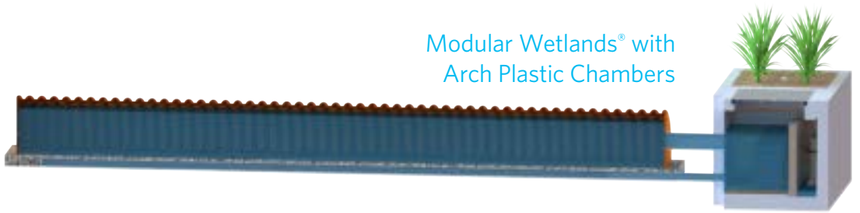
VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE



Modular Wetlands® with Box Culvert Prestorage

The Modular Wetlands® System Linear offers a unique advantage in the world of biofiltration due to its exclusive horizontal flow design: Volume-Based Design. No other biofilter has the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The systems horizontal flow configuration and built-in orifice control allows it to be installed with just 6″ of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points. In the example above, the Modular Wetlands® is installed downstream of underground box culvert storage. Designed for the water quality volume, the Modular Wetlands® will treat and discharge the required volume within local draindown time requirements.



Modular Wetlands® with Arch Plastic Chambers

DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the Modular Wetlands®, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

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

INDUSTRIAL

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

RESIDENTIAL

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

STREETS

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

PARKING LOTS

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

COMMERCIAL

Compared to bioretention systems, the Modular Wetlands® can treat far more area in less space, meeting treatment and volume control requirements.

MIXED USE

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

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION

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

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION

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

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

MAINTENANCE

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

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

BioClean
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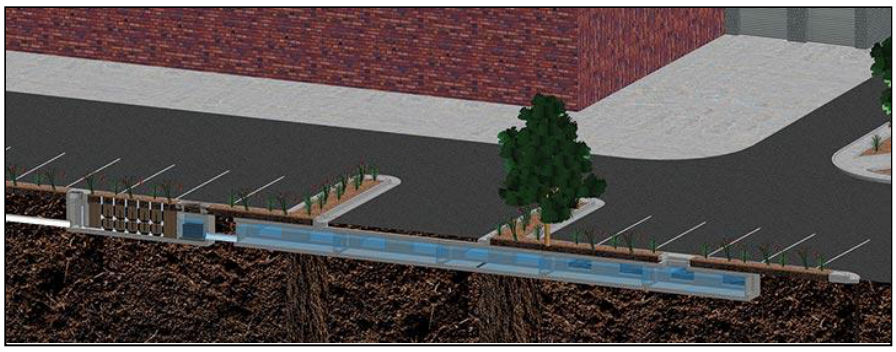


Volume Based Sizing

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

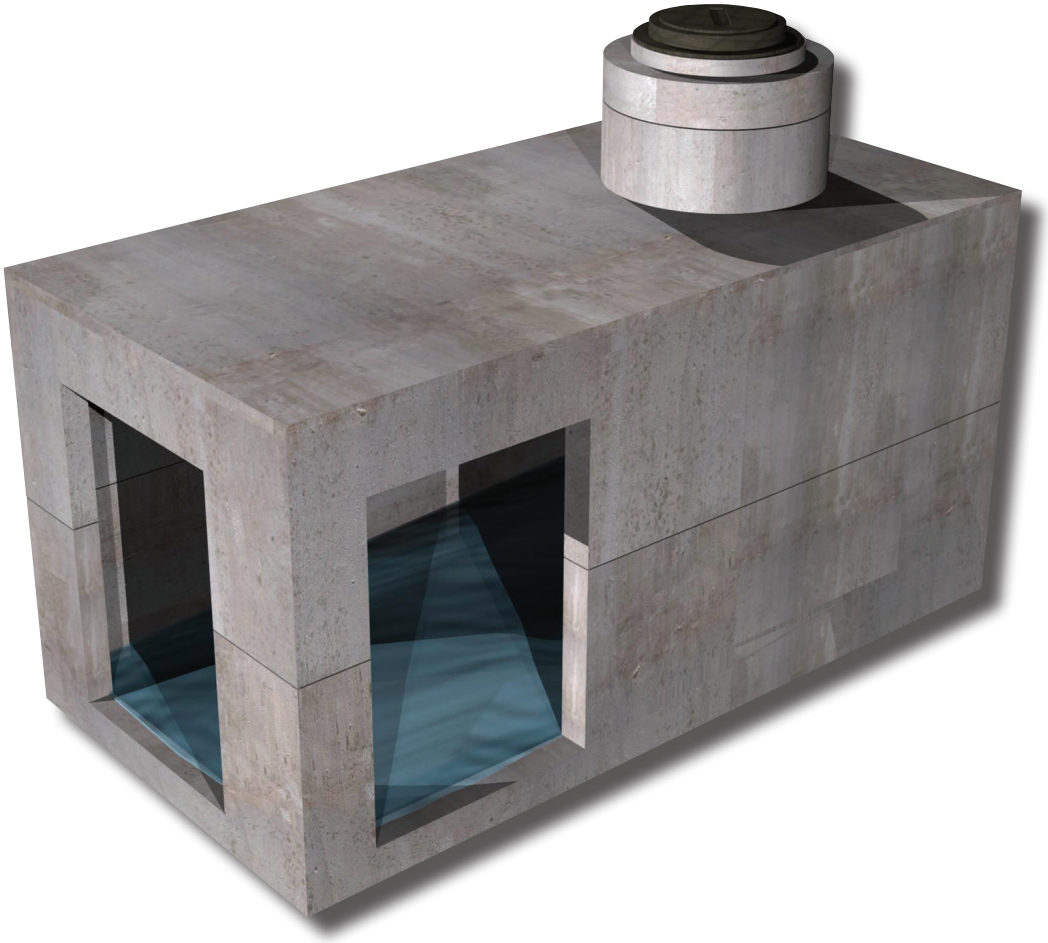
Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-4	1140	2280
MWS-L-4-6	1600	3200
MWS-L-4-8	2518	5036
MWS-L-4-13	3131	6261

Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-15	3811	7623
MWS-L-4-17	4492	8984
MWS-L-4-19	5172	10345
MWS-L-4-21	5853	11706
MWS-L-6-8	3191	6382
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145
MWS-L-8-20	12560	25120
MWS-L-8-24	15108	30216

Oldcastle Precast®

STORMCAPTURE®

StormCapture Modular Stormwater Management System for Infiltration, Detention, Retention and Treatment



Call us today **(800) 579-8819** or visit our website for detailed product information, drawings and design tools at **www.oldcastlestormwater.com**

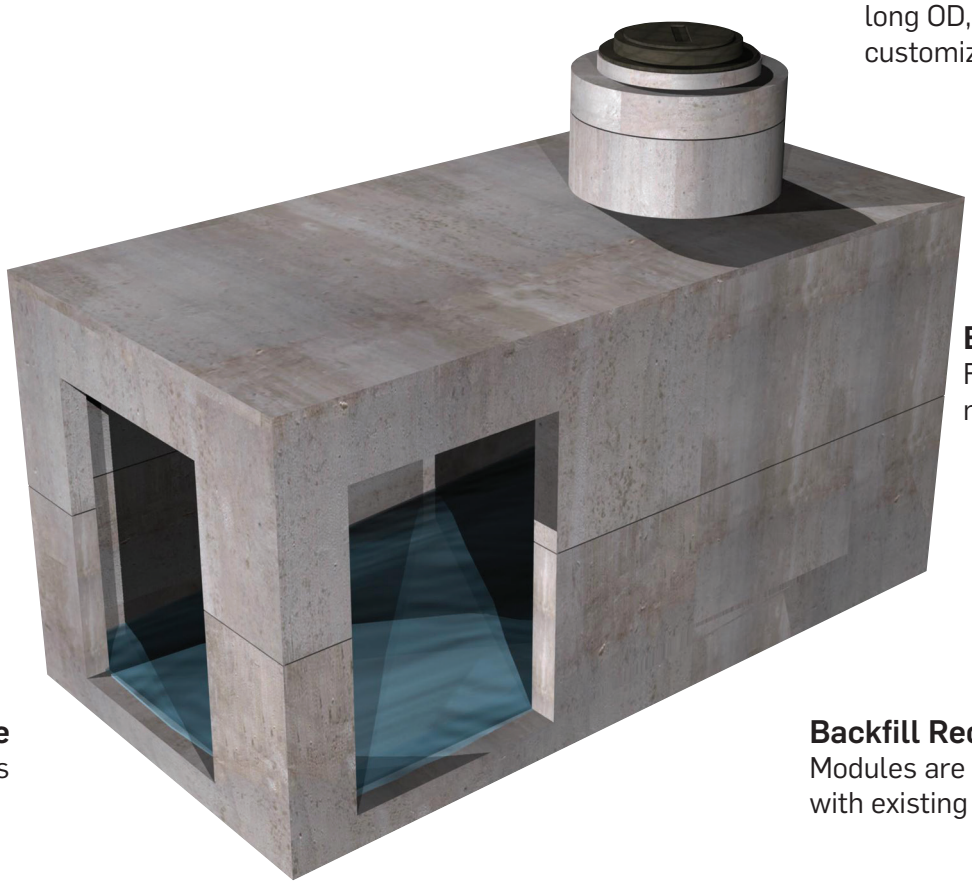
StormCapture® Module

Large Storage Capacity
Smaller system footprint for greater design flexibility.

Traffic Loading
Only requires 6" of cover.

Modular Design
Precast concrete modules measure 8' wide by 16' long OD, (7' x 15' ID), with customizable heights.

Custom Sizes
Available in internal heights from 2' to 14' to best-fit site needs.



Easy to Install
Fast installation with minimal handling.

Design Assistance
Let our professionals customize for your specific needs.

Backfill Requirements
Modules are typically backfilled with existing site materials.

Treatment Train
Available with pre-treatment, post-treatment, or both.

Construction Site Friendly
Contractor does not have to relinquish any ground on the site once the StormCapture system is installed.

Same-day staging and installation of StormCapture project.

StormCapture offers fast installation with minimal handling.

StormCapture modules are designed for HS20 traffic loading.

StormCapture detention system installed beneath office parking lot.

StormCapture Advantages

• **Fast Service** - Get help from our national engineering team with layouts and specifications to meet your project's requirements.

• **Cost Savings** - Highly competitive installation and maintenance costs.

• **Quality** - Manufactured to the rigid standards of the Oldcastle quality control program at Oldcastle facilities around the country.

• **Codes** - Designed to the latest codes for HS-20-44 (full truckload plus impact).

• **Sustainability** - The system is maintainable for long-term sustainability.

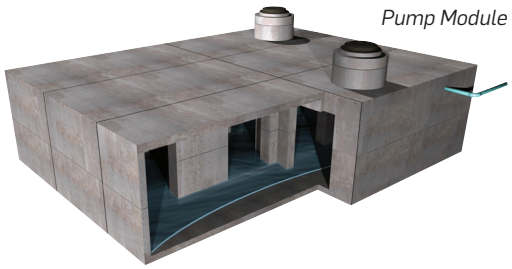
• **LID** - Ideal for Low-Impact Development (LID).

• **LEED** - Manufactured locally with recycled material for potential LEED credits. *LEED 2009 for New Construction & Major Renovation, U.S. Green Building Council: Sustainable Sites (5.1, 5.2, 6.1, 6.2), Materials & Resources (4.1, 4.2, 5.1, 5.2), Water Efficiency (1.1, 1.2, 3.1, 3.2).*

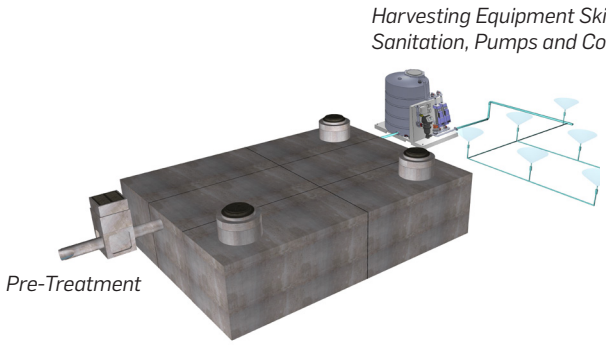
Applications

StormCapture offers numerous options for detention, retention, treatment and harvesting to solve your stormwater management needs. Let us show you how we can design and customize a solution for you.

DETENTION



RETENTION



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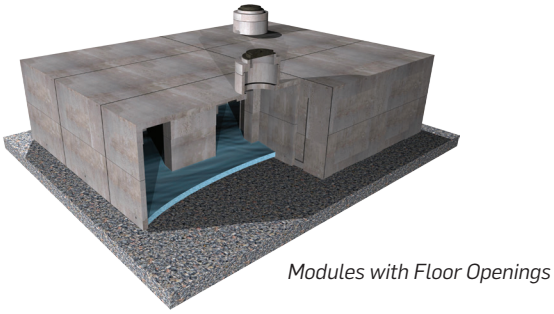

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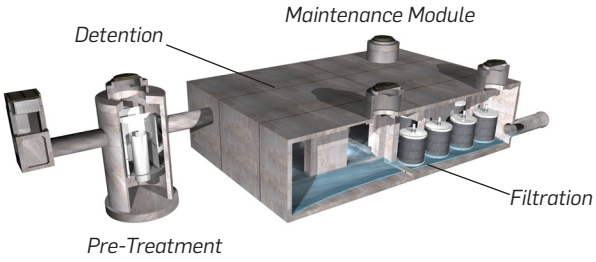

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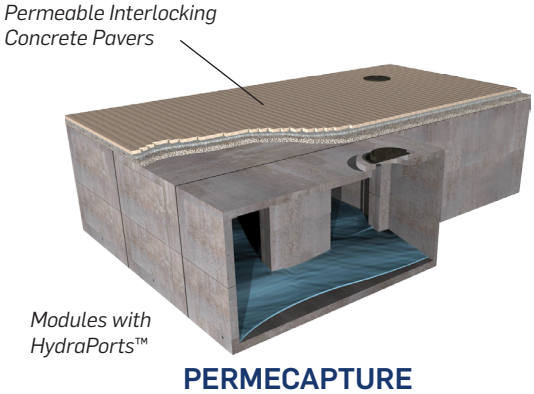

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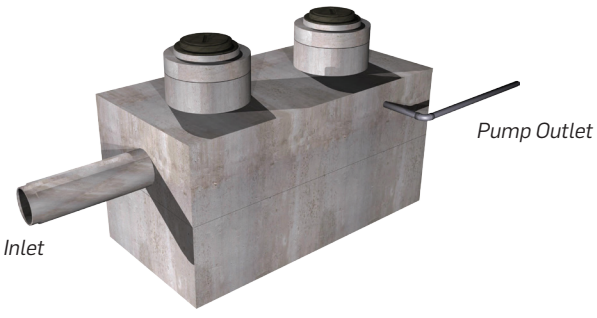
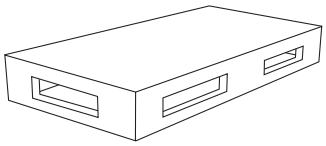


CISTERNS

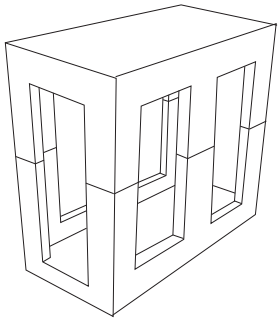



INSTALLED IN JUST ONE DAY

Module Sizes



SC1 - Single piece modules can be used for applications from 2' to 7' tall. Appropriate for cisterns, infiltration, detention and retention systems. SC1 modules are typically installed on minimally compacted gravel base, depending on specific project requirements.



SC2 - Two piece modules can be used for applications from 7' to 14' tall for maximum storage capacity in a condensed footprint. Appropriate for cisterns, infiltration, detention and retention systems. SC2 modules are typically installed on compacted native subgrade.

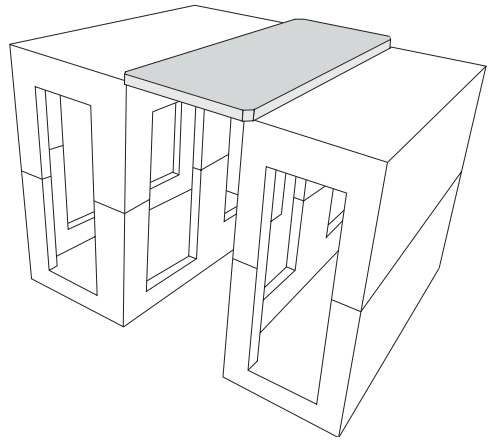
Module Sizes & Capacities

Modules are 8'x16' outside dimensions. Capacity varies by configuration of openings.

Inside Dimensions (ft)	Capacity Range (ft^3)
7x15x2	210-212
7x15x3	315-325
7x15x4	420-442
7x15x5	525-559
7x15x6	630-676
7x15x7	735-793
7x15x8	840-910

Inside Dimensions (ft)	Capacity Range (ft^3)
7x15x9	945-1,027
7x15x10	1,050-1,140
7x15x11	1,155-1,257
7x15x12	1,260-1,374
7x15x13*	1,365-1,491
7x15x14*	1,470-1,608

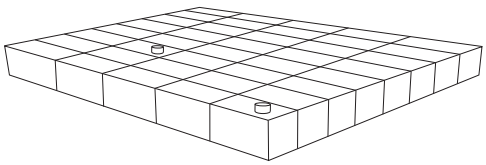
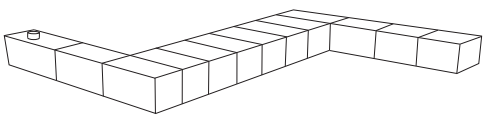
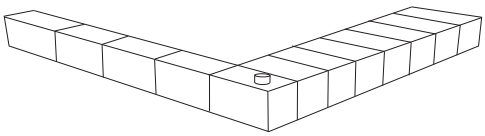
* Special design considerations required and limited availability



Link Slab - Unique design allows for significant reduction in the quantity of modules and associated costs, while providing maximum storage capacity.

Endless Configurations

Contact us today to start designing your system!

Oldcastle Precast®

Attachment E

Geotechnical Report

GEOTECHNICAL RECOMMENDATIONS
850 SAN CLEMENTE DRIVE
NEWPORT BEACH, CALIFORNIA

Prepared for:

RELATED CALIFORNIA
18201 Von Karman Avenue, Suite 300
Irvine, California 92612

Prepared by:

GROUP DELTA CONSULTANTS
32 Mauchly, Suite B
Irvine, California 92618
Tel. (949) 450-2100
Fax (949) 450-2108

GDC Project No. IR634
November 10, 2015

November 10, 2015

Related California
18201 Von Karman Avenue, Suite 300
Irvine, CA 92612

Attention: Steven Oh

Subject: Geotechnical Recommendations
850 San Clemente Drive
Newport Beach, California
GDC Project No IR-634

Dear Mr. Oh:

Group Delta Consultants (GDC) submits our geotechnical report for the proposed structure at 850 San Clemente Drive in Newport Beach, California. The work was performed in general accordance with our proposal dated August 18, 2015, and your subsequent authorization. The project will consist of the construction of 26-story residential condominium structure. The proposed structure includes two levels of subterranean parking.

Construction of the proposed structure is feasible from a geotechnical perspective provided the recommendations contained in this report are incorporated into the design.

If you have any questions regarding this report, please feel free to call the undersigned at (949) 450-2100.

Yours Sincerely,
Group Delta Consultants, Inc.

Anthony Augello, Ph. D., P. E.
Associate Engineer

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trenches are slope to drain to a sump. The structure at 670 Newport Center Drive installed wells to intercept the perched groundwater below the building.

4.4.2 Lateral Resistance

Mat foundations may derive lateral load resistance from passive resistance along the vertical sides of the foundations, we recommend an ultimate passive fluid pressure of 350 pounds per cubic foot (pcf). We recommend an ultimate sliding friction coefficient of 0.45 for design. Passive and sliding resistance may be used in combination without reduction. The required factor of safety is 1.5 for static loads and 1.1 for wind or seismic loads.

4.4.3 Infiltration

Because the basement excavation depth is very close to weathered bedrock elevation, infiltration basins are not feasible at the site. As discussed above. The weathered bedrock is a stiff to hard claystone. The permeability of these soils is low and percolation is not feasible.

4.5 Earthwork and Grading

We have assumed that the depth of the excavation will be approximately 20 to 25 feet below current grade. The borings performed at the area of the site were advanced using a track-mounted hollow stem auger drill rig or bucket auger drill rigs. Drilling was completed with moderated effort through the existing soils and rock in the area. Therefore, conventional earth moving equipment (i.e., scrapers, dozers, excavators) will be capable of performing a portion of the excavations required for the development. All surface water should be diverted away from excavations.

Excavation will be readily accomplished with light to heavy effort using conventional heavy-duty grading equipment such as scrapers, loaders, dozers, and excavators. Concrete, brick, old foundations, tanks, or other debris from the previous buildings/basements at the site may be encountered during the excavations.

We recommend foundations be supported on the native bedrock. The subgrade soils should be observed and verified appropriate by GDC for support of mat foundation. If loose disturbed or otherwise unsuitable soils are found at the subgrade level, these soils shall be removed or brought to near-optimum moisture content ($\pm$2%), recompacted, and tested to a minimum of 95% relative compaction prior to placement of fill or footing or floor slab construction. Only granular soils should be used for compacted fill.

4.6 Basement Excavation

The current conceptual drawing show the basement excavation extending to the property line, as a result shoring is required to support the excavations. Cantilever, tied-back or internally

GEOTECHNICAL PROFESSIONALS INC.

GEOTECHNICAL INVESTIGATION
PROPOSED VIVANTE NEWPORT COAST
850 SAN CLEMENTE DRIVE
NEWPORT BEACH, CALIFORNIA

Prepared for:
Nexus Companies
1 MacArthur Place, Suite 300
Santa Ana, California 92707

Prepared by:
Geotechnical Professionals Inc.
5736 Corporate Avenue
Cypress, California 90630
(714) 220-2211

Project No. 2870.I

November 13, 2018

GEOTECHNICAL PROFESSIONALS INC.

November 13, 2018

Vivante Newport Center, LLC
c/o Nexus Companies
1 MacArthur Place, Suite 300
Santa Ana, California 92707

Attention: Mr. Brad Cameron, S.E.
Technical Director

Subject: Report of Geotechnical Investigation
Proposed Vivante Newport Coast
850 San Clemente Drive
Newport Beach, California
GPI Project No. 2870.I

Dear Mr. Cameron:

Transmitted herewith is an electronic copy of our report of geotechnical investigation for the subject project. The report presents our evaluation of the foundation conditions at the site and recommendations for design and construction. Hard copies can be provided as needed.

We appreciate the opportunity of offering our services on this project and look forward to seeing the project through its successful completion. Feel free to call us if you have any questions regarding our report or need further assistance.

Very truly yours,
Geotechnical Professionals Inc.

Paul R. Schade, G.E.
Principal

cc: Doug Burroughs, Nexus Companies (email)
Stephen Scanlon, Nexus Companies (email)
Stephen Harris, S.E., Simpson Gumpertz & Heger (email)
Bart Mink, P.E., Tait & Associates, Inc. (email)
Nish Kothari / Don Harrier, HKS Inc. (email)

5736 Corporate Avenue • Cypress, CA 90630 • (714) 220-2211 , FAX (714) 220-2122

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LIST OF FIGURES

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APPENDIX A

APPENDIX B

APPENDIX B

1.0 INTRODUCTION

1.1 GENERAL

This report presents the results of a geotechnical investigation performed by Geotechnical Professionals Inc. (GPI) for the proposed Vivante Newport Coast project in Newport Beach, California. The site location is shown on the Site Location Map, Figure 1.

1.2 PROJECT DESCRIPTION

The proposed development will consist of a 7-story (6 levels above grade, one-level below grade) senior assisted living facility. The overall site is approximately 2.9 acres in plan and currently consists of two parcels. Based on plans provided by the Project Architect and Civil Engineer, the proposed building will be about 26,500 square feet in plan, with the majority underlain by a single subterranean level. The subterranean level is approximately 24,500 square feet in plan with a finished floor at an approximate elevation of +169 feet. The subterranean level also includes a pool area that extends to the northwest, outside of the above-grade portion of the proposed structure. The basement pool area will be overlain by an outdoor amenity deck. The northeast portion of the proposed building will be supported at-grade at an approximate elevation of +181 feet.

The project will also include new pavement and hardscape, landscape, minor retaining walls, bio-infiltration basins, and a new drive entrance. The existing site configuration is shown on the Existing Site Plan, Figure 2. The proposed site configuration, including the basement limits, is shown on the Proposed Site Plan, Figure 3.

It is our understanding that the proposed structure will be of Type 1 construction. Based on information provided by SGH, the Project Structural Engineers, column loads are anticipated to range from a minimum of 120 kips to a maximum of 800 kips, with an average load of 400 kips. Mat foundation pressures for the subterranean portion of the building are anticipated to range from about 1,000 to 2,000 pounds per square foot (psf). Preliminary grading plans provided by Tait & Associates the Project Civil Engineer indicate potential cuts of up to 11 feet within the basement level of the proposed structure and fills of up to 10 feet outside the building footprint. The preliminary grading plans indicate a potential net import (fill) of approximately 6,000 cubic yards of material. A subsurface section showing potential cut and fill areas is shown on the Subsurface Cross Section, Figure 4.

Our recommendations are based upon the above structural and grading information. We should be notified if the actual loads and/or grades change during the project design to either confirm or modify our recommendations. Also, when additional project grading and structural plans become available, we should be provided with a copy for review and comment.

1.3 PURPOSE OF INVESTIGATION

The primary purpose of this investigation and report is to provide an evaluation of the existing geotechnical and seismic conditions at the site, as they relate to the design and construction of the proposed development. More specifically, this investigation was aimed at providing geotechnical recommendations for earthwork, and design of foundations, walls below grade, and pavements.

1.4 PRIOR SITE WORK

GPI was provided with a prior, feasibility-level geotechnical investigation by others for a proposed high-rise residential structure at the subject site (Group Delta, 2015). The prior investigation included three exploratory borings and laboratory testing consisting of fines content analyses, Atterberg limits, consolidation, and corrosivity. The prior investigation was referenced when planning the current investigation and preparing this report. We have used select prior geotechnical data for this study where relevant, and assume the liability of relying on prior data by others.

2.0 SCOPE OF WORK

Our scope of work for this investigation consisted of a review of historical aerial photographs, review of prior investigations, geotechnical field exploration, laboratory testing, engineering analysis, and the preparation of this report.

Our geotechnical field exploration program consisted of four Cone Penetration Tests (CPT's) and two exploratory borings. The CPT's were advanced to depths ranging from 50 to 60 feet below existing site grades. The exploratory borings were drilled to depths of 21 to 46 feet below existing site grades. Details of the field procedures and logs of the CPT's and Borings are presented in Appendices A and B, respectively. The locations of the subsurface explorations are shown on Figures 2 and 3.

Laboratory tests were performed on selected representative soil samples as an aid in soil classification and to evaluate the engineering properties of the soils. The geotechnical laboratory testing included determinations of moisture content and dry density, fines content, Atterberg limits, shear strength (direct shear), consolidation, compaction (maximum density/optimum moisture), and expansion index. We have also incorporated prior test results at the site by others where appropriate. Laboratory testing procedures and results are summarized in Appendix C.

Engineering evaluations were performed to provide earthwork criteria, foundation, retaining wall, and slab design parameters, preliminary pavement sections, and assessments of seismic hazards. The results of our evaluations are presented in the remainder of the report.

3.0 SITE CONDITIONS

3.1 SITE HISTORY

Our understanding of the development history of the site is based on review of historical aerial photographs (Historic Aerials). In reviewing aerial photographs of the site, we noted that the site appears to have remained in its approximate current configuration since at least 1980. In aerial photographs from 1972 and prior, the site and surrounding area are undeveloped. The existing properties to the north (residential apartments) and east (multi-story parking garage) of the subject site were redeveloped after 2014.

3.2 SURFACE CONDITIONS

The subject site is bounded by San Clemente Drive to the south, office/commercial development to the west, Civic Plaza and a residential apartment development to the north, and an existing parking structure to the east. The site is currently occupied by two vacant, single-story buildings that used to house the Orange County Museum of Art. The remaining portions of the site are occupied by asphalt pavements (parking and drive aisles), concrete hardscape, and landscaping.

Topography in the site vicinity generally slopes down to the west and north. Within the subject site limits, the ground surface slopes down to the southwest at an approximate 3 to 4 percent grade. A topographic plan provided by the Project Civil Engineer indicates current ground surface elevations across the site ranging from approximately +180 feet in the northeast to +164 feet in the southwest.

Existing pavement sections at our boring locations consisted of 3 to 4 inches of asphalt concrete over 3 to 6 inches of aggregate base. The existing pavement at the time of our investigation was generally in fair condition.

3.3 SUBSURFACE SOILS

Our field investigation disclosed a subsurface profile consisting of shallow undocumented fill over natural soils and weathered bedrock. Detailed descriptions of the subsurface conditions encountered are shown on the Logs of CPT’s and Borings in Appendices A and B, respectively.

Fill soils, to depths of approximately 2 to 4 feet, were encountered in our exploratory borings. The fill soils consisted of moist clayey sands and sands. Documentation on the placement and compaction of the fill was not available at the time this report was prepared. Localized deeper fill may be in-place within the limits of the existing buildings.

The underlying natural soils consist primarily of marine terrace deposits overlying weathered claystone and siltstone bedrock of the Monterey Formation. The marine terrace deposits consist of sands, silty sands, and clayey sands with trace gravel extending to approximate elevations of +160 feet in the southwest portion of the site to +155 feet in the northeast portion of the site. These sandy soils were generally dense to

very dense and moist, with moisture contents ranging from 6.5 to 12.2 percent, roughly near the optimum moisture content of 10 percent. The sandy soils exhibit moderate to high strength and low compressibility characteristics.

The underlying bedrock consisted of claystone and siltstone of the Monterey Formation. The bedrock nearer the ground surface and contact with the terrace deposits was weathered, becoming less weathered with depth. The moisture contents of the bedrock materials were generally wet and highly variable, ranging from 25 percent to 94 percent, with an average value of roughly 55 percent within the upper 35 feet of the subsurface profile. Sampler blow counts indicate that the bedrock material is stiff to hard, increasing in stiffness with depth, using soil consistency terminology instead of rock terminology. Atterberg limit testing indicates that the claystone is highly plastic. Although not tested, the bedrock materials are anticipated to exhibit a moderate to high potential for expansion when processed and recompacted and would be expected to shrink and swell with changes in moisture content. The bedrock materials exhibit moderate strength and compressibility characteristics.

3.4 GROUNDWATER AND CAVING

Groundwater was not encountered in our exploratory borings within the 46-foot depth explored. Groundwater was measured at depths of 27 to 50 feet in our CPT's, corresponding to approximate elevations of +149 feet in the east to +114 feet in the west. During a prior investigation by others (Group Delta, 2015), a stabilized groundwater depth of 23 feet was measured in one of the exploratory borings.

Historical data provided by the California Geologic Survey (CGS) does not provide a clear indication of the shallowest groundwater depths in the site vicinity. The nearest groundwater level contour is located less than ½ mile to the west and indicates a shallowest depth to groundwater of 10 feet (CGS, 1997). However, ground surface elevations along this contour are, in general, at least 100 feet below the elevations across the subject site. As such, historical records may indicate shallowest groundwater depths in excess of 100 feet below the prevailing site grades.

Based on the lack of clear historical records and the variability in groundwater depths during our investigation, it is likely that the groundwater encountered in our explorations is the result of perched water conditions within the bedrock.

Caving was not encountered in our 8-inch diameter hollow-stem auger borings. Based on the fines and moisture contents of the soils encountered, the caving potential of the upper soils is considered to be low to moderate.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 GENERAL

Based on the results of our investigation, it is our opinion that from a geotechnical viewpoint it is feasible to develop the site as proposed. The proposed structure can be supported on shallow foundations following remedial grading to mitigate the geotechnical constraints discussed below. The most significant geotechnical issues that will affect the design and construction of the proposed structure are as follows:

- The undocumented fill and upper natural soils are not considered to be suitable for uniform support of new foundations or floor slabs. We recommend the existing fill and upper natural soils be removed and replaced as properly compacted fill. Details are presented in the "Earthwork" section of this report.

- There is a potential for differential settlement of footings supported at-grade and at the planned subterranean level as well as where columns with significantly different loads are located near each other. We recommend measures be taken to reduce the adverse effects of differential settlement at the transition from at-grade to below-grade foundations, such as creating joints or relief in the building exterior and flooring at the transition. We understand that a mat foundation is being considered for the subterranean portion of the building to better limit the differential settlements.

- Moisture contents of the near surface sandy soils (within 10 to 15 feet of the existing grades) are near or slightly below optimum, ranging from approximately 6 to 12 percent. The underlying claystone bedrock exhibited very high moisture contents within the upper 35 feet. Based on the provided grading plans, the claystone bedrock materials will likely not be exposed during earthwork activities and, as such, moisture conditioning (drying) of these materials will likely not be required.

- The upper sandy terrace deposits have a very low Expansion Index. Based on Atterberg limits testing, the claystone bedrock materials encountered at depth are anticipated to have moderate to high potential for expansion when processed and recompacted. As such, these materials will likely shrink and swell with changes in moisture content. These materials should not be used as compacted fill within 2 feet of finished grade in floor slab and hardscape areas.

- Retaining wall backfill should consist of granular, non-expansive fills. Based on our findings, such material is anticipated to be available on-site in significant quantities within the upper 5 to 15 feet below existing grades. The claystone bedrock materials encountered at depth should not be used as retaining wall backfill.

Our recommendations related to the geotechnical aspects of the development of the site are presented in the subsequent sections of this report.

4.2 SEISMIC CONSIDERATIONS

4.2.1 General

The site is located in a seismically active area of Southern California and is likely to be subjected to strong ground shaking due to earthquakes on nearby faults.

We assume the seismic design of the proposed development will be in accordance with the 2016 California Building Code (CBC) criteria. For the 2016 CBC, a Site Class C may be used. The remaining seismic code values can be determined by the Project Structural Engineer using the value above and the pertinent United States Geological Survey (USGS) website and tables from the building code. Using the USGS website, the corresponding seismic design parameters from the CBC are as follows:

S_S = 1.670g	$S_{MS} = F_a * S_S$ = 1.670g	$S_{DS} = 2/3 * S_{MS}$ = 1.114g
S_1 = 0.611g	$S_{M1} = F_V * S_1$ = 0.917g	$S_{D1} = 2/3 * S_{M1}$ = 0.611g

We can provide seismic parameters for the 2019 CBC if requested.

4.2.2 Strong Ground Motion Potential

Based on published information (geohazards.usgs.gov), the most significant fault in the proximity of the site is the Newport-Inglewood Fault, which is located about 2.9 miles from the site.

During the life of the project, the site will likely be subject to strong ground motions due to earthquakes on nearby faults. Based on the USGS website (earthquake.usgs.gov), we computed that the site could be subjected to a peak ground acceleration (PGA_M) of 0.68g for a magnitude 6.7 earthquake (Newport-Inglewood Fault). This acceleration has been computed using the mapped Maximum Considered Geometric Mean peak ground acceleration from ASCE 7-10 (ASCE, 2010) and a site coefficient (F_{PGA}) based on site class. The predominant earthquake magnitude was determined using a 2-percent probability of exceedance in a 50-year period, or an average return period of 2,475 years. The structural design will need to incorporate measures to mitigate the effects of strong ground motion.

4.2.3 Potential for Ground Rupture

The site is not located within an Alquist-Priolo Special Studies Zone and there are no known faults crossing or projecting toward the site. Therefore, ground rupture due to faulting is considered unlikely at this site.

4.2.4 Liquefaction

Liquefaction is a phenomenon in which saturated cohesionless soils undergo a temporary loss of strength during severe ground shaking and acquire a degree of mobility

sufficient to permit ground deformation. In extreme cases, the soil particles can become suspended in groundwater, resulting in the soil deposit becoming mobile and fluid-like. Liquefaction is generally considered to occur primarily in loose to medium dense deposits of saturated sandy soils. Thus, three conditions are required for liquefaction to occur: (1) a sandy soil of loose to medium density; (2) saturated conditions; and (3) rapid, large strain, cyclic loading, normally provided by earthquake motions.

The site is not located within an area shown as having a potential for soil liquefaction in accordance with the Seismic Hazards Mapping Act as shown in the Newport Beach Quadrangle (CGS, 1998). Groundwater was encountered as shallow as 27 feet below grade during our recent investigation and as shallow as 23 feet below existing grades in a prior investigation by others (Group Delta, 2015). Historical data for the site is inconclusive but based on nearby contours and regional topography, it is estimated that shallowest groundwater depths are greater than 50 feet below prevailing site grades. As such, the groundwater encountered in the recent explorations is anticipated to be the results of perched water conditions. In addition to the above, the material below elevations of +155 feet consisted of claystone bedrock, which is considered to be non-liquefiable. Excluding the site from a liquefaction hazard zone appears to be based primarily on the lack of shallow groundwater and on the near-surface presence of bedrock materials.

4.2.5 Seismic Ground Subsidence

Seismic ground subsidence (not related to liquefaction induced settlements) occurs when loose, granular (sandy) soils above the groundwater are densified during strong earthquake shaking.

The upper granular soils encountered in our explorations are predominantly dense to very dense sands, clayey sands, and silty sands. Based on our analyses, we computed a total potential seismic-induced subsidence of less than ¼-inch. Differential seismic settlement is estimated to be less than ¼-inch across a 40-foot span. As such, we consider the potential for seismic induced ground subsidence to adversely affect the planned project to be very low.

4.3 EARTHWORK

The earthwork anticipated at the project site will consist of clearing and grubbing, excavation of undocumented fills, loose natural soils and disturbed soils, excavations for basements, subgrade preparation, and the placement and compaction of fill.

4.3.1 Clearing and Grubbing

Prior to grading, the areas to be developed should be stripped of vegetation and cleared of debris. Buried obstructions, such as footings, utilities, and tree roots should be removed. Deleterious material generated during the clearing operation should be removed from the site. Inert demolition debris, such as concrete and asphalt may be crushed for reuse in engineered fills, in accordance with the criteria presented in the “Materials for Fill” section of this report.

Although not encountered during our investigation, leach lines, cesspools or septic systems encountered during grading should be removed in their entirety. The resulting excavation should be backfilled as recommended in the "Subgrade Preparation" and "Placement and Compaction of Fill" sections of this report. As an alternative, cesspools can be backfilled with lean sand-cement slurry. At the conclusion of the clearing operations, a GPI representative should observe and accept the site prior to further grading.

4.3.2 Excavations

Excavations at this site will include the subterranean excavation, removal of undocumented fill soils and upper loose natural soils, foundation excavations, and trenching for proposed utility lines.

Prior to placing fills or construction of the proposed building, undocumented fill and loose natural soils occurring within the proposed building pad area should be removed and replaced as properly compacted fill. For planning purposes, removals for the at-grade portion of the building should extend to depths of at least 4 feet below existing grades or 2 feet below the base of the planned foundations, whichever is deeper. For the subterranean level, overexcavation of the undisturbed natural soils is not anticipated to be required (i.e., footings may be established in the undisturbed natural soils). Based on the provided plans, we anticipate that sufficient space is available for deep excavations to be accomplished using open cuts. If site access is limited, temporary shoring may be required for supporting the vertical sides of the required excavations.

For minor structures such as site walls, removals should extend at least 3 feet below the existing grade or 1 foot below the base of foundations, whichever is deeper. In proposed pavement and hardscape areas, the existing near-surface soils should be removed to a depth of 1-foot below existing grades or finished subgrade, whichever is deeper, and replaced as properly compacted fill. Remedial earthwork removals are not anticipated for the planned swimming pool if undisturbed natural soils are exposed in the excavation.

The actual depths of removals should be determined in the field during grading by a representative of GPI.

The corners of the areas to be overexcavated should be accurately staked in the field by the Project Surveyor. The base of the excavations should extend laterally at least 5 feet beyond the outside edge of the perimeter foundations or a minimum distance equal to the depth of overexcavation/compaction below finish grade (i.e., a 1:1 projection below the top edge of footings), whichever is greater. This includes the footprint of the building and other foundation supported improvements, such as site walls and canopies.

Where not removed by the aforementioned excavations, existing utility trench backfill within building areas should be removed and replaced as properly compacted fill. This is especially important for deeper fills such as existing sewers and storm drains. For planning purposes, removals over the utilities should extend to within 1-foot of the top of the pipe. For utilities that are 3 feet or shallower, the removal should extend laterally 1-foot beyond both sides of the pipe. For deeper utilities, the removals should include a

zone defined by a 1:1 projection upward (and away from the pipe) from each side of the pipe. The actual limits of removal will be confirmed in the field. We recommend that all known utilities be shown on the grading plan.

Temporary construction excavations may be made vertically without shoring to a depth of 4 feet below adjacent grade for the existing natural soils. For cuts up to 12 feet deep, the entire cut should be properly shored or sloped back to at least 1:1 or flatter. For cuts up to 18 feet, the entire slope should be properly shored or sloped back at least 1¼:1 (horizontal to vertical) or flatter. Some raveling of the sandy deposits should be anticipated at the slope inclinations recommended. If raveling cannot be tolerated, flatter slope inclinations should be considered. The exposed slope face should be kept moist (but not saturated) during construction to reduce local sloughing.

In areas where removals are performed adjacent to property lines, existing streets, or other improvements where temporary slopes are not feasible, “ABC” slot cuts may be utilized instead of shoring. The slots should be no wider than 7 feet and no deeper than 8 feet and should be backfilled immediately to finish grade prior to excavation of the adjacent two slots on each side. Where localized dry, clean sand deposits are encountered, narrower slots may be required. We should review the plans for excavation adjacent to property lines and existing improvements when they are developed.

Surcharge loads should not be permitted within a horizontal distance equal to the height of cut from the top of the excavation or 5 feet from the top of the slopes, whichever is greater, unless the cut is properly shored. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of adjacent existing site facilities should be properly shored to maintain support of adjacent elements. Excavations and shoring systems should meet the minimum requirements given in the State of California Occupational Safety and Health Standards.

4.3.3 Subgrade Preparation

After the recommended removals are complete, the exposed subgrade soils should be scarified to a depth of 12 inches, moisture-conditioned, and compacted to at least 90 percent of the maximum dry density in accordance with ASTM D 1557. If encountered, subgrade processing should be omitted in the bedrock materials and in areas where very moist to wet soils are exposed. The exposed subgrade and footings for the subterranean portion of the building should be moisture conditioned and compacted to at least 90 percent prior to covering.

4.3.4 Material for Fill

The on-site soils are, in general, suitable for use as compacted fill. Although not anticipated, clay soils should not be placed as properly compacted fill within 2 feet of the finished grade in floor slab and hardscape areas or used as retaining wall backfill. Soils placed as retaining wall backfill should be granular and non-expansive. Such soils are anticipated to be available within the required excavations.

Imported fill material should be predominately granular (contain no more than 40 percent fines - portion passing No. 200 sieve) and non-expansive (E.I. less than 20). The import should also exhibit an R-value of at least 25 if used in proposed paved areas. GPI should be provided with a sample (at least 50 pounds) and notified of the location of soils proposed for import at least 72 hours prior to importing. Each proposed import source should be sampled, tested and accepted for use prior to delivery of the soils to the site. Soils imported prior to acceptance by GPI may be rejected if not suitable.

If open graded gravel is placed as backfill, we recommend that the gravel be placed in lifts and densified. The gravel should also be separated from the adjacent soil with a suitable filter fabric, such as Mirafi 140N or equivalent.

Both imported and existing on-site soils, to be used as fill, should be free of debris and pieces larger than 6 inches in greatest dimension.

4.3.5 Placement and Compaction of Fills

Fill soils should be placed in horizontal lifts, moisture-conditioned, and mechanically compacted to at least 90 percent of the maximum dry density in accordance with ASTM D 1557. Fill soils within the upper 1-foot of the pavement subgrade should be compacted to at least 95 percent. The optimum lift thickness will depend on the compaction equipment used and can best be determined in the field. The following uncompacted lift thickness can be used as preliminary guidelines.

Plate compactors	4-6 inches
Small vibratory or static rollers (5-ton)	6-8 inches
Scrapers, heavy loaders, and large vibratory rollers	8-12 inches

The maximum lift thickness should not be greater than 12 inches and each lift should be thoroughly compacted and accepted prior to subsequent lifts.

The moisture contents of the existing near surface soils are near or slightly below optimum. The moisture content of the fill materials should be between 1 and 3 percent over optimum moisture conditions at the time of compaction. During backfill of excavations, the fill should be properly benched into the construction slopes as it is placed in lifts.

4.3.6 Shrinkage and Subsidence

Shrinkage is the loss of soil volume caused by compaction of fills to a higher density than before grading. Subsidence is the settlement of in-place subgrade soils caused by loads generated by large earthmoving equipment. For earthwork volume estimating purposes, an average shrinkage value of about 10 percent may be assumed for the near surface soils. Subsidence is expected to be less than 0.1 feet. These values are estimates only and exclude losses due to removal of vegetation or debris. Actual shrinkage and subsidence will depend on the types of earthmoving equipment used and should be determined during grading.

4.3.7 Trench/Wall Backfill

Utility trench and wall backfill should be mechanically compacted in lifts. Lift thickness should not exceed those values given in the "Compacted Fill" section of this report. Jetting or flooding of backfill materials should not be permitted. A representative of GPI should observe and test trench and wall backfill as they are placed.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. Slurry should also be used as backfill within the pipe zone for utilities that extend adjacent to and below building foundations. The slurry should contain 1½ sacks of cement per cubic yard and have a maximum slump of 5 inches.

4.3.8 Observation and Testing

A representative of GPI should observe excavations, subgrade preparation, and fill placement activities. Sufficient in-place field density tests should be performed during fill placement and in-place compaction to evaluate the overall compaction of the soils. Soils that do not meet minimum compaction requirements should be reworked and tested prior to placement of additional fill.

4.4 FOUNDATIONS

4.4.1 Foundation Type

The proposed structures may be supported on conventional isolated and/or continuous shallow footings or a mat foundation, provided the subsurface soils are prepared in accordance with the recommendations given in this report. Footings for the at-grade structures should be supported on properly compacted fill. Footings or a mat foundation for the subterranean level may be established in the undisturbed natural soils or properly compacted fill. The soils exposed in the subterranean foundation excavations should be moisture conditioned and compacted to at least 90 percent prior to placement of rebar and concrete.

4.4.2 Spread Footings

Bearing Capacities

Based on the shear strength and elastic settlement characteristics of the natural and recompacted on-site soils, a static allowable net bearing pressure of 4,000 pounds per square foot (psf) may be used for both continuous footings and isolated column footings. These bearing pressures are for dead-plus-live-loads, and may be increased one-third for short-term, transient, wind and seismic loading. The actual bearing pressure used may be less than the value presented above and can be based on economics and structural loads to determine the minimum width for footings as discussed below. The maximum edge pressures induced by eccentric loading or overturning moments should not be allowed to exceed these recommended values.

Minimum Footing Width and Embedment

The following minimum footing widths and embedments are recommended for the corresponding allowable bearing pressure.

STATIC BEARING PRESSURE (psf)	MINIMUM FOOTING WIDTH (inches)	MINIMUM FOOTING* EMBEDMENT (inches)
4,000	72	24
3,500	48	24
3,000	24	24
2,000	18	18
1,500	15	15

* Refers to minimum depth below lowest adjacent grade at the time of foundation construction.

A minimum footing width of 15 inches should be used even if the actual bearing pressure is less than 1,500 psf.

Estimated Settlements

Total static settlement of the more heavily loaded column foundations (800 kips) is expected to be on the order of 1- to 1¼-inch for footings established at the basement level and ½-inch for footings established at-grade. Maximum differential settlements between similarly loaded adjacent footings or along a 40-foot span of a continuous footing are expected to be on the order of ½- to ¾-inch. Potential seismic settlements should be added to these values when considering total settlements. As noted previously, seismic settlements are anticipated to be less than ¼ inch.

The following table presents anticipated static settlement values for near-grade and subterranean level footings and for various column loads.

COLUMN LOAD (kips)	SETTLEMENT (inch)	
	AT-GRADE FOOTINGS	SUBTERRANEAN FOOTINGS
120 (minimum)	¼ - ½	½
400 (average)	½	¾ - 1
800 (maximum)	½ - ¾	1 - 1¼

The differential settlement between the at-grade and subterranean supported portions of the building should be noted in designing settlement sensitive elements of the project, such as exterior facades and floor slabs. Structural joints/separations should be considered.

The above estimates assume that the recommended earthwork will be performed and that the footings will be sized in accordance with our recommendations.

Lateral Load Resistance

Soil resistance to lateral loads will be provided by a combination of frictional resistance between the bottom of footings and underlying soils and by passive soil pressures acting against the embedded sides of the footings. For frictional resistance, a coefficient of friction of 0.35 may be used for design. In addition, an allowable lateral bearing pressure equal to an equivalent fluid weight of 275 pounds per cubic foot may be used, provided the footings are poured tight against undisturbed natural or compacted fill soils. These values may be used in combination without reduction.

4.4.3 Mat Foundation

We understand that a mat foundation is being considered for the subterranean portion of the building to limit differential settlements to within tolerable limits. The allowable bearing pressure for a mat foundation is generally not the governing geotechnical design issue as compared to the anticipated settlement. We have been provided with estimated mat foundation pressures for the shear wall cores ranging from 2,400 to 2,800 pounds per square foot.

For the elastic design of the mat foundation, a modulus of subgrade reaction (k-value) of 60 pounds per cubic inch (pounds per square inch per inch of deflection) may be used. This value is for a 1-foot by 1-foot square loaded area and should be adjusted for the area of the mat foundation using appropriate elastic theory. Using generally accepted methods and our site-specific consolidation test results, we recommend using a value of 15 pci for the adjusted k-value in designing the mat foundation. The k-value may be increased by one-half for short-term, transient, wind and seismic loading. As previously discussed, we should be provided with the anticipated mat pressures when they are developed so that we can review and confirm the recommendations provided, as well as provide an estimate for the anticipated maximum static settlements for the mat foundations.

The allowable soil bearing pressure will be significantly greater than the average bearing pressures required for the mat foundation as discussed above. At localized areas of the mat, such as columns and point of load applications along exterior walls, a static allowable net bearing pressure of 4,000 pounds per square foot may be used. These allowable bearing pressures are for dead-plus-live loads, and may be increased one-third for short-term, transient, wind and seismic loading.

Based on a plot of the anticipated dead-plus-live load bearing pressures under the mat foundation provided by the Project Structural Engineer, we evaluated the resulting static settlements. Bearing pressures ranged from about 1,000 to 2,000 psf. We determined the resulting total static settlement of the mat to range from about ¾ inch at the perimeter to about 1¼ to 1½ inch at the center, with differential settlements of about ½ inch across spans of 40 feet.

4.4.4 Foundation Concrete

Prior testing of three samples by others at the site measured sulfate levels in the upper soils of less than 0.01 percent by weight for the upper sandy soils and 0.01 percent by weight for the deeper bedrock. In accordance with the 2016 CBC, foundation concrete should conform to the requirements outlined to the requirements outlined in ACI 318, Section 19.3 for a negligible level of soluble sulfate exposure for soil (category S0). Chloride contents were also less than 0.01 percent by weight, which is considered to be low (category C1).

4.4.5 Footing Excavation Observation

Prior to placement of steel and concrete, a representative of GPI should observe and approve foundation excavations. Footing excavations should be moistened immediately prior to concrete placement.

4.5 BUILDING FLOOR SLABS

Slab-on-grade floors should be supported on granular (sandy) non-expansive, compacted soils as discussed in the “Placement and Compaction of Fill” section. The on-site upper soils encountered are suitable for support of the slabs.

A moisture vapor retarder should be placed under slabs that are to be covered with moisture-sensitive floor coverings (wood, vinyl, tile, etc.). Currently, common practice is to use a 10 or 15 mil polyethylene product such as Stego Wrap for this purpose. Whether the concrete slab is placed directly on the vapor barrier or on a clean sand layer between the slab and vapor barrier is a decision for the Project Architect and General Contractor, as it is not a geotechnical issue. If covered by sand, the sand layer should be about 2 inches thick and contain less than 5 percent by weight passing the No. 200 sieve. Based on our explorations and laboratory testing, the soils at the site are not suitable for this purpose. The sand layer should be nominally compacted using light equipment. The sand placed over the vapor retarder should only be slightly moist. If the sand gets wet (for example as a result of rainfall or excessive moistening) it must be allowed to dry prior to placing concrete. Care should be taken to avoid infiltration of water into the sand layer after placement of the concrete slab, such as at slab cut-outs and other exposures. A sand layer is not required beneath the vapor retarder, but we take no exception if one is provided.

It should be noted that the material used as a vapor barrier is only one of several factors affecting the prevention of moisture accumulation under floor coverings. Other factors include maintaining a low water to cement ratio for the concrete used for the floor slab, effective sealing of joints and edges (particularly at pipe penetrations), and protecting the sand layer immediately under the slab from collecting water, such as through slab openings prior to construction of the roof. Ultimately, the transmission of water vapor can be reduced but not stopped completely. The manufacturer of the floor coverings should be consulted for establishing acceptable criteria for the condition of floor surface prior to placing moisture-sensitive floor coverings.

For lateral resistance design, a coefficient of friction value of 0.30 between the native sandy soils and concrete may be used.

4.6 LATERAL EARTH PRESSURES

Based on information provided, subterranean walls are planned for the majority of the proposed structure. The following recommendations are provided for retaining walls less than 15 feet in height. We recommend that walls be backfilled with non-expansive (Expansion Index of 20 of less) granular (no more than 40 percent passing No. 200 U.S. standard sieve) soils. The on-site claystone bedrock materials are not suitable for this backfill, but the on-site sands and silty sands would be suitable.

Active earth pressures can be used for designing walls that can yield at least ½-inch laterally in 10 feet of wall height under the imposed loads. For level backfill comprised of on-site or imported granular soils, the magnitude of active pressures are equivalent to the pressures imposed by a fluid weighing 35 pounds per cubic foot (pcf). This pressure may also be used for the design of temporary excavation support.

At-rest pressures should be used for restrained walls that remain rigid enough to be essentially non-yielding. At-rest pressures imposed by a fluid weighing 55 pounds per cubic foot should be used for drained granular backfill.

To account for seismic loads, an additional lateral earth pressure equal to 20 pcf (equivalent fluid pressure distribution) should be added to the above active pressure to result in a total lateral earth pressure of 55 pcf (active plus seismic). If walls are designed using the above at-rest pressure, total (static plus seismic) lateral earth pressure may be limited to that value.

Walls subject to surcharge loads should be designed for an additional uniform lateral pressure equal to one-third and one-half the anticipated surcharge pressure for unrestrained and restrained walls, respectively.

The wall backfill should be well-drained to relieve possible hydrostatic pressure or designed to withstand these pressures. A drain consisting of perforated pipe and gravel wrapped in filter fabric should be used. One cubic foot of rock should be used for each lineal foot of pipe. The fabric (non-woven filter fabric, Mirafi 140N or equivalent) should be lapped at the top. For the subterranean level, this drain line should be collected in a sump capable of pumping the water to a suitable discharge facility.

The Structural Engineer should specify the use of select, granular wall backfill on the plans. Wall footings should be designed as discussed in the "Foundations" section.

In addition to the above active pressure, if temporary shoring is planned to consist of soldier piles and lagging, an allowable passive value of 550 pcf, to a maximum of 5,500 psf, may be used. We should review shoring plans prior to construction.

4.7 CORROSIVITY

Resistivity testing of three representative samples of the on-site soils by others indicates that they are moderately corrosive to ferrous metals. We do not practice corrosion protection engineering. If corrosion protection recommendations are required, a corrosion engineer such as HDR should be consulted.

4.8 DRAINAGE

Positive surface gradients should be provided adjacent to structures so as to direct surface water run-off and roof drainage away from foundations and slabs toward suitable discharge facilities. Long-term ponding of surface water should not be allowed on pavements. We recommend that landscape planters be avoided immediately adjacent to the building. If planters are required, they should be provided with surface drains and planted with drought tolerant plants to reduce the potential for the infiltration of surface water beneath the building foundations and floor slab.

4.9 EXTERIOR CONCRETE AND MASONRY FLATWORK

Exterior concrete and masonry flatwork should be supported on non-expansive, compacted fill. Prior to placement of concrete, the subgrade should be prepared as recommended in "Subgrade Preparation" section. The use of clayey soils in the slab-subgrade should not be permitted.

4.10 PAVED AREAS

Based on the soils encountered, pavement design has been based on an assumed R-value of 25, which is consistent with the upper sandy soils encountered. R-value testing should be performed prior to construction of the pavement sections to confirm the preliminary design. The California Division of Highways Design Method was used for design of the recommended preliminary pavement sections. These recommendations are based on the assumption that the pavement subgrades will consist of existing near surface soils. The following pavement sections are recommended:

PAVEMENT AREA	TRAFFIC INDEX	SECTION THICKNESS (inches)	
		ASPHALT/PORTLAND CONCRETE	AGGREGATE BASE COURSE
Asphalt Concrete			
Automobile Parking	4.0	3.0	4.0
Automobile Drives	5.0	3.0	7.0
Truck Drives	6.0	3.5	9.0
Portland Cement Concrete			
Automobile Parking	4.0	6.0	4.0
Automobile Drives	5.0	6.5	4.0
Truck Drives	6.0	7.0	4.0

The concrete used for paving should have a modulus of rupture of at least 550 psi (equivalent to an approximate compressive strength of 3,700 psi at the time the pavement is subjected to traffic).

If the site is base paved prior to the start of building construction, the above pavement sections should be re-evaluated based on the anticipated construction traffic loads. A significant pavement design issue with base-paving a site before building construction is that localized areas, such as construction entry drives, staging areas, and delivery areas, will experience significantly higher construction traffic loads than the typical design traffic loads during the life of the project. As such, the asphalt pavement sections should be designed for higher Traffic Indexes, where impacted by construction traffic. Identifying areas of increased traffic loads requires input from the General Contractor, and is beyond the scope of our services. As an alternative, asphalt pavement areas can be designed using the higher construction traffic loads.

We recommend the following pavement sections for the project if base paving prior to building construction is planned:

PAVEMENT AREA	TYPICAL TRAFFIC INDEX	SECTION THICKNESS (inches)	
		ASPHALT/PORTLAND CONCRETE	AGGREGATE BASE COURSE
Asphalt Concrete			
Automobile Parking	4.0	4.0	5.0
Automobile Drives	5.0	4.0	7.0
Truck Drives	6.0	4.5	9.0

In areas where very high impact construction traffic loads are planned, such as the main construction entrance/exit and locations for concrete truck delivery, the above asphalt concrete section may still experience surface distress (stops and starts or sharp turning of heavily loads vehicles will tend to shove and tear the base-paved asphalt concrete). In these localized areas, an allowance should be made to remove and replace the asphalt concrete at the completion of building construction.

The pavement subgrade underlying the aggregate base should be properly prepared and compacted in accordance with the recommendations outlined under "Subgrade Preparation".

The pavement base course should be compacted to at least 95 percent of the maximum dry density (ASTM D 1557). Aggregate base should conform to the requirements of Section 26 of the California Department of Transportation Standard Specifications for Class II aggregate base (three-quarter inch maximum) or Section 200-2 of the Standard Specifications for Public Works Construction (Green Book) for untreated base materials (except processed miscellaneous base).

The above recommendations are based on the assumption that the base course and compacted subgrade will be properly drained. The design of paved areas should incorporate measures to prevent moisture build-up within the base course which can otherwise lead to premature pavement failure. For example, curbing adjacent to landscaped areas should be deep enough to act as a barrier to infiltration of irrigation water into the adjacent base course.

4.11 GEOTECHNICAL OBSERVATION AND TESTING

We recommend that a representative of GPI observe the earthwork during construction to confirm that the recommendations provided in our report are applicable during construction. The earthwork activities include grading, compaction of fills, subgrade preparation, pavement construction and foundation excavations. If conditions are different than expected, we should be afforded the opportunity to provide an alternate recommendation based on the actual conditions encountered.

5.0 LIMITATIONS

The report, exploration logs, and other materials resulting from GPI's efforts were prepared exclusively for use by Nexus Companies and their consultants in designing the proposed development. The report is not intended to be suitable for reuse on extensions or modifications of the project or for use on any project other than the currently proposed development, as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report are provided to contractors or included in specifications, it should be understood that they are provided for information only. This report cannot be utilized by another entity without the express written permission of GPI. This report is an instrument of our services and remains the property of GPI.

Soil deposits may vary in type, strength, and many other important properties between points of exploration due to non-uniformity of the geologic formations or to man-made cut and fill operations. While we cannot evaluate the consistency of the properties of materials in areas not explored, the conclusions drawn in this report are based on the assumption that the data obtained in the field and laboratory are reasonably representative of field conditions and are conducive to interpolation and extrapolation.

Furthermore, our recommendations were developed with the assumption that a proper level of field observation and construction review will be provided during grading, excavation, and foundation construction by GPI. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations. If construction phase services are performed by others, they must accept full responsibility (as Project Geotechnical Engineer) for all geotechnical aspects of the project, including this report.

Our investigation and evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable Geotechnical Engineers practicing in this area. No other representation, either expressed or implied, is included or intended in our report.

Respectfully submitted,
Geotechnical Professionals Inc.

Dylan J. Boyle, P.E.
Project Engineer

Paul R. Schade, G.E.
Principal

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0 2000 4000 FEET

BASE MAP REPRODUCED FROM MICROSOFT STREETS AND TRIPS (C. 2008)

GPI GEOTECHNICAL PROFESSIONALS, INC.

VIVANTE NEWPORT COAST

GPI PROJECT NO.: 2870.I | SCALE: 1" = 2000'

SITE LOCATION MAP

FIGURE 1

Attachment F

Operations & Maintenance (O&M) and Inspection Form

Operations and Maintenance (O&M) Plan

Water Quality Management Plan
for

Vivante

850/856 San Clemente Drive

Newport Beach, CA 92660

APN #442-261-17 & 05

Legal Project Description:

THE LAND REFERRED TO IN THIS COMMITMENT IS SITUATED IN THE CITY OF NEWPORT BEACH, IN THE COUNTY OF ORANGE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL A:
PARCEL 2, IN THE CITY OF NEWPORT BEACH, IN THE COUNTY OF ORANGE, STATE OF CALIFORNIA, AS SHOWN ON A MAP FILED IN BOOK 81, PAGES 8 AND 9 OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF ORANGE COUNTY, CALIFORNIA.

EXCEPTING THEREFROM ALL OIL, OIL RIGHTS, MINERALS, MINERAL RIGHTS, NATURAL GAS RIGHTS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER SAID LAND, AND THE RIGHT TO TRANSFER SAME, TOGETHER WITH ALL NECESSARY AND CONVENIENT RIGHTS TO EXPLORE FOR, DEVELOP, PRODUCE AND EXTRACT AND TAKE THE SAME, SUBJECT TO THE EXPRESS LIMITATION THAT ANY AND ALL OPERATIONS FOR THE EXPLORATION, DEVELOPMENT, EXTRACTION AND TAKING OF ANY OF SAID SUBSTANCES SHALL BE CARRIED ON AT LEVELS BELOW THE DEPTH OF FIVE HUNDRED (500) FEET FROM THE SURFACE OF SAID LAND BY MEANS OF WELLS, DERRICK, AND/OR OTHER EQUIPMENT FROM SURFACE LOCATIONS ON ADJOINING OR NEIGHBORING LAND, AND SUBJECT FURTHER TO THE EXPRESS LIMITATION THAT THE FOREGOING RESERVATION SHALL IN NO WAY BE INTERPRETED TO INCLUDE ANY RIGHT OF ENTRY IN AND UPON THE SURFACE OF SAID LAND, AS RESERVED BY THE IRVINE COMPANY, A CORPORATION ORGANIZED UNDER THE LAWS OF THE STATE OF WEST VIRGINIA IN A DEED RECORDED FEBRUARY 28, 1977 AS INSTRUMENT NO. 35908 IN BOOK 12085, PAGE 1561 OF OFFICIAL RECORDS.

PARCEL B:

PARCEL 2 AS SHOWN ON EXHIBIT "B" OF CITY OF NEWPORT BEACH LOT LINE ADJUSTMENT, NO. 95-3, RECORDED OCTOBER 31, 1995 AS INSTRUMENT NO. 19950483821 OF OFFICIAL RECORDS OF ORANGE COUNTY, CALIFORNIA, IN THE CITY OF NEWPORT BEACH, COUNTY OF ORANGE, STATE OF CALIFORNIA,

EXCEPTING THEREFROM ALL OIL, OIL RIGHTS, MINERALS, MINERAL RIGHTS, NATURAL GAS RIGHTS AND OTHER HYDROCARBONS BY WHATSOEVER NAME KNOWN, GEOTHERMAL STEAM, AND ALL PRODUCTS DERIVED FROM ANY OF THE FOREGOING, THAT MAY BE WITHIN OR UNDER LAND, TOGETHER WITH THE PERPETUAL RIGHT OF DRILLING, MINING, EXPLORING AND OPERATING THEREFOR, AND STORING IN AND REMOVING THE SAME FROM SAID LAND OR ANY OTHER LAND, INCLUDING THE RIGHT TO WHIPSTOCK OR DIRECTIONALLY DRILL AND MINE FROM LANDS OTHER THAN THE SAID LAND, OIL OR GAS WELLS, TUNNELS AND SHAFTS INTO, THROUGH OR ACROSS THE SUBSURFACE OF THE LAND, AND TO BOTTOM SUCH WHIPSTOCKED OR DIRECTIONALLY DRILLED WELLS, TUNNELS AND SHAFTS UNDER AND BENEATH OR BEYOND THE EXTERIOR LIMITS THEREOF, AND TO REDRILL, RETUNNEL, EQUIP, MAINTAIN, REPAIR, DEEPEN AND OPERATE ANY SUCH WELLS OR MINES, WITHOUT, HOWEVER, THE RIGHT TO DRILL, MINE, STORE, EXPLORE AND OPERATE THROUGH THE SURFACE OR THE UPPER 500 FEET OF THE SUBSURFACE OF LAND, AS RESERVED BY THE IRVINE COMPANY, A MICHIGAN CORPORATION IN A DEED RECORDED NOVEMBER 22, 1995 AS INSTRUMENT NO. 19950519960 OF OFFICIAL RECORDS.

ALSO EXCEPTING THEREFROM ANY AND ALL WATER, WATER RIGHTS OR INTERESTS, THEREIN APPURTENANT OR RELATING TO THE LAND OR OWNED OR USED BY THE IRVINE COMPANY IN CONNECTION WITH OR WITH RESPECT TO THE LAND (NO MATTER HOW ACQUIRED BY THE IRVINE COMPANY), WHETHER SUCH WATER RIGHTS SHALL BE RIPARIAN, OVERLYING, APPROPRIATIVE, LITTORAL, PERCOLATING, PRESCRIPTIVE, ADJUDICATED, STATUTORY OR CONTRACTUAL, TOGETHER WITH THE RIGHT AND POWER TO EXPLORE, DRILL, REDRILL, REMOVE AND STORE THE SAME FROM OR IN THE LAND OR TO DIVERT OR OTHERWISE UTILIZE SUCH WATER, RIGHTS OR INTERESTS, ON ANY OTHER PROPERTY OWNED OR LEASED BY THE IRVINE COMPANY; BUT WITHOUT, HOWEVER, ANY RIGHTS TO ENTER UPON THE SURFACE OF THE LAND IN THE EXERCISE OF SUCH RIGHTS, AS RESERVED BY THE IRVINE COMPANY, A MICHIGAN CORPORATION IN THE DEED RECORDED NOVEMBER 22, 1995 AS INSTRUMENT NO. 19950519960 OF OFFICIAL RECORDS.

PARCEL B-I:

AN APPURTENANT NON-EXCLUSIVE JOINT ACCESS EASEMENT FOR ACCESS, INGRESS AND EGRESS OVER THAT PORTION OF PARCEL 1 AS SHOWN ON EXHIBIT "B" OF CITY OF NEWPORT BEACH LOT LINE ADJUSTMENT N0. 95-3 RECORDED OCTOBER 31, 1995 AS INSTRUMENT NO. 19950483821 OF OFFICIAL RECORDS, AS MORE FULLY DESCRIBED IN THE DECLARATION OF EASEMENTS RECORDED OCTOBER 31, 1995 AS INSTRUMENT NO. 19950484848 OF OFFICIAL RECORDS, DESCRIBED AS FOLLOWS:

BEGINNING AT THE MOST SOUTHERLY SOUTHEASTERLY CORNER OF SAID PARCEL 1; THENCE NORTHERLY ALONG THE EASTERLY PARCEL LINE OF SAID PARCEL 1 NORTH 07° 03' 01" WEST 55.00 FEET; THENCE SOUTH 82° 56' 59" WEST 65.00 FEET; THENCE SOUTH 07° 03' 01" EAST 55.00 FEET TO A POINT ON THE MOST SOUTHERLY LINE OF SAID PARCEL 1, SAID POINT BEING ALSO ON THE MOST NORTHERLY RIGHT OF WAY LINE OF SAN CLEMENTE DRIVE; THENCE EASTERLY ALONG SAID SOUTHERLY LINE AND SAID RIGHT OF WAY LINE NORTH 82° 56' 59" EAST 65.00 FEET TO THE POINT OF BEGINNING.

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Non-Structural Source Control BMPs			
Yes	**N1. Education for Property Owners, Tenants and Occupants** The property owner shall prepare a training manual for all existing and future employees. The manual shall include information regarding proper practices that contribute to the protection of the stormwater quality. Training shall be provided upon hire of new associates. A copy of the training manual shall remain in the building at all times for employees to use as needed. The manual shall include all Educational Material included on Attachment A of this report. Additional education material may be found in the following website: http://www.ocwatershed.com/PublicEd/resources/business-brochures.html	Quarterly	Owner
Yes	**N2. Activity Restriction** The property owner shall ensure that the rules and guidelines as determined on the project conditions, covenants and restrictions (CC&R's) and lease terms or other policies are followed at all times once the project is operations. Prohibited activities for the project that promoted water quality includes: • Prohibit discharges of fertilizer, pesticides, or animal wastes to streets or storm drains. • Prohibit blowing or sweeping of debris (leaf litter, grass clippings, litter, etc.) into streets or storm drains. • Requirement to keep dumpster lids closed at all times. • Prohibit vehicle washing, maintenance, or repair on the premised or restrict those activities to designated areas.	Continual	Owner

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N3. Common Area Landscape Management** Specific practices are followed for landscape maintenance as identified on the COA landscape specification included in Attachment G. Ongoing maintenance is conducted to minimize erosion and over-irrigation, conserve water and reduce pesticide and fertilizer applications. All maintenance must be consistent with the City of Newport Beach requirements. Proper maintenance practices should help reduce and/or eliminate pollution from pesticides, nutrients, trash/debris and sediments. The project common area landscape maintenance should be consistent with the following documents included in Attachment A: • Building and Ground Maintenance Guidelines • Housekeeping practices • Plaza and sidewalk cleaning • Landscape maintenance	Weekly	Owner

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N4. BMP Maintenance** Bio-Filtration Planter Areas • Visual Inspection for trash and debris accumulation and dispose of any trash and debris accumulation. • Inspect for standing water, and vegetation condition per the specifications included in the manual. • When the system is not functioning (standing water, lack of infiltration), replace the bio-filtration media and inspect the condition of the gravel underdrain to ensure adequate flow rates through the bio-filtration system.	Prior to and following the rainy season After each rain event	Owner
Yes	**N5. Title 22 CCR Compliance** Hazardous waste shall be managed properly trough compliance with applicable title 22 regulations. Storage and transportation of hazardous materials shall be per the title 22 of the California Code of Regulations and the Health and Safety Code.	Continual	Owner
No	**N7. Spill Contingency Plan**		
No	**N8. Underground Storage Tank Compliance**		

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N9. Hazardous Materials Disclosure Compliance** The Owner is responsible for obtaining the required permits for the use and transportation of hazardous materials. Permits may be required from the County of Orange Health Department, City of Newport Beach, and other local authorities.	Continual	Owner
Yes	**N10. Uniform Fire Code Implementation** The Owner is responsible for complying with the Orange County Fire Authority requirements regarding proper management of hazardous materials and emergency response plans. An inventory of hazardous materials should be maintained on-site and an emergency response plans should be established.	Continual	Owner
Yes	**N11. Common Area Litter Control** The Owner will be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The Owner may contract with their landscape maintenance firm to provide this service with regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations and reporting the violations to the Owner for investigation.	Continual	Owner
Yes	**N12. Employee Training**	Quarterly	Owner
No	**N13. Housekeeping of Loading Docks**		

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N14. Common Area Catch Basin Inspection** The Owner must ensure that the on-site drain inlets, grates, and drain pipes will be periodically inspected visually. Cleaning should take place in the late summer/early fall prior to the start of the rainy season. If necessary, clean, repair, or replace any drainage facility prior to the start of each rainy season (no later than October 15 of each year). Also refer to "Drainage System Maintenance" in Attachment A.	Continual -Before and after predicted storm events	Owner
Yes	**N15. Street Sweeping Private Streets and Parking Lots** The Owner must sweep outdoor lots regularly (minimum monthly), and prior to the storm season (no later than October 15 each year). Sweeping shall be done with a vacuum-type sweeper. Under no circumstances are outdoor areas/lots to be rinsed or washed with water unless said rinse/wash water is collected and disposed of properly (i.e. into the sewer).	Monthly	Owner
No	**N17. Retail Gasoline Outlets**		
Structural Source Control BMPs			
No	**Provide Storm Drain System Stenciling and Signage** All catch basins/inlets/outlets on site must be marked using the City's "No Dumping – Drains to Ocean" curb marker or stenciled. An approved stencil shall be used to paint this message on the top of curb directly above the inlet, and on one side of the curb face. Labeling for catch basins is to be inspected regularly and maintained so as to be reasonably legible at all times. The inspection and maintenance is to be performed by the Owner. This stencil is to alert the public/employees to the destination of pollutants discharged into the storm water.	Annual	Owner

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	**Design and Construct Outdoor Material Storage Areas to Reduce Pollutant Introduction**		
Yes	**Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction** The owner shall post signs on trash enclosure gates that state "Keep Dumpster Lids Closed." The Owner will monitor dumpster usage such that dumpsters are not overfilled and the dumpster lids can close completely. The Owner shall increase the trash pickup schedule as necessary to prevent dumpsters from overfilling. The Owner will observe and damage to the trash enclosure wall and any discharge from the trash storage area.	Continual	Owner
Yes	**Use Efficient Irrigation Systems & Landscape Design** All irrigation systems will be inspected to ensure that the systems are functioning properly and that the programmable timers are set correctly.	Weekly	Owner
No	**Protect Slopes and Channels and Provide Energy Dissipation**		
No	**Loading Docks**		
No	**Maintenance Bays**		
No	**Vehicle Wash Areas**		
No	**Outdoor Processing Areas**		

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	**Equipment Wash Areas**		
No	**Fueling Areas**		
No	**Hillside Landscaping**		
No	**Wash Water Controls for Food Preparation Areas**		
No	**Community Car Wash Racks**		
Treatment Control BMPs			

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**Modular Wetland System (MWS) Linear**	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). See additional information on manufacturer maintenance specifications.	Owner.

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**FloGard Catch Basin Filter Insert**	Inspect basin for any illegal dumping (notify authoritis if illegal dumping is appearent) -Using an industrial vacum, remove collected materials from the liner. -Remove filter pocuhes and inspected and replaced as necessary. -See manufacturer specificationfor addittional information. Inspections shall occur a minimum of three time per year, with a change of filter media once per year.	Owner.

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
	Storm Capture Underground Basin	Inpsect inlets contributing to system and clear Debris. -Check for sediment within the module. Anything over 6″ deep shall be removed manually or mechanically (vcamun is recommended) -See appendix F with manufacturer specifciations for additional information Inpsect quarterly and following significant storm wvents within the first year of operation.	Onwer

Oldcastle Precast®

FLOGARD+PLUS®
CATCH BASIN INSERT FILTER

Inspection and Maintenance Guide

DRAINAGE PROTECTION SYSTEMS
DPS
A division of
Oldcastle Precast

Stormwater

SCOPE:

Federal, State and Local Clean Water Act regulations and those of insurance carriers require that stormwater filtration systems be maintained and serviced on a recurring basis. The intent of the regulations is to ensure that the systems, on a continuing basis, efficiently remove pollutants from stormwater runoff thereby preventing pollution of the nation's water resources. These specifications apply to the FloGard+Plus® Catch Basin Insert Filter.

RECOMMENDED FREQUENCY OF SERVICE:

Drainage Protection Systems (DPS) recommends that installed FloGard+Plus Catch Basin Insert Filters be serviced on a recurring basis. Ultimately, the frequency depends on the amount of runoff, pollutant loading and interference from debris (leaves, vegetation, cans, paper, etc.); however, it is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. DPS technicians are available to do an onsite evaluation, upon request.

RECOMMENDED TIMING OF SERVICE:

DPS guidelines for the timing of service are as follows:

1. For areas with a definite rainy season: Prior to, during and following the rainy season.
2. For areas subject to year-round rainfall: On a recurring basis (at least three times per year).
3. For areas with winter snow and summer rain: Prior to and just after the snow season and during the summer rain season.
4. For installed devices not subject to the elements (washracks, parking garages, etc.): On a recurring basis (no less than three times per year).

SERVICE PROCEDURES:

1. The catch basin grate shall be removed and set to one side. The catch basin shall be visually inspected for defects and possible illegal dumping. If illegal dumping has occurred, the proper authorities and property owner representative shall be notified as soon as practicable.
2. Using an industrial vacuum, the collected materials shall be removed from the liner. (Note: DPS uses a truck-mounted vacuum for servicing FloGard+Plus catch basin inserts.)
3. When all of the collected materials have been removed, the filter medium pouches shall be removed by unsnapping the tether from the D-ring and set to one side. The filter liner, gaskets, stainless steel frame and mounting brackets, etc., shall be inspected for continued serviceability. Minor damage or defects found shall be corrected on-the-spot and a notation made on the Maintenance Record. More extensive deficiencies that affect the efficiency of the filter (torn liner, etc.), if approved by the customer representative, will be corrected and an invoice submitted to the representative along with the Maintenance Record.
4. The filter medium pouches shall be inspected for defects and continued serviceability and replaced as necessary and the pouch tethers re-attached to the liner's D-ring. See below.
5. The grate shall be replaced.

REPLACEMENT AND DISPOSAL OF EXPOSED FILTER MEDIUM AND COLLECTED DEBRIS

The frequency of filter medium exchange will be in accordance with the existing DPS-Customer Maintenance Contract. DPS recommends that the medium be changed at least once per year. During the appropriate service, or if so determined by the service technician during a non-scheduled service, the filter medium will be replaced with new material. Once the exposed pouches and debris have been removed, DPS has possession and must dispose of it in accordance with local, state and federal agency requirements.

DPS also has the capability of servicing all manner of storm drain filters, catch basin inserts and catch basins without inserts, underground oil/water separators, stormwater interceptors and other such devices. All DPS personnel are highly qualified technicians and are confined space trained and certified. Call us at (888) 950-8826 for further information and assistance.

FLOGARD+PLUS®
CATCH BASIN INSERT FILTER

OUR MARKETS

BUILDING STRUCTURES

COMMUNICATIONS

WATER

ENERGY

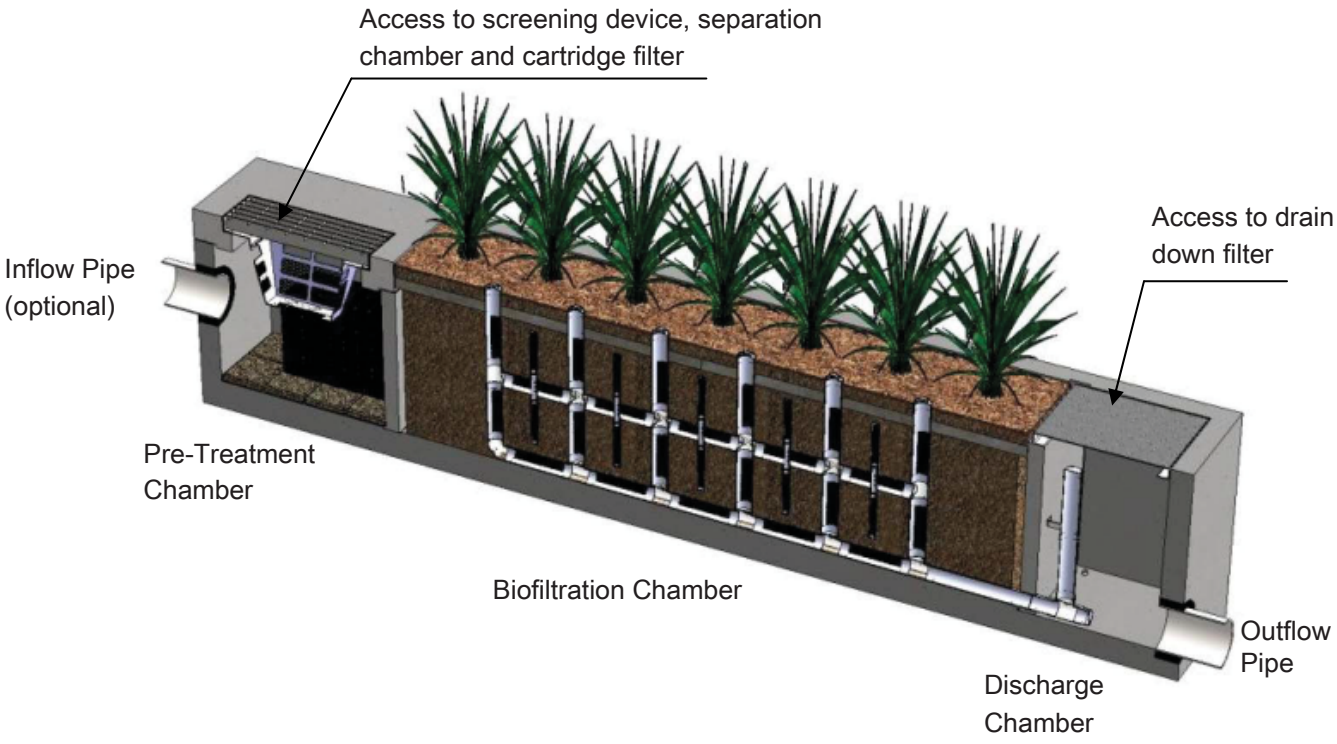
TRANSPORTATION

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



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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.

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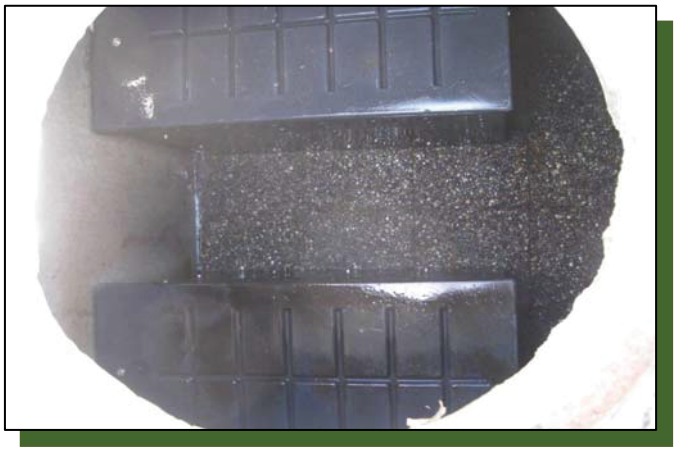
Cartridge Filters

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.

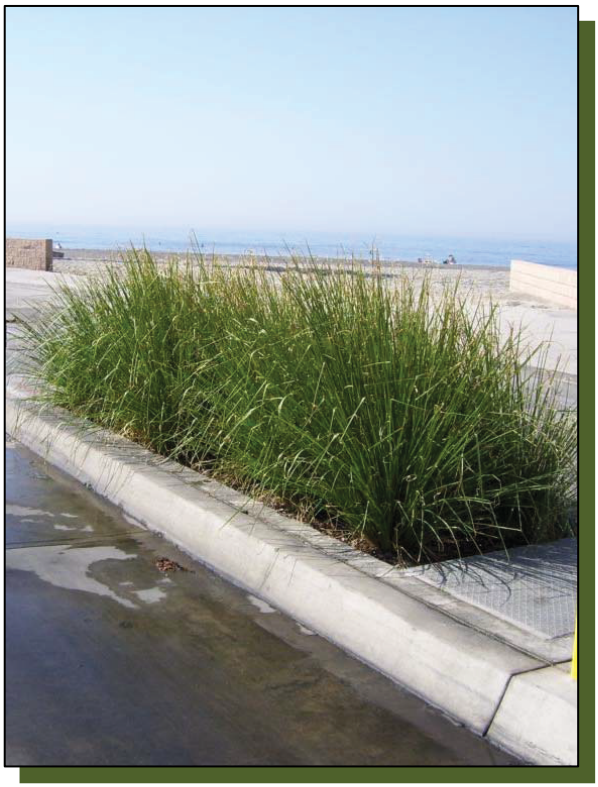


Drain Down Filter

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: _____

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

Maintenance Report

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www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

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

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

Weather Condition _____ Additional Notes _____

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

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

Comments:

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STORMCAPTURE®

Inspection and Maintenance Guide

Stormwater

General

Inspection and maintenance of the StormCapture system is vital for the satisfactory performance and life cycle of the stormwater management system. Permit requirements, local, state and federal regulations, along with Oldcastle and any incorporated device manufacturer recommendations must be followed for system compliance. The StormCapture design provides manway access for ease of inspection and debris removal if required. Flushing, which can cause particle displacement, undermining and internal disturbance, is not recommended for gravel foundation, open bottom systems. Flushing is acceptable in systems with concrete bases. Inlet controls, internal or external, are recommended for controlling, monitoring and maintaining the StormCapture system.

External Inlets are typically devices that are separate from the StormCapture modules. These external devices receive site stormwater and are designed with manway access for maintenance and typically include an internal sump for sediment capture. External inlets may receive single or multiple pipes and incorporate an open grated top with an outfall pipe to the StormCapture system. Grated inlets may incorporate protection devices or baffles to capture floatables or the "first flush". Scheduled inspections and maintenance shall include the removal of any sedimentation build up in the external inlets. Debris or sedimentation build up shall not exceed 3" below an outfall elevation. Internal components may be incorporated for pre-treatment. Manufacturer recommendations must be followed. Scheduled maintenance and inspection will include removal of debris and sediments by manual or mechanical means.

Maintenance Modules (MM's) are optional internal control modules based on design preference. MM's are modules with roof manway access openings and provide the primary means of access to the StormCapture system for scheduled inspection and maintenance. In addition, MM's may incorporate weirs or baffles to enhance reduction or removal of Total Suspended Solids (TSS) from the stormwater. Placement of internal components must be part of the system engineering and design. Grated inlets can be incorporated to accommodate surface stormwater flows into the StormCapture and may include an inlet protection device. Schedule inspection and manufacturer recommendations for maintenance must be followed.

For open bottom systems (no concrete floor), concrete splash pads may be installed below inlet grate openings and pipe inlets to prevent base erosion. During scheduled inspection and maintenance activities, the concrete splash pads must be inspected for proper function and any sediment shall be removed. Standard StormCapture module design incorporates lateral and longitudinal passageways between modules to accommodate internal stormwater conveyance between modules. These passageways may be of a window configuration with standard 12" tall sediment baffles below the windows extending from the internal module invert, or doorway configurations extending from the floor slab. Any sediment and debris build up over 6" deep inside a module shall be removed by manual or mechanical means. Removal by vacuum is recommended. Internal module flushing, which can cause particle displacement, undermining or internal disturbance, is prohibited.

Inspection Frequency

Oldcastle recommends that the StormCapture system be inspected quarterly, and following any significant rain events within the first year of operation. Standard Operating Procedures shall specify an annual inspection and maintenance plan as required thereafter or as stated in the permit, or as required by other governing regulations. **Only authorized and trained personnel shall inspect and enter a StormCapture system.** Personnel must be properly trained and equipped before entering any underground or confined space structure. Training includes being familiar with and following any local, state and federal regulations governing the operation, inspection and maintenance of underground structures, as well as specific StormCapture system requirements.

Inspection Activities

During inspection, a minimum of the following shall be inspected:

- Contributing drainage area inlets are clear of debris.
- If the StormCapture system is an exfiltration system (open bottom with stormwater percolating into the ground), monitor and confirm that the system drains completely within a reasonable time or the required permit time.
- Sediment depths within modules (anything over 6" deep shall be removed as outlined above).
- Inlet and outlet pipe penetrations to check for movement and/or leakage.
- Movement of modules.
- General interior condition of modules to look for concrete cracking or deterioration.
- Condition of pre-treatment devices, baffles and polishing devices if part of the system.

Recordkeeping

A log must be kept of all inspection and maintenance activities.

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Required Permits

No permits are required.

Forms to Record BMP Implementation, Maintenance, and Inspection

The form that will be used to record implementation, maintenance, and inspection of BMPs is attached.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed