CUP 1930

County of Orange/Santa Ana Region Priority Project

Preliminary Water Quality Management Plan (PWQMP)

Project Name:

Shopoff Development (Euclid and Heil), Fountain Valley , CA

NE CORNER OF EUCLID STREET AND HEIL AVENUE, CA 92708
APN#: 144-111-01

Prepared for:

Shopoff Realty Investments, L.P.

18565 Jamboree Road, Suite 200
Irvine, CA 92612
(949) 417-1396

Prepared by:

Kimley-Horn and Associates, Inc.

1100 Town and Country Road, Suite 700
Orange, CA 92868
(714) 939-1030

Date Prepared: December 2023
Revised: November 2024; January 2025; March 2025; May 2025, June 2025

Kimley»Horn

Project Owner's Certification			
Planning Application No. (If applicable)	CUP 1930	Grading Permit No.	Precise Plan 579
Tract/Parcel Map and Lot(s) No.	2024-103	Building Permit No.	N/A
Address of Project Site and APN: 16300 Euclid Street, Fountain Valley, CA 92708			APN: 144-111-01

This Water Quality Management Plan (WQMP) has been prepared for Shopoff by Kimley-Horn and 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.

Representation on the Authority of Parties/Signatories. Each person signing this Agreement represents and warrants that he or she is duly authorized and has legal capacity to execute and deliver this Agreement. Each Party represents and warrants to the other that the excution and delivery of the Agreement and the performance of such party's obligations hereunder have been duly authorized and that the Agreement is a valid and legal agreement binding on such party and enforceable in accordance with its terms. This agreement is binding on any successors in interest, designees or transferees. Attach proof of authority to execute this agreement.

Owner: Shopoff Realty Investments, L.P.			
Title	Blair Ruffner, Senior Development Manager		
Company	Shopoff Realty Investments, L.P.		
Address	18565 Jamboree Road, Suite 200 Irvine, CA 92612		
Email	bruffner@shopoff.com		
Telephone #	(949) 769-6713		
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): Jason Marechal			
Title	Associate	PE Registration #	63164
Company	Kimley-Horn & Associates, Inc.		
Address	1100 Town and Country Rd Suite 700, Orange, CA 92868		
Email	Jason.Marechal@kimley-horn.com		
Telephone #	(714) 705-1305		
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	6/04/2025
Place Stamp Here			

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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. (If applicable)	CUP 1930	Grading or Building Permit No. (If applicable)	Precise Plan 579
Address of Project Site (or Tract Map and Lot Number if no address) and APN	NE Corner of 16300 EUCLID STREET, FOUNTAIN VALLEY, CA 92708		

Water Quality Conditions of Approval or Issuance	
Water Quality Conditions of Approval or Issuance applied to this project. (Please list verbatim.)	Conditions of approval shall be provided upon approval. The project is subject to the water quality conditions set forth per City of Fountain Valley Municipal Code (21.18.120 Storm water and urban runoff management), which requires all new development and significant redevelopment projects comply with the requirements of the County of Orange Drainage Area Management Plan (DAMP).

Conceptual WQMP	
Was a Conceptual Water Quality Management Plan previously approved for this project?	No

Watershed-Based Plan Conditions	
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	**East Garden Grove Wintersburg Channel** 303(d): Ammonia. No TMDLs listed. **Bolsa Bay Marsh**: 303(d): Toxicity. No TDMLs listed. **Huntington Harbour**: 303(d): Chlordane, Copper, Indicated Bacteria, Lead, PCBs, Toxicity No TDMLs listed.

Section II Project Description

II.1 Project Description

Provide a detailed project description including:

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

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

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td>Development Category (From Model WQMP, Table 7.11-2; or -3):</td><td colspan="4">Project Priority – Category 1: New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the Permittees.</td></tr>
<tr><td>Project Area (AC): 18.64 AC
Disturbed Area 18.09 AC</td><td colspan="2">Number of Dwelling Units:
• Apartments: 387
• Multifamily: 183
• Single Family: 36</td><td colspan="2">SIC Code: 6513, 6514</td></tr>
<tr><td rowspan="2">Project Area</td><td colspan="2">Pervious</td><td colspan="2">Impervious</td></tr>
<tr><td>Area
(acres or sq. ft)</td><td>Percentage</td><td>Area
(acres or sq. ft)</td><td>Percentage</td></tr>
<tr><td>Pre-Project Conditions</td><td>18.64 * 0.95 = 17.71 AC</td><td>95%</td><td>18.64 * 0.05 = 0.93 AC</td><td>5%</td></tr>
<tr><td>Post-Project Conditions</td><td>18.09 * 0.20 = 3.62 AC (0.55 Acres are dedicated to the City for street widening)</td><td>20%</td><td>18.09 * 0.80 = 14.47 AC</td><td>80%</td></tr>
</table>

Drainage Patterns/Connections	The site is flat with an elevation of 48-ft at the north-east corner and elevation 45-ft at the south-west corner. Existing site runoff flows from the north to the south toward Heil Avenue. There is an existing ditch along Heil Ave. that conveys the runoff to the west toward an existing catch basin located at the Heil and Euclid intersection (Outfall A). The existing catch basin is connected to a 24—inch storm drain line that discharges in the Mile Square Park channel and ultimately drains into the East Garden Grove Wintersburg Channel. Miles Square Park channel is concrete line and stabilized. A small portion of the site runoff will be directed easterly towards an existing catch basin located in the southeast area of the site on Heil Avenue (Outfall B). There is currently no storm drain within Heil Ave. between Euclid St. and Sugarloaf St. The project site is not located within flood hazardous location. The site is located within Zone X, a 1% annual chance flood hazard. The East Garden Grove Wintersburg Channel is part of the Anaheim Bay/Huntington Harbor watershed which drains to the Pacific Ocean. The East Garden Grove Wintersburg Channel is on the State's 303(d) list of impaired water bodies with Ammonia listed as a pollutant. There are no TMDLs listed. The site is to be developed into two separate maintenance entities, one for the "For-Sale" and the other for the apartment development. Both the "For-Sale" and apartment storm drain systems will connect to the existing catch basin located on Euclid St. and Heil Ave. A Storm Drain Extension in Heil Avenue will be required to provide a connection for the "For-Sale" portion of the site. In the proposed condition, storm water will need to be detained in underground detention storage units prior to being pumped to the existing catch basin. Stormwater mitigation is needed to ensure the proposed flows do not negatively impact the existing downstream drainage facilities. The proposed flows that will be mitigated through detention tanks to match the existing flows. A separate Hydrology and Hydraulic report has been prepared for this project, providing detailed information regarding the size of the detention tank. Due to the shallow groundwater conditions, flow-based modular wetland systems were used for water quality purposes.

Narrative Project Description: (Use as much space as necessary.)	In accordance with the recently adopted General Plan Update and City initiated change of zone, the project site has a General Plan Land Use Designation of High Density Residential (15 to 30 du/ac) and the zoning is R-4 High Density Multiple Dwelling (30 units/acre). The project site will be developed from a previous agricultural use into a residential community with a variety of living accommodations including townhomes, triplexes, and apartments. The project proposes common open space amenities and ingress and egress along Heil Avenue. The site will be subdivided into a 14.00-acre parcel for townhomes and triplexes and 4.09-acre parcel for apartments. The City has recently adopted a General Plan Update which included an amendment of the General Plan land use designation of the site to High Density Residential (up to 30 dwelling units/acre) and a Zone Change to R4 High Density Multiple Dwelling zoning district. The applicant will submit a preliminary housing application pursuant to Senate Bill SB 330, and Planning and Development Application. The anticipated entitlements are a Conditional Use Permit, Precise Plan, Vesting Tentative Parcel Map, and associated environmental analysis. The proposed project includes the development of the existing 18.64 acres and the widening of Heil creates a net total site area of 18.09 acres. 0.55 acres will be dedicated for Heil street widening that will be maintained by City of Fountain Valley. The project site will be developed from agricultural land into a residential community with a variety of living accommodations including small lot single family detached units (SFD), townhomes, and apartments. The project proposes two parks and four points of ingress and egress. JZMK Partners has developed a site plan for the "For-Sale" component of the site and has incorporated Architect Orange's (AO) design for the multifamily wrap product along with an Affordable Housing Component. It is understood that the "For-Sale" portion of the proposed site and apartments will ultimately be developed as separate projects. It is expected that the proposed site will need to discharge fully into the existing catch basin at the west. The new widened road will channelize flow through curb and gutter and also discharge fully into the existing catch basin at the west. Per the geotechnical investigation, the site has historic groundwater levels of 4-ft below ground surface (bgs) and encountered ground water levels of 6-ft (bgs). Because groundwater levels are so high, it is assumed that infiltration will be infeasible. As noted above, the site is to be developed into two separate maintenance entities. This project is located within Region 8 of the State Water Resources Control Board (SWRCB). This Water Quality Management Plan (WQMP) will comply with the requirements of the North Orange County Permit. The Orange County Model WQMP guidelines states that a new development project that creates 10,000 square feet or more of impervious area is a Priority Project. If a project is considered Priority Project, then preparation of a WQMP Report will be required. Hydrologic Conditions of Concern (HCOC) exists when a site's hydrologic regime is altered and there are significant impacts on downstream storm drain facilities. This involves retaining onsite the excess volume of runoff from storm events. The WQMP will outline the treatment of low flow

runoff prior to entering the public storm drain. Treatment of the runoff for Priority Projects will follow a hierarchy of treatment options. The first criteria are infiltration. Infiltration is not feasible based on the Leighton and Associates findings that groundwater was encountered at depths between 5.9 and 6.4 (bgs). Harvest and Use is the second method of the treatment hierarchy. Reclaimed water mains exist on Euclid Street and Heil Avenue and will supply the projects irrigation demand. The third item in the hierarchy is evapotranspiration. For this project there will not be enough trees to provide a non-negligible reduction to the stormwater design volume. Biotreatment may only be considered if infiltration, harvest and use, and evapotranspiration cannot be feasibly implemented for the full design capture. Infiltration, harvest and use, and evapotranspiration practices must be implemented to the greatest extent feasible and biotreatment may be provided for the remaining design capture volume. This project will utilize biotreatment such as modular wetland catch basins for the treatment of the low flow runoff. The brochure for the Modular Wetlands Linear Catch basin is provided in Appendix J as an option to the type of BMP to be provided. These catch basins will be provided throughout the "For-Sale" portion of the site. The multifamily will have its own separate WQMP due to separate future ownership and maintenance considerations. A bio treatment vault structure will be designed and incorporated into the WQMP report.

The offsite portion of the project will also have Modular Wetland systems proposed to treatment the offsite improvement flows.

II.2 Potential Stormwater Pollutants

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

Pollutants of Concern			
Pollutant	**Check One for each: E=Expected to be of concern**	**N=Not Expected to be of concern**	**Additional Information and Comments**
Suspended-Solid/ Sediment	E ☒	N ☐	Expected for all proposed development types.
Nutrients	E ☒	N ☐	Expected for all proposed development types.
Heavy Metals	E ☐	N ☒	
Pathogens (Bacteria/Virus)	E ☒	N ☐	Expected for all proposed development types.
Pesticides	E ☒	N ☐	Expected for all proposed development types.
Oil and Grease	E ☒	N ☐	Expected for all proposed development types.
Toxic Organic Compounds	E ☐	N ☒	
Trash and Debris	E ☒	N ☐	Expected for all proposed development types.

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 (Appendix D)

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

Based on *Susceptibility Analysis Anaheim Bay – Huntington Harbor* Map from *Figure XVI.3: North Orange County Hydromodification Susceptibility Maps in the Technical Guidance Document (TGD) for North Orange County*

II.4 Post Development Drainage Characteristics

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

As noted above, the post development drainage conditions include the site draining to the existing storm water inlet located at the corner of Euclid St. and Heil Ave. The storm drainage eventually drains to the East Garden Grove Wintersburg Channel which drains to Bolsa Bay Marsh, Huntington Harbor, and the Pacific Ocean.

Existing Infrastructure: Storm Drain inlet located at the corner of Euclid St. and Heil Ave.

II.5 Property Ownership/Management

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

The project area is owned by Shopoff Realty Inverstments. Infrastructure to be transferred to public agencies is not expected on the site. The formation of a homeowner's association is unknown currently.

Section III Site Description

III.1 Physical Setting

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

Name of Planned Community/Planning Area (if applicable)	Euclid and Heil Site
Location/Address	Corner of Euclid and Heil in the City of Fountain Valley, Orange County, CA.
	16300 Euclid Street, Fountain Valley, CA 92708
General Plan Land Use Designation	Low Density Residential General Plan
Zoning	R1 – Single-Family Residential (5 units/acre – 0.5 FAR)
Acreage of Project Site	18.09 AC
Predominant Soil Type	A (See Appendix B, Figure XVI-2a in the TGD)

III.2 Site Characteristics

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

Site Characteristics	
Precipitation Zone	0.75" (See Appendix B, Figure XVI-1 in the TGD)
Topography	Flat, sloping generally to the Southwest
Drainage Patterns/Connections	The site is flat with an elevation of 48-ft at the north-east corner and elevation 45-ft at the south-west corner. Existing site runoff

	flows from the north to the south toward Heil Avenue. There is an existing ditch along Heil Ave. that conveys the runoff to the west toward an existing catch basin located at the Heil and Euclid intersection (Outfall A). The existing catch basin is connected to a 24—inch storm drain line that discharges in the Mile Square Park channel and ultimately drains into the East Garden Grove Wintersburg Channel. Miles Square Park channel is concrete line and stabilized. A small portion of the site runoff will be directed easterly towards an existing catch basin located in the southeast area of the site on Heil Avenue (Outfall B). There is currently no storm drain within Heil Ave. between Euclid St. and Sugarloaf St. The project site is not located within flood hazardous location. The site is located within Zone X, a 1% annual chance flood hazard. The East Garden Grove Wintersburg Channel is part of the Anaheim Bay/Huntington Harbor watershed which drains to the Pacific Ocean. The East Garden Grove Wintersburg Channel is on the State's 303(d) list of impaired water bodies with Ammonia listed as a pollutant. There are no TMDLs listed. The site is to be developed into two separate maintenance entities, one for the "For-Sale" and the other for the apartment development. Both the "For-Sale" and apartment storm drain systems will connect to the existing catch basin located on Euclid St. and Heil Ave. A Storm Drain Extension in Heil Avenue will be required to provide a connection for the "For-Sale" portion of the site. In the proposed condition, storm water will need to be detained in underground detention storage units prior to being pumped to the existing catch basin. Stormwater mitigation is needed to ensure the proposed flows do not negatively impact the existing downstream drainage facilities. The proposed flows that will be mitigated through detention tanks to match the existing flows. A separate Hydrology and Hydraulic report has been prepared for this project, providing detailed information regarding the size of the detention tank. Due to the shallow groundwater conditions, flow-based modular wetland systems were used for water quality purposes.

Soil Type, Geology, and Infiltration Properties	Orange County Hydrology Manual depicts soils type A. Infiltration is not feasible based on the Leighton and Associates findings that groundwater was encountered at depths between 5.9 and 6.4 (bgs).
Hydrogeologic (Groundwater) Conditions	North Orange County Mapped Depth to First Groundwater indicates 5 feet depth to first groundwater and North Orange County Mapped Shallow Groundwater indicates a shallow groundwater <= 5 feet.
Geotechnical Conditions (relevant to infiltration)	Infiltration is not feasible based on the Leighton and Associates findings that groundwater was encountered at depths between 5.9 and 6.4 (bgs). The near surface (upper 5 feet) onsite soils consist predominantly of sand and silty sand. The laboratory test result of representative near-surface (upper 5 feet) bulk soil sample indicates very low expansion potential when wetted (EI = 0), or non-expansive. Accordingly, Leighton and Associates recommend that the upper onsite soils be assumed to have very low expansion potential. Leighton and Associates identified the project site is located within an area that has been identified by the State of California as being potentially susceptible to liquefaction. Based on the evaluation using the Maximum Considered Earthquake (MCE) and a design groundwater level of 4 feet (bgs) for the CPTs performed at the site, the potential for liquefaction to occur at the site is very high.
Off-Site Drainage	The existing site is approximately 18.64 acres and consists of agricultural land. The site is fairly flat with an elevation of 48-ft at the north-east corner and elevation 45-ft at the south-west corner. Existing site runoff flows from the north-east to the south-west and terminates into a street catch basin located on the corner of Heil and Euclid. The site is bordered by Single-Family residential at the North and East, and developed streets to the West and South. It is not anticipated that any off-site flows will contribute drainage onsite.
Utility and Infrastructure Information	Existing water, sewer, storm, reclaimed water and gas, and telecommunications lines exist within Euclid and Heil Ave. There is an existing overhead electrical line that feeds an existing onsite pump system.

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).*

Receiving Waters	East Garden Grove Wintersburg Channel, Bolsa Bay Marsh, Huntington Harbor, Pacific Ocean
303(d) Listed Impairments	East Garden Grove Wintersburg Channel: Ammonia Bolsa Bay Marsh: Toxicity Huntington Harbor: Chlordane, Copper, PCBs (Polychlorinated biphenyls), Toxicity, Lead, Indicator Bacteria
Applicable TMDLs	N/A
Pollutants of Concern for the Project	Suspended Solid/Sediment, Nutrients, Pathogens, Pesticides, Oil and Grease, and Trash and Debris (*Table 2.1 of the TGD,* based on proposed land use: *Attached Residential Development*)
Environmentally Sensitive and Special Biological Significant Areas	N/A

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

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

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

(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?	YES ☐	NO ☒

Project Performance Criteria	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	N/A
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	• Biotreat, on-site, additional runoff, as feasible, up to 80 percent average annual capture efficiency (cumulative, retention plus biotreatment)
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Since it is not feasible to meet LID performance criteria through infiltration this project will utilize biotreatment such as modular wetland catch basins for the treatment of the low flow runoff.
Calculate LID design storm capture volume for Project.	LID Volume capture per Worksheet B provided for DA 1 and DA 2. DA 1: d=0.75 inches A=4.09 acres Imp=0.80 C= 0.75 V=8,351 CF

	DA 2: d=0.75 inches A=14.00 acres Imp=0.80 C= 0.75 V=28,586 CF ***DCV calculations provided for reference only. Project proposes Flow-based BMPs. See Section IV.2.

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.

See Attachment E for calculations and Attachment H for the WQMP site plan. The calculations are based on the parameters below. High groundwater levels cause infiltration BMPs to be infeasible. Limited surface area due to building set backs limit the use of structural BMPs such as biofiltration. As a result, proprietary Modular Wetlands have been sized and proposed as part of the storm drain inlet design.

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

Area	% Impervious	C	I (in/hr)	A (acres)	Q (cfs)	Selected Modular Wetland	Modular Wetland Allowable Q	Lat/Long
Apartment Side (DA-1 ; 4.09 AC)								
DMA-1	80.0%	0.75	0.26	1.40	0.273	MWS-L-8-12	0.346	33.724964, -117.936832
DMA-2	80.0%	0.75	0.26	1.56	0.304	MWS-L-8-16	0.462	33.724626, -117.936836
DMA-3	80.0%	0.75	0.26	0.63	0.123	MWS-L-6-8	0.147	33.724315, -117.936872
DMA-4	80.0%	0.75	0.26	0.50	0.098	MWS-L-4-8	0.115	33.723883, -117.936019
For Sale Side (DA-2; 14.00AC)								
DMA-1	80.0%	0.75	0.26	2.46	0.480	MWS-L-8-16, MWS-L-4-6	0.535	33.724260, -117.933245 33.724703, -117.933219
DMA-2	80.0%	0.75	0.26	2.12	0.413	MWS-L-4-19 (2), MWS-L-4-6 (2)	0.620	33.724260, -117.933245 33.724158, -117.933263 33.723831, -117.933352 33.723826, -117.933469
DMA-3	80.0%	0.75	0.26	2.23	0.435	MWS-L-4-19 (2), MWS-L-4-6	0.547	33.724283, -117.934511 33.724156, -117.934477 33.723826, -117.934512
DMA-4	80.0%	0.75	0.26	2.32	0.452	MWS-L-4-19 (2), MWS-L-4-6	0.547	33.724320, -117.934718 33.724155, -117.934752 33.723825, -117.934700
DMA-5	80.0%	0.75	0.26	3.74	0.729	MWS-L-4-17 (4)	0.824	33.724568, -117.935538 33.724505, -117.935529 33.724310, -117.935635 33.724306, -117.935534
DMA-6	80.0%	0.75	0.26	1.13	0.220	MWS-L-4-21	0.268	33.725201, -117.936722
Offsites								
DMA - O1	90.0%	0.825	0.26	1.24	0.269	MWS-L-8-12	0.346	33.723766, -117,936917
DMA - O2	90.0%	0.825	0.26	0.12	0.026	MWS-L-4-4	0.052	33.723775 -117.932888

**Q=CIA*

IV.3 LID BMP Selection and Project Conformance Analysis

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

IV.3.1 Hydrologic Source Controls (HSCs)

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

Name	Included?
Localized on-lot infiltration	☐
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)	☐

A description of the use or non-use of each HSC follows:

Localized on-lot infiltration: Infiltration is infeasible due to shallow ground water.

Impervious area dispersion (e.g. roof top disconnection): The overall project density is incompatible with typical rooftop disconnection.

Street trees (canopy interception): Significant canopy coverage is not proposed on-site.

Residential rain barrels (not actively managed): The overall project types of apartments and townhome configurations do not provide adequate space for rain barrels with easy access for regular maintenance.

Green roofs/Brown roofs: Green roofs are not feasible in this construction type

Blue roofs: Blue roofs are not feasible in this consturction type.

Impervious area reduction (e.g. permeable pavers, site design): Due to the overall site density, impervious area reduction is not proposed

HSC's will not be calculated as part of this project design. Proprietary biotreatment will be used as described in Section IV.3.4.

IV.3.2 Infiltration BMPs

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

Name	Included?
Bioretention without underdrains	☐
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	☐

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

Infiltration is infeasible due to shallow ground water.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

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

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

There is insufficient on-site landscape area and plumbing fixtures to implement rainwater harvesting. The required Water Quality flow rate will be treated with biotreatment such as modular wetland catch basins for the treatment of the low flow runoff.

IV.3.4 Biotreatment BMPs

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

Name	Included?
Bioretention with underdrains	☐
Stormwater planter boxes with underdrains	☐
Rain gardens with underdrains	☐
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated biotreatment systems	☒
Wet extended detention basin	☐
Dry extended detention basins	☐

Due to the observed shallow ground water, infiltration is not feasible. Proprietary biotreatment BMPs are the likely feasible biotreatment BMP. Proprietary BMPs shall be those that are independently certified and tested by public agencies, including the State of Washington or an equivalent nationally recognized certification. The sizing of biofiltration BMPs shall accommodate the treatment flow rates outlined in Section IV.2 of this report.

IV.3.5 Hydromodification Control BMPs

Area is not located in HCOC.

IV.3.6 Regional/Sub-Regional LID BMPs

No regional or sub-regional LID BMPs are available or proposed.

IV.3.7 Treatment Control BMPs

Treatment control BMPs are not proposed for this project, since bioreatment fully treates the DCV.

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)	☐	☒	Hazardous waste is not anticipated onsite.
N6	Local Industrial Permit Compliance	☐	☒	Industrial uses are not proposed on site.
N7	Spill Contingency Plan	☐	☒	Hazardous waste is not anticipated onsite.
N8	Underground Storage Tank Compliance	☐	☒	
N9	Hazardous Materials Disclosure Compliance	☐	☒	Hazardous waste is not anticipated onsite.
N10	Uniform Fire Code Implementation	☐	☒	Hazardous waste is not anticipated onsite.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	Loading Docks are not part of the site plan.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	

N16	Retail Gasoline Outlets	☐	☒	Retail gasoline outlets are not anticipated on the site.

Implementation of Non-Structural BMPS

N1. Education of Property Owners, Tenants and Occupants.

Responsible Party for Implementation of BMP: Property Owner's Association.

Implementation Frequency: Ongoing. Orientation shall be given to new owners, tenants, and occupants within 30 days of startup.

Educational material and information shall be provided by the property owner to new owners/tenants/occupants on general good housekeeping BMPs and other practices that contribute to protection of storm water quality. This WQMP shall be provided with emphasis placed on the materials included in, but not limited to, Sections N, V, VI and VII of this report. For additional information, see the BMP Maintenance Responsibility /Frequency Matrix in Section V. Educational Materials to be used include, but are not limited to, SC-10, Non-Stormwater Discharges, SC-34, Waste Handling & Disposal, SC-41, Building & Grounds Maintenance, SC-43, Parking/Storage Area Maintenance, and The Ocean Begins at Your Front Door. In addition to the attachments, the following resource can be contacted to obtain updated educational information free of charge http://ocwatersheds.com/PublicEd. See Table V-1 in Section V for inspection and maintenance activity requirements.

N2. Activity Restrictions.

Responsible Party for Implementation of BMP: Property Owner's Association.

Implementation Frequency: Daily management of operation. Orientation shall be given to new owners, tenants, and occupants within 30 days of startup. Refreshing orientation shall be given annually.

Onsite activities shall be restricted to those currently granted by the City of Fountain Valley and as stated in the Conditions, Covenants, and Restrictions (CCRs), which will be available in the near future. Parking restrictions include, but are not limited to, provisions regulating vehicle and truck deliveries, vehicle and truck parking, loading and unloading activities, etc. Some other common restrictions to be adhered to are as follows:

- No discharges of fertilizer, pesticides, and wastes to streets or storm drains
- No blowing or sweeping of debris into streets or storm drains
- No hosing down of paved surfaces
- No vehicle washing or maintenance.

- Do not perform paint cleanup activities in paved areas or allow rinse water from these activities to enter the storm drain system. Clean brushes containing water-based paint in a sink that is connected to the sanitary sewer system.
- Do not use detergents or other chemical additives when washing concrete sidewalks or building exteriors, use potable water only and collect wash water runoff using a vacuum truck, for proper offsite disposal.
- Keep premises, as well as trash container areas, free of litter. See Table V -1 in Section V for inspection and maintenance activity requirements.

In addition, onsite activities shall be limited to the requirements of this WQMP as described herein.

N3. Common Area Landscape Management.

Responsible Party for Implementation of BMP: Property Owner's Association.

Implementation Frequency: Landscape areas shall be maintained on a weekly basis through Grounds and Maintenance personnel.

All maintenance shall be consistent with the City of Fountain Valley Municipal Code General guidelines include the following: Plant vegetation that reduces water, fertilizer, herbicide, and pesticide use. Waste shall be disposed of by composting or at a permitted landfill and shall not be raked or blown into the street, gutter, or storm drains. Irrigation systems shall be inspected monthly for leaks. Leaks shall be repaired as soon as they are observed. Avoid over-watering of vegetation. If excessive runoff is observed, automatic timers shall be adjusted. Fertilizers, herbicides, and pesticides shall be used as directed on the label. If fertilizer is spilled on a paved surface it should be swept up immediately and placed in its container. Water shall not be used to clean fertilizer spills unless necessary and only after the area has been thoroughly cleaned using dry cleaning methods. Pesticides, herbicides, and fertilizers shall not be applied within 48 hours prior to rain or if wind speeds exceed 5 mph. For additional information, see Help Prevent Ocean Pollution - Proper Maintenance Practices for Your Business included in Section VII of this report. Also refer to BMP SC-41, Building & Grounds Maintenance, included in Section VII and the BMP Maintenance Responsibility /Frequency Matrix in Section V for details.

N4. BMP Maintenance.

Responsible Party for Implementation of BMP: Property Owner's Association.

Implementation Frequency: Individual BMPs shall be inspected based on the required frequency of each BMP as suggested in the Maintenance Responsibility /Frequency Matrix. See the BMP Maintenance Responsibility /Frequency Matrix in Section V for details.

N8. Underground Storage Tank Compliance

Responsible Party for Implementation of BMP: Property Owner's Association.

Implementation Frequency: Individual BMPs shall be inspected based on the required frequency of each BMP as suggested in the Maintenance Responsibility /Frequency Matrix. See the BMP Maintenance Responsibility /Frequency Matrix in Section V for details.

N11. Common Area Litter Control

Responsible Party for Implementation of BMP: Property Owner's Association.

Implementation Frequency: On a weekly basis through a maintenance firm.

To reduce the likelihood of polluting storm water runoff, regular maintenance will be conducted. This will consist of, at a minimum, site-wide litter control, emptying of trash receptacles in common areas, sweeping of dumpster enclosure areas, and reporting trash disposal violations to the owner or POA for investigation. The landscape maintenance may be contracted for common area litter control as well. See Table V-1 in Section V for inspection and maintenance activity requirements. Trash enclosures will include roofs.

N12 Employee Training

Responsible Party for Implementation of BMP: Property Owner's Association.

Implementation Frequency: Education of applicable employees for the tenants shall continue an ongoing basis and shall be done within 30 days of startup. Each new applicable onsite employee shall be given a water quality orientation within 30 days of hire using this WQMP Report as a reference. At a minimum, each applicable onsite employee shall have an annual review of the provisions of the WQMP Report for this project

See Table V -1 in Section V for inspection and maintenance activity requirements.

N14. Common Area Catch Basin Inspection.

Responsible Party for Implementation of BMP: Property Owner's Association.

Implementation Frequency: Twice a month to remove debris and after every major storm event.

The site's proposed drainage is picked up in catch basins at various places and is transported underground to the main storm drain. These catch basins are to be maintained minimum of once a year.

N15. Street Sweeping Private Streets and Parking Lots.

Responsible Party for Implementation of BMP: Property Owner's Association.

Implementation Frequency: Twice a month to remove debris.

The Property Owners' Association shall be responsible for sweeping the surrounding parking lot on a regular basis to remove debris. At minimum, the streets and parking lots will be required to be swept prior to the storm season, in late summer or early fall, prior to the start of the rainy season, or equivalent as required by the governing jurisdiction. For additional information, see BMP SC-34, Waste Handling and · Disposal and BMP SC-43, Parking/Storage Area Maintenance, included in Section VII, and the BMP Maintenance Responsibility /Frequency Matrix in Section V.

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	☐	☒	Outdoor storage areas are not anticipated on the 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	☐	☒	
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☐	N/A – North OC template.
S6	Dock areas	☐	☒	Uncovered dock areas are not anticipated
S7	Maintenance bays	☐	☒	Maintenance bays are not anticipated.
S8	Vehicle wash areas	☐	☒	Vehicle wash areas are not anticipated.
S9	Outdoor processing areas	☐	☒	Outdoor processing areas are not anticipated.
S10	Equipment wash areas	☐	☒	Equipment wash areas are not anticipated.
S11	Fueling areas	☐	☒	Fueling areas are not anticipated.

S12	Hillside landscaping	☐	☒	Hillsides are not anticipated.
S13	Wash water control for food preparation areas	☐	☒	No restaurants are anticipated.
S14	Community car wash racks	☐	☒	Community car wash racks are not anticipated.

Implementation of Structural BMPs

S1. Storm Drain System Stenciling and Signage

Phrase "No-Dumping- Drains to Oceans" or equally effective phrase is to be placed on each catch basin and storm drain inlet to inform the public of the destination of pollutants discharged into stormwater. Catch basin signage shall be inspected for legibility no less than once per year. The catch basin stencil shall be kept onsite. The stencils must be repainted when they become illegible but at a minimum once every five years. See BMP SD-13, Storm Drain Signage, in Section VII for more information.

S3. Design and construct trash and waste storage areas

The trash storage areas will be paved with an impervious surface. No drainage will be directed toward the trash areas and the enclosures will be walled and/or gated on all four sides to minimize spillage of trash into the Site. For additional information, see BMP SD-32, Trash Storage Areas, in Section VII.

Storm drain inlets near or adjacent to trash enclosures must be checked and cleared of debris on a regular basis, and before and after storms.

S4. Use efficient irrigation systems & landscape design

The proposed landscape and irrigation system shall group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration and shall comply with the Fountain Valley Municipal Code. Monthly inspection of the irrigation system shall be conducted to insure efficient water uses. See BMPs SC-41, Building and Grounds Maintenance, SD-10, Site Design and Landscape Planning, and SD-12, Efficient Irrigation, in Section VII.

IV.4 Alternative Compliance Plan (If Applicable)

IV.4.1 Water Quality Credits

<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">Not Applicable</td></tr>
</table>

IV.4.2 Alternative Compliance Plan Information

No alternative compliance plan is being proposed because no Water Quality Credits are being applied.

Section V Inspection/Maintenance Responsibility for BMPs

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Non-Structural Source Control BMPs			
N1. Education for Property Owners, Tenants and Occupants	Property Management Association	Educational material shall be provided to all employees and tenants.	Upon Tenant Occupancy
N2. Activity Restriction	Property Management Association	The owner shall develop activity restrictions to minimize the threat of hazardous waste or contamination into the storm drainage system. Car washing is not allowed on-site at any time.	Monthly
N3. Common Area Landscape Management	Property Management Association	Training on landscape management consistent with County Water Conservation Resolution or City equivalent, plus Management Guidelines for Fertilizers (DAMP Section 5.5) shall be conducted for all new field landscape maintenance personnel.	Weekly
N4. BMP Maintenance	Property Management Association	Maintenance of BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP.	Per Manufacturer's Recommendation - See Attachment G
N11. Common Area Litter Control	Property Management Association	Litter patrol, violations investigation, reporting and other litter control activities shall be performed in conjunction with maintenance activities.	Daily

N12. Employee Training	Property Management Association	Education programs shall be implemented as they apply to future employees and training of current employees.	Yearly for all employees and within 6 months of hire date for new employees.
N14. Common Area Catch Basin Inspection	Property Management Association	Litter and debris removal, illicit discharge violations investigation and reporting shall be performed in conjunction with maintenance activities.	Minimum of once a year prior to rainy season.
N15. Street Sweeping Private Streets and Parking Lots	Property Management Association	Private streets and parking area within the project shall be swept at a minimum frequency of once a month.	Monthly
Structural Source Control BMPs			
S1. Provide Storm Drain System Stenciling and Signage	Property Management Association	All proposed inlets shall be marked with the appropriate "No Dumping. Drains to Ocean." Stencil. The stencils must be repainted when they become illegible, but at a minimum once every five years.	Yearly
S3. Design and construct trash and waste storage areas to reduce pollution introduction	Property Management Association	The trash storage areas will be paved with an impervious surface. No drainage will be directed toward the trash areas and the enclosures will be walled and/or gated on all four sides to minimize spillage of trash into the Site. For additional information, see BMP SD-32, Trash Storage Areas, in Section VII.	Storm drain inlets near or adjacent to trash enclosures must be checked and cleared of debris on a regular basis, and before and after storms.
S4. Use efficient Irrigation Systems & Landscape Design	Property Management Association	Verify that landscape design continues to function properly by correctly adjusting to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, and day or night time temperatures.	Monthly

Low Impact Development (LID) and Treatment Control BMPs			
Modular Wetlands	Property Management Association	Inspect soil media and replace bi-annually or as needed. Inspect and remove trash and debris from outlet pipe twice a year.	Per Manufacturer's Recommendation - See Attachment G
Underground Detention System	Property Management Association	Inspect and clean isolation row from sediment.	Bi-Annual

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) 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	☒	Bioclean Product Information	☒
Tips for Pest Control	☒	Tips For Landscape and Gardening	☒
Landscape Maintenance	☒	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☒		☐
Household Tips	☒	Other Material	Check If Attached
Proper Disposal of Household Hazardous Waste	☒		
Proper Maintenance Practices for Your Business	☐		☐
SC-10 Non-Stormwater Discharge	☒		☐
SC-30 Outdoor Loading/Unloading	☐		☐
SC-34 Waste Handling and Disposal	☒		☐
SC-41 Building and Grounds Maintenance	☒		☐
SC-43 Parking/Storage Area Maintenance	☒		☐
SC-44 Drainage System Maintenance	☒		☐
SC-70 Road and Street Maintenance	☒		☐
SD-10 Site Design and Landscape Planning	☒		☐
SD-12 Efficient Irrigation	☒		☐
SD-13 Storm Drain Signage	☒		☐
SD-32 Trash Storage Areas	☒		☐
SD-34 Outdoor Material Storage Areas	☐		☐

ATTACHMENT A

303d LIST OF IMPAIRED WATER BODIES

Final California 2018 Integrated Report (303(d) List/305(b) Report)

Supporting Information

Regional Board 8 - Santa Ana Region

Water Body Name: **Bolsa Bay Marsh**
Water Body ID: **CAE8011100019991012164616**
Water Body Type: **Estuary**

DECISION ID	**94571**	**Region 8**
Bolsa Bay Marsh		

Pollutant: **Toxicity**
Final Listing Decision: **List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision: List on 303(d) list (TMDL required list)(2016)
Revision Status Original
Sources: A Source Unknown
Expected TMDL Completion Date: 2027
Impairment from Pollutant or Pollution: Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section 3.6 of the Listing Policy. Under section 3.6 at least one line of evidence is necessary to assess listing status for toxicity, and waters may be placed on the CWA section 303(d) List for toxicity alone.

Two lines of evidence are available in the administrative record to assess this pollutant.
Two of the seven samples exhibited sediment toxicity.
Five of the twelve samples exhibited water toxicity.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification in favor of placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Two of the seven samples exhibited sediment toxicity and this exceeds the allowable frequency listed in Table 3.1 of the Listing Policy. Five of the twelve samples exhibited water toxicity and this exceeds the allowable frequency listed in Table 3.1 of the Listing Policy.

	4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should be placed on the section 303(d) list because applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94571, Toxicity **Region 8**

Bolsa Bay Marsh

LOE ID:	81263
Pollutant:	Toxicity
LOE Subgroup:	Toxicity
Matrix:	Water
Fraction:	None
Beneficial Use:	Marine Habitat
Number of Samples:	12
Number of Exceedances:	5
Data and Information Type:	TOXICITY TESTING
Data Used to Assess Water Quality:	Twelve samples were collected to evaluate water toxicity. Five of the twelve samples exhibited significant toxicity. The toxicity tests that exhibited significant toxicity included Mysid biomass and survival and Purple Urchin fertilized.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health. The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	Toxicity is defined as a statistically significant effect in the sample exposure compared to the control using EPA-recommended hypothesis testing. The t-test is used to determine if there is a statistically significant decrease in organism response in the sample as compared to the control. Exceedances are counted with the significant effect code SL. SL is defined as the result being significant compared to the negative control based on a

	statistical test, less than stated the alpha level, AND less than the evaluation threshold.
Guideline Reference:	Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95-136.
Spatial Representation:	The samples were collected at station TGDC05 Bolsa Bay.
Temporal Representation:	The samples were collected from 2006 to 2009.
Environmental Conditions:	
QAPP Information:	The data collected under the Quality Assurance Management Plan for The Orange County Stormwater Program. The SWAMP measurement quality objectives were followed for toxicity data. The performance of toxicity bioassays and evaluation of reference toxicants were performed using USEPA and Standard Methods.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 94571, Toxicity **Region 8**

Bolsa Bay Marsh

LOE ID:	81264
Pollutant:	Toxicity
LOE Subgroup:	Toxicity
Matrix:	Sediment
Fraction:	None
Beneficial Use:	Marine Habitat
Number of Samples:	7
Number of Exceedances:	2
Data and Information Type:	TOXICITY TESTING
Data Used to Assess Water Quality:	Seven samples were collected to evaluate sediment toxicity. Two of the seven samples exhibited significant toxicity. The toxicity tests included survival of Eohaustorius.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health. The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	Toxicity is defined as a statistically significant effect in the sample exposure compared to the control using EPA-recommended hypothesis testing. The t-test is used to determine if there is a statistically significant decrease in organism response in the sample as compared to the control. Exceedances are counted with the significant effect code SL. SL is defined as the result being significant compared to the negative control based on a statistical test, less than stated the alpha level, AND less than the evaluation threshold.

Guideline Reference:	Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods. June 1994. EPA 600/R-94/025
Spatial Representation:	The samples were collected at station TGDC05 Bolsa Bay.
Temporal Representation:	The samples were collected approximately twice a year from 2006 to 2009.
Environmental Conditions:	
QAPP Information:	The data collected under the Quality Assurance Management Plan for The Orange County Stormwater Program. The SWAMP measurement quality objectives were followed for toxicity data. The performance of toxicity bioassays and evaluation of reference toxicants were performed using USEPA and Standard Methods.
QAPP Information Reference(s):	

Final California 2018 Integrated Report (303(d) List/305(b) Report)

Supporting Information

Regional Board 8 - Santa Ana Region

Water Body Name: **East Garden Grove Wintersburg Channel**
Water Body ID: **CAR8011100020080924142217**
Water Body Type: **River & Stream**

DECISION ID **93129** **Region 8**
East Garden Grove Wintersburg Channel

Pollutant: **Arsenic**
Final Listing Decision: **Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision: Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status Original
Impairment from Pollutant or Pollution: Pollutant

Regional Board Conclusion: This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status.

One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:	After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 93129, Arsenic **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	81447
Pollutant:	Arsenic
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the fifteen samples exceeded the criteria for arsenic.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in freshwater. The CTR for arsenic is 150 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).
Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County

Stormwater Program.

QAPP Information Reference(s):

DECISION ID	94130	Region 8
East Garden Grove Wintersburg Channel		

Pollutant:	**Cadmium**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status.

One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:

After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94130, Cadmium **Region 8**
East Garden Grove Wintersburg Channel

LOE ID:	81448
Pollutant:	Cadmium
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the fifteen samples exceeded the hardness adjusted criteria for cadmium.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in freshwater. The dissolved criterion in freshwater is hardness dependent for each sample and varies based on the ambient hardness during sampling. Section (b)(1) in CTR contains the hardness dependent formula for the metals criterion. If no hardness data were available, a value of 100 mg/L was used.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).
Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 94131 **Region 8**
East Garden Grove Wintersburg Channel

Pollutant:	**Chlorpyrifos**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**

Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status. One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fourteen (12) samples exceed the aquatic life beneficial use criterion. Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List. This conclusion is based on the staff findings that: 1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy. 2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy. 3. Zero (0) of the fourteen (14) samples exceed the beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1. 4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94131, Chlorpyrifos **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	81449
Pollutant:	Chlorpyrifos
LOE Subgroup:	Pollutant-Water
Matrix:	Water

Fraction:	Total Dissolved
Beneficial Use:	Estuarine Habitat
Number of Samples:	12
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	Zero of 12 samples exceed the continuous concentration (four day average) for chlorpyrifos in saltwater is 9.0 ng/L. However, three samples had a reporting limit higher than 9 ng/L rendering them unusable fore assessment purposes.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The Criteria Continuous Concentration (four day average) for chlorpyrifos in saltwater is 9.0 ng/L.
Guideline Reference:	Water quality criteria for diazinon and chlorpyrifos. Administrative Report 00-3. Rancho Cordova, CA: Pesticide Investigations Unit, Office of Spills and Response. CA Department of Fish and Game
Spatial Representation:	Samples were collected at site TGDC05.
Temporal Representation:	Samples were collected from 2006 through 2009.
Environmental Conditions:	
QAPP Information:	Data were submitted with the County of Orange Stormwater Program Quality Assurance Management Plan (QAMP) dated January 2010. The Regional Water Board has determined that equivalent QA/QC documentation exists within the Water Quality Monitoring and Reporting Program for the Orange County MS4 permit and appendix C-11- X of the 2008-09 monitoring report.
QAPP Information Reference(s):	Quality Assurance Project Plan for the Orange County Stormwater Program.

DECISION ID 94132 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Chromium**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status.

One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94132, Chromium **Region 8**
East Garden Grove Wintersburg Channel

LOE ID: 81450

Pollutant: Chromium
LOE Subgroup: Pollutant-Water
Matrix: Water
Fraction: Dissolved

Beneficial Use: Warm Freshwater Habitat

Number of Samples: 15
Number of Exceedances: 0

Data and Information Type: Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality: None of the fifteen samples exceeded the hardness adjusted criteria for chromium.

Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in freshwater. The dissolved criterion in freshwater is hardness dependent for each sample and varies based on the ambient hardness during sampling. Section (b)(1) in CTR contains the hardness dependent formula for the metals criterion. If no hardness data were available, a value of 100 mg/L was used.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).
Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 94189 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Copper**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status.

One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the

Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero (0) of fifteen (15) samples exceed the beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94189, Copper **Region 8**
East Garden Grove Wintersburg Channel

LOE ID:	81451
Pollutant:	Copper
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the fifteen samples exceeded the hardness adjusted criteria for copper.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in freshwater. The dissolved criterion in

	freshwater is hardness dependent for each sample and varies based on the ambient hardness during sampling. Section (b)(1) in CTR contains the hardness dependent formula for the metals criterion. If no hardness data were available, a value of 100 mg/L was used.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).
Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 96858 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Indicator Bacteria**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section 3.2 of the Listing Policy. Under section 3.2 a single line of evidence is necessary to assess listing status. Three (3) lines of evidence are available in the administrative record to assess this pollutant. Zero (0) of 0 samples exceed the E. coli Geomean Objective. Zero (0) of 0 samples exceed the E. coli Single Sample Objective. Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment ¿pollutant combination on the CWA section 303(d) List. This conclusion is based on the staff findings that: 1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy. 2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy. 3. Zero (0) of the 0 samples exceed the E. coli Geomean Objective, and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 5 samples is needed to determine if a beneficial use is fully supported using Table 3.2. 4. Zero (0) of the 0 samples exceed the E. coli Geomean Objective, and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 5 samples is needed to determine if a beneficial use is fully supported using Table 3.2.

	5. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 96858, Indicator Bacteria **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	81452
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	11
Number of Exceedances:	3
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Three of the eleven samples exceeded the entercoccus objective.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The single sample enterococcus concentration shall not exceed more than 104/100ml. Water Quality Control Plan for Ocean Waters 2006.
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The samples were collected from Bolsa Bay at East Garden Grove Wintersburg Channel outlet.
Temporal Representation:	The samples were collected from 2006 to 2009.
Environmental Conditions:	
QAPP Information:	The samples were collected and analyzed under the Quality Assurance Management Plan for The Orange County Stormwater Program.

QAPP Information Reference(s):

Line of Evidence (LOE) for Decision ID 96858, Indicator Bacteria **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	81460
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	11
Number of Exceedances:	3
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Three of the eleven samples exceeded the total coliform objective.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The single sample total coliform concentration shall not exceed more than 10000/100ml. Water Quality Control Plan for Ocean Waters 2006.
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The samples were collected from Bolsa Bay at East Garden Grove Wintersburg Channel outlet.
Temporal Representation:	The samples were collected from 2006 to 2009.
Environmental Conditions:	
QAPP Information:	The samples were collected and analyzed under the Quality Assurance Management Plan for The Orange County Stormwater Program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 96858, Indicator Bacteria **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	81453
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	11

Number of Exceedances:	5
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Five of the eleven samples exceeded the fecal coliform objective.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The single sample fecal coliform concentration shall not exceed more than 104/100ml. Water Quality Control Plan for Ocean Waters 2006.
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The samples were collected from Bolsa Bay at East Garden Grove Wintersburg Channel outlet.
Temporal Representation:	The samples were collected from 2006 to 2009.
Environmental Conditions:	
QAPP Information:	The samples were collected and analyzed under the Quality Assurance Management Plan for The Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 94190 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Lead**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status.

One (1) line of evidence is available in the administrative record to assess this pollutant. One (1) of the fifteen (15) samples exceed the aquatic life beneficial use criterion.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.

	3. One (1) of fifteen (15) samples exceeded the beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1. 4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94190, Lead **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	81454
Pollutant:	Lead
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	15
Number of Exceedances:	1
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	One of the fifteen samples exceeded the hardness adjusted criteria for lead.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in freshwater. The dissolved criterion in freshwater is hardness dependent for each sample and varies based on the ambient hardness during sampling. Section (b)(1) in CTR contains the hardness dependent formula for the metals criterion. If no hardness data were available, a value of 100 mg/L was used.

Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).
Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 94249 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Malathion**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status.

One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero (0) of fifteen (15) samples exceeded the beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the

	power and confidence of the Listing Policy, the applicable beneficial use support rating.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94249, Malathion **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	81455
Pollutant:	Malathion
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Total Dissolved
Beneficial Use:	Estuarine Habitat
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of 15 samples exceed the maximum (Instantaneous) concentration for Malathion in saltwater of 100 ng/L.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The maximum (Instantaneous) concentration for Malathion in saltwater is 100 ng/L.
Guideline Reference:	Quality Criteria for Water. USEPA Office of Water and Hazardous Materials. Washington, D.C
Spatial Representation:	Samples were collected at site TGDC05.
Temporal Representation:	Samples were collected from 2006 through 2009.
Environmental Conditions:	
QAPP Information:	Data were submitted with the County of Orange Stormwater Program Quality Assurance Management Plan (QAMP) dated January 2010. However, data were collected prior to the development of this QAMP, therefore the quality of these data are unknown.
QAPP Information Reference(s):	

DECISION ID	94251	Region 8
East Garden Grove Wintersburg Channel		

Pollutant:	**Mercury**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status.

One (1) line of evidence is available in the administrative record to assess this pollutant. One (1) of the three (3) samples exceed the aquatic life beneficial use criterion.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. One (1) of three (3) samples exceeded the beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:

After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94251, Mercury	Region 8
East Garden Grove Wintersburg Channel	

LOE ID:	81456
Pollutant:	Mercury
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	3
Number of Exceedances:	1
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	One of the three samples exceeded the criteria for mercury.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	National Recommended Water Quality Criteria Continuous Concentrations (4-day average concentrations) for freshwater aquatic organisms exposure to elemental mercury is 0.77 ug/L.
Guideline Reference:	National Recommended Water Quality Criteria. United States Environmental Protection Agency. Office of Water. Office of Science and Technology
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).
Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 94309 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Nickel**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status.

One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero (0) of fifteen (15) samples exceeds the beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94309, Nickel **Region 8**

East Garden Grove Wintersburg Channel

LOE ID: 81457

Pollutant: Nickel
LOE Subgroup: Pollutant-Water
Matrix: Water
Fraction: Dissolved

Beneficial Use: Warm Freshwater Habitat

Number of Samples: 15
Number of Exceedances: 0

Data and Information Type: Fixed station physical/chemical (conventional plus toxic pollutants)

Data Used to Assess Water Quality:	None of the fifteen samples exceeded the hardness adjusted criteria for nickel.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in freshwater. The dissolved criterion in freshwater is hardness dependent for each sample and varies based on the ambient hardness during sampling. Section (b)(1) in CTR contains the hardness dependent formula for the metals criterion. If no hardness data were available, a value of 100 mg/L was used.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).
Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 94310 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Selenium**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status. One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion. Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero (0) of fifteen (15) samples exceed the beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94310, Selenium **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	81458
Pollutant:	Selenium
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the fifteen samples exceeded the criteria for selenium.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin

Evaluation Guideline:	California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in freshwater. The CTR for selenium is 5.0 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).
Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 94312 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Silver**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status.

One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero (0) of fifteen (15) samples exceeded the beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:	After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94312, Silver East Garden Grove Wintersburg Channel **Region 8**

LOE ID:	81459
Pollutant:	Silver
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the fifteen samples exceeded the hardness adjusted criteria for silver.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	California Toxics Rule (CTR) lists criterion maximum concentrations for silver to protect aquatic life in freshwater (1-hour average). The dissolved silver criterion in freshwater is hardness dependent for each sample and varies based on the ambient hardness during sampling. Section (b)(1) in CTR contains the hardness dependent formula for the metals criterion. If no hardness data were available, a value of 100 mg/L was used.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).

Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 77249 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Temperature, water**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

There was no new data considered in the 2014 Listing Cycle, this previously made decision will carryover. The following description applies to an earlier Listing Cycle.

This pollutant is being considered for placement on the section 303(d) list under section 3.2 of the Listing Policy. Under section 3.2 a single line of evidence is necessary to assess listing status.

Two line of evidence are available in the administrative record to assess this pollutant. One of the samples exceed the water quality objective.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the section 303(d) list in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. One of 64 samples exceeded the Basin Plan Objective and this does not exceed the allowable frequency listed in Table 3.2 of the Listing Policy.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

This is a decision previously approved by the State Water Resources Control Board and the USEPA. No new data were assessed by the Regional Board for the current. The decision has not changed.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 77249, Temperature, water **Region 8**
East Garden Grove Wintersburg Channel

LOE ID:	28954
Pollutant:	Temperature, water
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	29
Number of Exceedances:	0
Data and Information Type:	PHYSICAL/CHEMICAL MONITORING
Data Used to Assess Water Quality:	Of the 29 samples collected, 0 exceeded the Basin Plan Objective.
Data Reference:	Orange County Coast Keeper Coastal Watersheds Project
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Temperature objectives for natural receiving water are specified in the ¿Water Quality Control Plan.¿ The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. The temperature of waters designated WARM shall not be raised above 90°F June through October or above 78°F during the rest of the year as a result of controllable water quality factors.
Objective/Criterion Reference:	Water Quality Control Plan for the Santa Ana River Basin
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The samples were collected at one station: Wintersburg Channel 2 located in Huntington Beach at the lower part of Wintersburg Channel and at the Beach Blvd and Heil intersection
Temporal Representation:	The samples were collected monthly starting on 3/17/2004 through 3/30/2006.
Environmental Conditions:	
QAPP Information:	The data's quality is deemed acceptable because it was collected under the auspices of a Regional Board staff's approved quality assurance plan.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 77249, Temperature, water **Region 8**
East Garden Grove Wintersburg Channel

LOE ID:	28947

Pollutant:	Temperature, water
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	35
Number of Exceedances:	1
Data and Information Type:	PHYSICAL/CHEMICAL MONITORING
Data Used to Assess Water Quality:	Of the 35 samples collected, 1 exceeded the Basin Plan Objective. There were 10 samples taken between June and October and 0 exceeded. There 25 samples taken between November and May and 1 exceeded
Data Reference:	Orange County Coast Keeper Coastal Watersheds Project
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Temperature objectives for natural receiving water are specified in the ¿Water Quality Control Plan.¿ The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. The temperature of waters designated WARM shall not be raised above 90°F June through October or above 78°F during the rest of the year as a result of controllable water quality factors.
Objective/Criterion Reference:	Water Quality Control Plan for the Santa Ana River Basin
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The samples were collected at one station: Wintersburg 1 which is located in Santa Ana in the upper part of Wintersburg channel on Euclid, just North to McFadden Ave
Temporal Representation:	The samples were collected monthly starting on 3/17/2004 through 3/30/2006.
Environmental Conditions:	
QAPP Information:	The data's quality is deemed acceptable because it was collected under the auspices of a Regional Board staff's approved quality assurance plan.
QAPP Information Reference(s):	

DECISION ID 94369 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**Zinc**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.1, a single line of evidence is necessary to assess listing status. One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the fifteen (15) samples exceed the aquatic life beneficial use criterion. Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List. This conclusion is based on the staff findings that: 1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy. 2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy. 3. Zero (0) of fifteen (15) samples exceed the beneficial use criterion and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples are needed to determine if a beneficial use is fully supported using table 3.1. 4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 94369, Zinc **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	81461
Pollutant:	Zinc
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	15
Number of Exceedances:	0

Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the fifteen samples exceeded the hardness adjusted criteria for zinc.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in freshwater. The dissolved criterion in freshwater is hardness dependent for each sample and varies based on the ambient hardness during sampling. Section (b)(1) in CTR contains the hardness dependent formula for the metals criterion. If no hardness data were available, a value of 100 mg/L was used.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from East Garden Grove Wintersburg Channel outlet into Bolsa Bay (TGDC05).
Temporal Representation:	Samples from station TGDC05 intermittently from September 2006 through February 2008.
Environmental Conditions:	Approximately 47% of the samples were collected after storm events.
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 73229 Region 8

East Garden Grove Wintersburg Channel

Pollutant:	**pH**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	There was no new data considered in the 2014 Listing Cycle, this previously made decision will carryover. The following description applies to an earlier Listing Cycle. This pollutant is being considered for placement on the section 303(d) list under section 3.2 of the Listing Policy. Under section 3.2 a single line of evidence is necessary to assess listing status. Two lines of evidence are available in the administrative record to assess this pollutant. One of the samples exceed the water quality objective.

	Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the section 303(d) list in the Water Quality Limited Segments category. This conclusion is based on the staff findings that: 1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy. 2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy. 3. One of sixty-nine samples exceeded the Basin Plan Objective and this does not exceed the allowable frequency listed in Table 3.2 of the Listing Policy. 4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	This is a decision previously approved by the State Water Resources Control Board and the USEPA. No new data were assessed by the Regional Board for the current. The decision has not changed.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 73229, pH **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	28963
Pollutant:	pH
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	36
Number of Exceedances:	1
Data and Information Type:	PHYSICAL/CHEMICAL MONITORING
Data Used to Assess Water Quality:	of the 36 samples collected, 1 exceeded the Basin Plan's objective.
Data Reference:	Orange County Coast Keeper Coastal Watersheds Project
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Basin Plan Objective: The ph of inland surface waters shall not be raised above 8.5 pH units or depressed below 6.5 pH units as a result of controllable water quality factors.
Objective/Criterion Reference:	Water Quality Control Plan for the Santa Ana River Basin

Evaluation Guideline:
Guideline Reference:

Spatial Representation: The samples were collected at one station: Wintersburg 1 which is located in Santa Ana in the upper part of Wintersburg channel on Euclid, just North to McFadden Ave

Temporal Representation: The samples were collected monthly starting on 3/17/2004 through 3/30/2006.

Environmental Conditions:

QAPP Information: The data's quality is deemed acceptable because it was collected under the auspices of a Regional Board staff's approved quality assurance plan.

QAPP Information Reference(s):

Line of Evidence (LOE) for Decision ID 73229, pH **Region 8**

East Garden Grove Wintersburg Channel

LOE ID: 28965

Pollutant: pH
LOE Subgroup: Pollutant-Water
Matrix: Water
Fraction: None

Beneficial Use: Warm Freshwater Habitat

Number of Samples: 33
Number of Exceedances: 0

Data and Information Type: PHYSICAL/CHEMICAL MONITORING
Data Used to Assess Water Quality: of the 33 samples collected, none exceeded the Basin Plan's objective.
Data Reference: Orange County Coast Keeper Coastal Watersheds Project

SWAMP Data: Non-SWAMP

Water Quality Objective/Criterion: Basin Plan Objective: The ph of inland surface waters shall not be raised above 8.5 pH units or depressed below 6.5 pH units as a result of controllable water quality factors.

Objective/Criterion Reference: Water Quality Control Plan for the Santa Ana River Basin

Evaluation Guideline:
Guideline Reference:

Spatial Representation: The samples were collected at one station: Wintersburg Channel 2 located in Huntington Beach at the lower part of Wintersburg Channel and at the Beach Blvd and Heil intersection

Temporal Representation: The samples were collected monthly starting on 3/17/2004 through 3/30/2006.

Environmental Conditions:

QAPP Information: The data's quality is deemed acceptable because it was collected under the auspices of a Regional Board staff's approved quality assurance plan

QAPP Information Reference(s):

Pollutant:	**Ammonia (Unionized)**
Final Listing Decision:	**List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Sources:	A Source Unknown
Expected TMDL Completion Date:	2021
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

There was no new data considered this Listing Cycle, this previously made decision will carryover. The following description applies to an earlier Listing Cycle.

This pollutant is being considered for placement on the section 303(d) list under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status.

Two (2) lines of evidence are available in the administrative record to assess this pollutant. Nine (9) of the samples exceed the water quality objective.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification in favor of placing this water segment-pollutant combination on the section 303(d) list in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Nine (9) of sixty-six (66) samples exceed the Basin Plan Objective and this exceeds the allowable frequency listed in Table 3.1 of the Listing Policy.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

This is a decision previously approved by the State Water Resources Control Board and the USEPA. No new data were assessed by the Regional Board for the current. The decision has not changed.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:

After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

East Garden Grove Wintersburg Channel

LOE ID:	28244
Pollutant:	Ammonia (Unionized)
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	32
Number of Exceedances:	8
Data and Information Type:	PHYSICAL/CHEMICAL MONITORING
Data Used to Assess Water Quality:	Of the 32 samples collected, 8 exceeded the standard
Data Reference:	Orange County Coast Keeper Coastal Watersheds Project
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	SARWQCB Basin Plan Objective: For waterbodies designated warm the Standard used varies according to a formula (SARWQCB 2008 Basin Plan Pg 4-7 through 4-9). This standard ranged from 0.19 mg/l to 0.51 mg/l.
Objective/Criterion Reference:	Water Quality Control Plan for the Santa Ana River Basin
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The samples were taken from one station, Wintersberg Channel 2, located in Huntington Beach at the lower part of Wintersburg channel and at the Beach Blvd and Heil intersection.
Temporal Representation:	The samples were collected in 2004 and 2005 sometimes twice a month and sometimes once a month.
Environmental Conditions:	No information on environmental conditions were available that would change the way this data should be assessed.
QAPP Information:	The data generated by this project is deemed of acceptable quality for assessment purposes because a state approved QAPP was developed per the requirements of the Proposition 13 grant that funded this project.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 76724, Ammonia (Unionized) **Region 8**

East Garden Grove Wintersburg Channel

LOE ID:	28242
Pollutant:	Ammonia (Unionized)
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Warm Freshwater Habitat
Number of Samples:	34

Number of Exceedances:	1
Data and Information Type:	PHYSICAL/CHEMICAL MONITORING
Data Used to Assess Water Quality:	Of the thirty-four samples taken only one exceeded the standard.
Data Reference:	Orange County Coast Keeper Coastal Watersheds Project
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	SARWQCB Basin Plan Objective: For waterbodies designated warm the Standard used varies according to a formula (SARWQCB 2008 Basin Plan Pg 4-7 through 4-9). This standard ranged from 0.19 mg/l to 0.51 mg/l.
Objective/Criterion Reference:	Water Quality Control Plan for the Santa Ana River Basin
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The samples were taken at one station, Wintersberg 1, Located in Santa Ana in the upper part of Wintersburg channel, on Euclid, just north to McFadden Ave.
Temporal Representation:	The samples were collected in 2004 and 2005 sometimes once a month, and sometimes twice a month.
Environmental Conditions:	No environmental conditions have been reported that would affect how this dataset is to be assessed.
QAPP Information:	The data generated by this project is deemed of acceptable quality for assessment purposes because a state approved QAPP was developed per the requirements of the Proposition 13 grant that funded this project.
QAPP Information Reference(s):	

Final California 2018 Integrated Report (303(d) List/305(b) Report)

Supporting Information

Regional Board 8 - Santa Ana Region

Water Body Name: **Huntington Harbour**
Water Body ID: **CAB80111000199903230952 54**
Water Body Type: **Bay & Harbor**

DECISION ID	**69142**	**Region 8**
Huntington Harbour		

Pollutant: **Dieldrin**
Final Listing Decision: **Delist from 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision: Delist from 303(d) list (TMDL required list)(2016)
Revision Status Original
Reason for Delisting: Applicable WQS attained; reason for recovery unspecified
Impairment from Pollutant or Pollution: Pollutant

Regional Board Conclusion: There was no new data considered in the 2014 Listing Cycle, this previously made decision will carryover. The following description applies to an earlier Listing Cycle.

This pollutant is being considered for removal from the section 303(d) list under section 4.6 and 4.11 of the Listing Policy. Under section 4.6 a single line of evidence is necessary to assess listing status.

Two lines of evidence are available in the administrative record to assess this pollutant. None of the sediment samples exceeds the sediment quality guidelines. There is sediment toxicity documented in this water body, however, it does not appear to be linked to this pollutant.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification in favor of removing this water segment-pollutant combination from the section 303(d) list in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The sediment quality guideline used complies with the requirements of section 6.1.3 of the Policy.
2. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
3. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.

4. None of 60 samples exceeded the sediment guideline and this does not exceed the allowable frequency listed in Table 4.1 of the Listing Policy.
5. There is no fish tissue data in the administrative record for Huntington Harbour. Based on section 4.11 of the Listing Policy, this is sufficient to delist this water body-pollutant combination from the 303(d) list.
6. Pursuant to section 4.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: This is a decision previously approved by the State Water Resources Control Board and the USEPA. No new data were assessed by the Regional Board for the current. The decision has not changed.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 69142, Dieldrin **Region 8**

Huntington Harbour

LOE ID:	251
Pollutant:	Sediment Toxicity
LOE Subgroup:	Toxicity
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	47
Data and Information Type:	Toxicity testing of sediments
Data Used to Assess Water Quality:	Forty-seven of 60 samples exceeded the 90 percent of the minimum significant difference for test species Eohaustorius estuarius. Twenty of 30 samples exhibited toxicity in the dry season (8/7/01 and 8/8/01), and 27 of 30 exhibited toxicity in the wet season (2/24/03) (Phillips et al., 1998).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Narrative Water Quality Objective: "The concentration of toxic pollutants in the water column, sediment or biota shall not adversely affect beneficial use."
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	
Guideline Reference:	

Spatial Representation:	Samples were collected at 32 stations (no data were included for stations 40, 45, 48, 61, and 67).
Temporal Representation:	Samples were collected on 8/7/01, 8/8/01 and 2/24/03.
Environmental Conditions:	Samples were collected during dry (8/7/01, 8/8/01) and wet season (2/24/03).
QAPP Information:	SARQWCB followed the Bight 1998 QAPP developed by SCCWRP.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 69142, Dieldrin **Region 8**
Huntington Harbour

LOE ID:	253
Pollutant:	Dieldrin
LOE Subgroup:	Pollutant-Sediment
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	0
Data and Information Type:	Chemical monitoring of sediments
Data Used to Assess Water Quality:	None of 60 samples exceeded the ERM for dieldrin (Santa Ana RWQCB, 2003b).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentration of toxic substance in the water column, sediments or biota shall not adversely affect beneficial uses (Santa Ana RWQCB, 1995a).
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	The ERM for dieldrin is 8 ug/kg (ppb) (Long et al., 1990).
Guideline Reference:	Placeholder reference 2006 303(d)
Spatial Representation:	Samples were collected at stations 36 though 72 in Huntington Harbor.
Temporal Representation:	Samples were collected on 08/08/2001 and on 02/27/2003.
Environmental Conditions:	Samples were collected during the dry season (August) and wet season (February).
QAPP Information:	SARWQCB followed the Bight 1998 QAPP developed by SCCWRP.Quality control data was presented.
QAPP Information Reference(s):	

DECISION ID 78524 **Region 8**
Huntington Harbour

Pollutant:	**Nickel**
Final Listing Decision:	**Delist from 303(d) list (TMDL required list)**

Last Listing Cycle's Final Listing Decision:	Delist from 303(d) list (TMDL required list)(2016)
Revision Status	Original
Reason for Delisting:	Applicable WQS attained; reason for recovery unspecified
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for removal from the CWA section 303(d) List under section 4.1 of the Listing Policy. Under this section a single line of evidence is necessary to assess listing status.

Two lines of evidence are available in the administrative record to assess this pollutant. Zero of the 45 samples exceeded the CRITERIA.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification for removing this water segment-pollutant combination from the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero of the 45 samples exceeded the CRITERIA and this does not exceed the allowable frequency listed in Table 4.1 of the Listing Policy.
4. Pursuant to section 4.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should be removed from the section 303(d) list because applicable water quality standards for the pollutant are not being exceeded.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:

After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 78524, Nickel **Region 8**

Huntington Harbour

LOE ID:	4413
Pollutant:	Nickel
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Not Recorded
Beneficial Use:	Marine Habitat
Number of Samples:	0

Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Unspecified--This LOE is a placeholder to support a 303(d) listing decision made prior to 2006.
Data Reference:	Placeholder reference pre-2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Unspecified
Objective/Criterion Reference:	Placeholder reference pre-2006 303(d)
Evaluation Guideline:	Unspecified
Guideline Reference:	Placeholder reference pre-2006 303(d)
Spatial Representation:	Unspecified
Temporal Representation:	Unspecified
Environmental Conditions:	Unspecified
QAPP Information:	Unspecified
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 78524, Nickel **Region 8**

Huntington Harbour

LOE ID:	81602
Pollutant:	Nickel
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	45
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the 45 samples exceeded the water quality objective for nickel.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in saltwater for nickel at 8.2 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB),

	and Warner Avenue (HUNWAR).
Temporal Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 68882 Region 8

Huntington Harbour

Pollutant:	**Copper**
Final Listing Decision:	**Do Not Delist from 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not Delist from 303(d) list (TMDL required list)(2016)
Revision Status	Original
Sources:	A Source Unknown
Expected TMDL Completion Date:	2019
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for removal from the CWA section 303(d) List under section 4.1 of the Listing Policy. Under this section a single line of evidence is necessary to assess listing status.

Two lines of evidence are available in the administrative record to assess pollutant. Sixteen out of 45 water samples exceed the CTR.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against removing this water segment-pollutant combination from the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Sixteen out of 45 water samples exceed the CTR and this exceeds the allowable frequency listed in Table 4.1 of the Listing Policy.
4. Pursuant to section 4.11 of the Listing Policy, no additional data and information are available indicating that standards are met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be removed from the section 303(d) list because applicable water quality standards for the pollutant are being exceeded.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 68882, Copper Huntington Harbour **Region 8**

LOE ID:	81572
Pollutant:	Copper
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	45
Number of Exceedances:	16
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	Sixteen (16) of the 45 samples exceeded the water quality objective for copper.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in saltwater for copper at 3.1 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB), and Warner Avenue (HUNWAR).
Temporal Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 68882, Copper Huntington Harbour **Region 8**

LOE ID:	4412
Pollutant:	Copper

LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Not Recorded
Beneficial Use:	Marine Habitat
Number of Samples:	0
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Unspecified--This LOE is a placeholder to support a 303(d) listing decision made prior to 2006.
Data Reference:	Placeholder reference pre-2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Unspecified
Objective/Criterion Reference:	Placeholder reference pre-2006 303(d)
Evaluation Guideline:	Unspecified
Guideline Reference:	Placeholder reference pre-2006 303(d)
Spatial Representation:	Unspecified
Temporal Representation:	Unspecified
Environmental Conditions:	Unspecified
QAPP Information:	Unspecified
QAPP Information Reference(s):	

DECISION ID 97909 Region 8
Huntington Harbour

Pollutant:	**Indicator Bacteria**
Final Listing Decision:	**Do Not Delist from 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not Delist from 303(d) list (TMDL required list)(2016)
Revision Status	Original
Sources:	A Source Unknown
Expected TMDL Completion Date:	2019
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for removal from the CWA section 303(d) List under section 4.3 of the Listing Policy. Under section 4.3 a single line of evidence is necessary to assess listing status.

Eighty Eight (88) lines of evidence are available in the administrative record to assess this pollutant.

Eight hundred and Fifty Two (852) of 6,867 samples exceed the Enterococcus Geomean Objective.
Thirty Nine (39) of 393 samples exceed the Enterococcus Single Sample Objective.
Three hundred and Ninety Two (392) of 8,408 samples exceed the Fecal Coliform

Geomean Objective.
Twenty Three (23) of 378 samples exceed the Fecal Coliform Single Sample Objective.
Three hundred and Twenty Seven (327) of 13,481 samples exceed the Total Coliform Geomean Objective.
Seventeen (17) of 287 samples exceed the Total Coliform Single Sample Objective.

However at 11th Street Station, Anderson Street Station, Clubhouse Station and Sunset Aquatic Park Station, 127 of 539 samples, 87 of 514 samples, 117 of 554 samples, and 158 of 541 samples, respectively, exceed the Enterococcus Geomean Objective Sample Objective and this exceeds the allowable frequency listed in Table 4.2 of the Listing Policy.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against removing this water segment-pollutant combination from the CWA section 303(d) List.
This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Eight hundred and Fifty Two (852) of the 6,867 samples exceed the Enterococcus Geomean Objective, 392 of the 8,408 samples exceed the Fecal Coliform Geomean Objective, 327 of the 13,481 samples exceed the Total Coliform Geomean, and this does not exceed the frequency listed in table 4.2
4. Thirty Nine (39) of the 393 samples exceed the Enterococcus Single Sample Objective, 23 of the 378 samples exceed the Fecal Coliform Single Sample Objective, 17 of the 287 samples exceed the Total Coliform Single Sample, and this does not exceed the frequency listed in table 4.2
5.At 4 stations, 11th Street Station, Anderson Street Station, Clubhouse Station and Sunset Aquatic Park Station, 127 of 539 samples, 87 of 514 samples, 117 of 554 samples, and 158 of 541 samples, respectively, exceed the Enterococcus Geomean Objective Sample Objective and this exceeds the allowable frequency listed in Table 4.2 of the Listing Policy..
6. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be removed from the section 303(d) list because applicable water quality standards for the pollutant are being exceeded.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria Region 8 Huntington Harbour

LOE ID: 81590

Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	12
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 12 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for fecal coliform states that the coliform density shall not exceed 400 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at MOTHERS BEACH.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81591
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	14
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 14 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP

Water Quality Objective/Criterion:	The standard for fecal coliform states that the coliform density shall not exceed 400 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at SEA GATE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81593
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	12
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 12 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for fecal coliform states that the coliform density shall not exceed 400 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at CLUBHOUSE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81594
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	12
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 12 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for fecal coliform states that the coliform density shall not exceed 400 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at CORAL CAY.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	6072
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1055
Number of Exceedances:	25
Data and Information Type:	PATHOGEN MONITORING

Data Used to Assess Water Quality:	Of the 1055 samples collected, 25 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1055 samples were collected at the Harbour Channel station located in Huntington Harbour
Temporal Representation:	The 1055 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	7016
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1076
Number of Exceedances:	30
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1076 samples collected, 30 exceeded the standards/guidelines listed above.

Data Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1076 samples were collected at the Sunset Aquatic Park station located in Huntington Harbour
Temporal Representation:	The 1076 samples were collected in March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6994
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	806
Number of Exceedances:	13
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 806 samples collected, 13 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008

SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml when
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 806 samples were collected at the Mothers Beach station located in Huntington Harbour
Temporal Representation:	The 806 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	7019
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1138
Number of Exceedances:	11
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1138 samples collected, 11 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP

Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1138 samples were collected at the Trinidad Lane station located in Huntington Harbour
Temporal Representation:	The 1138 samples were collected March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6811
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1138
Number of Exceedances:	20
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1138 samples collected, 20 exceeded the standards/guidelines listed above.
Data Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP

Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1138 samples were collected at the Humboldt Beach station located in Huntington Harbour
Temporal Representation:	The 1138 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	7014
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	129
Number of Exceedances:	0
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 129 samples collected, 0 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-

	foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 129 samples were collected at the Sea Gate station located in Huntington Harbour
Temporal Representation:	The 129 samples were collected between April 2004 and December 2006
Environmental Conditions:	The data spanned 3 entire years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81607
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	13
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 13 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for total coliform states that the coliform density shall not exceed 1000 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	

Spatial Representation:	Samples were collected at 11TH STREET BEACH.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81608
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	12
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 12 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for total coliform states that the coliform density shall not exceed 1000 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at MOTHERS BEACH.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6066
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None

Beneficial Use:	Water Contact Recreation
Number of Samples:	427
Number of Exceedances:	0
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 427 samples collected, 0 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml when
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 427 samples were collected at the Coral Clay station located in Huntington Harbour
Temporal Representation:	The 427 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6069
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation

Number of Samples:	1134
Number of Exceedances:	11
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1134 samples collected, 11 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1134 samples were collected at the Davenport Beach station located in Huntington Harbour
Temporal Representation:	The 1134 samples were collected March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6059
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1002
Number of Exceedances:	9
Data and Information Type:	PATHOGEN MONITORING

Data Used to Assess Water Quality:	Of the 1002 samples collected, 9 exceeded the objectives listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1002 samples were collected at the Bolsa Chica station located in Huntington Harbour
Temporal Representation:	The 1002 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6046
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1170
Number of Exceedances:	29
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1170 samples collected, 29 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008

SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1170 samples were collected at the 11th Street Beach station located in Huntington Harbour
Temporal Representation:	The 1170 samples were collected between March 1999and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81616
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	13
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 13 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for total coliform states that the coliform density shall not exceed 1000 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.

Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at TRINIDAD LANE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81610
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	12
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 12 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for total coliform states that the coliform density shall not exceed 1000 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at ADMIRALTY DRIVE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81611
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	12
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 12 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for total coliform states that the coliform density shall not exceed 1000 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at CLUBHOUSE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81612
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	12
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 12 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP

Water Quality Objective/Criterion:	The standard for total coliform states that the coliform density shall not exceed 1000 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at Davenport Beach.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81613
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 15 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for total coliform states that the coliform density shall not exceed 1000 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at HARBOUR CHANNEL.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81614
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	13
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 13 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for total coliform states that the coliform density shall not exceed 1000 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at HUMBOLDT BEACH.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81615
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	14
Number of Exceedances:	0
Data and Information Type:	Not Specified

Data Used to Assess Water Quality:	Zero of the 14 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for total coliform states that the coliform density shall not exceed 1000 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at SEA GATE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81580
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	13
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 13 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for enterococcus states that the density shall not exceed 35 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at CLUBHOUSE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	

QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81575
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	14
Number of Exceedances:	1
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	One of the 14 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for enterococcus states that the density shall not exceed 35 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at 11TH STREET BEACH.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81577
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	42
Number of Exceedances:	12

Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Twelve of the forty-two samples exceeded the enterococcus objective.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The single sample enterococcus concentration shall not exceed more than 104/100ml. Water Quality Control Plan for Ocean Waters 2006.
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The samples were collected from Huntington Harbour sites, Bolsa Chica Channel Mouth, Christiana Bay, and Warner Avenue.
Temporal Representation:	The samples were collected from 2006 to 2009.
Environmental Conditions:	
QAPP Information:	The samples were collected and analyzed under the Quality Assurance Management Plan for The Orange County Stormwater Program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81578
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	7
Number of Exceedances:	1
Data and Information Type:	(VOL.) Chem./phys. monitoring data by quality-assured volunteer program
Data Used to Assess Water Quality:	One of the seven samples exceeded the enterococcus objective. The data was collected by volunteer monitoring groups during three years.
Data Reference:	Data for bacteria in various waterbodies, Feb. 2005-May 2007
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The single sample entercoccus concentration shall not exceed more than 104/100ml. Calidornia Ocean Plan 2006. (Basin Plan Region 8)
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	

Guideline Reference:	
Spatial Representation:	The data was collected from Peter's Landing - estuary and Huntington Harbor - estuary.
Temporal Representation:	The data was collected in November 2003, February, May and July 2004, and May 2007.
Environmental Conditions:	
QAPP Information:	The data was collected by volunteer monitoring groups under The Southern California Marine Institute Volunteer Monitoring Quality Assurance Project Plan.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6990
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	100
Number of Exceedances:	10
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 100 samples collected, 10 exceed the following criteria, or guidelines as stated in the Ocean Plan: Enterococcus <104MPN/100mL
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a single sample maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 104 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 100 samples were collected at the Mothers Beach station located in Huntington Harbour.

Temporal Representation:	The 100 samples were collected in 2004 on the days of April 14, April 21, April 28, May 5, May 12, May 19, May 26, June 3, June 9, June 21, June 30, July 8, July 12, August 25, September 1, September 9, September 15, November 17, November 2, December 1, December 7, December 15, and December 22; in 2005 on the days of April 20, April 27, May 11, May 17, June 22, July 7, July 20, August 3, August 10, September 2, September 8, September 13, September 21, September 26, October 5, October 13, October 19, October 26, November 2, November 9, November 16, November 21, November 28, December 7, December 13, December 21, and December 29; in 2006 on the days of January 5, January 11, January 19, January 25, February 1, February 8, February 23, March 1, March 8, March 13, March 22, March 29, April 5, April 10, April 19, April 26, May 3, May 8, May 15, May 22, June 1, June 7, June 14, June 23, June 29, July 5, July 7, July 12, July 19, July 26,July 28, July 29, August 2, August 16, August 23, August 30, September 7, September 13, September 27, October 4, October 12, October 17, October 25, October 27, November 15, November 20, November 30, December 6, December 13, December 20, and December 26
Environmental Conditions:	The data spanned 3 entire years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	7017
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	96
Number of Exceedances:	7
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 96 samples collected, 7 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a single sample maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the

Objective/Criterion Reference:	following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 104 per 100 ml Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 96 samples were collected at the Trinidad Lane station located in Huntington Harbour.
Temporal Representation:	The 96 samples were collected in 2004 on the days of April 14, April 21, April 28, May 5, May 12, May 19, May 26, June 3, June 9, June 21, June 23, June 30, July 8, August 25, September 1, September 15, November 17, November 22, December 1, December 7, December 15, and December 22; in 2005 on the days of April 20, April 27, May 11, May 17, June 22, July 7, July 13, July 20, August 3, August 10, September 2, September 8, September 13, September 21, September 26, October 5, October 13, October 19, October 26, November 2, November 9, November 16, November 21, November 28, December 7, December 13, December 21, and December 29; in 2006 on the days of January 5, January 11, January 19, January 25, February 1, February 8, February 23, March 1, March 8, March 13, March 22, March 29, April 5, April 10, April 19, April 26, May 3, May 8, May 15, May 22, June 1, June 7, June 14, June 29, July 5, July 12, July 19, July 26, August 2, August 16, August 23, August 30, September 7, September 13, September 27, October 4, October 12, October 17, October 25, November 15, November 20, November 30, December 6, December 13, December 20, and December 26
Environmental Conditions:	The data spanned 3 entire years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81574
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	248
Number of Exceedances:	19
Data and Information Type:	PATHOGEN MONITORING

Data Used to Assess Water Quality:	Water Board staff assessed BeachWatch data for Huntington Harbour to determine beneficial use support and results are as follows: 19 of 248 samples exceed the criterion for Enterococci.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	California Ocean Plan (SWRCB 2009) single sample maximum states that enterococcus density shall not exceed 104 per 100 mL.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Data for this line of evidence for Huntington Harbour was collected at 10 monitoring sites [MOTHERS BEACH, TRINIDAD LANE, SEA GATE, HUMBOLDT BEACH, Davenport Beach, CLUBHOUSE, HARBOUR CHANNEL, 11TH STREET BEACH, ADMIRALTY DRIVE, CORAL CAY]
Temporal Representation:	Data was collected over the time period 1/14/2009-10/28/2009.
Environmental Conditions:	Staff is not aware of any special conditions that might affect interpretation of the data.
QAPP Information:	The samples were collected for the Beach Watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6055
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	514
Number of Exceedances:	87
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 514 samples collected, 87 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp*

Objective/Criterion Reference:	beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 514 samples were collected at the Anderson Street station located in Huntington Harbor.
Temporal Representation:	The 514 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limits used were EPA_1600.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	5660
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	541
Number of Exceedances:	158
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	541 samples were taken and 158 exceeded
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency

Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	541 samples were collected at the location named Sunset Aquatic Park in Huntington Harbour.
Temporal Representation:	The samples were collected weekly between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data collected by the Orange County Health Care Agency
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6044
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	525
Number of Exceedances:	126
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 525 samples collected, 126 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency

Spatial Representation:	The 126 samples were collected at the 11th Street Beach station located in Huntington Harbour.
Temporal Representation:	The 126 samples were collected weekly between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limits used were EPA_1600 and MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	7015
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	541
Number of Exceedances:	117
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 541 samples collected, 117 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 117 samples were collected at the Club House station located in Huntington Harbor.

Temporal Representation:	The 117 samples were collected weekly between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board. The EPA Method/Analytical Detection Limits used were EPA_1600.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6067
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	487
Number of Exceedances:	26
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 487 samples collected, 26 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 487 samples were collected at the Davenport Beach station located in Huntington Harbour.
Temporal Representation:	The 487 samples were collected daily between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.

QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limits used were EPA_1600.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6051
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	488
Number of Exceedances:	22
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 488 samples collected, 22 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 488 samples were collected at the Anaheim Bay station located in Huntington Harbour.
Temporal Representation:	The 488 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of

	the 2008 303d list. The EPA Method/Analytical Detection Limits used were EPA_1600.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6050
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	504
Number of Exceedances:	53
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 504 samples collected, 53 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 504 samples were collected at the Admiralty Drive station located in Huntington Harbour.
Temporal Representation:	The 504 samples were collected weekly between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limits used were EPA_1600.
QAPP Information Reference(s):	

LOE ID:	6065
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	443
Number of Exceedances:	42
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 443 samples collected, 42 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 443 samples were collected at the Coral Clay station located in Huntington Harbor.
Temporal Representation:	The 443 samples were collected weekly between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was EPA_1600.
QAPP Information Reference(s):	

Huntington Harbour

LOE ID:	6062
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	114
Number of Exceedances:	15
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 114 samples collected, 15 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 114 samples were collected at the Bolsa Chica station located in Huntington Harbour.
Temporal Representation:	The 114 samples were collected between April 2004 and December 2006
Environmental Conditions:	The data spanned 3 entire years including wet and dry seasons.
QAPP Information:	Data's quality is deemed appropriate beacause it was collected by the Orange County Environmental Health Agency.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6070
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water

Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	520
Number of Exceedances:	76
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 520 samples collected, 76 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 520 samples were collected at the Harbor Channel station located in Huntington Harbor.
Temporal Representation:	The 520 samples were collected weekly between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limits used were EPA_1600.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6830
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None

Beneficial Use:	Water Contact Recreation
Number of Samples:	501
Number of Exceedances:	41
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 501 samples collected, 41 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan: a. SWRCB Water-Contact Standards (1) Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: 30d geometric mean iii. Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 501 samples were collected at the Mothers Beach station located in Huntington Harbor.
Temporal Representation:	The 501 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limits used were EPA_1600.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	7009
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation

Number of Samples:	488
Number of Exceedances:	15
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 488 samples collected, 15 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 488 samples were collected at the Sea Gate station located in Huntington Harbor.
Temporal Representation:	The 488 samples were collected weekly between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limits used were EPA_1600.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	7018
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	488
Number of Exceedances:	24

Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 488 samples collected, 24 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 488 samples were collected at the Trinidad Lane station located in Huntington Harbour.
Temporal Representation:	The 130 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6809
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	487
Number of Exceedances:	33
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 487 samples collected, 33 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008

SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Enterococcus density shall not exceed 35 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 487 samples were collected at the Humblodt Beach station located in Huntington Harbor.
Temporal Representation:	The 487 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limits used were EPA_1600.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81576
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	13
Number of Exceedances:	1
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	One of the 13 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for enterococcus states that the density shall not exceed 35 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.

Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at MOTHERS BEACH.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81579
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	16
Number of Exceedances:	1
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	One of the 16 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for enterococcus states that the density shall not exceed 35 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at ADMIRALTY DRIVE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81581

Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	13
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 13 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for enterococcus states that the density shall not exceed 35 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at Davenport Beach.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81582
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 15 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP

Water Quality Objective/Criterion:	The standard for enterococcus states that the density shall not exceed 35 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at HARBOUR CHANNEL.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81583
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	14
Number of Exceedances:	3
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Three of the 14 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for enterococcus states that the density shall not exceed 35 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at HUMBOLDT BEACH.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81584
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	14
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 14 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for enterococcus states that the density shall not exceed 35 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at SEA GATE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81585
Pollutant:	Enterococcus
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	14
Number of Exceedances:	1
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	One of the 14 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP

Water Quality Objective/Criterion:	The standard for enterococcus states that the density shall not exceed 35 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at TRINIDAD LANE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81586
Pollutant:	Escherichia coli (E. coli)
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	7
Number of Exceedances:	1
Data and Information Type:	(VOL.) Chem./phys. monitoring data by quality-assured volunteer program
Data Used to Assess Water Quality:	One of the seven samples exceeded the E. coli objective. The data was collected by volunteer monitoring groups during three years.
Data Reference:	Data for bacteria in various waterbodies, Feb. 2005-May 2007
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses. Region 8 Basin Plan.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The single sample E. coli concentration shall not exceed more than 235/100ml. USEPA Ambient Water Quality Criteria 1986.
Guideline Reference:	Ambient Water Quality Criteria for Bacteria - 1986. EPA440/5-84-002
Spatial Representation:	The data was collected from Peter's Landing - estuary and Huntington Harbor - estuary.
Temporal Representation:	The data was collected in November 2003, February, May and July 2004, and May 2007.
Environmental Conditions:	
QAPP Information:	The data was collected by volunteer monitoring groups under The Southern California Marine Institute Volunteer Monitoring Quality

Assurance Project Plan.

QAPP Information Reference(s):

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID: 81592

Pollutant: Fecal Coliform
LOE Subgroup: Pollutant-Water
Matrix: Water
Fraction: None

Beneficial Use: Water Contact Recreation

Number of Samples: 42
Number of Exceedances: 13

Data and Information Type: Not Specified
Data Used to Assess Water Quality: Thirteen of the forty-two samples exceeded the fecal colifrom objective.
Data Reference: Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.

SWAMP Data: Non-SWAMP

Water Quality Objective/Criterion: The single sample fecal coliform concentration shall not exceed more than 400/100ml. Water Quality Control Plan for Ocean Waters 2006.
Objective/Criterion Reference: Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency

Evaluation Guideline:
Guideline Reference:

Spatial Representation: The samples were collected from Huntington Harbour sites, Bolsa Chica Channel Mouth, Christiana Bay, and Warner Avenue.
Temporal Representation: The samples were collected from 2006 to 2009.
Environmental Conditions:
QAPP Information: The samples were collected and analyzed under the Quality Assurance Management Plan for The Orange County Stormwater Program.
QAPP Information Reference(s):

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID: 7937

Pollutant: Fecal Coliform
LOE Subgroup: Pollutant-Water
Matrix: Water
Fraction: None

Beneficial Use: Water Contact Recreation

Number of Samples:	96
Number of Exceedances:	7
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 96 samples collected, 7 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a single sample maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 400 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	Of the 96 samples collected, 7 exceed the following criteria, or guidelines as stated in the Ocean Plan: Fecal Coliform <400MPN/100mL
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 96 samples were collected at the Trinidad Lane station located in Huntington Harbour. The Single Sample Maximum under the SWRCB Water-Contact Standards from the California Ocean Plan was used to assess this bacterium.
Temporal Representation:	The 96 samples were collected in 2004 on the days of April 14, April 21, April 28, May 5, May 12, May 19, May 26, June 3, June 9, June 21, June 23, June 30, July 8, August 25, September 1, September 15, November 17, November 22, December 1, December 7, December 15, and December 22; in 2005 on the days of April 20, April 27, May 11, May 17, June 22, July 7, July 13, July 20, August 3, August 10, September 2, September 8, September 13, September 21, September 26, October 5, October 13, October 19, October 26, November 2, November 9, November 16, November 21, November 28, December 7, December 13, December 21, and December 29; in 2006 on the days of January 5, January 11, January 19, January 25, February 1, February 8, February 23, March 1, March 8, March 13, March 22, March 29, April 5, April 10, April 19, April 26, May 3, May 8, May 15, May 22, June 1, June 7, June 14, June 29, July 5, July 12, July 19, July 26, August 2, August 16, August 23, August 30, September 7, September 13, September 27, October 4, October 12, October 17, October 25, November 15, November 20, November 30, December 6, December 13, December 20, and December 26
Environmental Conditions:	The data spanned 3 entire years including wet and dry seasons.
QAPP Information:	The QA of the data is considered to be acceptable because the data was collected by the Orange County Environmental Health Agency. The EPA Method/Analytical Detection Limits used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81587
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	240
Number of Exceedances:	3
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Water Board staff assessed BeachWatch data for Huntington Harbour to determine beneficial use support and results are as follows: 3 of 240 samples exceed the criterion for Coliform, Fecal.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	California Ocean Plan (SWRCB 2009) single sample maximum states that fecal coliform density shall not exceed 400 per 100ml
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Data for this line of evidence for Huntington Harbour was collected at 10 monitoring sites [MOTHERS BEACH, TRINIDAD LANE, SEA GATE, HUMBOLDT BEACH, Davenport Beach, CLUBHOUSE, HARBOUR CHANNEL, 11TH STREET BEACH, ADMIRALTY DRIVE, CORAL CAY]
Temporal Representation:	Data was collected over the time period 1/14/2009-10/28/2009.
Environmental Conditions:	Staff is not aware of any special conditions that might affect interpretation of the data.
QAPP Information:	The samples were collected for the Beach Watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	7010
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None

Beneficial Use:	Water Contact Recreation
Number of Samples:	219
Number of Exceedances:	8
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 219 samples collected, 8 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 219 samples were collected at the 11th station located in Huntington Harbour.
Temporal Representation:	The 219 samples were collected between April 2004 and December 2006
Environmental Conditions:	The data spanned 3 entire years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6056
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1083
Number of Exceedances:	77

Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1083 samples collected 77 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1083 samples were collected at the Anderson Street station located in Huntington Harbour.
Temporal Representation:	The 1083 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6068
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	554
Number of Exceedances:	20
Data and Information Type:	PATHOGEN MONITORING

Data Used to Assess Water Quality:	Of the 554 samples collected, 20 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 554 samples were collected at the Davenport Beach station located in Huntington Harbour.
Temporal Representation:	The 554 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6071
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	554
Number of Exceedances:	11
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 554 samples collected, 11 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008

SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 554 samples were collected at the Harbour Channel station located in Huntington Harbour.
Temporal Representation:	The 554 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	6992
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	616
Number of Exceedances:	33
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 616 samples collected, 33 exceeded the standards/guidelines listed above.
Data Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP

Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 616 samples were collected at the Mothers Beach station located in Huntington Harbour.
Temporal Representation:	The 616 samples were collected March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	7011
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	494
Number of Exceedances:	0
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 494 samples collected, 0 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas

	outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 494 samples were collected at the Sea Gate station located in Huntington Harbour.
Temporal Representation:	The 494 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6810
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	564
Number of Exceedances:	13
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 564 samples collected, 13 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml

Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 564 samples were collected at the Humboldt Beach station located in Huntington Harbour.
Temporal Representation:	The 564 samples were collected March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	7938
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	516
Number of Exceedances:	18
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 516 samples collected, 18 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency

Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 516 samples were collected at the Trinidad Lane station located in Huntington Harbour.
Temporal Representation:	The 516 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limits used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	7939
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	440
Number of Exceedances:	7
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 440 samples collected, 7 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency

Spatial Representation:	The 440 samples were collected at the Coral Clay station located in Huntington Harbour.
Temporal Representation:	The 440 samples were collected between March1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	7013
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	642
Number of Exceedances:	63
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 642 samples collected, 63 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 642 samples were collected at the Sunset Aquatic Park station located in Huntington Harbor.
Temporal Representation:	The 642 samples were collected between March 1999 and December 2008

Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	7936
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	592
Number of Exceedances:	43
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 592 samples collected, 43 exceed the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 592 samples were collected at the 11th Street Beach station located in Huntington Harbor.
Temporal Representation:	The 592 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of

	the 2008 303d list. The EPA Method/Analytical Detection Limits used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81588
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 15 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for fecal coliform states that the coliform density shall not exceed 400 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at ADMIRALTY DRIVE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81589
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation

Number of Samples:	13
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 13 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for fecal coliform states that the coliform density shall not exceed 400 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at 11TH STREET BEACH.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81595
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	15
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 15 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for fecal coliform states that the coliform density shall not exceed 400 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	

Spatial Representation:	Samples were collected at HARBOUR CHANNEL.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81596
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	13
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Zero of the 13 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for fecal coliform states that the coliform density shall not exceed 400 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at HUMBOLDT BEACH.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6063
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water

Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	653
Number of Exceedances:	49
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 653 samples collected, 49 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 653 samples were collected at the Clubhouse station located in Huntington Harbour.
Temporal Representation:	The 156 samples were collected March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6049
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation

Number of Samples:	584
Number of Exceedances:	16
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 584 samples collected, 16 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 584 samples were collected at the Admiralty Drive station located in Huntington Harbour.
Temporal Representation:	The 584 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81597
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	13
Number of Exceedances:	0
Data and Information Type:	Not Specified

Data Used to Assess Water Quality:	Zero of the 13 geomeans exceeded the objective.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The standard for fecal coliform states that the coliform density shall not exceed 400 per 100 mL. Water Quality Control Plan for Ocean Waters 2009.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at TRINIDAD LANE.
Temporal Representation:	Samples were collected approximately once a week from January to October 2009 and once in October 2010.
Environmental Conditions:	
QAPP Information:	The samples were collected for the beach watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6061
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	482
Number of Exceedances:	30
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 482 samples collected, 30 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency

Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 482 samples were collected at the Bolsa Chica station located in Huntington Harbour.
Temporal Representation:	The 482 samples were collected March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6052
Pollutant:	Fecal Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	515
Number of Exceedances:	12
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 515 samples collected, 12 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Fecal Coliform density shall not exceed 200 per 100ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board,

California Environmental Protection Agency

Spatial Representation:	The 515 samples were collected at the Anaheim Bay station located in Huntington Harbor.
Temporal Representation:	The 515 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_9222_D.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	4414
Pollutant:	Pathogens
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Not Recorded
Beneficial Use:	Water Contact Recreation
Number of Samples:	0
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Unspecified--This LOE is a placeholder to support a 303(d) listing decision made prior to 2006.
Data Reference:	Placeholder reference pre-2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Unspecified
Objective/Criterion Reference:	Placeholder reference pre-2006 303(d)
Evaluation Guideline:	Unspecified
Guideline Reference:	Placeholder reference pre-2006 303(d)
Spatial Representation:	Unspecified
Temporal Representation:	Unspecified
Environmental Conditions:	Unspecified
QAPP Information:	Unspecified
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	81609
Pollutant:	Total Coliform

LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	7
Number of Exceedances:	2
Data and Information Type:	(VOL.) Chem./phys. monitoring data by quality-assured volunteer program
Data Used to Assess Water Quality:	Two of the seven samples exceeded the total coliform objective. The data was collected by volunteer monitoring groups during three years.
Data Reference:	Data for bacteria in various waterbodies, Feb. 2005-May 2007
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The single sample total coliform concentration shall not exceed more than 10,000/100ml. Calidornia Ocean Plan 2006. (Basin Plan Region 8)
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The data was collected from Peter's Landing - estuary and Huntington Harbor - estuary.
Temporal Representation:	The data was collected in November 2003, February, May and July 2004, and May 2007.
Environmental Conditions:	
QAPP Information:	The data was collected by volunteer monitoring groups under The Southern California Marine Institute Volunteer Monitoring Quality Assurance Project Plan.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81617
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	42
Number of Exceedances:	12
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Twelve of the forty-two samples exceeded the total colifrom objective.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.

SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The single sample total coliform concentration shall not exceed more than 10000/100ml. Water Quality Control Plan for Ocean Waters 2006.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	The samples were collected from Huntington Harbour sites, Bolsa Chica Channel Mouth, Christiana Bay, and Warner Avenue.
Temporal Representation:	The samples were collected from 2006 to 2009.
Environmental Conditions:	
QAPP Information:	The samples were collected and analyzed under the Quality Assurance Management Plan for The Orange County Stormwater Program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	81606
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	238
Number of Exceedances:	3
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Water Board staff assessed BeachWatch data for Huntington Harbour to determine beneficial use support and results are as follows: 3 of 238 samples exceed the criterion for Coliform, Total.
Data Reference:	Data for Region 8 Beach Watch.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	California Ocean Plan (2009) single sample maximum states that total coliform density shall not exceed 10,000 per 100 mL
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Data for this line of evidence for Huntington Harbour was collected at 10 monitoring sites [MOTHERS BEACH, TRINIDAD LANE, SEA GATE, HUMBOLDT BEACH, Davenport Beach, CLUBHOUSE, HARBOUR

	CHANNEL, 11TH STREET BEACH, ADMIRALTY DRIVE, CORAL CAY]
Temporal Representation:	Data was collected over the time period 1/14/2009-10/28/2009.
Environmental Conditions:	Staff is not aware of any special conditions that might affect interpretation of the data.
QAPP Information:	The samples were collected for the Beach Watch program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6048
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1039
Number of Exceedances:	13
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1039 samples collected, 13 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column:Total Coliform density shall not exceed 1,000 per 100 ml when
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1039 samples were collected at the Admiralty Drive station located in Huntington Harbour
Temporal Representation:	The 1039 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.

QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6058
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1149
Number of Exceedances:	93
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1149 samples collected, 93 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1149 samples were collected at the Anderson Street station located in Huntington Harbour
Temporal Representation:	The 1149 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of

	the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**

Huntington Harbour

LOE ID:	6054
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1023
Number of Exceedances:	16
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1023 samples collected, 16 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1023 samples were collected at the Anaheim Bay station located in Huntington Harbour
Temporal Representation:	The 1023 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data was collected by the Orange County Environmental Health Agency and provided to the Regional Board by the State Water Resources Control Board for the sole purpose of the water quality assessment and update of the 2008 303d list. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97909, Indicator Bacteria **Region 8**
Huntington Harbour

LOE ID:	6064
Pollutant:	Total Coliform
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	None
Beneficial Use:	Water Contact Recreation
Number of Samples:	1079
Number of Exceedances:	57
Data and Information Type:	PATHOGEN MONITORING
Data Used to Assess Water Quality:	Of the 1079 samples collected, 57 exceeded the standards/guidelines listed above.
Data Reference:	Bacteria data for Huntington Harbour from 1999 to 2008
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	As stated in the California Ocean Plan, under the SWRCB Water-Contact Standards using a 30d geometric mean maximum, within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column: Total Coliform density shall not exceed 1,000 per 100 ml
Objective/Criterion Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Evaluation Guideline:	
Guideline Reference:	Water Quality Control Plan Ocean Waters of California. California Ocean Plan 2005. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency
Spatial Representation:	The 1079 samples were collected at the Clubhouse station located in Huntington Harbour
Temporal Representation:	The 1079 samples were collected between March 1999 and December 2008
Environmental Conditions:	The data spanned 10 years including wet and dry seasons.
QAPP Information:	Data's quality is acceptable because it was collected by the Orange County Environmental Health Agency and provided to the Regional Board. The EPA Method/Analytical Detection Limit used was MF_APHA_922_B.
QAPP Information Reference(s):	

DECISION ID 80431 **Region 8**
Huntington Harbour

Pollutant:	**Lead**
Final Listing Decision:	**Do Not Delist from 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not Delist from 303(d) list (TMDL required list)(2016)
Revision Status	Original
Sources:	A Source Unknown
Expected TMDL Completion Date:	2019
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section 3.6 of the Listing Policy. Under section 3.6 at least two lines of evidence are necessary to assess listing status for pollutants in sediment, and pollutant concentrations in sediment must be associated with sediment toxicity to justify adding that pollutant to the CWA section 303(d) List.

Three lines of evidence are available in the administrative record to assess this pollutant. Zero of 45 water samples exceed the CTR. Forty-seven of 60 samples exhibited sediment toxicity. Seven of the 60 sediment samples exceed the sediment quality guideline.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification in favor of placing this water segment-pollutant combination on the section 303(d) list in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. A sediment quality guideline is available that complies with the requirements of section 6.1.3 of the Policy.
2. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
3. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
4. Zero of 45 water samples exceed the CTR. Forty-seven of 60 samples exhibited sediment toxicity and this exceeds the allowable frequency listed in Table 3.1 of the Listing Policy. Seven of the 60 sediment samples exceed the sediment quality guideline and this exceeds the allowable frequency listed in Table 3.1 of the Listing Policy.
5. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should be placed on the section 303(d) list because applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 80431, Lead **Region 8**
Huntington Harbour

LOE ID:	248
Pollutant:	Lead
LOE Subgroup:	Pollutant-Sediment
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	7
Data and Information Type:	Chemical monitoring of sediments
Data Used to Assess Water Quality:	Seven of 60 sediment samples were collected and exceeded the PEL sediment quality guideline (Santa Ana RWQCB, 2003b).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentration of toxic substance in the water column, sediments or biota shall not adversely affect beneficial uses (SARWQCB, 1995).
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	PEL sediment quality guideline for lead is 112.18 µg/g/dw.
Guideline Reference:	Placeholder reference 2006 303(d)
Spatial Representation:	Samples were collected at stations 36 thru 72 in Huntington Harbour. Data were available for 32 stations (no data were included for stations 40, 45, 48, 61, and 67.)
Temporal Representation:	Samples were collected on 08/08/2001 and 02/27/2003.
Environmental Conditions:	Samples were collected during dry season (8/8/01) and wet season (2/27/03).
QAPP Information:	SARWQCB followed the Bight 1998 QAPP developed by SCCWRP.Quality control data was presented.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 80431, Lead **Region 8**
Huntington Harbour

LOE ID:	81598
Pollutant:	Lead
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved

Beneficial Use:	Marine Habitat
Number of Samples:	45
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the 45 samples exceeded the water quality objective for lead.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in saltwater for lead at 8.1 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB), and Warner Avenue (HUNWAR).
Temporal Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 80431, Lead **Region 8**

Huntington Harbour

LOE ID:	251
Pollutant:	Sediment Toxicity
LOE Subgroup:	Toxicity
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	47
Data and Information Type:	Toxicity testing of sediments
Data Used to Assess Water Quality:	Forty-seven of 60 samples exceeded the 90 percent of the minimum significant difference for test species Eohaustorius estuarius. Twenty of 30 samples exhibited toxicity in the dry season (8/7/01 and 8/8/01), and 27 of 30 exhibited toxicity in the wet season (2/24/03) (Phillips et al., 1998).
Data Reference:	Placeholder reference 2006 303(d)

SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Narrative Water Quality Objective: "The concentration of toxic pollutants in the water column, sediment or biota shall not adversely affect beneficial use."
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at 32 stations (no data were included for stations 40, 45, 48, 61, and 67).
Temporal Representation:	Samples were collected on 8/7/01, 8/8/01 and 2/24/03.
Environmental Conditions:	Samples were collected during dry (8/7/01, 8/8/01) and wet season (2/24/03).
QAPP Information:	SARQWCB followed the Bight 1998 QAPP developed by SCCWRP.
QAPP Information Reference(s):	

DECISION ID 76729 Region 8
Huntington Harbour

Pollutant:	**Toxicity**
Final Listing Decision:	**Do Not Delist from 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not Delist from 303(d) list (TMDL required list)(2016)
Revision Status	Original
Sources:	A Source Unknown
Expected TMDL Completion Date:	2025
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the section 303(d) list under section 3.6 of the Listing Policy. Under section 3.6 at least one line of evidence is necessary to assess listing status for toxicity, and waters may be placed on the CWA section 303(d) List for toxicity alone.

Three lines of evidence are available in the administrative record to assess this pollutant. Fifty-three out of 81 samples exhibited sediment toxicity. Fourteen out of 39 samples exhibited water toxicity.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification in favor of placing this water segment-pollutant combination on the section 303(d) list in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Fifty-three out of 81 samples exhibited sediment toxicity and this exceeds the allowable frequency listed in Table 3.1 of the Listing Policy. Fourteen out of 39

	samples exhibited water toxicity and this exceeds the allowable frequency listed in Table 3.1 of the Listing Policy. 4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should be placed on the section 303(d) list because applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 76729, Toxicity **Region 8**

Huntington Harbour

LOE ID:	81619
Pollutant:	Toxicity
LOE Subgroup:	Toxicity
Matrix:	Sediment
Fraction:	None
Beneficial Use:	Marine Habitat
Number of Samples:	21
Number of Exceedances:	6
Data and Information Type:	TOXICITY TESTING
Data Used to Assess Water Quality:	Twenty-one samples were collected to evaluate sediment toxicity. Six of the 21 samples exhibited significant toxicity. The toxicity tests included survival of Eohaustorius.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health. Region 8 Basin Plan.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	Toxicity is defined as a statistically significant effect in the sample exposure compared to the control using EPA-recommended hypothesis testing. The t-test is used to determine if there is a statistically significant decrease in organism response in the sample as compared to the control. Exceedances are counted with the significant effect code SL. SL is defined as the result being significant compared to the negative control based on a

	statistical test, less than stated the alpha level, AND less than the evaluation threshold.
Guideline Reference:	Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods. June 1994. EPA 600/R-94/025
Spatial Representation:	The samples were collected at stations HUNBCC, HUNCRB, HUNWAR Huntington Harbour.
Temporal Representation:	The samples were collected approximately twice a year from 2006 to 2009.
Environmental Conditions:	
QAPP Information:	The data collected under the Quality Assurance Management Plan for The Orange County Stormwater Program. The SWAMP measurement quality objectives were followed for toxicity data. The performance of toxicity bioassays and evaluation of reference toxicants were performed using USEPA and Standard Methods.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 76729, Toxicity **Region 8**

Huntington Harbour

LOE ID:	251
Pollutant:	Sediment Toxicity
LOE Subgroup:	Toxicity
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	47
Data and Information Type:	Toxicity testing of sediments
Data Used to Assess Water Quality:	Forty-seven of 60 samples exceeded the 90 percent of the minimum significant difference for test species Eohaustorius estuarius. Twenty of 30 samples exhibited toxicity in the dry season (8/7/01 and 8/8/01), and 27 of 30 exhibited toxicity in the wet season (2/24/03) (Phillips et al., 1998).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Narrative Water Quality Objective: "The concentration of toxic pollutants in the water column, sediment or biota shall not adversely affect beneficial use."
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at 32 stations (no data were included for stations 40, 45, 48, 61, and 67).
Temporal Representation:	Samples were collected on 8/7/01, 8/8/01 and 2/24/03.
Environmental Conditions:	Samples were collected during dry (8/7/01, 8/8/01) and wet season (2/24/03).

QAPP Information:	SARQWCB followed the Bight 1998 QAPP developed by SCCWRP.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 76729, Toxicity **Region 8**

Huntington Harbour

LOE ID:	81618
Pollutant:	Toxicity
LOE Subgroup:	Toxicity
Matrix:	Water
Fraction:	None
Beneficial Use:	Marine Habitat
Number of Samples:	39
Number of Exceedances:	14
Data and Information Type:	TOXICITY TESTING
Data Used to Assess Water Quality:	Thirty-nine samples were collected at three different stations to evaluate water toxicity. Fourteen of the 39 samples exhibited significant toxicity. The toxicity tests that exhibited significant toxicity included chronic and acute Mysid Survival and biomass, and Purple Urchin fertilized and development.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health. Region 8 Basin Plan.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	Toxicity is defined as a statistically significant effect in the sample exposure compared to the control using EPA-recommended hypothesis testing. The t-test is used to determine if there is a statistically significant decrease in organism response in the sample as compared to the control. Exceedances are counted with the significant effect code SL. SL is defined as the result being significant compared to the negative control based on a statistical test, less than stated the alpha level, AND less than the evaluation threshold.
Guideline Reference:	Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95-136.
Spatial Representation:	The samples were collected at stations HUNBCC, HUNCRB, and HUNWAR- Huntington Harbour.
Temporal Representation:	The samples were collected approximately quarterly from 2006 to 2009.
Environmental Conditions:	
QAPP Information:	The data collected under the Quality Assurance Management Plan for The Orange County Stormwater Program. The SWAMP measurement quality objectives were followed for toxicity data. The performance of toxicity bioassays and evaluation of reference toxicants were performed using USEPA and Standard Methods.

QAPP Information Reference(s):

DECISION ID	97274	Region 8
Huntington Harbour		

Pollutant: **Arsenic**
Final Listing Decision: **Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision: Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status Original
Impairment from Pollutant or Pollution: Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status.

One line of evidence is available in the administrative record to assess this pollutant. Zero of the 43 samples exceed the CRITERIA.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero of the 43 samples exceed the CRITERIA and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list because applicable water quality standards are not being exceeded.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 97274, Arsenic	Region 8
Huntington Harbour	

LOE ID: 81569

Pollutant:	Arsenic
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	43
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the 43 samples exceeded the water quality objective for arsenic.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in saltwater for arsenic at 36 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB), and Warner Avenue (HUNWAR).
Temporal Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 68080 Region 8
Huntington Harbour

Pollutant:	**Cadmium**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under sections 3.1 and 3.6 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status. Under section 3.6 at least two lines of evidence are necessary to assess listing status for pollutants in sediment, and

pollutant concentrations in sediment must be associated with sediment toxicity to justify adding that pollutant to the CWA section 303(d) List.

Three lines of evidence are available in the administrative record to assess this pollutant. Zero of 45 water samples exceed the criteria and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy. Zero of 65 sediment samples exceed the guideline and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy. Sediment toxicity is observed.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the section 303(d) list in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero of 45 water samples exceed the criteria and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy. Zero of 65 sediment samples exceed the guideline and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that though this water body is impaired for sediment toxicity, this water body-pollutant combination should not be placed on the section 303(d) list because applicable the water or sediment quality standards for these pollutants are not being exceeded or are insufficient to determine use support.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 68080, Cadmium **Region 8**

Huntington Harbour

LOE ID:	81570
Pollutant:	Cadmium
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	45

Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the 45 samples exceeded the water quality objective for cadmium.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in saltwater for cadmium at 9.3 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB), and Warner Avenue (HUNWAR).
Temporal Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 68080, Cadmium **Region 8**

Huntington Harbour

LOE ID:	247
Pollutant:	Cadmium
LOE Subgroup:	Pollutant-Sediment
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	65
Number of Exceedances:	0
Data and Information Type:	Chemical monitoring of sediments
Data Used to Assess Water Quality:	None of the 65 samples exceeded the cadmium PEL sediment quality guideline. (Bay and Greenstein, 2003).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentration of toxic substance in the water column, sediments or biota shall not adversely affect beneficial uses (SARWQCB, 1995).

Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	There is a sediment quality guideline for cadmium of 4.21 ug/g dw.
Guideline Reference:	Placeholder reference 2006 303(d)
Spatial Representation:	Samples were collected at Huntington Harbor, stations labeled 36 through 72.
Temporal Representation:	Samples were collected on 08/08/2001 and 02/27/2003.
Environmental Conditions:	
QAPP Information:	SARWQCB followed the Bight 1998 QAPP developed by SCCWRP.Quality control data was presented.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 68080, Cadmium **Region 8**

Huntington Harbour

LOE ID:	251
Pollutant:	Sediment Toxicity
LOE Subgroup:	Toxicity
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	47
Data and Information Type:	Toxicity testing of sediments
Data Used to Assess Water Quality:	Forty-seven of 60 samples exceeded the 90 percent of the minimum significant difference for test species Eohaustorius estuarius. Twenty of 30 samples exhibited toxicity in the dry season (8/7/01 and 8/8/01), and 27 of 30 exhibited toxicity in the wet season (2/24/03) (Phillips et al., 1998).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Narrative Water Quality Objective: "The concentration of toxic pollutants in the water column, sediment or biota shall not adversely affect beneficial use."
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at 32 stations (no data were included for stations 40, 45, 48, 61, and 67).
Temporal Representation:	Samples were collected on 8/7/01, 8/8/01 and 2/24/03.
Environmental Conditions:	Samples were collected during dry (8/7/01, 8/8/01) and wet season (2/24/03).
QAPP Information:	SARQWCB followed the Bight 1998 QAPP developed by SCCWRP.
QAPP Information Reference(s):	

DECISION ID	97331	Region 8
Huntington Harbour		

Pollutant:	**Chlorpyrifos**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status.

One line of evidence is available in the administrative record to assess this pollutant. Zero of the 36 samples exceed the CRITERIA. However, 9 samples had a reporting limit higher than 9 ng/L rendering them unusable for assessment purposes.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero of the 36 samples exceed the CRITERIA and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list because applicable water quality standards are not being exceeded.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:

After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 97331, Chlorpyrifos	Region 8
Huntington Harbour	

LOE ID:	81571
Pollutant:	Chlorpyrifos

LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Total Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	36
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of 36 samples exceed the Criteria Continuous Concentration for Chlorpyrifos of 9 ng/L. However, 9 samples had a reporting limit higher than 9 ng/L rendering them unusable for assessment purposes.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	The Criteria Continuous Concentration for chlorpyrifos in saltwater is 9 ng/L.
Guideline Reference:	Water quality criteria for diazinon and chlorpyrifos. Administrative Report 00-3. Rancho Cordova, CA: Pesticide Investigations Unit, Office of Spills and Response. CA Department of Fish and Game
Spatial Representation:	Samples were collected at sites: HUNBCC, HUNCRB and HUNWAR.
Temporal Representation:	Samples were collected 2006 to 2009.
Environmental Conditions:	
QAPP Information:	Data were submitted with the County of Orange Stormwater Program Quality Assurance Management Plan (QAMP) dated January 2010. The Regional Water Board has determined that equivalent QA/QC documentation exists within the Water Quality Monitoring and Reporting Program for the Orange County MS4 permit and appendix C-11- X of the 2008-09 monitoring report.
QAPP Information Reference(s):	Quality Assurance Project Plan for the Orange County Stormwater Program.

DECISION ID 97333 Region 8

Huntington Harbour

Pollutant:	**Diazinon**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is

necessary to assess listing status.

One line of evidence is available in the administrative record to assess this pollutant. Zero of the 45 samples exceed the CRITERIA.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero of the 45 samples exceed the CRITERIA and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list because applicable water quality standards are not being exceeded.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 97333, Diazinon **Region 8**

Huntington Harbour

LOE ID:	81573
Pollutant:	Diazinon
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Total Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	45
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the 45 samples exceeded the Criteria Continuous Concentration for diazinon of 820 ng/L.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP

Water Quality Objective/Criterion:	Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	The Criteria Continuous Concentration for diazinon in saltwater is 820 ng/L.
Guideline Reference:	Aquatic Life Ambient Water Quality Criteria for Diazinon
Spatial Representation:	Samples were collected at sites: HUNBCC, HUNCRB and HUNWAR.
Temporal Representation:	amples were collected 2006 to 2009.
Environmental Conditions:	
QAPP Information:	Data were submitted with the County of Orange Stormwater Program Quality Assurance Management Plan (QAMP) dated January 2010. However, data were collected prior to the development of this QAMP, therefor the quality of these data are unknown.
QAPP Information Reference(s):	

DECISION ID **68526** **Region 8**

Huntington Harbour

Pollutant:	**Endrin**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

There was no new data considered in the 2014 Listing Cycle, this previously made decision will carryover. The following description applies to an earlier Listing Cycle.

This pollutant is being considered for placement on the section 303(d) list under sections 3.6 of the Listing Policy. Under section 3.6 a two lines of evidence are necessary to assess listing status.

Two lines of evidence are available in the administrative record to assess this pollutant. None of the sediment samples exceeds the sediment quality guidelines. There is sediment toxicity documented in this water body, however, it does not appear to be linked to this pollutant.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the section 303(d) list in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The sediment quality guideline used complies with the requirements of section 6.1.3 of the Policy.
2. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.

	3. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy. 4. None of 60 samples exceeded the sediment quality guideline, and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy. 5. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	This is a decision previously approved by the State Water Resources Control Board and the USEPA. No new data were assessed by the Regional Board for the current. The decision has not changed.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 68526, Endrin **Region 8**

Huntington Harbour

LOE ID:	250
Pollutant:	Endrin
LOE Subgroup:	Pollutant-Sediment
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	0
Data and Information Type:	Chemical monitoring of sediments
Data Used to Assess Water Quality:	None of 60 samples exceeded the sediment quality guidelines for endrin (Santa Ana RWQCB, 2003b).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentration of toxic substance in the water column, sediments or biota shall not adversely affect beneficial uses (SARWQCB, 1995).
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	The sediment quality guideline for endrin is 0.76 ug/g (ppm) dry weight (USEPA, 1993).
Guideline Reference:	Placeholder reference 2006 303(d)
Spatial Representation:	Samples were collected at stations 36 though 72 in Huntington Harbor.
Temporal Representation:	Samples were collected on 08/07/2001 and on 02/27/2003.
Environmental Conditions:	Samples were collected during dry season (8/7/01) and wet season (2/27/03).

QAPP Information:	SARWQCB followed the Bight 1998 QAPP developed by SCCWRP.Quality control data was presented.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 68526, Endrin **Region 8**
Huntington Harbour

LOE ID:	251
Pollutant:	Sediment Toxicity
LOE Subgroup:	Toxicity
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	47
Data and Information Type:	Toxicity testing of sediments
Data Used to Assess Water Quality:	Forty-seven of 60 samples exceeded the 90 percent of the minimum significant difference for test species Eohaustorius estuarius. Twenty of 30 samples exhibited toxicity in the dry season (8/7/01 and 8/8/01), and 27 of 30 exhibited toxicity in the wet season (2/24/03) (Phillips et al., 1998).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Narrative Water Quality Objective: "The concentration of toxic pollutants in the water column, sediment or biota shall not adversely affect beneficial use."
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at 32 stations (no data were included for stations 40, 45, 48, 61, and 67).
Temporal Representation:	Samples were collected on 8/7/01, 8/8/01 and 2/24/03.
Environmental Conditions:	Samples were collected during dry (8/7/01, 8/8/01) and wet season (2/24/03).
QAPP Information:	SARQWCB followed the Bight 1998 QAPP developed by SCCWRP.
QAPP Information Reference(s):	

DECISION ID 69570 **Region 8**
Huntington Harbour

Pollutant:	**Invasive Species**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original

Impairment from Pollutant or Pollution:	Pollution
Regional Board Conclusion:	This pollutant is being considered for placement on the section 303(d) list under section 3.10 of the Listing Policy. Under section 3.10 a single line of evidence is necessary to assess listing status. One line of evidence is available in the administrative record to assess this pollutant. The pollutant does not exceed the water quality objective. Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the section 303(d) list in the Water Quality Limited Segments category. This conclusion is based on the staff findings that: 1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy. 2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy. 3. The invasive aquatic plant, Caulerpa taxifolia has not been detected in Huntington Harbour since 2002. Eradication and monitoring of infected sites has been ongoing since it was discovered in July 2000. So the pollutant does not exceed the water quality objective and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy. 4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	This is a decision previously approved by the State Water Resources Control Board and the USEPA. No new data were assessed by the Regional Board for the current. The decision has not changed.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 69570, Invasive Species **Region 8**

Huntington Harbour

LOE ID:	252
Pollutant:	Invasive Species
LOE Subgroup:	Population/Community Degradation
Matrix:	Water
Fraction:	None
Beneficial Use:	Marine Habitat
Number of Samples:	0

Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Caulerpa taxifolia was discovered in July 2000 at Huntington Harbour near Long Beach, CA. Intensive monitoring and surveillance of infested waters has been ongoing. Infested areas have been contained and treated in the past. Since 2002 no Caulerpa has been detected in Huntington Harbour. (Anderson, 2005).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Toxic Substances: The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Huntington Harbour near Long Beach, CA.
Temporal Representation:	From July 2000 to 2002. Currently no Caulerpa has been detected in Huntington Harbour.
Environmental Conditions:	Changes in relative diversity and abundance of native species may also be driven by habitat alteration, flow changes, or hydromodification.
QAPP Information:	Powerpoint presentation by Lars W.J. Anderson, USDA Ag. Research Svc., Davis, CA.
QAPP Information Reference(s):	

DECISION ID 97372 Region 8
Huntington Harbour

Pollutant:	**Malathion**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status. One line of evidence is available in the administrative record to assess this pollutant. Zero of 45 samples exceed the GUIDELINE. Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List in the Water Quality Limited Segments category. This conclusion is based on the staff findings that: 1. The data used satisfies the data quality requirements of section 6.1.4 of the

	Policy. 2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy. 3. Zero of 45 samples exceed the GUIDELINE and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy. 4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list because applicable water quality standards are not being exceeded.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 97372, Malathion **Region 8**

Huntington Harbour

LOE ID:	81599
Pollutant:	Malathion
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Total Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	45
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the 45 samples exceeded the maximum concentration for Malathion of 100 ng/L.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.
Objective/Criterion Reference:	California Ocean Plan Water Quality Control Plan Ocean Waters of California 2009
Evaluation Guideline:	The maximum (Instantaneous) concentration for Malathion in saltwater is 100 ng/L.
Guideline Reference:	Quality Criteria for Water. USEPA Office of Water and Hazardous Materials. Washington, D.C
Spatial Representation:	Samples were collected at sites: HUNBCC, HUNCRB and HUNWAR.

Temporal Representation:	Samples were collected 2006 to 2009.
Environmental Conditions:	
QAPP Information:	Data were submitted with the County of Orange Stormwater Program Quality Assurance Management Plan (QAMP) dated January 2010. However, data were collected prior to the development of this QAMP, therefore the quality of these data are unknown.
QAPP Information Reference(s):	

DECISION ID	**97922**	**Region 8**
Huntington Harbour		

Pollutant:	**Mercury**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status.

One line of evidence is available in the administrative record to assess this pollutant. One of the 6 samples exceed the CRITERIA.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. One of the 6 samples exceed the CRITERIA and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 16 samples is needed to determine if a beneficial use is fully supported using table 3.1.
4. Pursuant to SECTION 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 97922, Mercury **Region 8**
Huntington Harbour

LOE ID:	81600
Pollutant:	Mercury
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	6
Number of Exceedances:	1
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	One of the six samples exceeded the water quality objective for mercury.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	National Recommended Water Quality Criteria Continuous Concentrations (4-day average concentrations) for saltwater aquatic organisms exposure to elemental mercury is 0.94 ug/L.
Guideline Reference:	National Recommended Water Quality Criteria. United States Environmental Protection Agency. Office of Water. Office of Science and Technology
Spatial Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB), and Warner Avenue (HUNWAR).
Temporal Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 97922, Mercury **Region 8**
Huntington Harbour

LOE ID:	81601
Pollutant:	Mercury

LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Estuarine Habitat
Number of Samples:	6
Number of Exceedances:	1
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	One of the six samples exceeded the water quality objective for mercury.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	National Recommended Water Quality Criteria Continuous Concentrations (4-day average concentrations) for saltwater aquatic organisms exposure to elemental mercury is 0.94 ug/L.
Guideline Reference:	National Recommended Water Quality Criteria. United States Environmental Protection Agency. Office of Water. Office of Science and Technology
Spatial Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Temporal Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB), and Warner Avenue (HUNWAR).
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 97921 Region 8

Huntington Harbour

Pollutant:	**Selenium**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status. One] line of evidence is available in the administrative record to assess this

pollutant. Zero of the 43 samples exceed the CRITERIA.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero of the 43 samples exceeded the CRITERIA and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list because applicable water quality standards are not being exceeded.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 97921, Selenium **Region 8**

Huntington Harbour

LOE ID:	81604
Pollutant:	Selenium
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	43
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the 43 samples exceeded the water quality objective for selenium.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin

Evaluation Guideline:	The California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in saltwater for selenium at 71 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB), and Warner Avenue (HUNWAR).
Temporal Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 97861 Region 8
Huntington Harbour

Pollutant:	**Silver**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status.

One line of evidence is available in the administrative record to assess this pollutant. Zero of the 45 samples exceed the CRITERIA.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero of the 45 samples exceeded the CRITERIA and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list

because applicable water quality standards are not being exceeded.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 97861, Silver Huntington Harbour **Region 8**

LOE ID:	81605
Pollutant:	Silver
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	45
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the 45 samples exceeded the water quality objective for silver.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The California Toxics Rule (CTR) lists criterion maximum concentrations (1-hour average) for silver to protect aquatic life in saltwater as 1.9 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB), and Warner Avenue (HUNWAR).
Temporal Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID	97920	Region 8
Huntington Harbour		

Pollutant:	**Zinc**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

This pollutant is being considered for placement on the CWA section 303(d) List under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status.

One line of evidence is available in the administrative record to assess this pollutant. Zero of the 45 samples exceed the CRITERIA.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero of the 45 samples exceed the CRITERIA and this does not exceed the allowable frequency listed in Table 3.1 of the Listing Policy.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation:

After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list because applicable water quality standards are not being exceeded.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation:

After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 97920, Zinc	Region 8
Huntington Harbour	

LOE ID:	81620
Pollutant:	Zinc
LOE Subgroup:	Pollutant-Water

Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Marine Habitat
Number of Samples:	45
Number of Exceedances:	0
Data and Information Type:	Fixed station physical/chemical (conventional plus toxic pollutants)
Data Used to Assess Water Quality:	None of the 45 samples exceeded the water quality objective for zinc.
Data Reference:	Data for Various Waterbodies in Region 8 and Region 9, 2006-2009.
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	The California Toxics Rule (CTR) lists criterion continuous concentrations (4-day average) to protect aquatic life in saltwater for zinc at 81 ug/L.
Guideline Reference:	Code of Federal Regulations 40 part 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California. 7/1/2011 Edition
Spatial Representation:	Samples were collected from within Huntington Harbor at three samples stations: Harbor Entrance (HUNBCC), Sunset Aquatic Park (HUNCRB), and Warner Avenue (HUNWAR).
Temporal Representation:	Samples were collected quarterly starting in Fall of 2006 through June of 2009.
Environmental Conditions:	
QAPP Information:	Samples were collected and analyzed in accordance with the signed and certified, Quality Assurance Management Plan for the Orange County Stormwater Program.
QAPP Information Reference(s):	

DECISION ID 88777 Region 8

Huntington Harbour

Pollutant:	**pH**
Final Listing Decision:	**Do Not List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	Do Not List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	This pollutant is being considered for placement on the CWA section 303(d) List under section three (3) of the Listing Policy. Under section 3.2, a single line of evidence is necessary to assess the listing status. One (1) line of evidence is available in the administrative record to assess this pollutant. Zero (0) of the two (2) samples exceed the Objective.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification against placing this water segment-pollutant combination on the CWA section 303(d) List.

This conclusion is based on the staff findings that:
1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.
3. Zero (0) of the two (2) samples exceeded the Objective and this sample size is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating. A minimum of 26 samples are needed to determine if a beneficial use is fully supported using table 3.2.
4. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.

Regional Board Decision Recommendation: After review of the available data and information, RWQCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list. The readily available data and information is insufficient to determine, with the power and confidence of the Listing Policy, the applicable beneficial use support rating.

State Board Review of Regional Board Conclusion and Recommendation:

State Board Decision Recommendation: After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 88777, pH **Region 8**

Huntington Harbour

LOE ID:	81603
Pollutant:	pH
LOE Subgroup:	Pollutant-Water
Matrix:	Water
Fraction:	Dissolved
Beneficial Use:	Estuarine Habitat
Number of Samples:	2
Number of Exceedances:	0
Data and Information Type:	PHYSICAL/CHEMICAL MONITORING
Data Used to Assess Water Quality:	Numeric data generated from 2 samples of pH data had no exceedences.
Data Reference:	Data for bacteria in various waterbodies, Feb. 2005-May 2007
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The pH of bay or estuary waters shall not be raised above 8.6 or depressed below 7.0 as a result of controllable water quality factors...

Objective/Criterion Reference:	Water Quality Control Plan, Santa Ana River Basin
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected from the Huntington Harbor and Peter's Landing stations
Temporal Representation:	One sample was collected on 5/5/2007.
Environmental Conditions:	
QAPP Information:	NPDES quality assurance.
QAPP Information Reference(s):	

DECISION ID	**68183**	**Region 8**
Huntington Harbour		

Pollutant:	**Chlordane**
Final Listing Decision:	**List on 303(d) list (TMDL required list)**
Last Listing Cycle's Final Listing Decision:	List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Sources:	A Source Unknown
Expected TMDL Completion Date:	2019
Impairment from Pollutant or Pollution:	Pollutant

Regional Board Conclusion:

Regional Board conclusion:
This pollutant was considered for placement on the section 303(d) list in a previous assessment cycle. No new information was reviewed for this current assessment cycle. Therefore, the previous conclusion remains unchanged, and is as follows:

This pollutant is being considered for placement on the CWA section 303(d) List under section 3.6 of the Listing Policy. Under section 3.6 at least two lines of evidence are necessary to assess listing status for pollutants in sediment, and pollutant concentrations in sediment must be associated with sediment toxicity to justify adding that pollutant to the CWA section 303(d) List.

Multiple lines of evidence are available in the administrative record to assess this pollutant. Based on section 3.6 the site has significant sediment toxicity and the pollutant is likely to cause or contribute to the toxic effect.

Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification in favor of placing this water segment-pollutant combination on the section 303(d) list in the Water Quality Limited Segments category.

This conclusion is based on the staff findings that:
1. The sediment quality guideline used complies with the requirements of section 6.1.3 of the Policy.
2. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
3. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.

	4. Seven of 60 samples exceeded ERM sediment guideline, and 47 of 60 samples exhibit toxicity, and these exceed the allowable frequency listed in Table 3.1 of the Listing Policy. 5. Pursuant to section 3.11 of the Listing Policy, no additional data and information are available indicating that standards are not met.
Regional Board Decision Recommendation:	This is a decision previously approved by the State Water Resources Control Board and the USEPA. No new data were assessed by the Regional Board for the current cycle. The decision has not changed.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 68183, Chlordane **Region 8**

Huntington Harbour

LOE ID:	249
Pollutant:	Chlordane
LOE Subgroup:	Pollutant-Sediment
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	7
Data and Information Type:	Chemical monitoring of sediments
Data Used to Assess Water Quality:	Seven of 60 sediment samples exceeded the ERM guideline (Santa Ana RWQCB, 2003b).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	The concentration of toxic substance in the water column, sediments or biota shall not adversely affect beneficial uses (Santa Ana RWQCB, 1995a).
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	The ERM sediment quality guideline for chlordane is 6 ng/g (ppb) dry weight (Long et. al., 1990).
Guideline Reference:	Placeholder reference 2006 303(d)
Spatial Representation:	Samples were collected at stations 36 through 72 in Huntington Harbour. Data were available for 32 stations (no data were included for stations 40, 45, 48, 61, and 67).
Temporal Representation:	Samples were collected on August 2001 and February 2003.

Environmental Conditions:	Samples were collected during dry season (August 2001) and wet season (February 2003).
QAPP Information:	SARWQCB followed the Bight 1998 QAPP developed by SCCWRP.Quality control data was presented.
QAPP Information Reference(s):	

Line of Evidence (LOE) for Decision ID 68183, Chlordane **Region 8**
Huntington Harbour

LOE ID:	251
Pollutant:	Sediment Toxicity
LOE Subgroup:	Toxicity
Matrix:	Sediment
Fraction:	Total
Beneficial Use:	Marine Habitat
Number of Samples:	60
Number of Exceedances:	47
Data and Information Type:	Toxicity testing of sediments
Data Used to Assess Water Quality:	Forty-seven of 60 samples exceeded the 90 percent of the minimum significant difference for test species Eohaustorius estuarius. Twenty of 30 samples exhibited toxicity in the dry season (8/7/01 and 8/8/01), and 27 of 30 exhibited toxicity in the wet season (2/24/03) (Phillips et al., 1998).
Data Reference:	Placeholder reference 2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Narrative Water Quality Objective: "The concentration of toxic pollutants in the water column, sediment or biota shall not adversely affect beneficial use."
Objective/Criterion Reference:	Placeholder reference 2006 303(d)
Evaluation Guideline:	
Guideline Reference:	
Spatial Representation:	Samples were collected at 32 stations (no data were included for stations 40, 45, 48, 61, and 67).
Temporal Representation:	Samples were collected on 8/7/01, 8/8/01 and 2/24/03.
Environmental Conditions:	Samples were collected during dry (8/7/01, 8/8/01) and wet season (2/24/03).
QAPP Information:	SARQWCB followed the Bight 1998 QAPP developed by SCCWRP.
QAPP Information Reference(s):	

DECISION ID 70200 **Region 8**
Huntington Harbour

Pollutant:	**PCBs (Polychlorinated biphenyls)**
Final Listing Decision:	**List on 303(d) list (TMDL required list)**

Last Listing Cycle's Final Listing Decision:	List on 303(d) list (TMDL required list)(2016)
Revision Status	Original
Sources:	A Source Unknown
Expected TMDL Completion Date:	2019
Impairment from Pollutant or Pollution:	Pollutant
Regional Board Conclusion:	There was no new data considered in the 2014 Listing Cycle, this previously made decision will carryover. The following description applies to an earlier Listing Cycle. 303(d) listing decisions made prior to 2006 were not held in an assessment database. The Regional Boards will update this decision when new data and information become available and are assessed.
Regional Board Decision Recommendation:	This is a decision previously approved by the State Water Resources Control Board and the USEPA. No new data were assessed by the Regional Board for the current. The decision has not changed.
State Board Review of Regional Board Conclusion and Recommendation:	
State Board Decision Recommendation:	After review of this Regional Board decision, SWRCB staff recommend the decision be approved by the State Board.

Line of Evidence (LOE) for Decision ID 70200, PCBs (Polychlorinated biphenyls) **Region 8**

Huntington Harbour

LOE ID:	4415
Pollutant:	PCBs (Polychlorinated biphenyls) (tissue)
LOE Subgroup:	Pollutant-Tissue
Matrix:	Tissue
Fraction:	Not Recorded
Beneficial Use:	Commercial or recreational collection of fish, shellfish, or organisms
Number of Samples:	0
Number of Exceedances:	0
Data and Information Type:	Not Specified
Data Used to Assess Water Quality:	Unspecified--This LOE is a placeholder to support a 303(d) listing decision made prior to 2006.
Data Reference:	Placeholder reference pre-2006 303(d)
SWAMP Data:	Non-SWAMP
Water Quality Objective/Criterion:	Unspecified

Objective/Criterion Reference:	Placeholder reference pre-2006 303(d)
Evaluation Guideline:	Unspecified
Guideline Reference:	Placeholder reference pre-2006 303(d)
Spatial Representation:	Unspecified
Temporal Representation:	Unspecified
Environmental Conditions:	Unspecified
QAPP Information:	Unspecified
QAPP Information Reference(s):	

ATTACHMENT B

COUNTY SOILS AND RAINFALL MAPS

Susceptibility

Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

Earth (Unstable)

Earth (Stabilized)

Stabilized

Tidel Influence

<= Mean High Water Line (4.28')

Water Body

Basin

Lake

Federal & Other Lands

Seal Beach National Wildlife Refuge

Airports/Military

San Gabriel-Coyote Creek

Los Alamitos Naval Air Station

Seal Beach Naval Weapons Station

Seal Beach National Wildlife Refuge

West Street Retarding Basin

Haster Retarding Basin

Newland Retarding Basin

Lake Huntington

PROJECT AREA

Santa Ana River

Newport Bay

John Wayne Airport

J-194

0 6,500 13,000 Feet

P:\9526E\6-GIS\Mxds\Workspace\SusceptibleAnalysis_20100422\9526E_AnaheimBay_20100331.mxd

TITLE: SUSCEPTIBILITY ANALYIS ANAHEIM BAY-HUNTINGTON HARBOR

JOB: ORANGE COUNTY WATERSHED MASTER PLANNING ORANGE CO. CA

SCALE	DESIGNED	DRAWING	CHECKED	DATE	JOB NO.
1" = 6500'	TH	TH	BMP	04/22/10	9526-E

PACE Advanced Water Engineering

FIGURE 2

SUBJECT TO FURTHER REVISION

LEGEND

City Boundaries

Hydrologic Soil Groups

- A Soils
- B Soils
- C Soils
- D Soils

Source:
Soils: Natural Resources Conservation Service (NRCS)
Soil Survey - soil_ca678, Orange County & Western Riverside
Date of publication: 2006-02-08
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

PROJECT AREA

LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
San Pedro Channel
Pacific Ocean
Riverside County
San Diego County

0 2.5 5 10 Kilometers
0 1.8 3.6 7.2 Miles

TITLE
NRCS HYDROLOGIC SOILS GROUPS

JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.8 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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SUBJECT TO FURTHER REVISION

LEGEND

- Orange County Precipitation Stations
- 24 Hour, 85th Percentile Rainfall (Inches)
- 24 Hour, 85th Percentile Rainfall (Inches) - Extrapolated
- City Boundaries

Rainfall Zones

Design Capture Storm Depth (inches)

- 0.65"
- 0.7
- 0.75
- 0.80
- 0.85
- 0.90
- 0.95
- 1.00
- 1.10"

Note: Events defined as 24-hour periods (calendar days) with greater than 0.1 inches of rainfall.
For areas outside of available data coverage, professional judgment shall be applied.

PROJECT AREA

0.65 0.7 0.75 0.8 0.85 0.9 0.95 1 1.05

LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

TITLE: RAINFALL ZONES

ORANGE COUNTY
TECHNICAL GUIDANCE
DOCUMENT

JOB: ORANGE CO. CA

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

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SUBJECT TO FURTHER REVISION

LOS ANGELES COUNTY
ORANGE COUNTY

SAN BERNARDINO COUNTY
ORANGE COUNTY

RIVERSIDE COUNTY
ORANGE COUNTY

LOS ANGELES COUNTY
ORANGE COUNTY

PROJECT AREA

LEGEND

City Boundaries

OCWD Groundwater Basin Protection Boundary

Depth To Groundwater

<= 5'

5-10'

Note: Data are not available for South Orange County at this time.

Source:
Sprotte, Fuller and Greenwood, 1980.
California Division of Mines and Geology;
California Geological Survey

0 2 4 8 Kilometers

0 1.25 2.5 5 Miles

TITLE

NORTH ORANGE COUNTY
MAPPED SHALLOW GROUNDWATER

ORANGE COUNTY
INFILTRATION STUDY

CA

JOB

ORANGE CO.

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

PACE
Advanced Water Engineering

FIGURE

XVI-2e

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SUBJECT TO FURTHER REVISION

LEGEND

- Depth To First Groundwater Contours
- City Boundaries
- OCWD Groundwater Basin Protection Boundary

Note: Data are not available for South Orange County at this time.

Source:
Sprotte, Fuller and Greenwood, 1980.
California Division of Mines and Geology;
California Geological Survey

LOS ANGELES COUNTY
ORANGE COUNTY

SAN BERNARDINO COUNTY
ORANGE COUNTY

RIVERSIDE COUNTY
ORANGE COUNTY

PROJECT AREA

0 2 4 8 Kilometers

0 1.25 2.5 5 Miles

TITLE
NORTH ORANGE COUNTY
MAPPED DEPTH TO FIRST
GROUNDWATER

JOB
ORANGE COUNTY
INFILTRATION STUDY
ORANGE CO. CA

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

PACE
Advanced Water Engineering

FIGURE
XVI-2d

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ATTACHMENT C

GEOTECHNICAL REPORT

DUE-DILIGENCE GEOTECHNICAL EVALUATION
PROPOSED RESIDENTIAL DEVELOPMENT
16300 EUCLID STREET
FOUNTAIN VALLEY, CALIFORNIA

Prepared For

SHOPOFF ADVISORS, LP
2 PARK PLAZA, SUITE 700
IRVINE, CALIFORNIA 92614

Prepared By

LEIGHTON AND ASSOCIATES, INC.
17781 COWAN
IRVINE, CALIFORNIA 92614

13255.001

September 20, 2021

September 20, 2021

Project No. 13255.001

Shopoff Advisors, LP
2 Park Plaza, Suite 700
Irvine, California 92614

Attention: Mr. Blair Ruffner

Subject: Due-Diligence Geotechnical Evaluation
Proposed Residential Development
16300 Euclid Street
Fountain Valley, California

In accordance with our proposal, dated August 16, 2021, Leighton and Associates, Inc. (Leighton) has performed a due-diligence level geotechnical evaluation for the subject project. The purpose of this study is to provide you with our professional opinion with respect to the feasibility of developing the site for its intended use from a geotechnical standpoint, and to provide you with the required information for budgeting and cost analysis. Our study included five (5) Cone Penetrometer Test (CPT) soundings to preliminarily evaluate the liquefaction and settlement potential at the site. In addition, our study included limited geotechnical laboratory testing of near-surface site soils to evaluate soil expansion and corrosion potential.

We appreciate the opportunity to provide our services for this project. We trust that the information contained herein meets your objectives.

If you have any questions or concerns, please contact us at your convenience. The undersigned can be reached at **(866) *LEIGHTON***, specifically at the phone extension and e-mail address listed below.



Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

Jeffrey Pflueger, PG, CEG 2499
Associate Geologist
Ext. 4257, jpflueger@leightongroup.com



Carl Kim PE, GE 2620
Senior Principal Engineer
Ext. 4262, ckim@leightongroup.com

MM/JMP/CCK/rg

Distribution: (1) Addressee

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1.0 INTRODUCTION

1.1 Site Description and Proposed Development

The project site is located at the northeast corner of Euclid Street and Heil Avenue in the City of Fountain Valley, California. The site location (latitude 33.724564°, longitude -117.934992°) and immediate vicinity are shown on Figure 1, *Site Location Map.* The project site covers approximately 19 acres and is currently used for agricultural purposes. The Orange County Assessor's Office identifies the site as Assessor Parcel Numbers (APN) 144-111-01. The site is bordered by single-family residential homes to the north and east, Heil Avenue to the south, and Euclid Street to the west.

Based on review of aerial photographs (NETR, 2021), the site appears to have been used for agricultural purposes since at least 1953.

Review of the United States Geological Survey (USGS) *7.5-Minute Newport Beach Quadrangle* (USGS, 1978) indicates the site is relatively flat at approximate elevation (El.) +45 feet mean sea level (msl) with sheet flow generally directed to the southwest.

Based on review of the *Site Plan – Alternative 6D*, prepared by JZMK Partners, dated September 1, 2021, we understand the proposed development will consist of 38 two-story single-family dwellings, 93 three-story single-family dwellings, fifteen 3-story townhome buildings with a total of 93 units, and 2 podium apartment buildings with a total of 290 units. We understand that the proposed apartment buildings will be 3- to 4-stories in height, with a partial basement level planned for parking. When plans become available, they should be provided to the geotechnical engineer for review to ensure the recommendations contained herein remain applicable to site development.

1.2 Purpose and Scope

The purpose of our work was to evaluate the subsurface conditions at the site relative to the proposed development and provide preliminary geotechnical recommendations to aid in project planning. The scope of this evaluation included the following tasks:

- *Background Review* – We reviewed readily available geotechnical reports, literature, aerial photographs, and maps relevant to the site available from our in-house library or in the public domain. We evaluated geological hazards and potential geotechnical issues that may significantly impact the site. The documents reviewed are listed in Appendix A, *References*.

- *Field Exploration* – Our field exploration was performed on September 9, 2021 and consisted of five (5) Cone Penetrometer Test (CPT) soundings advanced at the site (designated CPT-1 through CPT-5), each to an approximate depth of 50 feet below ground surface (bgs). Shear wave velocity measurements were recorded at CPT-4 to develop seismic design parameters. Pore pressure dissipation tests were recorded at CPT-1 and CPT-4 to evaluate the groundwater conditions at the site. In addition, the groundwater level was physically measured at each CPT location after completion of each CPT prior to backfill. The approximate locations of the CPTs are shown on Figure 2, *Exploration Location Map*. Prior to the field exploration, the CPT locations were marked and Underground Service Alert (USA) was notified for utility clearance. In addition, we hand-augered the upper 5 feet at CPT-2 to CPT-4 prior to collect a representative near-surface bulk soil sample from the site for laboratory testing.

  The CPT soundings were performed in accordance with ASTM D5778 advanced by a 30-ton CPT rig in which a standard Cone equipped with a 15 cm^2 tip advanced at a constant rate of approximately 1 inch per second. The CPT provides a continuous record of the subsurface stratigraphy via data regarding tip and sleeve resistance which is continuously recorded electronically as the probe is advanced through the subsurface stratigraphy. The recorded data is processed yielding interpretations of soil type based upon the anticipated engineering behavior of the various soil strata though which the probe penetrates. Graphical logs of the interpreted soil conditions at the CPT sounding locations are included in Appendix B, *Cone Penetrometer Test (CPT) Logs*.

- *Laboratory Testing* – Laboratory tests were performed on the collected bulk soil sample from CPT-2 at our in-house geotechnical laboratory to preliminarily evaluate the near-surface site soils for expansion potential and corrosivity. The following laboratory tests were performed:

  - Expansion Index (ASTM D4829); and

- Corrosivity Suite - pH, Sulfate, Chloride, and Resistivity (California Test Methods 417, 422, and 532/643).

The results of the laboratory tests are presented in Appendix C, *Laboratory Test Results*.

- *Engineering Analysis* – The data obtained from our background review and subsurface field exploration were evaluated and analyzed to develop conclusions and preliminary recommendations for the proposed development.
- *Report Preparation* – This report presents our findings, conclusions, and preliminary recommendations for the conceptually proposed development

2.0 GEOTECHNICAL FINDINGS

2.1 Regional Geology

The project site is located on the lowest reach of the Santa Ana River basin within the Peninsular Ranges geomorphic province. The Peninsular Ranges geomorphic province extends southward from the Los Angeles Basin to the tip of Baja California (Yerkes et al., 1965) and is characterized by elongated northwest-trending mountain ranges separated by sediment-floored valleys. The most dominant structural features of the province are the northwest-trending fault zones, most of which die out, merge with, or are terminated by the steep reverse faults at the southern margin of the Transverse Ranges geomorphic province. East of the site are the northwest-trending Santa Ana Mountains, a large range that has been uplifted on its eastern side along the Whittier-Elsinore Fault Zone, producing a tilted, irregular highland that slopes westward toward the sea.

Approximately 65 million years ago (at the end of the Cretaceous Period) a deep, structural trough existed off the coast of southern California (Yerkes, 1972). Over time the trough was filled with sediments eroded from the surrounding highlands and mountains. About 7 million years ago, the boundary between the Pacific and North American plates shifted to its present position and the geologically modern Los Angeles basin began to form. The deepest part of the Los Angeles basin contains Tertiary to Quaternary-aged (65 million years and younger) marine and non-marine sedimentary rocks that are about 24,000 feet thick (Yerkes, et al, 1965; Wright, 1991). During the Pleistocene epoch (the last two million years), the region was flooded as the sea level rose in response to the worldwide melting of the Pleistocene glaciers depositing sediments across the Los Angeles Basin during transgression and regression of sea level.

The area south and west of the Santa Ana Mountains is generally characterized as a broad, complex, alluvial fan that receives sediments from the Santa Ana River and its tributaries draining the Santa Ana and San Bernardino Mountains. These sediments are comprised of relatively flat-lying, unconsolidated to loosely consolidated clastic deposits that are approximately 3,000 feet thick beneath the site (Sprotte et al., 1980, and Real, 1985). The project site is located approximately 0.9 mile west of the Santa Ana River. Regional geologic mapping of the project site and vicinity indicates that near-surface native soils beneath the site consist of Quaternary age (Holocene) young alluvial fan deposits consisting of varying proportions of sand, silt, and clay (Morton and Miller, 2006; Bedrossian and

Roffers, 2010). The surficial geologic units mapped in the vicinity of the project site are shown on Figure 3, *Regional Geology Map*.

2.2 Subsurface Conditions

Based on past site usage and development, the site is likely underlain by a relatively thin layer of undocumented artificial fill materials overlying Quaternary-age young alluvial fan deposits. The artificial fill materials at the site are likely associated with the current and historical agricultural site use, and generally anticipated to be on the order of approximately 2 to 3 feet in thickness. The stratigraphy of the subsurface soils as interpreted in each CPT is presented on the logs included in Appendix B, and a general description of the interpreted earth materials as encountered during the CPT exploration are described below.

2.2.1 Subsurface Soils

Based on review of the CPT interpretations (CPT-1 through CPT-5), the subsurface soils to the depth explored (50 feet bgs) contain alternating sequences with variable thicknesses of sand, silty sand, sandy silt, silt, silty clay, and clay.

Artificial fill materials in the upper 2 to 3 feet across the site generally consist of silty sand. Localized thicker accumulations of fill materials should be anticipated during future earthwork construction.

2.2.2 Expansive Soil Characteristics

Expansive soils contain significant amounts of clay particles that swell considerably when wetted and shrink when dried. Foundations constructed on these soils are subject to uplifting forces caused by the swelling. Without proper mitigation measures, heaving and cracking of both building foundations and slabs-on-grade could result. Based on our exploration, the near surface (upper 5 feet) onsite soils consist predominantly of sand and silty sand. The laboratory test result of representative near-surface (upper 5 feet) bulk soil sample from CPT-2 indicates very low expansion potential when wetted (EI = 0), or non-expansive. Accordingly, we recommend that the upper onsite soils be assumed to have very low expansion potential.

Variance in expansion potential of onsite soil is anticipated; therefore, additional testing is recommended during future geotechnical exploration

and/or upon completion of rough grading to confirm the expansion potential result presented in this report. Standard engineering and earthwork construction practices, such as proper foundation design and controlled moisture conditioning will reduce impacts associated with expansive soils.

2.2.3 Soil Corrosivity

In general, soil environments that are detrimental to concrete have high concentrations of soluble sulfates and/or pH values of less than 5.5. Section 4.3 of ACI 318 (ACI, 2014). The 2019 California Building Code (CBC) provides specific guidelines for the concrete mix-design when the soluble sulfate content of the soil exceeds 0.1 percent by weight or 1,000 parts per million (ppm). The minimum amount of chloride ions in the soil environment that are corrosive to steel, either in the form of reinforcement protected by concrete cover or plain steel substructures, such as steel pipes, is 500 ppm per California Test 532. Concentrations of chloride ions above the stated concentration or other characteristics such as soil resistivity or redox potential may warrant special corrosion protection measures.

For screening purposes, representative near-surface (upper 5 feet) bulk soil sample from CPT-2 was tested to provide a preliminary evaluation of corrosivity. The test results indicate a soluble sulfate concentration of 115 ppm, chloride content of 100 ppm, pH value of 7.52 and minimum resistivity value of 1,250 ohm-cm.

The results of the resistivity test indicate that the underlying soil is severely corrosive to buried ferrous metals per ASTM STP 1013. Based on the measured water-soluble sulfate content from the soil sample, concrete in contact with the soil is expected to have negligible exposure to sulfate attack per ACI 318-14. The sample tested for water-soluble chloride content indicate a low potential for corrosion of steel in concrete due to the chloride content of the soil. The chemical analysis test results for the onsite soil from our geotechnical exploration are included in Appendix C of this report.

2.2.4 Shear Wave Velocity Profile

Shear wave velocities were measured in CPT-4, see Figure 2 for location. Results are presented in Appendix B. The average shear wave velocity the ground surface down to about 45 feet bgs is about 587 feet per, which falls

just under the lower threshold of Site Class D. However, considering that shear wave velocity generally increases with depth, we assumed that Site Class D can be justified with additional exploration. Accordingly, the seismic site class is characterized as Site Class D for preliminary design purposes.

2.2.5 Groundwater Conditions

Groundwater was encountered at the locations of CPT-1 through CPT-5 at depths between 5.9 and 6.4 feet bgs. According to groundwater information obtained through the California Geological Survey (CGS) and presented in the Seismic Hazard Zone Report for the Anaheim and Newport Beach 7.5-Minute Quadrangles (CGS, 1997), the historically shallowest groundwater depth in the vicinity of the project site is approximately 4 feet bgs. In addition, based on review of available groundwater information from the California Department of Water Resources Water Data Library (DWR, 2021) for a nearby groundwater monitoring well located approximately 0.4 mile to the southwest of the project site (State Well # 05S10W21M002S), the shallowest groundwater level measured for a monitoring period between November 1969 and October 2010 was approximately 12.3 feet bgs.

Based on the currently proposed development scheme, groundwater will likely pose a constraint during and after construction. We recommend that a groundwater level at 4 feet bgs be assumed for preliminary design and construction.

Seasonal fluctuations in groundwater level, localized zones of perched water including water due to nearby landscaping, and an increase in soil moisture should be anticipated during and following locally intense rainfall or stormwater runoff. More detailed evaluation of the current groundwater level at the site should be performed during future subsurface exploration of the site in support of design level foundation studies

2.3 Surface Fault Rupture

Our review of available in-house literature indicates that no known active faults have been mapped across the site, and the site is not located within a designated Alquist-Priolo Earthquake Fault Zone (Bryant and Hart, 2007; CGS, 1986 and 2018).

Therefore, the potential for surface fault rupture at the site is expected to be low and a surface fault rupture hazard evaluation is not mandated for this site.

The location of the closest active faults to the site was evaluated using the United States Geological Survey (USGS) Earthquake Hazards Program National Seismic Hazard Maps (USGS, 2008). The closest active faults to the site with the potential for surface rupture are the Newport-Inglewood Fault Zone (NIFZ), Elsinore Fault, and Palos Verdes Fault located approximately 4.7 miles, 14.8 miles, and 15.5 miles from the site, respectively. The Puente Hills and San Joaquin Hills faults are located approximately 2.0 and 10.1 miles from the site, respectively; however, these are blind thrust faults that are concealed at depth without the potential for surface fault rupture. The San Andreas Fault, which is the largest active fault in California, is approximately 46 miles northeast of the site. Major regional faults with surface expression in proximity to the site are shown on Figure 4, *Regional Fault and Historic Seismicity Map*.

2.4 Seismicity and Ground Shaking

The principal seismic hazard to the site is ground shaking resulting from an earthquake occurring along any of several major active and potentially active faults in southern California. The intensity of ground shaking at a given location depends primarily upon the earthquake magnitude, the distance from the seismic source, and the site response characteristics. The site should be expected to experience strong ground shaking after the proposed project is developed resulting from an earthquake occurring along one or more of the major active faults (Figure 4). Accordingly, the project should be designed in accordance with all applicable current codes and standards utilizing the appropriate seismic design parameters to reduce seismic risk as defined by California Geological Survey (CGS) Chapter 2 of Special Publication 117a (CGS, 2008). The 2019 edition of the California Building Code (CBC) is the current edition of the code. Through compliance with these regulatory requirements and the utilization of appropriate seismic design parameters selected by the design professionals for the project, potential effects relating to seismic shaking can be reduced.

The following parameters should be considered for design under the 2019 CBC:

Table 1 – 2019 CBC Based Ground Motion Parameters (Mapped Values)

Categorization/Coefficients	Code-Based
Site Longitude (decimal degrees) West	-117.934992°
Site Latitude (decimal degrees) North	33.724564°
Site Class	D (default)
Mapped Spectral Response Acceleration at 0.2s Period, S_s	1.331
Mapped Spectral Response Acceleration at 1s Period, S_1	0.477
Short Period Site Coefficient at 0.2s Period, F_a	1.2
Long Period Site Coefficient at 1s Period, F_v	null[1]
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}	1.597
Adjusted Spectral Response Acceleration at 1s Period, S_{M1}	null[1]
Design Spectral Response Acceleration at 0.2s Period, S_{DS}	1.065
Design Spectral Response Acceleration at 1s Period, S_{D1}	null[1]
Site-adjusted geometric mean Peak Ground Acceleration, PGA_m	0.685

[1]Per Exception 2 in Section 11.4.8 of ASCE 7-16, seismic response coefficient C_S to be determined by Eq. 12.8-2 for values of $T \leq 1.5T_s$ and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for $T_L \geq T > 1.5T_s$ or Eq. 12.8-4 for $T > T_L$

2.5 Liquefaction Potential

The term liquefaction is generally referenced to loss of strength and stiffness in soils due to build-up of pore water pressure when subject to cyclic or monotonic loading. Both sandy and clayey soils are susceptible to loss of strength and stiffness. Because of the difference in strength characteristic and methods for evaluating strength loss potential for granular and clayey soils, the term liquefaction is used for granular soils while cyclic softening is used for fine-grained soils (i.e. clays and plastic silts).

In general, adverse effects of liquefaction or cyclic softening include excessive ground settlement, loss of bearing support for structural foundations, and seismically-induced lateral ground deformations such as lateral spreading. Depending upon the relative thickness of the liquefied strata with respect to overlying non-liquefiable soils, other potentially adverse effects such as ground oscillation and ground fissuring may occur.

As shown on the *Seismic Hazard Zones* map for the Newport Beach Quadrangle (CGS, 1998), the project site **is** located within an area that has been identified by the State of California as being potentially susceptible to liquefaction (Figure 5, *Seismic Hazard Map*). In addition, the historically shallowest depth to groundwater at the site is approximately 4 feet bgs (CGS, 1997). Groundwater was also encountered during our subsurface exploration at depths between approximately 5.9 and 6.4 feet bgs.

As a part of this due-diligence geotechnical evaluation, we have evaluated the liquefaction potential at the site using the data obtained from the CPTs with the computer program *Cliq* (v.3.0.3.4). Based on our evaluation using the using the Maximum Considered Earthquake (MCE) and a design groundwater level of 4 feet bgs for the CPTs performed at the site, the potential for liquefaction to occur at the site is very high. The results of our analysis are presented in Appendix D, *Liquefaction Analysis.*

2.6 Seismically-Induced Settlement

Seismically-induced settlement consists of dynamic settlement of unsaturated soil (above groundwater) and liquefaction-induced settlement (below groundwater). These settlements occur primarily within low density sandy soil due to reduction in volume during and shortly after an earthquake event.

Based on the results of our preliminary analysis, total seismically-induced settlement due to dry dynamic settlement (above groundwater) and liquefaction settlement (below groundwater) is estimated to range between 1.4 and 3.1 inches across the site. The differential settlement can be taken as one-half the total estimated settlement over a horizontal distance of 30 feet.

2.7 Seismically-Induced Lateral Ground Displacements

Liquefaction may also cause lateral spreading. For lateral spreading to occur, the liquefiable zone must be continuous, unconstrained laterally, and free to move along gently sloping ground toward an unconfined area. Since the site is essentially flat and constrained laterally, the potential for lateral spreading due to liquefaction is also considered low.

2.8 Seismically-Induced Landsliding

As shown on the *Seismic Hazard Zones* map for the Newport Beach Quadrangle (CGS, 1998), the project site is **not** located within a seismically-induced landslide hazard zone identified by the State of California (Figure 5, *Seismic Hazard Map*). In addition, due to project site being relatively flat, it is our opinion that the potential for seismically-induced landslide hazard at the site is negligible.

2.9 Flooding

According to a Federal Emergency Management Agency (FEMA) flood insurance rate map (FEMA, 2009), the project site is located within a flood hazard area identified as "Zone X", which is defined as area with reduced flood risk due to levee. As shown on Figure 6, *Flood Hazard Zone Map*, the site is **not** located within a 100-year or 500-year flood hazard zone.

Earthquake-induced flooding can be caused by failure of dams or other water-retaining structures as a result of earthquakes. The project site **is** located within a flood impact zone from Prado Dam as indicated on Figure 7, *Dam Inundation Map*. However, due to the location and distance of the site from Prado Dam, the potential for earthquake-induced flooding to occur due to a failure of this dam is considered low. In addition, catastrophic failure of this dam is expected to be a very unlikely event in that dam safety regulations exist and are enforced by the Division of Safety of Dams, Army Corp of Engineers and Department of Water Resources. Inspectors may require dam owners to perform work, maintenance or implement controls if issues are found with the safety of the dam.

2.10 Seiches and Tsunamis

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. Tsunamis are waves generated in large bodies of water by fault displacement or major ground movement. Based on the absence of an enclosed water body near the site and the inland location of the site, seiche and tsunami risks at the site are considered negligible.

2.11 Sedimentation and Erosion

The erosion characteristics of the unconsolidated alluvial deposits exposed on any future slopes onsite are expected to be moderately susceptible to erosion. These

materials will be particularly prone to erosion during excavation and site development, especially during heavy rains.

The potential for erosion can be mitigated through the application of best management practices (BMPs) and other Storm Water Pollution Prevention Plan (SWPPPs), such as temporary catchment basins and/or sandbagging to control runoff and contain sediment transport within the project site during construction. Following completion of the project, the site is anticipated to be improved with structures, hardscape, landscaping, and appropriate drainage infrastructure. Therefore, sedimentation and erosion impacts upon completion of construction are considered less than significant.

3.0 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Presented below is a summary of findings based upon the results of our due-diligence geotechnical evaluation of the site:

- The site is likely underlain by a relatively thin veneer of undocumented artificial fill generally anticipated to be on the order of approximately 2 to 3 feet overlying Quaternary age (Holocene) young alluvial fan deposits. Localized thicker accumulations of fill materials should be anticipated during future earthwork construction.

- Based on review of groundwater information obtained through the California Geological Survey (CGS) and presented in the Seismic Hazard Zone Report for the Newport Beach Quadrangle, the historically shallowest groundwater depth in the vicinity of the project site is approximately 4 feet bgs.

- The site is **not** located in a designated Alquist-Priolo Earthquake Fault Zone. The nearest fault to the site with the potential for ground surface rupture is the Newport-Inglewood Fault Zone which is located approximately 4.7 miles from the site. The site is expected to experience moderate to strong ground shaking resulting from an earthquake from one of the major regional faults located in the southern California region.

- The site **is** located within an area shown as susceptible to liquefaction based on the State of California Seismic Hazard Zones map for the Newport Beach Quadrangle. Based on the results of our preliminary analysis of data obtained from our CPTs performed at the site, the potential for liquefaction to occur at the site is very high. Total seismically-induced settlement potential is estimated to range between 1.4 and 3.1 inches across the site.

- The site is essentially flat and is **not** located within an area shown as susceptible to seismically-induced landslides based on the California Seismic Hazard Zones map for the Newport Beach Quadrangle; therefore, the potential for this hazard to occur at the site is negligible.

- The project site is **not** located within a 100-year or 500-year flood hazard zone; however, the site **is** located within a flood impact zone from Prado Dam.

It should be noted that a design-level geotechnical exploration, including soil borings, laboratory testing, and engineering analysis is recommended and will be required by the

reviewing agency during design phase of the project to confirm our preliminary findings and to develop design geotechnical recommendations for the project suitable for submittal to the reviewing agency in pursuit of building permits. In addition, the geotechnical consultant should review the grading plan, foundation plan and specifications as they become available to verify that the geotechnical recommendations presented in the future design-level studies for the project have been incorporated into the plans. Subsurface conditions encountered during field exploration indicate the soils underlying the site may be potentially compressible when subject to heavy structural loads. Some of the clayey soil may also be susceptible to settlement over time. The settlement of the native soil under the new buildings or engineered fill should be evaluated when the building and grading plans become available. Building loads should be provided when available for the various structures such that settlement analysis can be performed during design level foundation studies.

4.0 PRELIMINARY RECOMMENDATIONS

Presented below are the preliminary geotechnical recommendations for planning purposes. A geotechnical investigation that includes additional subsurface explorations will be required by the reviewing agency once the proposed design, building loads and project plans become available for review. Design of the project in accordance with standard engineering practice, including requirements of the 2019 California Building Code (CBC), and the recommendations of the project civil and structural engineers, geotechnical consultant and others will reduce the potential for adverse geotechnical conditions impacting the proposed improvements.

The conceptually proposed residential structures (both single-family and multi-family) may be supported on shallow spread-type foundations if the seismic and static settlements can be accommodated. Ground improvement will likely be required to enable support of planned podium structure on spread footings. There may be existing underground utilities that will also be impacted. Information on these utilities should be provided to Leighton for evaluation. All existing undocumented fill is recommended to be removed beneath any planned improvements. Excavations may require dewatering during construction if it extends more than approximately 4 feet bgs. Conversely, saturated subgrade soils may be encountered at this depth (or shallower) requiring mitigation. Any planned basement floor slab and basement walls will have to be designed for hydrostatic pressure if the basement level extends more than 4 feet bgs. A permanent dewatering system may be implemented as an alternative.

4.1 Earthwork

All site earthwork grading should be performed in accordance with the applicable local codes and in accordance with the project specifications that are prepared by the appropriate design professionals.

4.1.1 Site Preparation

Prior to construction, the site should be cleared of any existing improvements, vegetation, trash and/or debris within the area of proposed grading. These materials should be removed from the site. Any underground obstructions onsite should be removed. Efforts should be made to locate any existing utility lines to be removed or rerouted where interfering with the proposed construction. Any resulting cavities should be properly backfilled and compacted. After the site is cleared, the soils should

be carefully observed for the removal of all unsuitable deposits. All unsuitable deposits should be excavated and removed from proposed building/structure footprint prior to fill placement.

4.1.2 Site Grading

A majority of the project area is likely covered with artificial fill anticipated on the order of up to approximately 2 to 3 feet bgs. Localized thicker accumulations of undocumented fill materials and possible foundation remnants should be anticipated during future earthwork construction. To provide a uniform support and reduce the potential for differential settlement, all existing fill should be removed to expose suitable native soils and replaced as engineered fill to provide supports for the proposed building and other structural improvements.

Where ground improvement is not performed, removals should be performed such that a minimum of 3 feet of engineered fill is established below the bottom of all new foundations. Where feasible, overexcavation and recompaction should extend a minimum horizontal distance of 3 feet from the edges of the foundations (i.e., a 1:1 projection line down from the bottom edges of the foundations).

4.1.3 Excavation Bottom Preparation

After excavating as recommended, the moisture content of the soils should be determined, and the soils slowly and uniformly moistened (or dried) as necessary to bring the soils to a uniform moist condition. The moisture content of the clayey soils should be brought to about 4 percent over optimum moisture content to a depth of 18 inches. The moisture content of any relatively non-expansive and predominantly granular soils should be brought to about 2 percent over optimum moisture content to a depth of 18 inches. The moisture content of the subgrade should be checked and approved by Leighton prior to placing the required fill. In addition, placement of a gravel or rock layer may be needed to stabilize the excavation bottoms, reduce the potential for piping, and provide a firm working surface for heavy equipment. If a rock or gravel layer is placed, a layer of nonwoven filter fabric such as Mirafi 140N or equivalent, should be placed over the gravel/rock layer to reduce the potential for migration of sediments into the void space between the coarse aggregate.

All concrete slabs on grade, including floor slabs and Portland cement concrete paving, should be underlain by at least 2 feet of non-expansive fill (EI<20). It is anticipated that existing near-surface soil onsite may be suitable for this purpose. Additional geotechnical testing is warranted to confirm expansive potential for reuse below concrete during future design level study of the site.

4.1.4 Fill Materials

On-site soil that is free of construction debris, organics, cobbles, boulders, rubble, or rock larger than 4-inches in largest dimension is suitable to be used as fill for support of structures. Any imported fill soil should be approved by the geotechnical engineer prior to placement as fill.

4.1.5 Fill Placement and Compaction

Fill soils should be placed in loose lifts not exceeding 8 inches, moisture-conditioned to at least 2 percent above optimum moisture content for sandy soils and at least 4 percent above optimum moisture content for clayey soils, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method D 1557. Aggregate base should be compacted to a minimum of 95 percent relative compaction.

When grading is interrupted by heavy rains, fill operations should not be resumed until the moisture content and the dry density of the placed fill are satisfactory.

4.1.6 Construction Dewatering

Due to the shallow groundwater conditions that exist at the site and the reported historic high groundwater level at the site as shallow as 4 feet bgs (CGS, 1997), temporary dewatering may be required during earthwork construction and/or construction of subterranean portions of the project (if applicable). To minimize the potential for impacting the surrounding improvements, we recommend using localized sump pumps within the excavation to remove the groundwater that enters the excavation. It is the responsibility of the contractor to design and install the dewatering system should it be required. The contractor should anticipate that continuous pumping of groundwater may be required during the excavation. Discharge of groundwater during excavation should comply with all environmental

regulations and under proper National Pollutant Discharge Elimination System (NPDES) permitting. Additional site-specific information to better characterize the groundwater levels at the site should be obtained during the design-level geotechnical investigation recommended to be performed during the design phase of the project.

4.2 Preliminary Foundation Design

Shallow foundations may be used to support the proposed structures if the seismic and static settlements can be accommodated. Due to anticipated dead-plus-live column loads exceeding 500 kips, ground improvement will likely be required to enable support of planned podium structure on spread footings.

The ground improvement system should be designed by a specialty contractor specializing in design and construction of ground improvement techniques. Feasible alternatives for ground improvement at this site that may be considered are Geopiers® or rammed aggregate piers, drilled displacement columns, and stone columns. The performance target for ground improvement is an allowable bearing capacity of at least 5,000 pounds per square foot (psf) and a reduction in total static plus seismically-induced settlement of less than 1½ inches.

4.2.1 Conventional Spread Footings over Improved Ground

Footings should be embedded a minimum 18 inches below the lowest adjacent grade. An allowable soil bearing pressure of 5,000 psf may be used for footings with a minimum width of 12 inches for continuous footings and 18 inches for isolated footings. A one-third increase in the bearing value for short duration loading, such as wind or seismic forces may be used. The ultimate bearing capacity can be taken as 15,000 psf, which does not incorporate a factor of safety. A resistance factor of 0.45 should be used for initial bearing capacity evaluation with factored loads.

The recommended bearing values are net values, and the weight of concrete in the footings can be taken as 50 pounds per cubic foot (pcf); the weight of soil backfill can be neglected when determining the downward loads

The allowable bearing capacity for shallow footings is based on a total static settlement of 1 inch. Differential settlement can be taken as half the total settlement over a horizontal distance of 30 feet. Since settlement is a

function of footing size and contact bearing pressure, differential settlement can be expected between adjacent columns or walls where a large differential loading condition exists. Leighton should review the settlement estimates when final foundation plans and loads for the proposed structures become available.

Resistance to lateral loads will be provided by a combination of friction between the soil and structure interface and passive pressure acting against the vertical portion of the footings structures. For calculating lateral resistance above the design groundwater at 4 feet bgs, a passive pressure of 300 pcf and a frictional coefficient of 0.30 may be used. Below groundwater, the passive resistance should be reduced to 200 pcf to a maximum of 3,000 psf. Note that the passive and frictional coefficients do not include a factor of safety. The frictional resistance and the passive resistance of the soils can be combined without reduction in determining the total lateral resistance.

4.2.2 Mat Foundations

A mat foundation established on engineered fill may be used to support the proposed single-family homes and townhouses if seismically-induced settlement of up to 3 inches can be accommodated. Mat foundations may be designed using an allowable bearing capacity 2,000 pounds per square foot (psf) and a modulus of subgrade reaction of 25 pounds per cubic inch (pci). Differential settlement of the mat foundation due to the static and seismic loads is expected to be on the order of 1½ inches over a distance of 30 feet. The bearing capacity may be increased by one-third for wind or seismic loading. The perimeter of the mat foundation should have a minimum embedment of 12 inches below the lowest adjacent grade.

The ultimate bearing capacity can be taken as 4,500 psf, which does not incorporate a factor of safety. A resistance factor of 0.45 should be used for initial bearing capacity evaluation with factored loads. The recommended bearing values are net values, and the weight of concrete in the mat foundation can be taken as 50 pcf; the weight of soil backfill can be neglected when determining the downward loads.

Resistance to lateral loads will be provided by a combination of friction between the soil and structure interface and passive pressure acting against

the vertical portion of the footings structures. For calculating lateral resistance above the design groundwater at 4 feet bgs, a passive pressure of 300 pcf and a frictional coefficient of 0.30 may be used. Below groundwater, the passive resistance should be reduced to 200 pcf to a maximum of 3,000 psf. Note that the passive and frictional coefficients do not include a factor of safety. The frictional resistance and the passive resistance of the soils can be combined without reduction in determining the total lateral resistance.

4.2.3 Post-Tensioned Slab-on-Ground Foundations

Post-tensioned slab-on-ground (PT-slab) foundations over engineered fill may also be used to support the proposed single-family homes and townhouses if seismically-induced settlement of up to 3 inches can be accommodated. The following table provides a design summary for foundations for the apartment buildings underlain engineered fill consisting of on-site materials.

Table 2 - Geotechnical Parameters for Post-Tensioned Slab Design

Design Criteria		Design Value
Edge Moisture Variation, e_m (feet)	Center Lift	9
	Edge Lift	5
Differential Soil Movement, y_m (inch)	Center Lift	0.2
	Edge Lift	0.4
Minimum Perimeter Foundation Embedment Depth (feet)		2
Allowable Bearing Pressure		2,000 psf*
Modulus of Subgrade Reaction		25 pci**

*pounds per square foot
**pounds per cubic inch

The above recommended slab design parameters are based on Post-Tensioning Institute's *Design of Post-Tensioned Slabs-on Ground*, 3rd Edition with 2008 supplement (PTI DC10.1-08). Local agencies, the structural engineer or the California Building Code may have requirements that are more stringent.

Differential settlement of the PT-slab foundation due to the static and seismic loads is expected to be on the order of 1½ inches over a distance of 30 feet. The bearing capacity may be increased by one-third for wind or

seismic loading. Leighton should review the settlement estimates when final foundation plans and loads for the proposed structures become available.

Resistance to lateral loads will be provided by a combination of friction between the soil and structure interface and passive pressure acting against the vertical portion of the foundations. For calculating lateral resistance, a passive pressure of 250 psf per foot of depth to a maximum of 2,500 psf and a frictional coefficient of 0.30 may be used. Note that the passive and frictional coefficients do not include a factor of safety. The frictional resistance and the passive resistance of the soils can be combined without reduction in determining the total lateral resistance.

The post-tensioned slabs are recommended to be underlain by a synthetic sheeting to serve as a retarder to moisture vapor transmission in areas where a moisture-sensitive floor covering (such as vinyl, tile, or carpet) or equipment is planned. The sheeting is recommended to be a minimum 15-mil thick and consist of polyethylene or similar material that meets or exceeds specifications for ASTM E1745 Class A vapor retarders. Where the vapor retarder is used, 2 inches of sand should be placed above and below to prevent punctures and to aid in the concrete cure. Vapor barrier seams should be overlapped a minimum of 6 inches and taped or otherwise sealed. Floor covering manufacturers should be consulted for specific recommendations based on type of product used.

Soil-moisture change below slabs is the major factor in expansive soil problems. The appropriate personnel involved in the day to day maintenance of the site improvements should be made aware of the potential negative consequences of both excessive watering, as well as allowing expansive soils to become too dry (i.e., the soil will undergo shrinkage as it dries up, followed by swelling during the winter, rainy season or when irrigation is resumed, resulting in distress to improvements and structures). Planters should not be located adjacent to foundations unless they are properly designed such that they do not pond water.

Our experience indicates that use of post-tension slab foundations can generally reduce the potential for drying and shrinkage cracking. However, some cracking should be expected as the concrete cures. Minor cracking is considered normal; however, it is often aggravated by a high

water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low slump concrete can reduce the potential for shrinkage cracking.

4.3 Slabs-on-Grade

Concrete slabs may be designed using a modulus of subgrade reaction of 100 pci provided the subgrade is prepared as described in Section 4.1. From a geotechnical standpoint, we recommend slab-on-grade be a minimum 5 inches thick with No. 3 rebar placed at the center of the slab at 24 inches on center in each direction. The structural engineer should design the actual thickness and reinforcement based on anticipated loading conditions. Where moisture-sensitive floor coverings or equipment is planned, the slabs should be protected by a minimum 10-mil-thick vapor barrier between the slab and subgrade. A coefficient of friction of 0.35 can be used between the floor slab and the vapor barrier.

Minor cracking of concrete after curing due to drying and shrinkage is normal and should be expected; however, concrete is often aggravated by a high water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low-slump concrete or low water/cement ratios can reduce the potential for shrinkage cracking. Additionally, our experience indicates that the use of reinforcement in slabs and foundations can generally reduce the potential but not eliminate for concrete cracking.

To reduce the potential for excessive cracking, concrete slabs-on-grade should be provided with construction or weakened plane joints at frequent intervals. Joints should be laid out to form approximately square panels.

4.4 Temporary Excavation and Shoring Design

All temporary excavations, including utility trenches, retaining wall excavations and foundation excavations should be performed in accordance with project plans, specifications, and all OSHA requirements. Excavations 5 feet or deeper should be laid back or shored in accordance with OSHA requirements before personnel are allowed to enter.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the cut, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site foundation should be properly shored to maintain support of the adjacent structure.

Typical cantilever shoring for drained conditions should be designed based on the active fluid pressure of 35 pcf. If excavations are braced at the top and at specific design intervals, the active pressure for drained conditions may then be approximated by a rectangular soil pressure distribution with the pressure per foot of width equal to 25H, where H is equal to the depth of the excavation being shored.

Adjacent to existing buildings, shoring should be designed to accommodate the surcharge pressure from existing foundations. A uniform horizontal pressure equal to ½ of the foundation bearing pressure may be assumed for preliminary design.

4.5 Drainage and Landscaping

Building walls below grade should be waterproofed or at least dampproofed, depending upon the degree of moisture protection desired and the depth below grade. Surface drainage should be designed to direct water away from foundations and toward approved drainage devices. Irrigation of landscaping should be controlled to maintain, as much as possible, consistent moisture content sufficient to provide healthy plant growth without overwatering.

5.0 LIMITATIONS

Leighton's work was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in California at this time. No other warranty, express or implied, is made as to the conclusions and professional opinions included in this report.

This report is issued with the understanding that it is the responsibility of the owner or a duly authorized agent acting on behalf of the owner, to ensure that information and preliminary recommendations contained herein are brought to the attention of the necessary design consultants for this project and incorporated into plans and specifications.

Until reviewed and accepted by the local governing Agency, this report may be subject to change. Changes may be required as part of the Agency review process. Leighton assumes no risk or liability for consequential damages that may arise due to design work progressing before this report is reviewed and accepted by the reviewing Agency.

The findings of this report are considered valid as of the present date. However, changes in the condition of a property can occur with the passage of time, whether due to natural processes or the work of man on the subject or adjacent properties. In addition, changes in standards of practice may occur from legislation or the broadening of knowledge. Accordingly, the findings of this report may at some future time be invalidated wholly or partially by changes outside Leighton's control. Conditions revealed in construction excavations may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by Leighton and additional recommendations may be warranted based on additional observations and findings.

The conclusions and recommendations in this report are based in part upon data that were obtained from a necessarily limited number of observations, site visits, excavations, samples and testes. Such information can be obtained only with respect to the specific locations explored, and therefore may not completely define all subsurface conditions throughout the site. The nature of many sites is that differing geotechnical and/or geological conditions can occur within small distances and under varying climatic conditions. Furthermore, changes in subsurface conditions can and do occur over time. Therefore, the findings, conclusions, and recommendations presented in this report should be considered preliminary if unanticipated conditions are encountered and

additional explorations, testing and analyses may be necessary to develop alternative recommendations.

APPENDIX A

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APPENDIX A

REFERENCES

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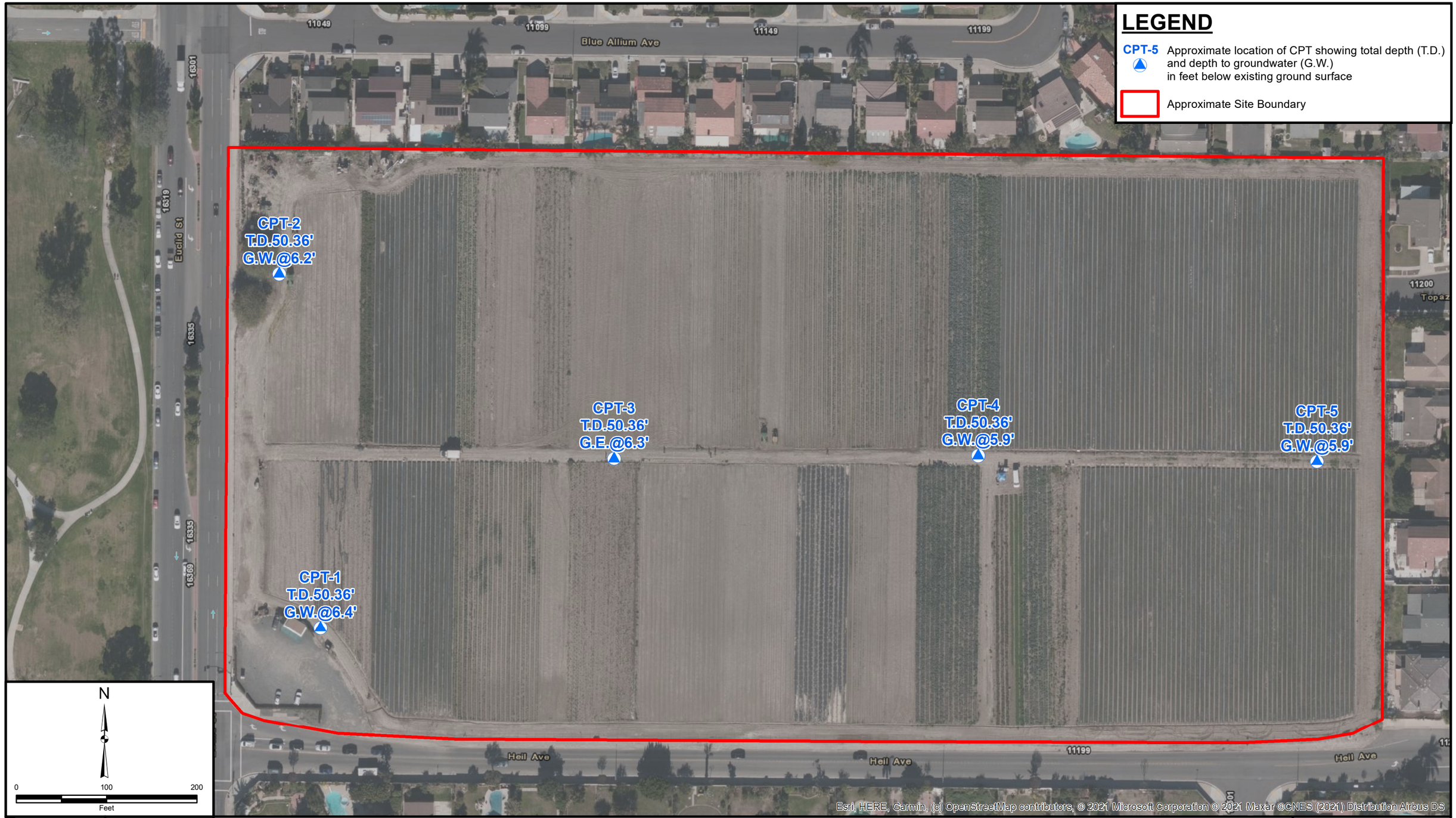
SITE LOCATION MAP

Proposed Residential Development
16300 Euclid Street
Fountain Valley, California

FIGURE 1

Leighton

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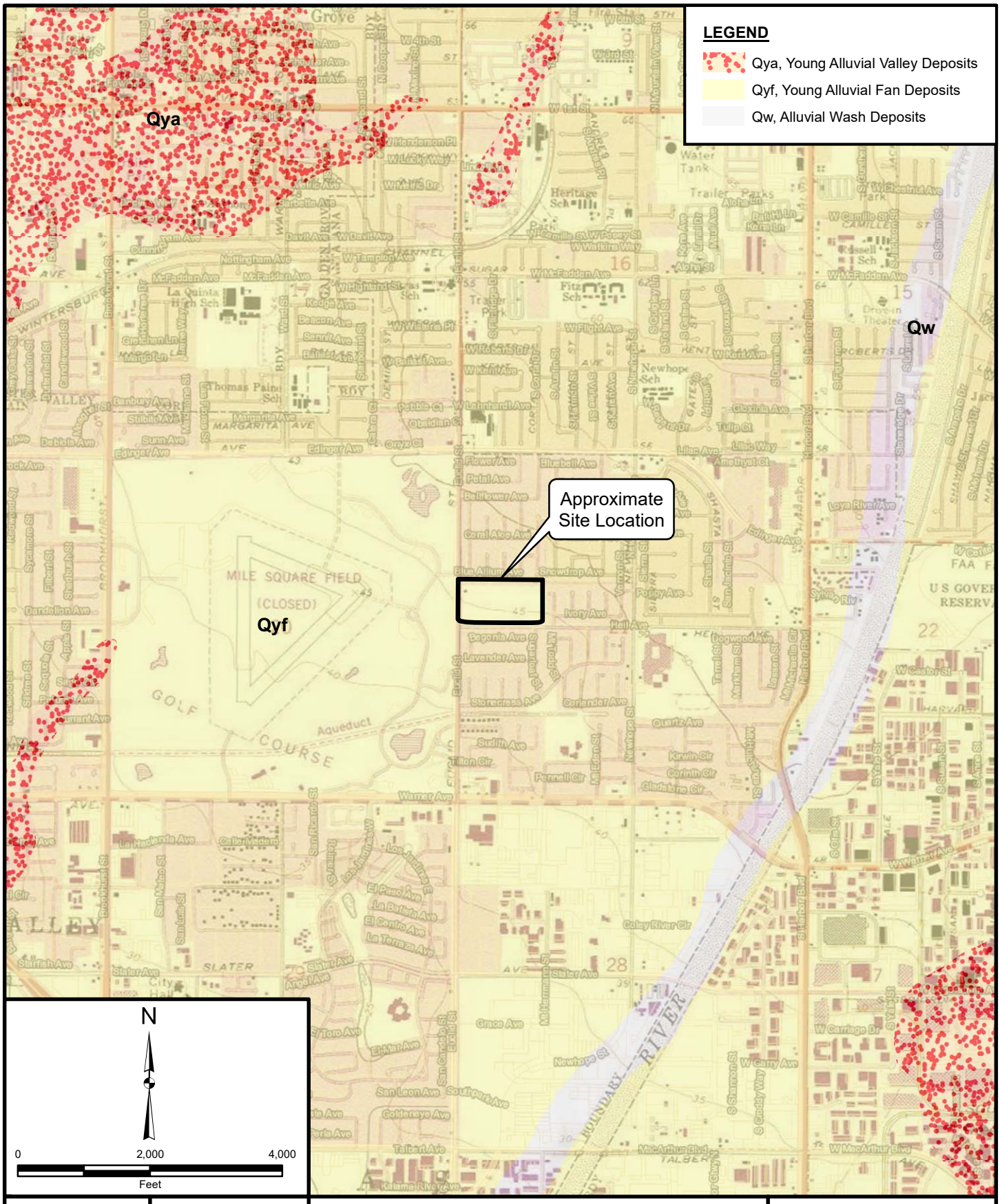
BORING LOCATION MAP

Proposed Residential Development
16300 Euclid Street
Fountain Valley, California

FIGURE 2

Leighton

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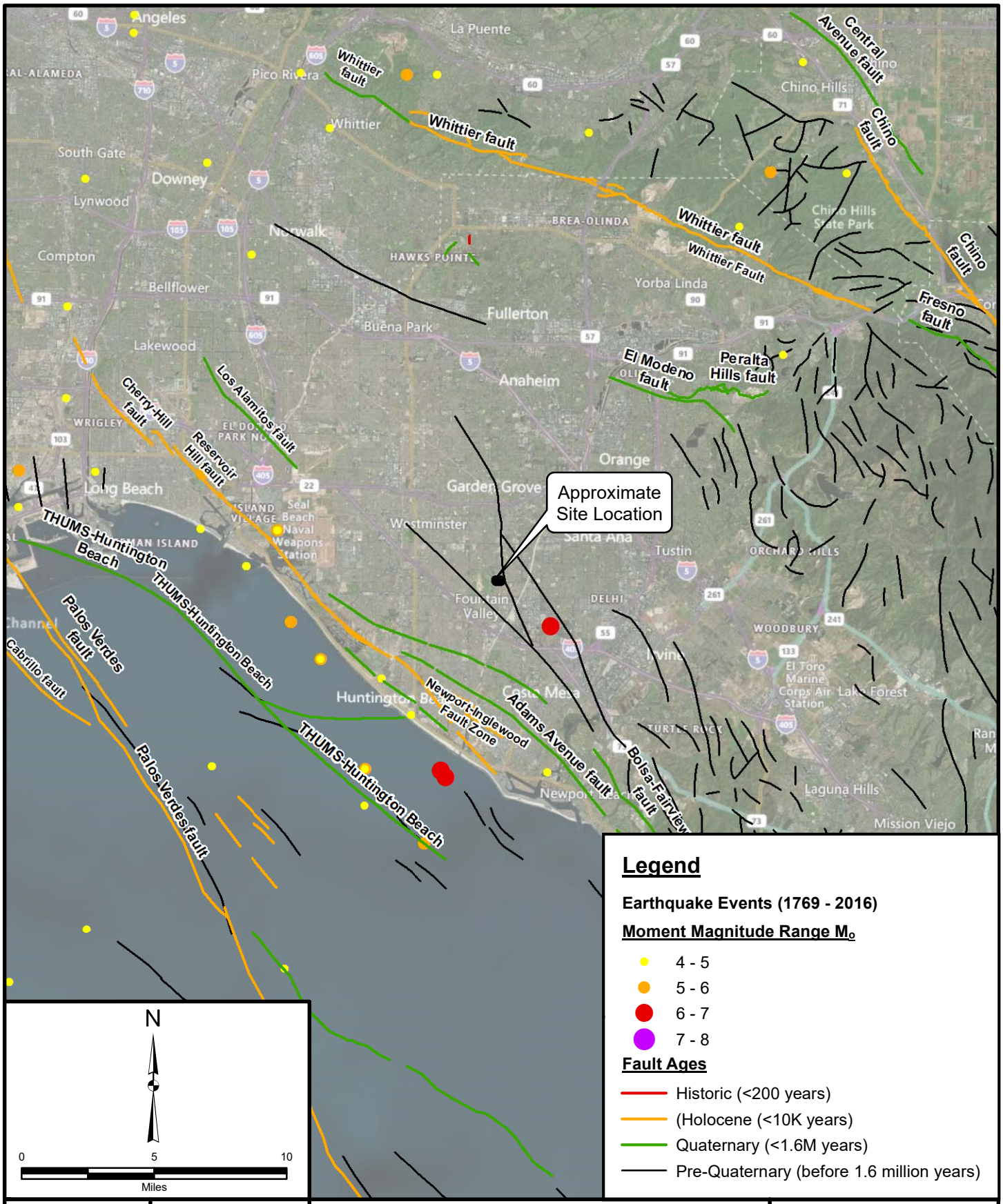
REGIONAL GEOLOGY MAP

Proposed Residential Development
16300 Euclid Street
Fountain Valley, California

FIGURE 3

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Legend

Earthquake Events (1769 - 2016)

Moment Magnitude Range M_o

- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8

Fault Ages

- Historic (<200 years)
- (Holocene (<10K years)
- Quaternary (<1.6M years)
- Pre-Quaternary (before 1.6 million years)

Project: 13255.001	Eng/Geol: JMP
Scale: 1 " = 5 miles	Date: September 2021

Reference: ESRI ArcGIS Online 2021
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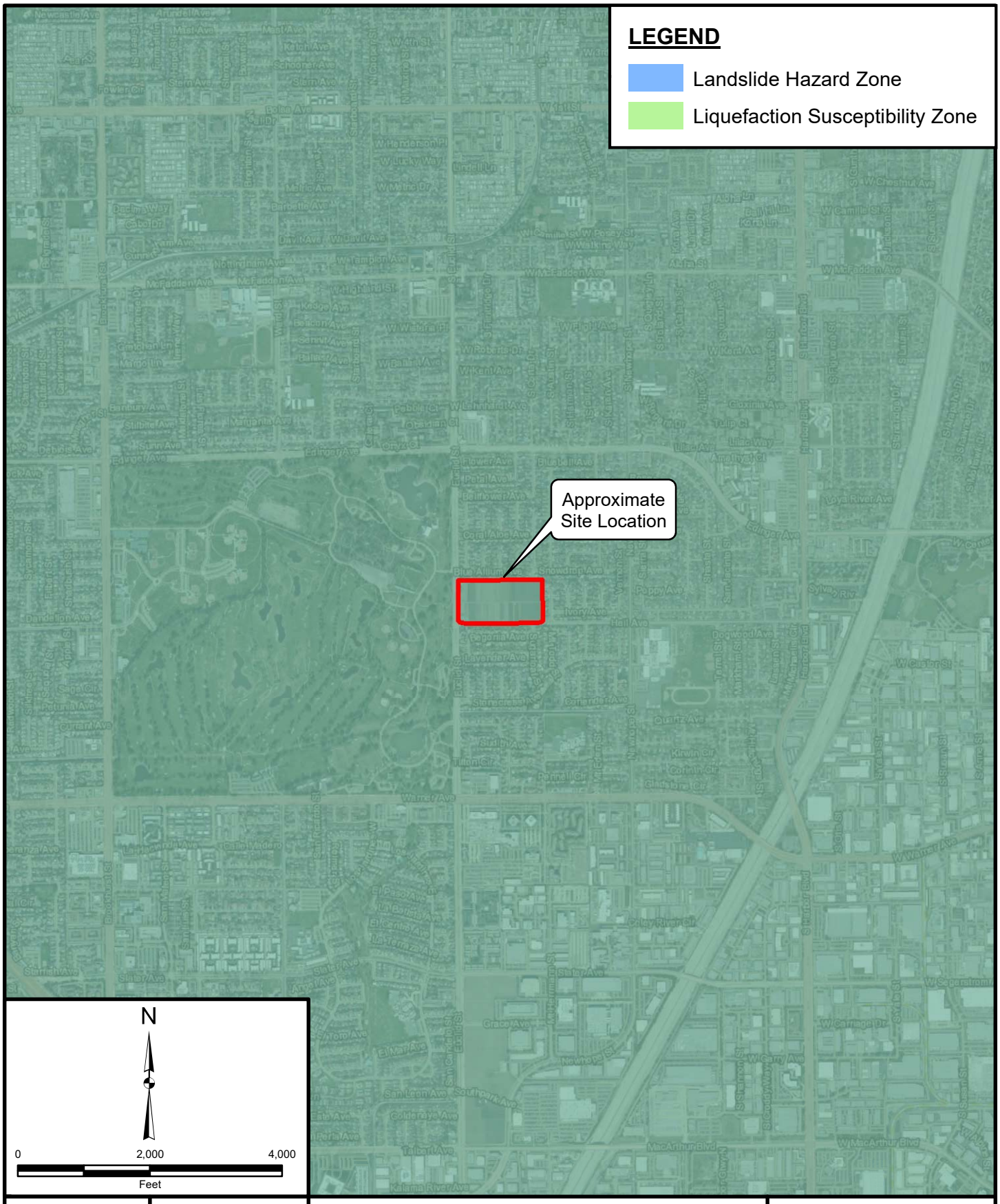
REGIONAL FAULT AND HISTORICAL SEISMICITY MAP

Proposed Residential Development
16300 Euclid Street
Fountain Valley, California

FIGURE 4

Leighton

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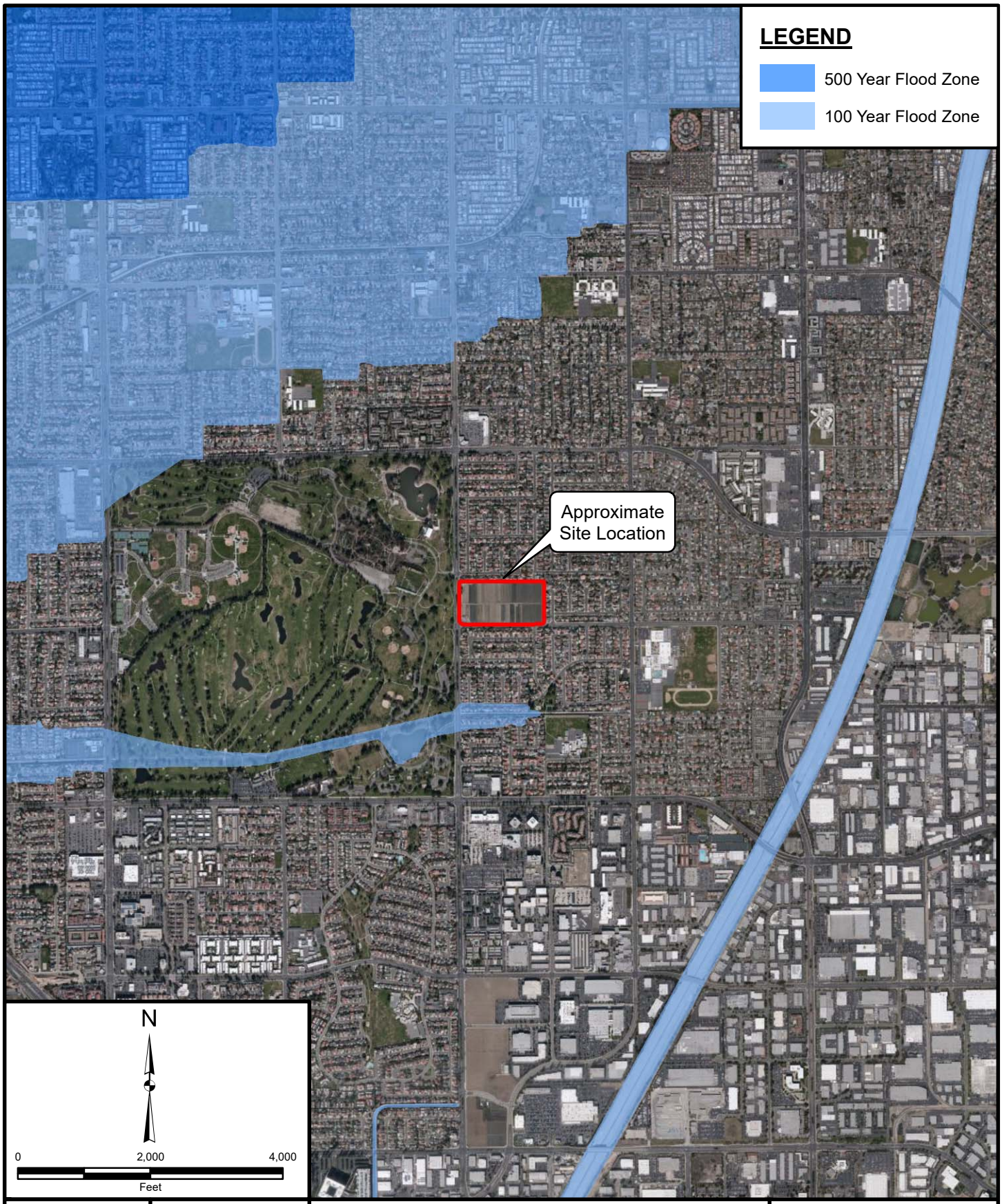
SEISMIC HAZARD MAP

Proposed Residential Development
16300 Euclid Street
Fountain Valley, California

FIGURE 5

Leighton

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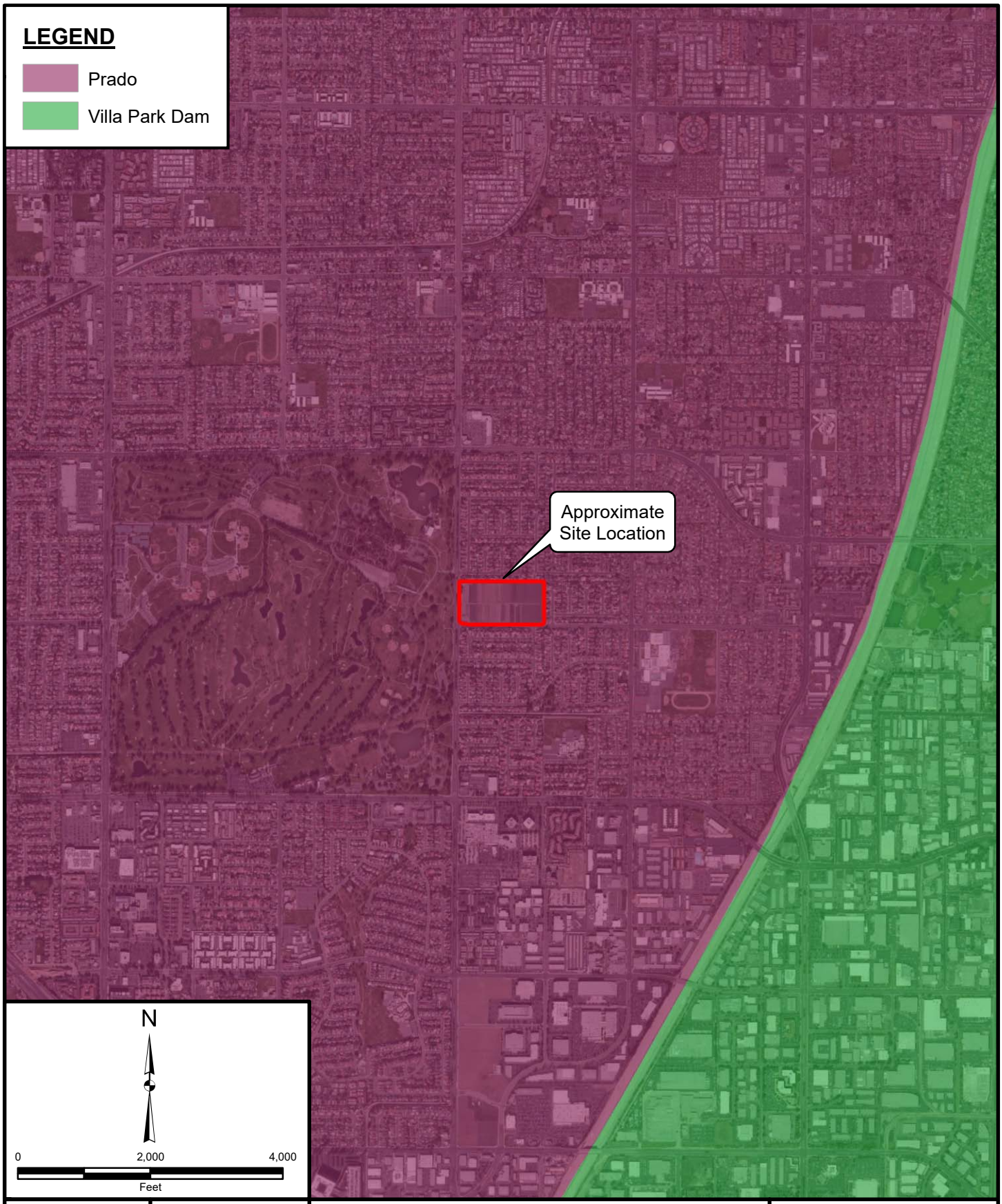
FLOOD HAZARD ZONE MAP

Proposed Residential Development
16300 Euclid Street
Fountain Valley, California

FIGURE 6

Leighton

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Base Map: ESRI ArcGIS Online 2021
Reference: CA DWR, FEMA
Author: Leighton Geomatics (btran)

DAM INUNDATION MAP

Proposed Residential Development
16300 Euclid Street
Fountain Valley, California

FIGURE 7

Leighton

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APPENDIX B

CONE PENETROMETER TEST (CPT) LOGS

September 3, 2021

Leighton Consulting
Attn: Michelle M.

Subject: CPT Site Investigation
Shop Off
Fountain Valley, California
GREGG Project Number: D1215078

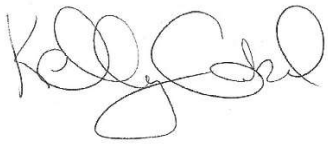
Dear Michelle:

The following report presents the results of GREGG Drilling Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☒
2	Pore Pressure Dissipation Tests	(PPD)	☒
3	Seismic Cone Penetration Tests	(SCPTU)	☒
4	UVOST Laser Induced Fluorescence	(UVOST)	☐
5	Groundwater Sampling	(GWS)	☐
6	Soil Sampling	(SS)	☐
7	Vapor Sampling	(VS)	☐
8	Pressuremeter Testing	(PMT)	☐
9	Vane Shear Testing	(VST)	☐
10	Dilatometer Testing	(DMT)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact me at 949-903-6873.

Sincerely,
Gregg Drilling, LLC.



CPT Reports Team
Gregg Drilling, LLC.

Cone Penetration Test Sounding Summary

-Table 1-

CPT Sounding Identification	Date	Termination Depth (feet)	Depth of Groundwater Samples (feet)	Depth of Soil Samples (feet)	Depth of Pore Pressure Dissipation Tests (feet)
CPT-01	9/3/2021	50.36	-	-	50.4
CPT-02	9/3/2021	50.36	-	-	18.7
CPT-03	9/3/2021	50.36	-	-	-
CPT-05	9/3/2021	50.36	-	-	-
SCPT-04	9/3/2021	50.36	-	-	23.1

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Copies of ASTM Standards are available through www.astm.org

Cone Penetration Testing Procedure (CPT)

Gregg Drilling carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*.

The cone takes measurements of tip resistance (q_c), sleeve resistance (f_s), and penetration pore water pressure (u_2). Measurements are taken at either 2.5 or 5 cm intervals during penetration to provide a nearly continuous profile. CPT data reduction and basic interpretation is performed in real time facilitating on-site decision making. The above mentioned parameters are stored electronically for further analysis and reference. All CPT soundings are performed in accordance with revised ASTM standards (D 5778-12).

The 5mm thick porous plastic filter element is located directly behind the cone tip in the u_2 location. A new saturated filter element is used on each sounding to measure both penetration pore pressures as well as measurements during a dissipation test (*PPDT*). Prior to each test, the filter element is fully saturated with oil under vacuum pressure to improve accuracy.

When the sounding is completed, the test hole is backfilled according to client specifications. If grouting is used, the procedure generally consists of pushing a hollow tremie pipe with a "knock out" plug to the termination depth of the CPT hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

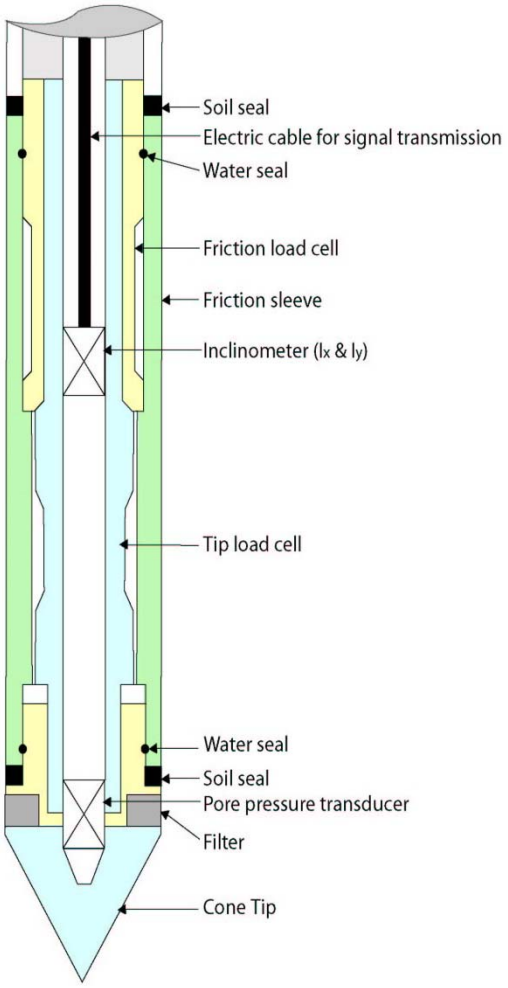


Figure CPT

Gregg 15cm^2 Standard Cone Specifications

Dimensions	
Cone base area	15 cm^2
Sleeve surface area	225 cm^2
Cone net area ratio	0.80
Specifications	
Cone load cell	
Full scale range	180 kN (20 tons)
Overload capacity	150%
Full scale tip stress	120 MPa (1,200 tsf)
Repeatability	120 kPa (1.2 tsf)
Sleeve load cell	
Full scale range	31 kN (3.5 tons)
Overload capacity	150%
Full scale sleeve stress	1,400 kPa (15 tsf)
Repeatability	1.4 kPa (0.015 tsf)
Pore pressure transducer	
Full scale range	7,000 kPa (1,000 psi)
Overload capacity	150%
Repeatability	7 kPa (1 psi)

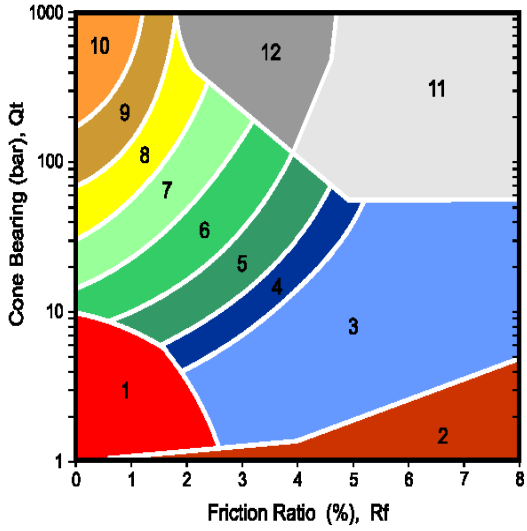
Note: The repeatability during field use will depend somewhat on ground conditions, abrasion, maintenance and zero load stability.

Cone Penetration Test Data & Interpretation

The Cone Penetration Test (CPT) data collected are presented in graphical and electronic form in the report. The plots include interpreted Soil Behavior Type (SBT) based on the charts described by Robertson (1990). Typical plots display SBT based on the non-normalized charts of Robertson et al (1986). For CPT soundings deeper than 30m, we recommend the use of the normalized charts of Robertson (1990) which can be displayed as SBTn, upon request. The report also includes spreadsheet output of computer calculations of basic interpretation in terms of SBT and SBTn and various geotechnical parameters using current published correlations based on the comprehensive review by Lunne, Robertson and Powell (1997), as well as recent updates by Professor Robertson (Guide to Cone Penetration Testing, 2015). The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg Drilling & Testing Inc. does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software. Some interpretation methods require input of the groundwater level to calculate vertical effective stress. An estimate of the in-situ groundwater level has been made based on field observations and/or CPT results, but should be verified by the user.

A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Note that it is not always possible to clearly identify a soil type based solely on q_t, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the correct soil behavior type.



ZONE		SBT
1		Sensitive, fine grained
2		Organic materials
3		Clay
4		Silty clay to clay
5		Clayey silt to silty clay
6		Sandy silt to clayey silt
7		Silty sand to sandy silt
8		Sand to silty sand
9		Sand
10		Gravely sand to sand
11		Very stiff fine grained*
12		Sand to clayey sand*

*over consolidated or cemented

Figure SBT (After Robertson et al., 1986) – Note: Colors may vary slightly compared to plots

Cone Penetration Test (CPT) Interpretation

Gregg uses a proprietary CPT interpretation and plotting software. The software takes the CPT data and performs basic interpretation in terms of soil behavior type (SBT) and various geotechnical parameters using current published empirical correlations based on the comprehensive review by Lunne, Robertson and Powell (1997). The interpretation is presented in tabular format using MS Excel. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

The following provides a summary of the methods used for the interpretation. Many of the empirical correlations to estimate geotechnical parameters have constants that have a range of values depending on soil type, geologic origin and other factors. The software uses 'default' values that have been selected to provide, in general, conservatively low estimates of the various geotechnical parameters.

Input:

1 Units for display (Imperial or metric) (atm. pressure, p_a = 0.96 tsf or 0.1 MPa)
2 Depth interval to average results (ft or m). Data are collected at either 0.02 or 0.05m and can be averaged every 1, 3 or 5 intervals.
3 Elevation of ground surface (ft or m)
4 Depth to water table, z_w (ft or m) – input required
5 Net area ratio for cone, a (default to 0.80)
6 Relative Density constant, C_{Dr} (default to 350)
7 Young's modulus number for sands, α (default to 5)
8 Small strain shear modulus number
  a. for sands, S_G (default to 180 for SBT_n 5, 6, 7)
  b. for clays, C_G (default to 50 for SBT_n 1, 2, 3 & 4)
9 Undrained shear strength cone factor for clays, N_{kt} (default to 15)
10 Over Consolidation ratio number, k_{ocr} (default to 0.3)
11 Unit weight of water, (default to γ_w = 62.4 lb/ft^3 or 9.81 kN/m^3)

Column

1 Depth, z, (m) – CPT data is collected in meters
2 Depth (ft)
3 Cone resistance, q_c (tsf or MPa)
4 Sleeve resistance, f_s (tsf or MPa)
5 Penetration pore pressure, u (psi or MPa), measured behind the cone (i.e. u_2)
6 Other – any additional data
7 Total cone resistance, q_t (tsf or MPa) $q_t = q_c + u\,(1-a)$

8	Friction Ratio, R_f (%)	$R_f = (f_s/q_t) \times 100\%$
9	Soil Behavior Type (non-normalized), SBT	see note
10	Unit weight, γ (pcf or kN/m^3)	based on SBT, see note
11	Total overburden stress, σ_v (tsf)	$\sigma_{vo} = \sigma\ z$
12	In-situ pore pressure, u_o (tsf)	$u_o = \gamma_w (z - z_w)$
13	Effective overburden stress, σ'_{vo} (tsf)	$\sigma'_{vo} = \sigma_{vo} - u_o$
14	Normalized cone resistance, Q_{t1}	$Q_{t1} = (q_t - \sigma_{vo}) / \sigma'_{vo}$
15	Normalized friction ratio, F_r (%)	$F_r = f_s / (q_t - \sigma_{vo}) \times 100\%$
16	Normalized Pore Pressure ratio, B_q	$B_q = u - u_o / (q_t - \sigma_{vo})$
17	Soil Behavior Type (normalized), SBT_n	see note
18	SBT_n Index, I_c	see note
19	Normalized Cone resistance, Q_{tn} (n varies with I_c)	see note
20	Estimated permeability, k_{SBT} (cm/sec or ft/sec)	see note
21	Equivalent SPT N_{60}, blows/ft	see note
22	Equivalent SPT $(N_1)_{60}$ blows/ft	see note
23	Estimated Relative Density, D_r, (%)	see note
24	Estimated Friction Angle, ϕ', (degrees)	see note
25	Estimated Young's modulus, E_s (tsf)	see note
26	Estimated small strain Shear modulus, Go (tsf)	see note
27	Estimated Undrained shear strength, s_u (tsf)	see note
28	Estimated Undrained strength ratio	s_u/σ_v'
29	Estimated Over Consolidation ratio, OCR	see note

Notes:

1 Soil Behavior Type (non-normalized), SBT (Lunne et al., 1997 and table below)

2 Unit weight, γ either constant at 119 pcf or based on Non-normalized SBT (Lunne et al., 1997 and table below)

3 Soil Behavior Type (Normalized), SBT_n Lunne et al. (1997)

4 SBT_n Index, I_c $I_c = ((3.47 - \log Q_{t1})^2 + (\log F_r + 1.22)^2)^{0.5}$

5 Normalized Cone resistance, Q_{tn} (n varies with Ic)

$Q_{tn} = ((q_t - \sigma_{vo})/pa)\ (pa/(\sigma'_{vo})^n$ and recalculate I_c, then iterate:

When $I_c < 1.64$, n = 0.5 (clean sand)
When $I_c > 3.30$, n = 1.0 (clays)
When $1.64 < I_c < 3.30$, $n = (I_c - 1.64)0.3 + 0.5$
Iterate until the change in n, $\Delta n < 0.01$

6 Estimated permeability, k_{SBT} based on Normalized SBT_n (Lunne et al., 1997 and table below)

7 Equivalent SPT N_{60}, blows/ft Lunne et al. (1997)

$$\frac{(q_t/p_a)}{N_{60}} = 8.5\left(1 - \frac{I_c}{4.6}\right)$$

8 Equivalent SPT $(N_1)_{60}$ blows/ft $(N_1)_{60} = N_{60}\, C_N$,
where $C_N = (pa/\sigma'_{vo})^{0.5}$

9 Relative Density, D_r, (%) $D_r^2 = Q_{tn} / C_{Dr}$
Only SBT_n 5, 6, 7 & 8 *Show 'N/A' in zones 1, 2, 3, 4 & 9*

10 Friction Angle, ϕ', (degrees) $\tan\phi' = \frac{1}{2.68}\left[\log\left(\frac{q_c}{\sigma'_{vo}}\right) + 0.29\right]$
Only SBT_n 5, 6, 7 & 8 *Show'N/A' in zones 1, 2, 3, 4 & 9*

11 Young's modulus, E_s $E_s = \alpha\, q_t$
Only SBT_n 5, 6, 7 & 8 *Show 'N/A' in zones 1, 2, 3, 4 & 9*

12 Small strain shear modulus, Go

a. $G_o = S_G\,(q_t\ \sigma'_{vo}\ pa)^{1/3}$ *For SBT_n 5, 6, 7*

b. $G_o = C_G\, q_t$ *For SBT_n 1, 2, 3& 4*

Show 'N/A' in zones 8 & 9

13 Undrained shear strength, s_u $s_u = (q_t - \sigma_{vo}) / N_{kt}$
Only SBT_n 1, 2, 3, 4 & 9 *Show 'N/A' in zones 5, 6, 7 & 8*

14 Over Consolidation ratio, OCR $OCR = k_{ocr}\, Q_{t1}$
Only SBT_n 1, 2, 3, 4 & 9 *Show 'N/A' in zones 5, 6, 7 & 8*

The following updated and simplified SBT descriptions have been used in the software:

SBT Zones		**SBT_n Zones**	
1	sensitive fine grained	1	sensitive fine grained
2	organic soil	2	organic soil
3	clay	3	clay
4	clay & silty clay	4	clay & silty clay
5	clay & silty clay		
6	sandy silt & clayey silt		

7	silty sand & sandy silt	5	silty sand & sandy silt
8	sand & silty sand	6	sand & silty sand
9	sand		
10	sand	7	sand
11	very dense/stiff soil*	8	very dense/stiff soil*
12	very dense/stiff soil*	9	very dense/stiff soil*

*heavily overconsolidated and/or cemented

Track when soils fall with zones of same description and print that description (i.e. if soils fall only within SBT zones 4 & 5, print 'clays & silty clays')

Estimated Permeability (see Lunne et al., 1997)

SBT_n	Permeability (ft/sec)	(m/sec)
1	$3x\ 10^{-8}$	$1x\ 10^{-8}$
2	$3x\ 10^{-7}$	$1x\ 10^{-7}$
3	$1x\ 10^{-9}$	$3x\ 10^{-10}$
4	$3x\ 10^{-8}$	$1x\ 10^{-8}$
5	$3x\ 10^{-6}$	$1x\ 10^{-6}$
6	$3x\ 10^{-4}$	$1x\ 10^{-4}$
7	$3x\ 10^{-2}$	$1x\ 10^{-2}$
8	$3x\ 10^{-6}$	$1x\ 10^{-6}$
9	$1x\ 10^{-8}$	$3x\ 10^{-9}$

Estimated Unit Weight (see Lunne et al., 1997)

SBT	Approximate Unit Weight (lb/ft^3)	(kN/m^3)
1	111.4	17.5
2	79.6	12.5
3	111.4	17.5
4	114.6	18.0
5	114.6	18.0
6	114.6	18.0
7	117.8	18.5
8	120.9	19.0
9	124.1	19.5
10	127.3	20.0
11	130.5	20.5
12	120.9	19.0

Pore Pressure Dissipation Tests (PPDT)

Pore Pressure Dissipation Tests (PPDT's) conducted at various intervals can be used to measure equilibrium water pressure (at the time of the CPT). If conditions are hydrostatic, the equilibrium water pressure can be used to determine the approximate depth of the ground water table. A PPDT is conducted when penetration is halted at specific intervals determined by the field representative. The variation of the penetration pore pressure (*u)* with time is measured behind the tip of the cone and recorded.

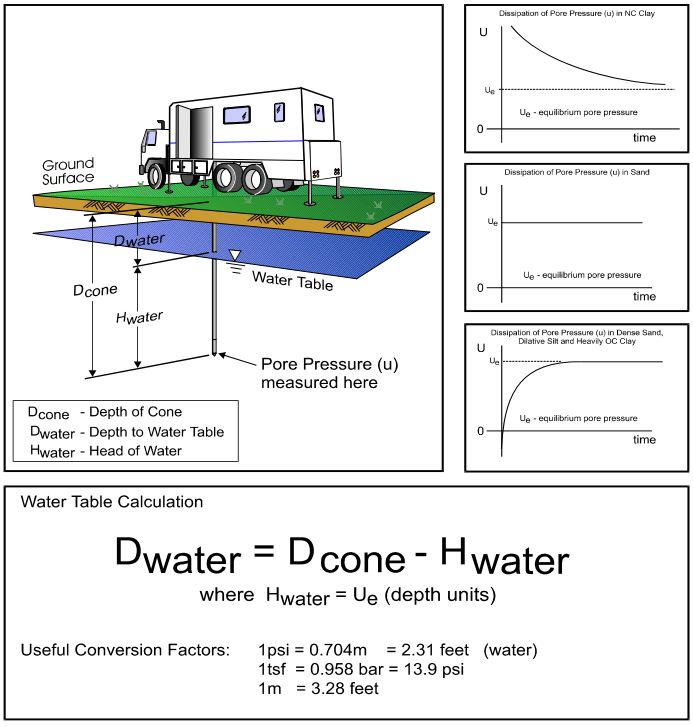
Pore pressure dissipation data can be interpreted to provide estimates of:

- Equilibrium piezometric pressure
- Phreatic Surface
- In situ horizontal coefficient of consolidation (c_h)
- In situ horizontal coefficient of permeability (k_h)

In order to correctly interpret the equilibrium piezometric pressure and/or the phreatic surface, the pore pressure must be monitored until it reaches equilibrium, *Figure PPDT*. This time is commonly referred to as t_{100}, the point at which 100% of the excess pore pressure has dissipated.

A complete reference on pore pressure dissipation tests is presented by Robertson et al. 1992 and Lunne et al. 1997.

A summary of the pore pressure dissipation tests are summarized in Table 1.



Water Table Calculation

$$D_{water} = D_{cone} - H_{water}$$

where $H_{water} = U_e$ (depth units)

Useful Conversion Factors: 1psi = 0.704m = 2.31 feet (water)
1tsf = 0.958 bar = 13.9 psi
1m = 3.28 feet

Figure PPDT

Seismic Cone Penetration Testing (SCPT)

Seismic Cone Penetration Testing (SCPT) can be conducted at various intervals during the Cone Penetration Test. Shear wave velocity (Vs) can then be calculated over a specified interval with depth. A small interval for seismic testing, such as 1-1.5m (3-5ft) allows for a detailed look at the shear wave profile with depth. Conversely, a larger interval such as 3-6m (10-20ft) allows for a more average shear wave velocity to be calculated. Gregg's cones have a horizontally active geophone located 0.2m (0.66ft) behind the tip.

To conduct the seismic shear wave test, the penetration of the cone is stopped and the rods are decoupled from the rig. An automatic hammer is triggered to send a shear wave into the soil. The distance from the source to the cone is calculated knowing the total depth of the cone and the horizontal offset distance between the source and the cone. To calculate an interval velocity, a minimum of two tests must be performed at two different depths. The arrival times between the two wave traces are compared to obtain the difference in time (Δt). The difference in depth is calculated (Δd) and velocity can be determined using the simple equation: $v = \Delta d/\Delta t$

Multiple wave traces can be recorded at the same depth to improve quality of the data.

A complete reference on seismic cone penetration tests is presented by Robertson et al. 1986 and Lunne et al. 1997.

A summary the shear wave velocities, arrival times and wave traces are provided with the report.

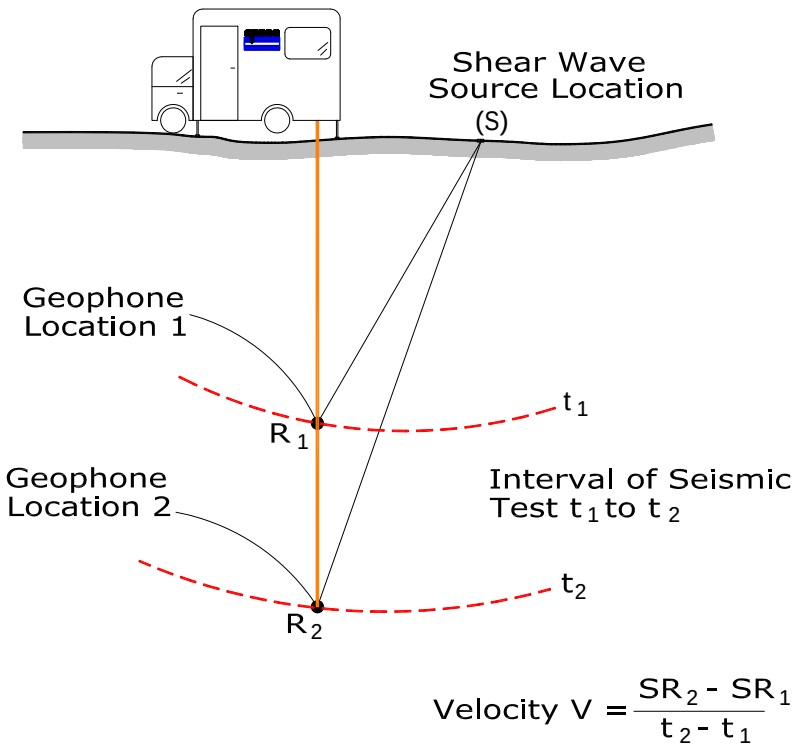


Figure SCPT

Groundwater Sampling

Gregg Drilling & Testing, Inc. conducts groundwater sampling using a sampler as shown in *Figure GWS*. The groundwater sampler has a retrievable stainless steel or disposable PVC screen with steel drop off tip. This allows for samples to be taken at multiple depth intervals within the same sounding location. In areas of slower water recharge, provisions may be made to set temporary PVC well screens during sampling to allow the pushing equipment to advance to the next sample location while the groundwater is allowed to infiltrate.

The groundwater sampler operates by advancing 44.5mm (1¾ inch) hollow push rods with the filter tip in a closed configuration to the base of the desired sampling interval. Once at the desired sample depth, the push rods are retracted; exposing the encased filter screen and allowing groundwater to infiltrate hydrostatically from the formation into the inlet screen. A small diameter bailer (approximately ½ or ¾ inch) is lowered through the push rods into the screen section for sample collection. The number of downhole trips with the bailer and time necessary to complete the sample collection at each depth interval is a function of sampling protocols, volume requirements, and the yield characteristics and storage capacity of the formation. Upon completion of sample collection, the push rods and sampler, with the exception of the PVC screen and steel drop off tip are retrieved to the ground surface, decontaminated and prepared for the next sampling event.

For a detailed reference on direct push groundwater sampling, refer to Zemo et. al., 1992.

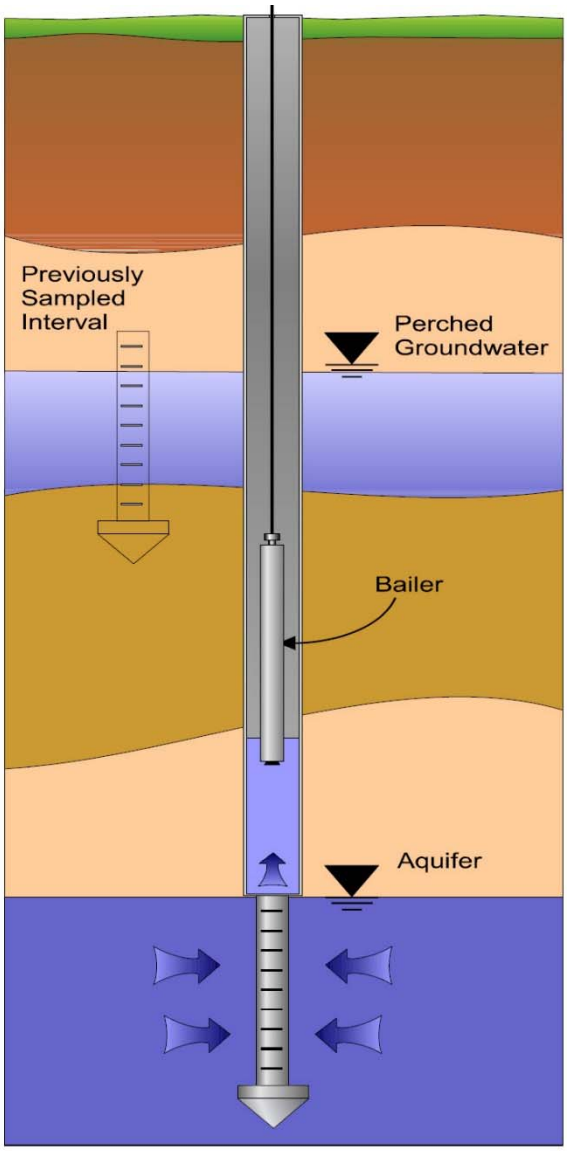


Figure GWS

Soil Sampling

Gregg Drilling & Testing, Inc. uses a piston-type push-in sampler to obtain small soil samples without generating any soil cuttings, *Figure SS*. Two different types of samplers (12 and 18 inch) are used depending on the soil type and density. The soil sampler is initially pushed in a "closed" position to the desired sampling interval using the CPT pushing equipment. Keeping the sampler closed minimizes the potential of cross contamination. The inner tip of the sampler is then retracted leaving a hollow soil sampler with inner 1¼" diameter sample tubes. The hollow sampler is then pushed in a locked "open" position to collect a soil sample. The filled sampler and push rods are then retrieved to the ground surface. Because the soil enters the sampler at a constant rate, the opportunity for 100% recovery is increased. For environmental analysis, the soil sample tube ends are sealed with Teflon and plastic caps. Often, a longer "split tube" can be used for geotechnical sampling.

For a detailed reference on direct push soil sampling, refer to Robertson et al, 1998.

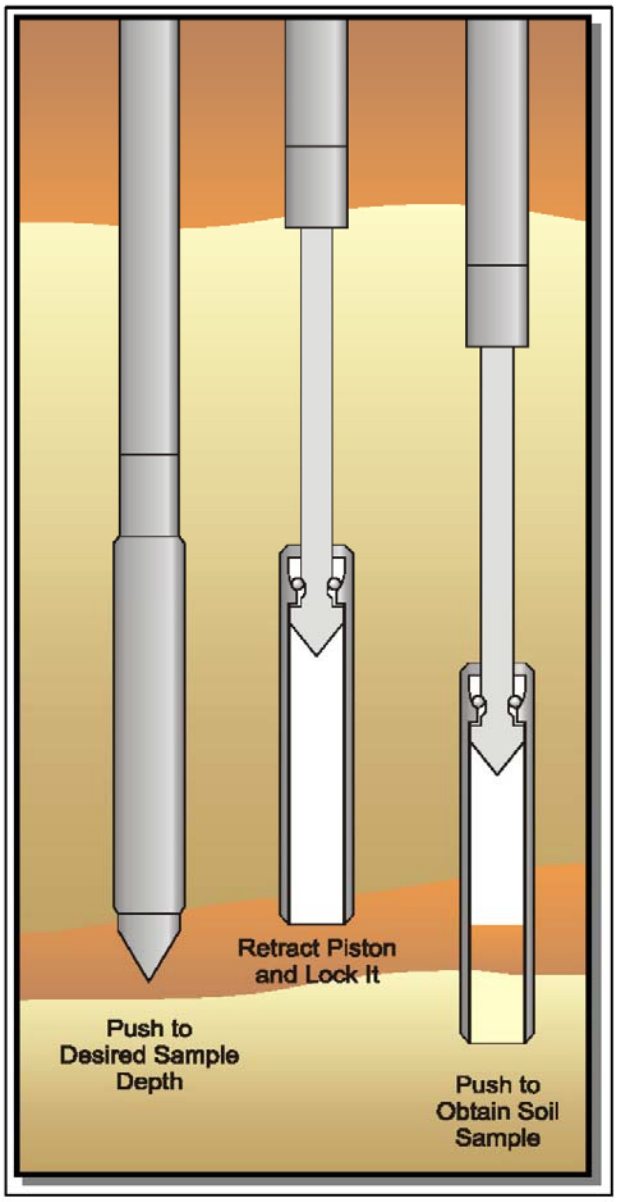


Figure SS

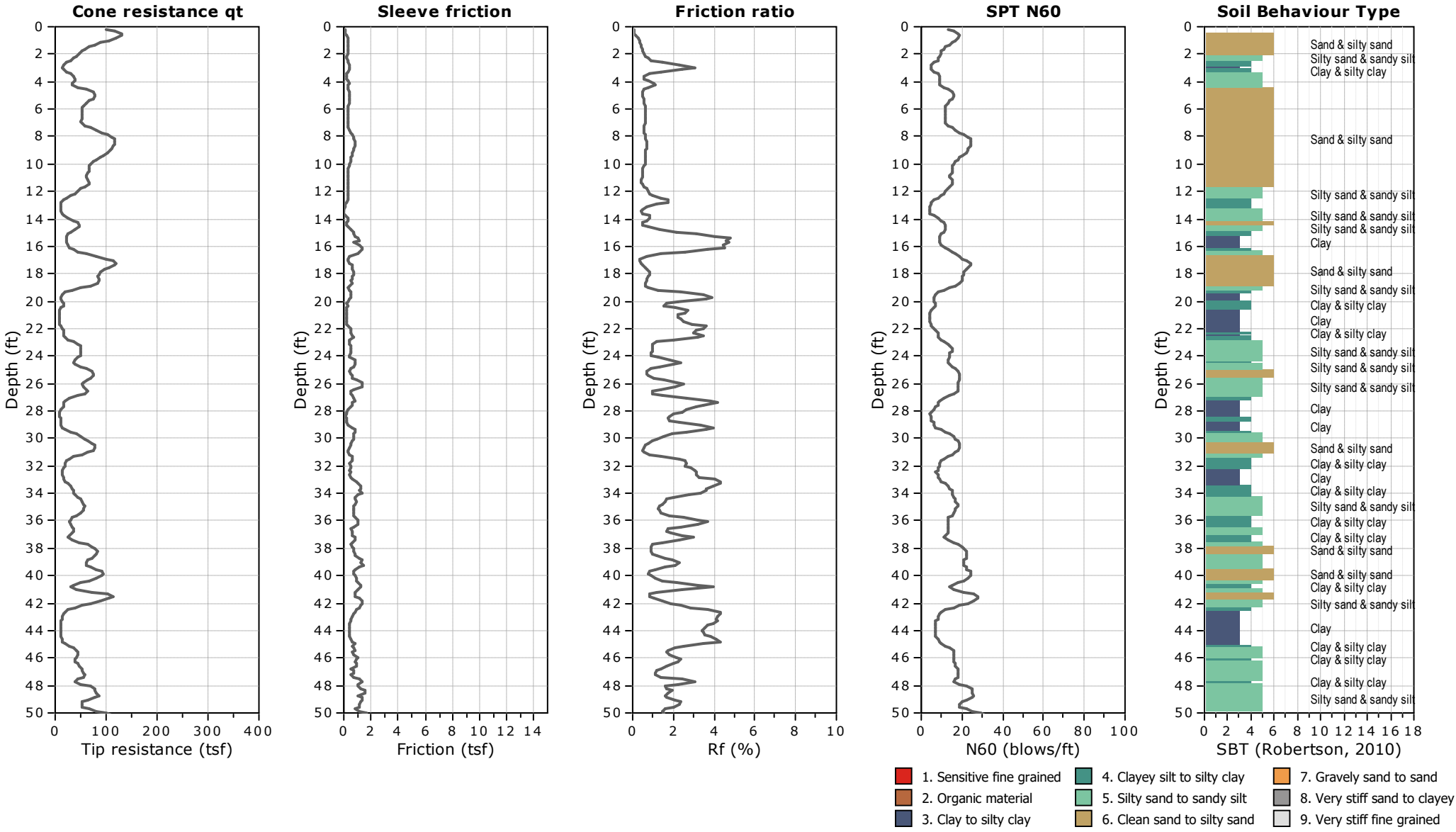
CPT: CPT-01

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



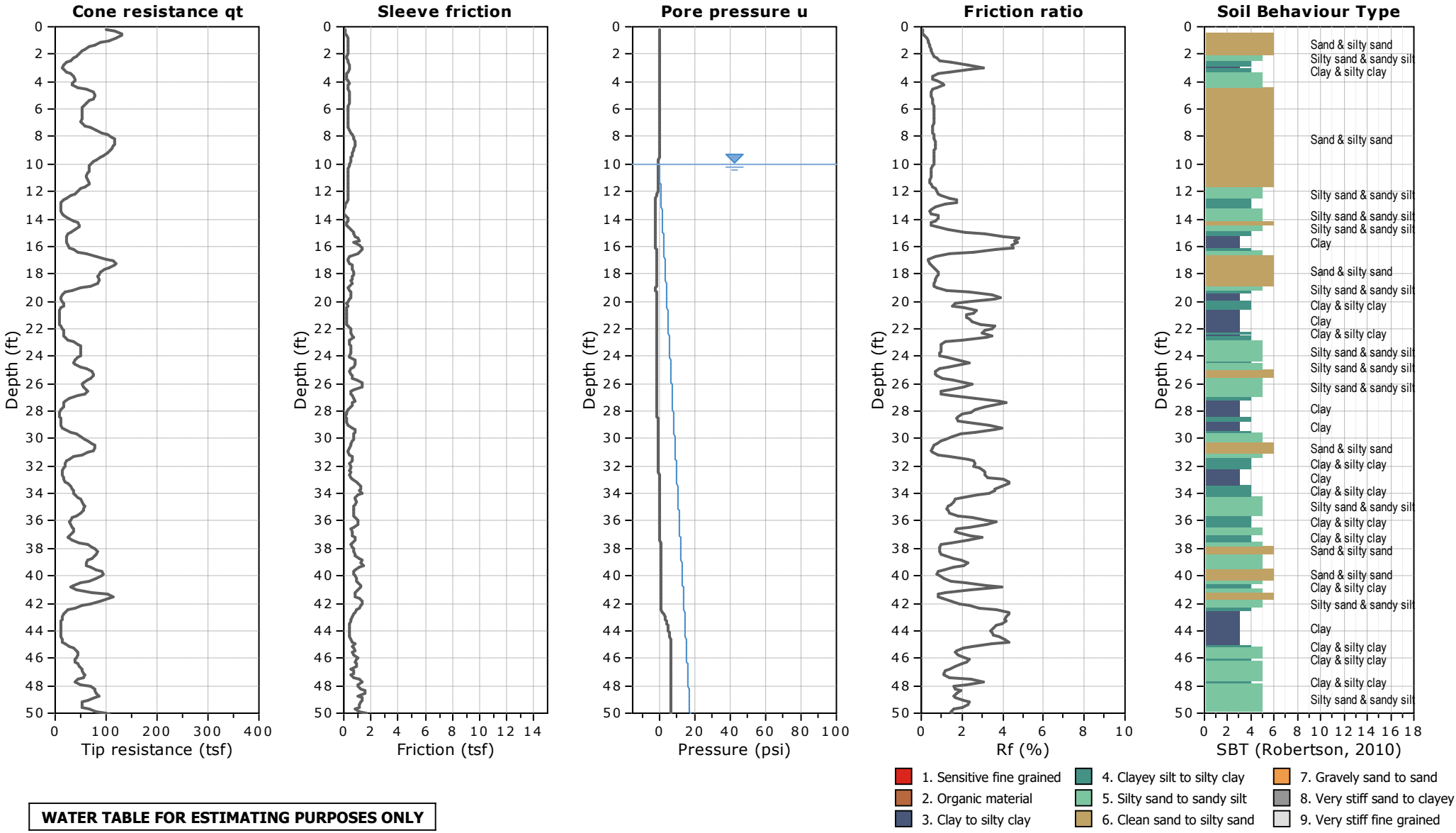
CPT: CPT-01

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



WATER TABLE FOR ESTIMATING PURPOSES ONLY

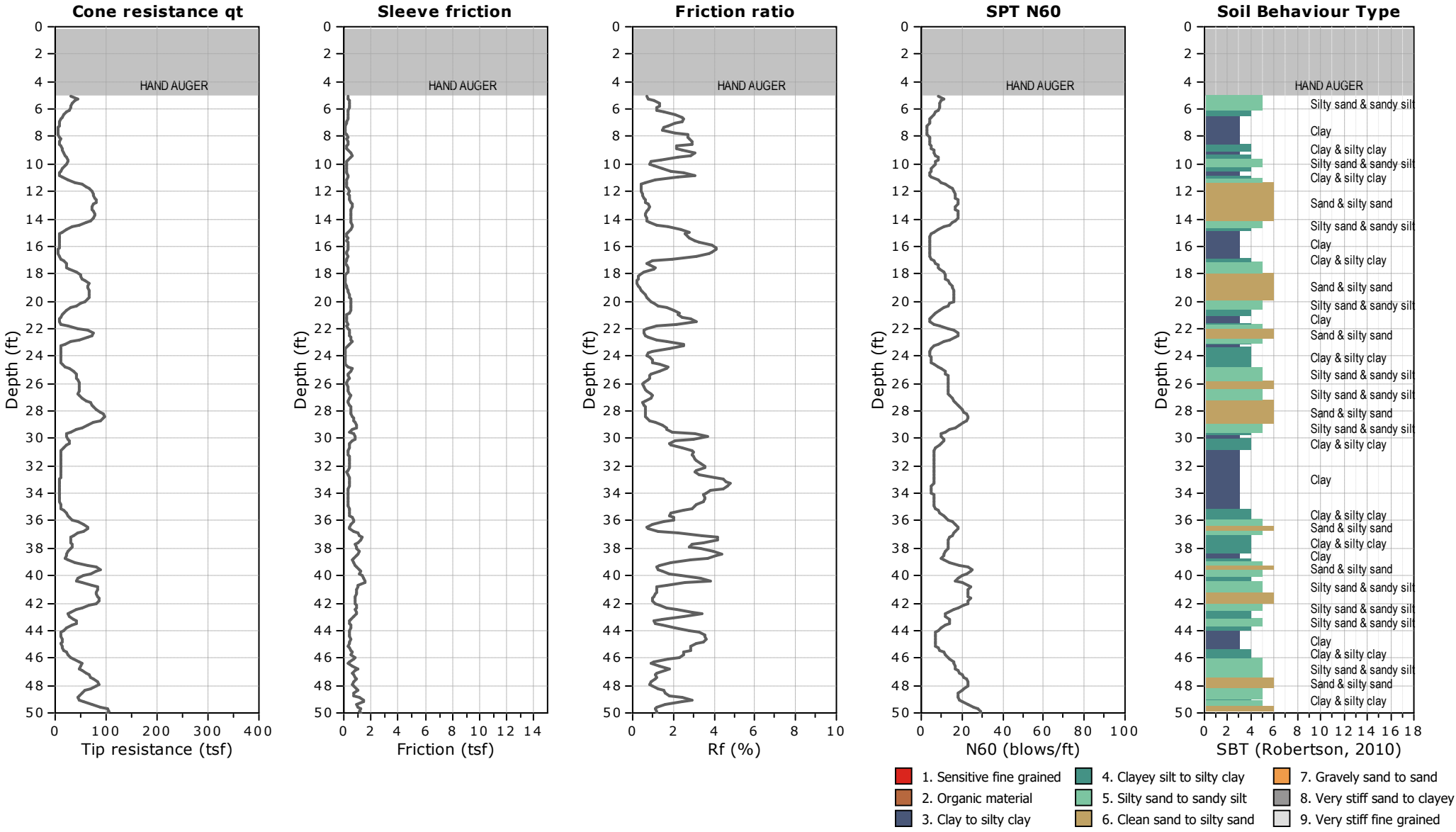
CPT: CPT-02

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



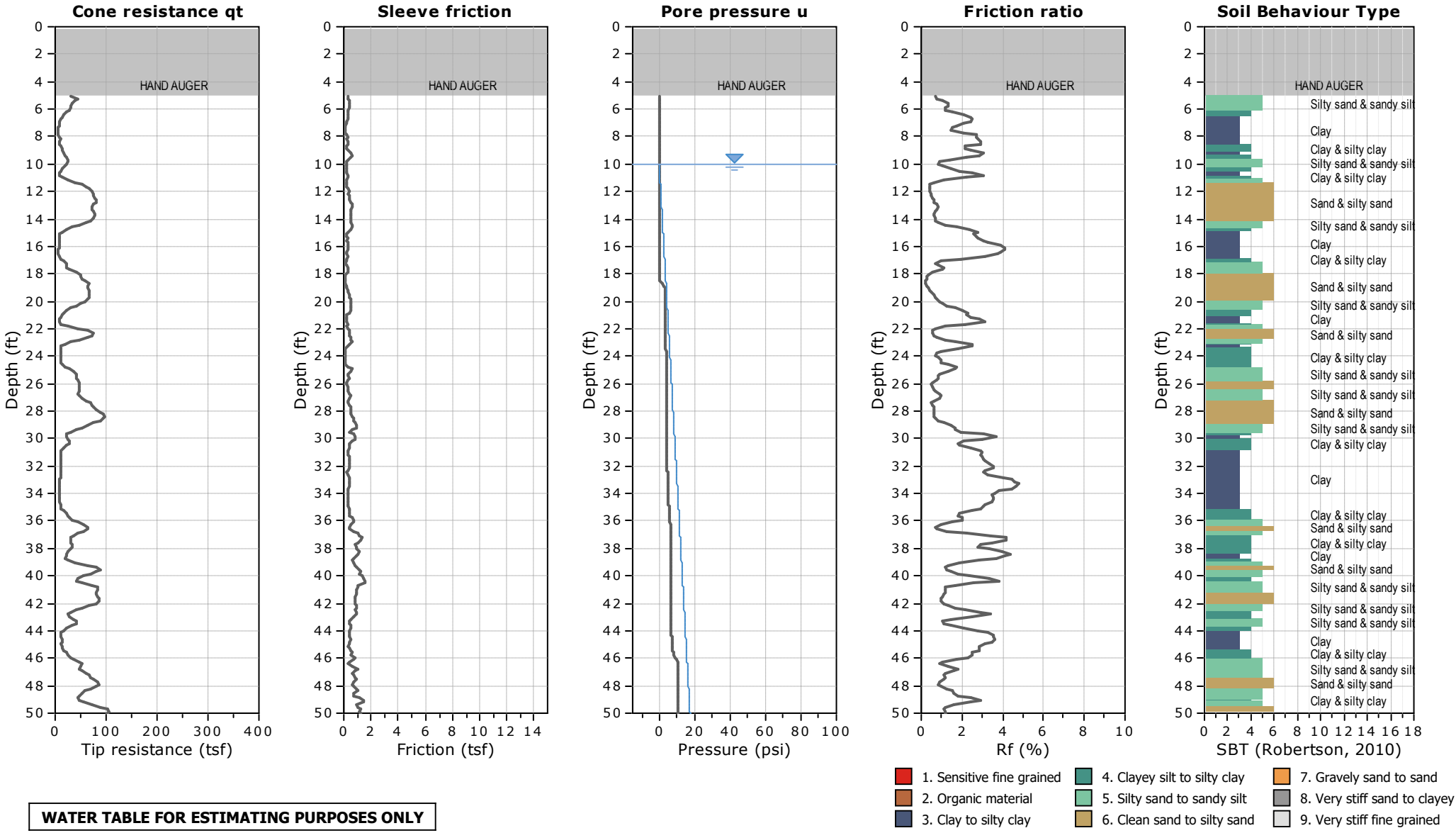
CPT: CPT-02

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



WATER TABLE FOR ESTIMATING PURPOSES ONLY

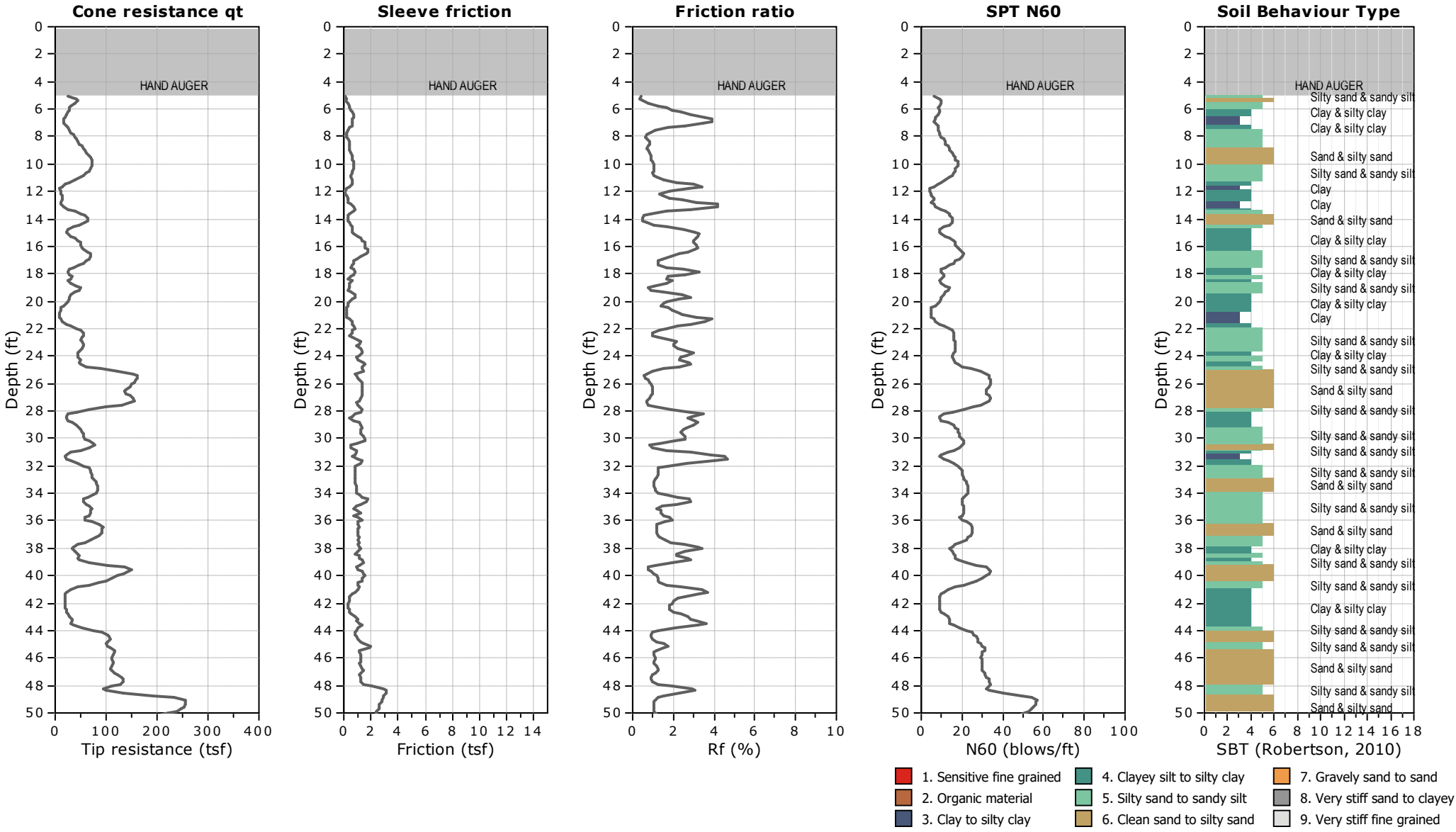
CPT: CPT-03

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



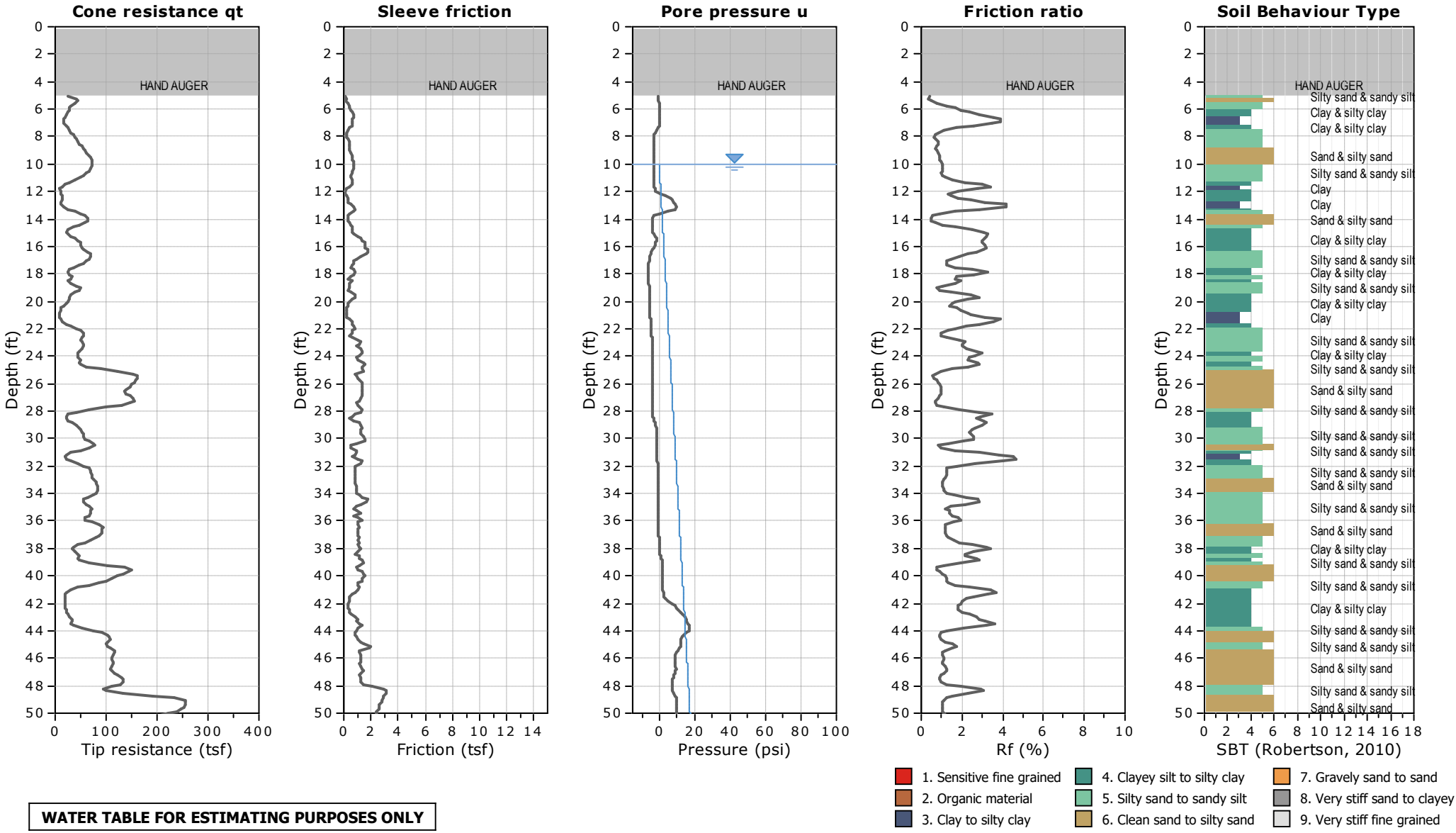
CPT: CPT-03

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



WATER TABLE FOR ESTIMATING PURPOSES ONLY

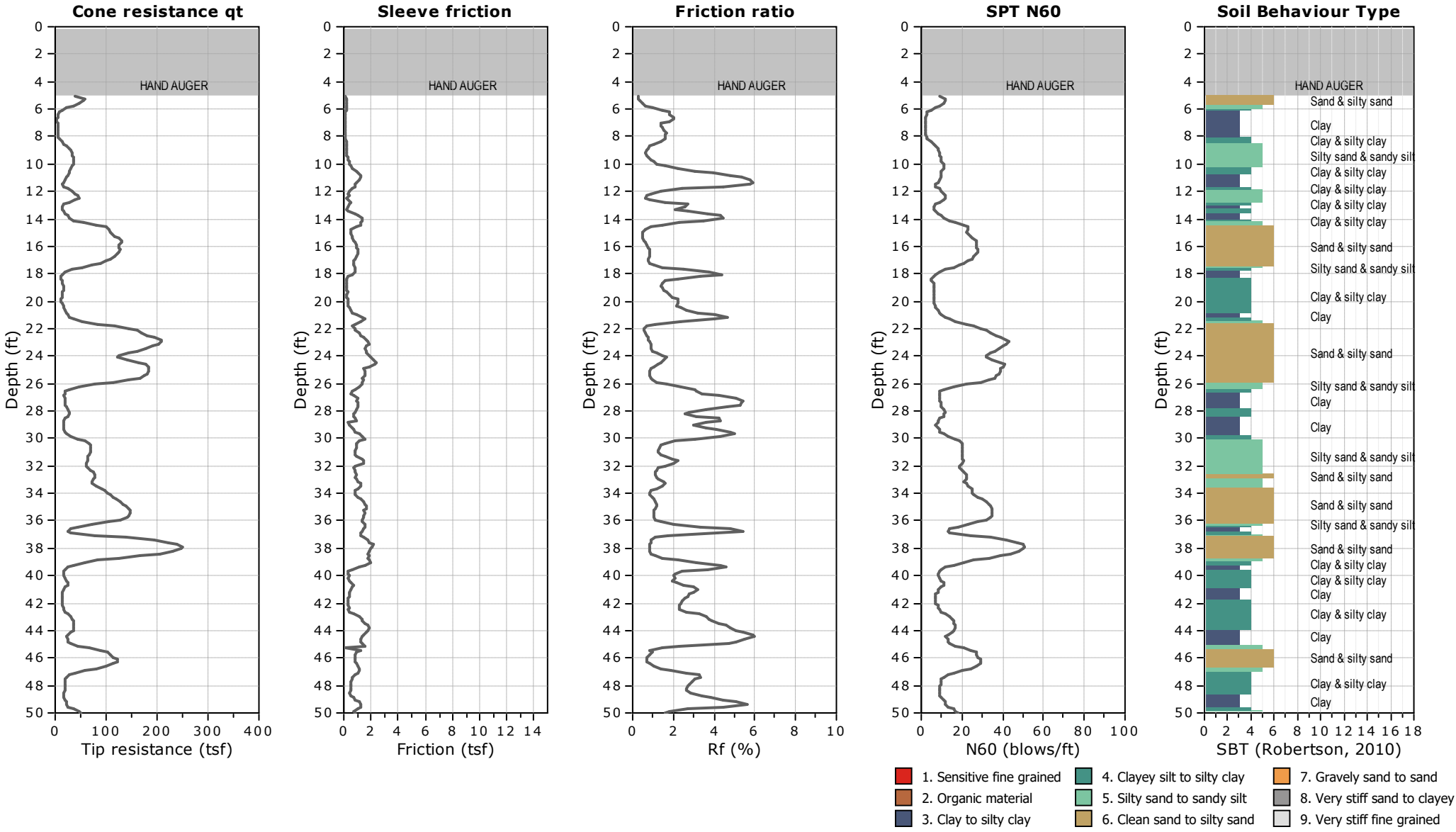
CPT: CPT-05

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



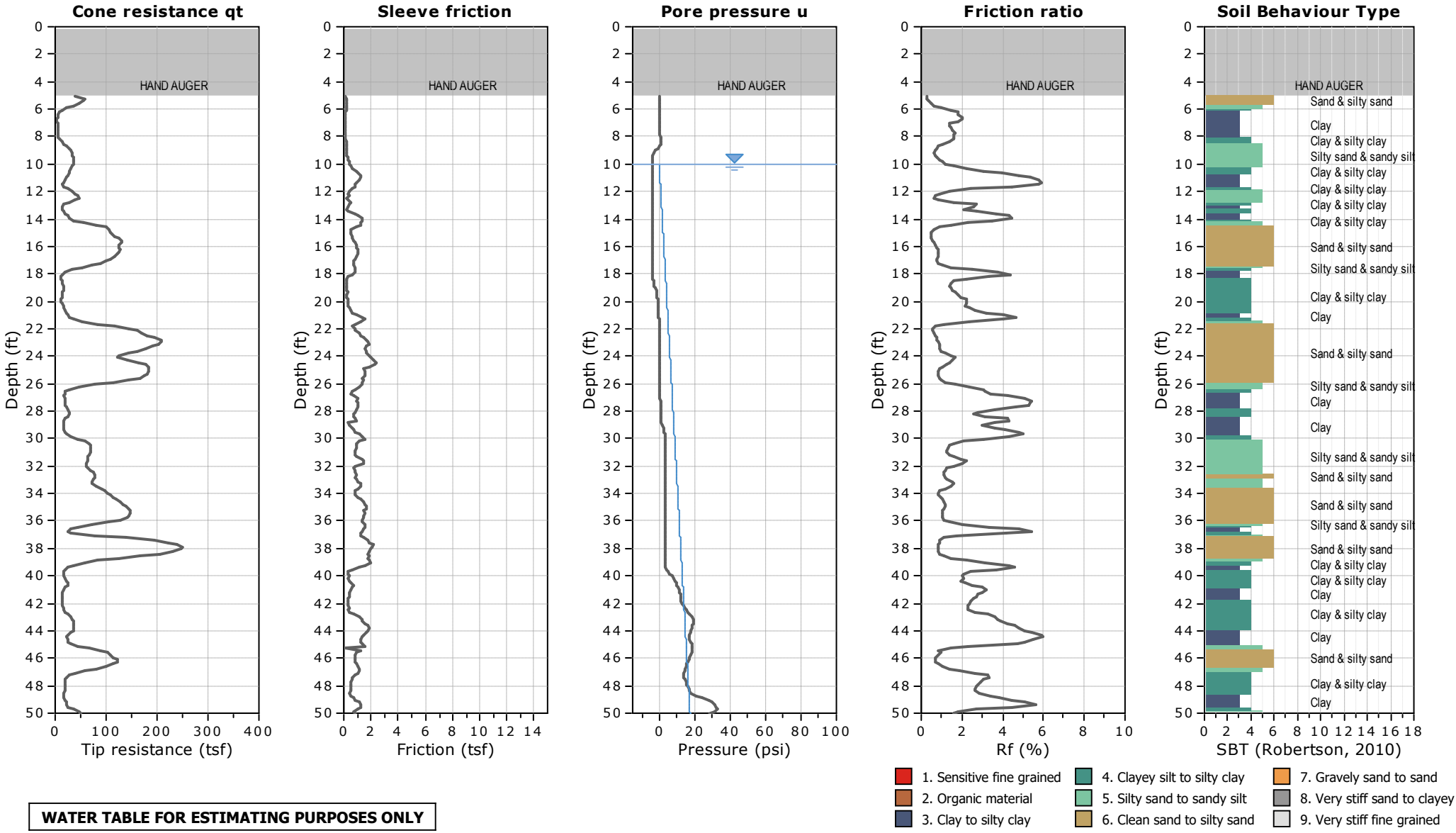
CPT: CPT-05

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



WATER TABLE FOR ESTIMATING PURPOSES ONLY

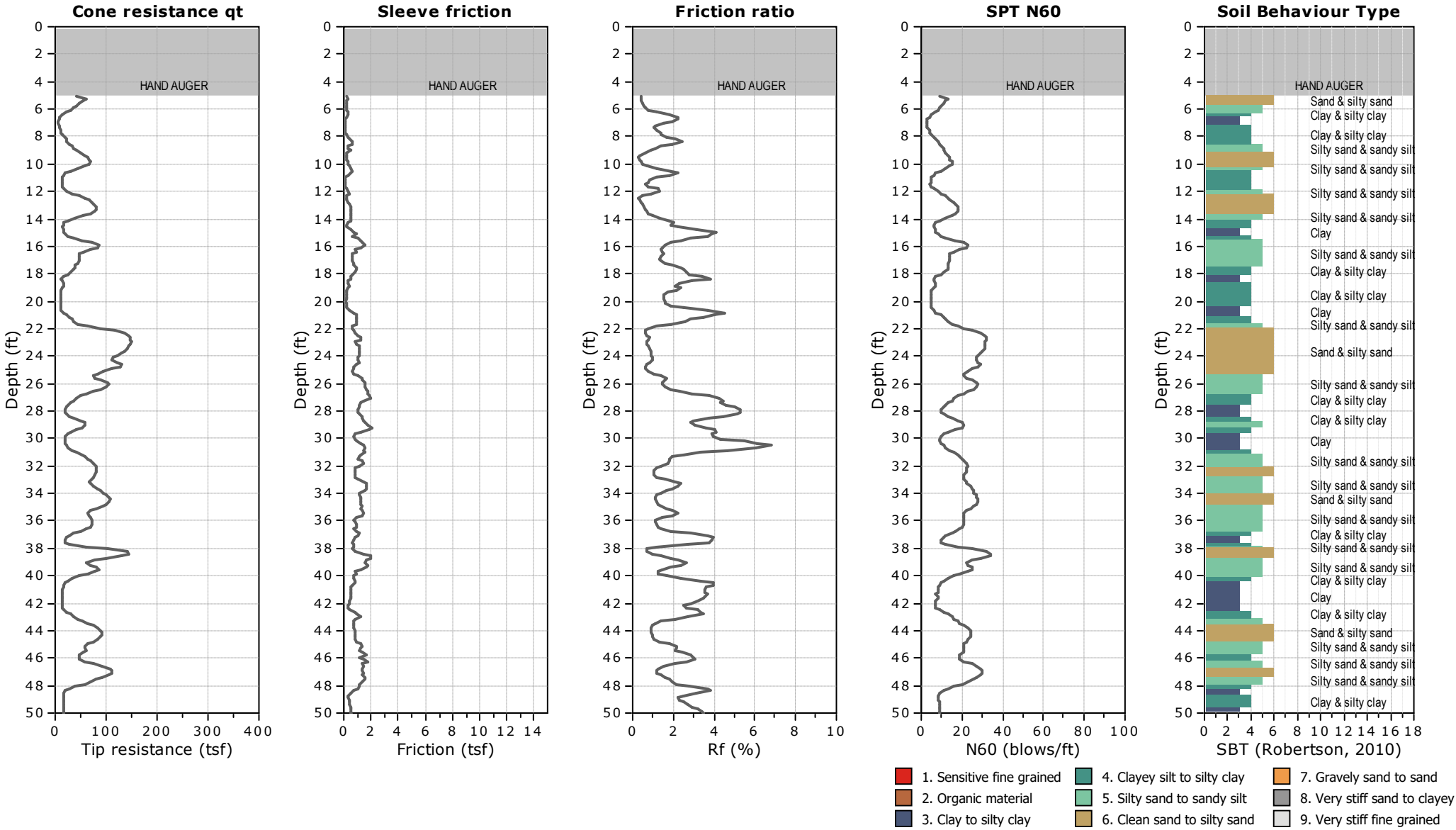
CPT: SCPT-04

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



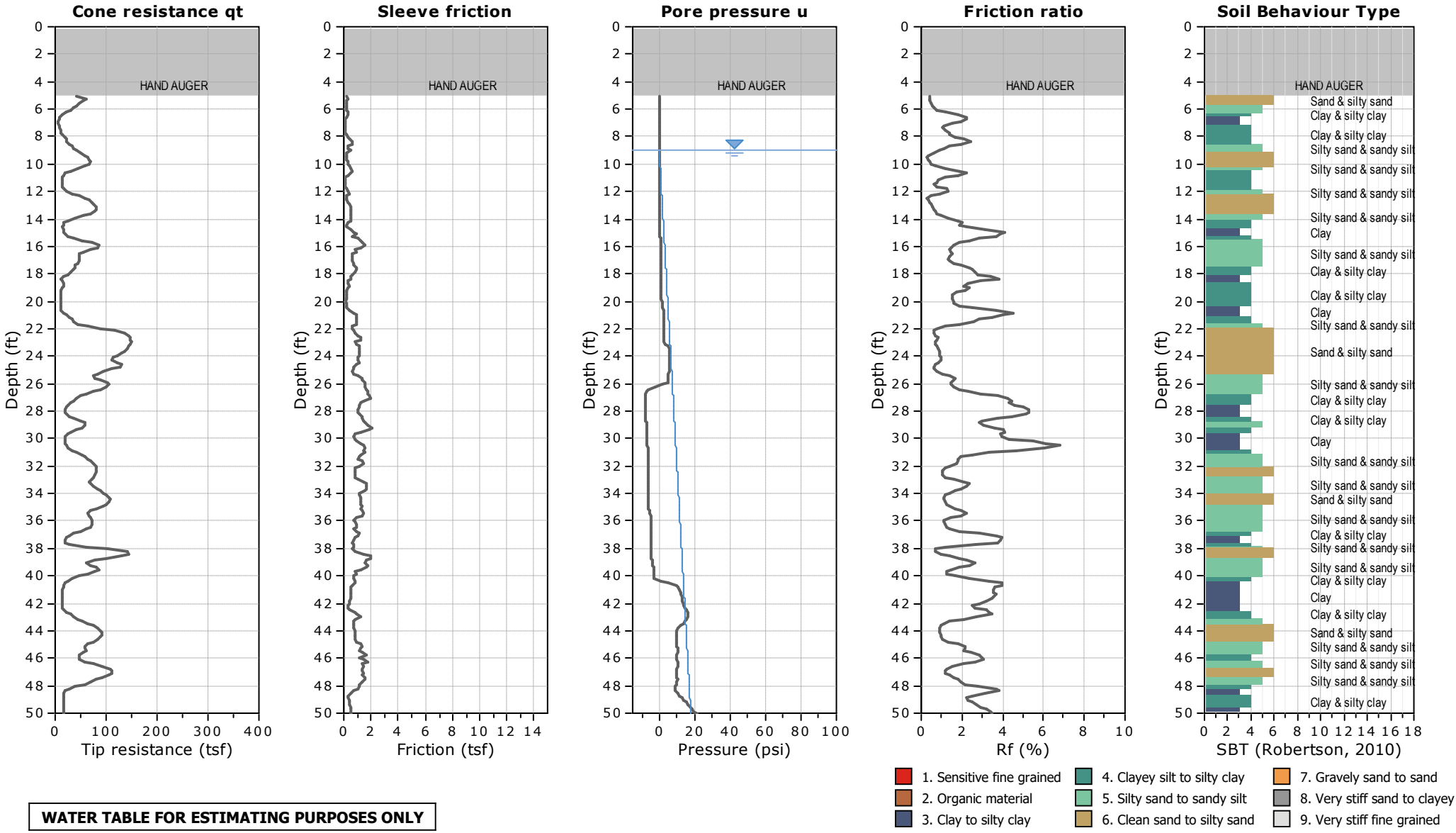
CPT: SCPT-04

CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021



WATER TABLE FOR ESTIMATING PURPOSES ONLY

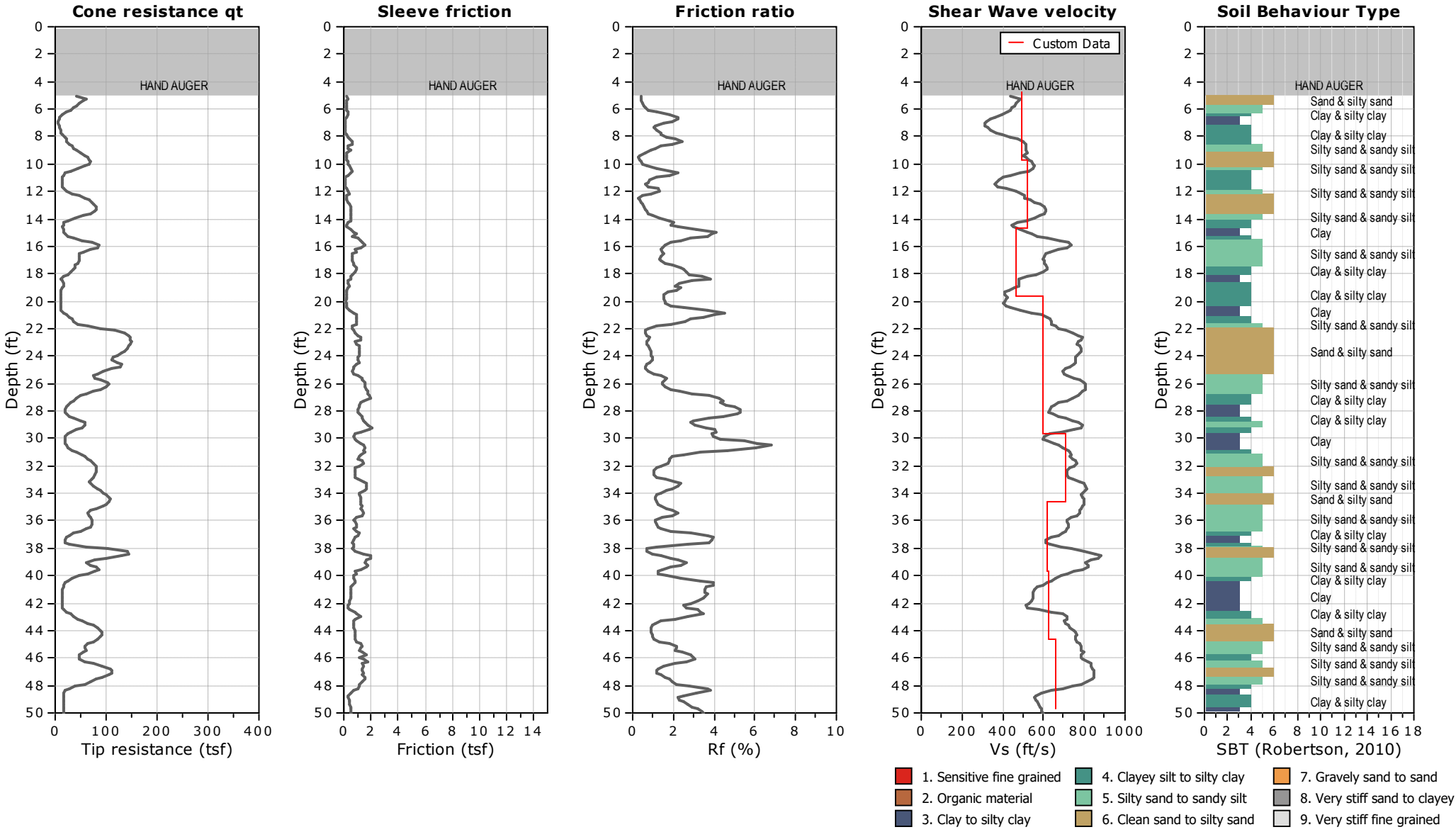
CPT: SCPT-04

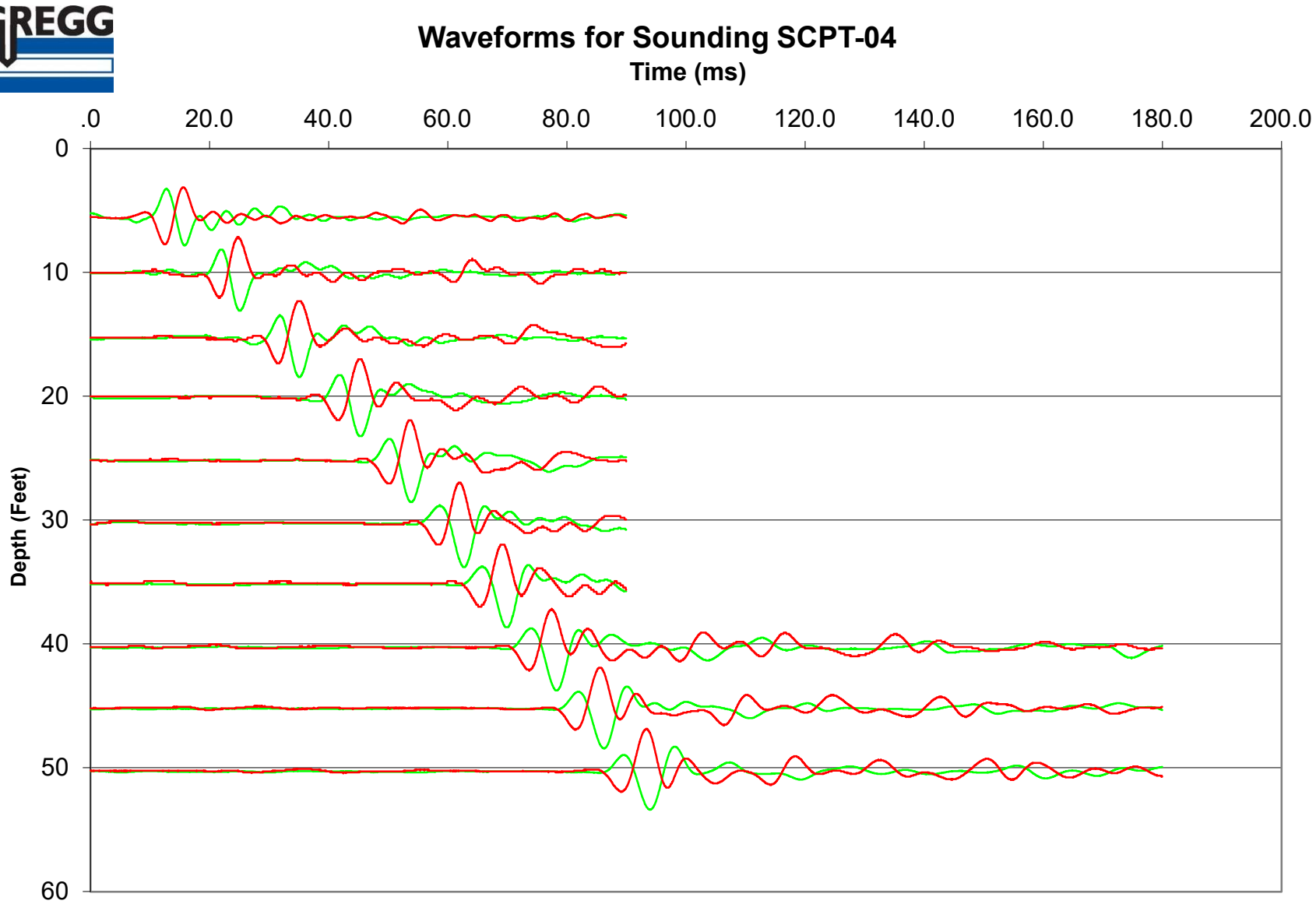
CLIENT: LEIGHTON CONSULTANTS

SITE: SHOP OFF, FOUNTAIN VALLEY, CA

FIELD REP: MICHELLE M.

Total depth: 50.36 ft, Date: 9/3/2021




Waveforms for Sounding SCPT-04
Time (ms)
.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
200.0
Depth (Feet)
0
10
20
30
40
50
60

Shear Wave Velocity Calculations

SHOPOFF FV

SCPT-04

Geophone Offset: 0.66 Feet

Source Offset: 1.67 Feet

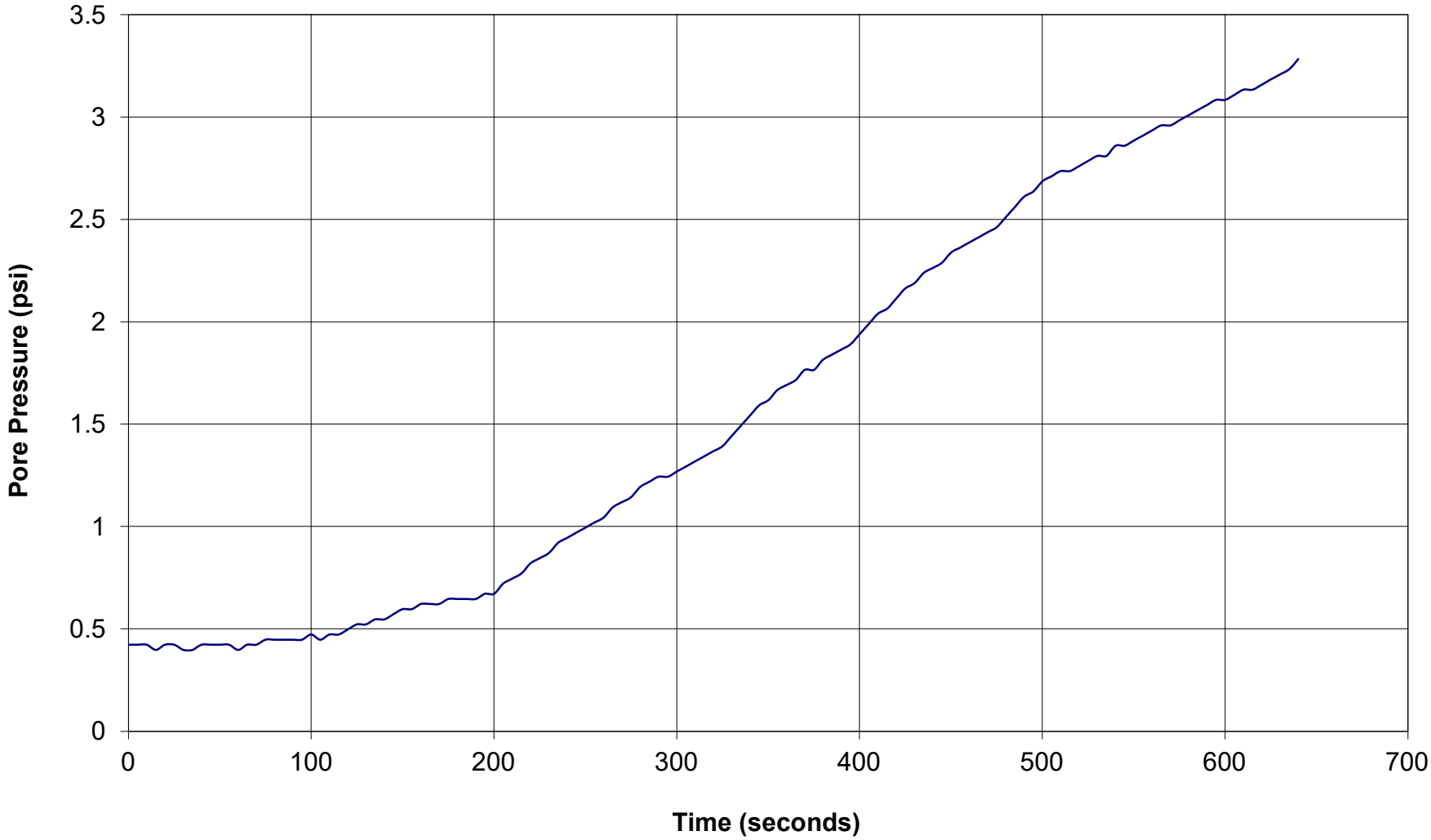
09/03/21

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
5.58	4.92	5.19	5.19	14.1500			
10.17	9.51	9.66	4.46	23.1500	9.0000	495.9	7.21
15.42	14.76	14.85	5.20	33.1000	9.9500	522.4	12.14
20.18	19.52	19.59	4.73	43.3500	10.2500	461.9	17.14
25.26	24.60	24.66	5.07	51.8000	8.4500	600.1	22.06
30.35	29.69	29.73	5.08	60.3000	8.5000	597.1	27.15
35.27	34.61	34.65	4.91	67.2500	6.9500	707.1	32.15
40.35	39.69	39.73	5.08	75.5000	8.2500	615.8	37.15
45.28	44.62	44.65	4.92	83.3500	7.8500	626.4	42.15
50.36	49.70	49.73	5.08	91.0500	7.7000	660.0	47.16

GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

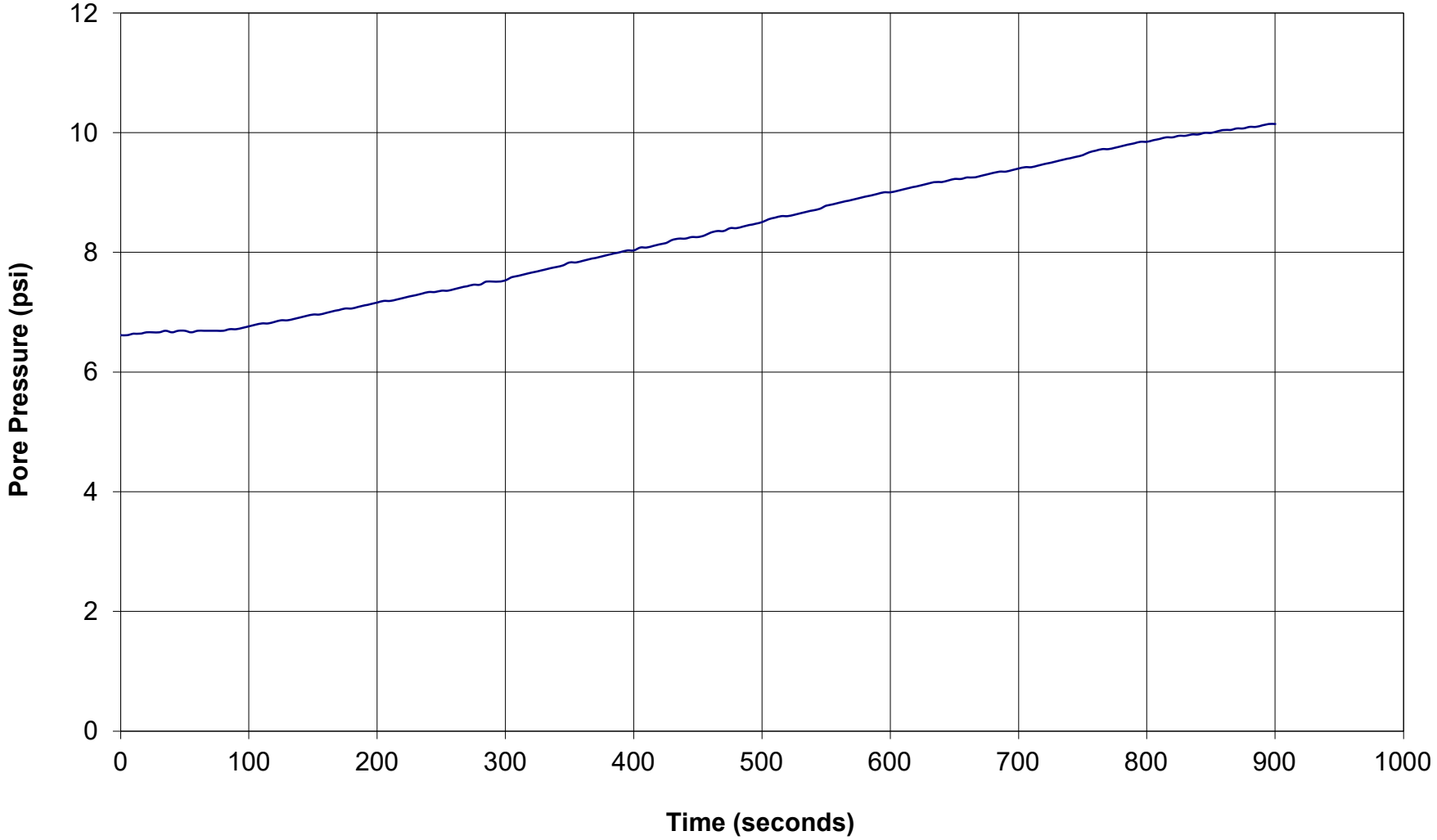
Sounding: CPT-01
Depth (ft): 18.70
Site: SHOPOFF FV
Engineer: MICHELLE M.



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

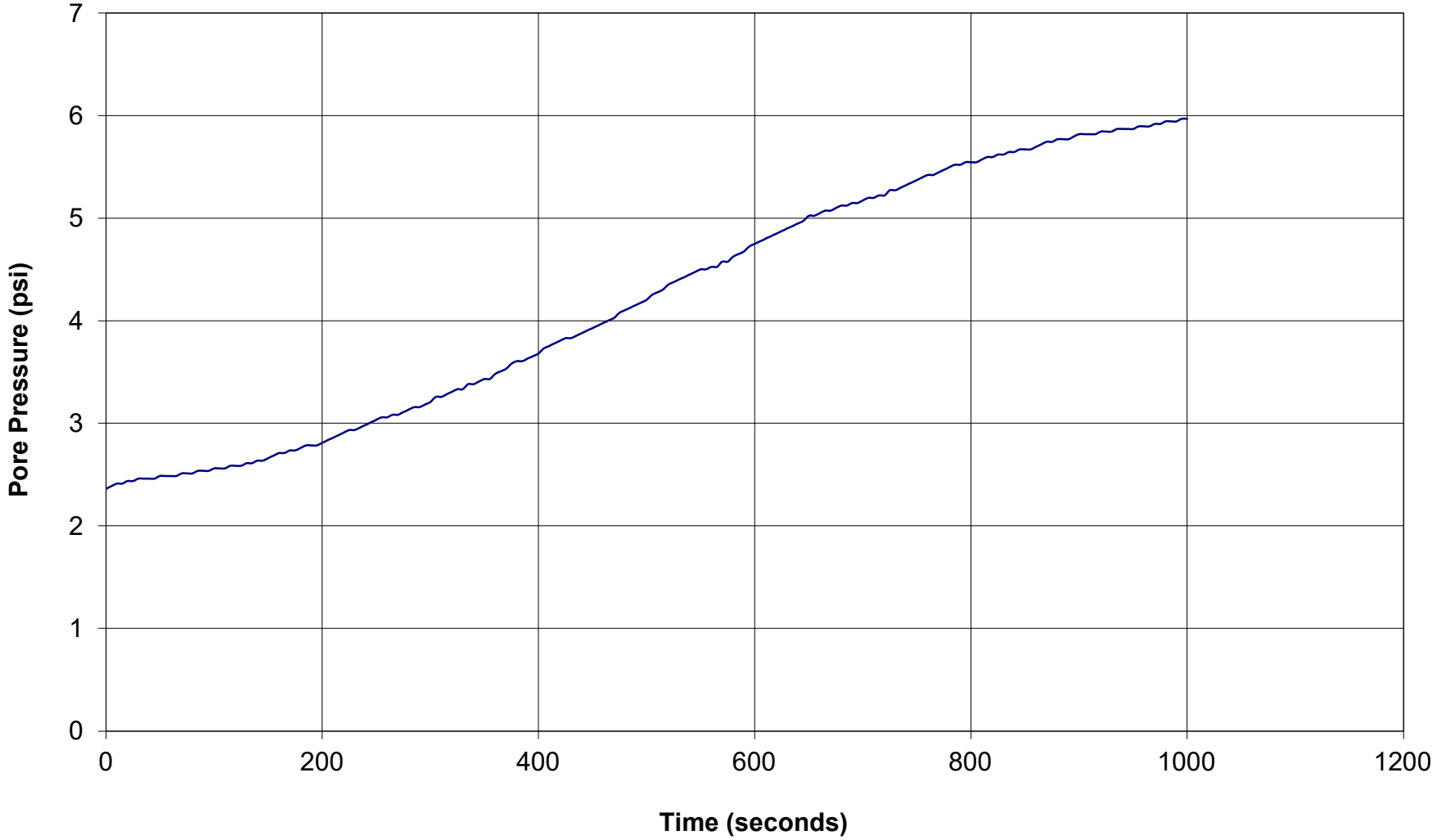
Sounding: CPT-01
Depth (ft): 50.36
Site: SHOPOFF FV
Engineer: MICHELLE M.



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

Sounding: SCPT-04
Depth (ft): 23.13
Site: SHOPOFF FV
Engineer: MICHELLE M.



APPENDIX C

LABORATORY TEST RESULTS

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name:	Shopoff Fountain Valley	Tested By:	G. Berdy	Date:	09/08/21
Project No.:	13255.001	Checked By:	A. Santos	Date:	09/09/21
Boring No.:	CPT-2	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Pale olive silty sand (SM)				

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0005
Wt. Comp. Soil + Mold	(g)	565.20	391.70
Wt. of Mold	(g)	201.30	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	733.50	593.00
Dry Wt. of Soil + Cont.	(g)	646.20	521.92
Wt. of Container	(g)	0.00	201.30
Moisture Content	(%)	13.51	22.17
Wet Density	(pcf)	109.8	118.1
Dry Density	(pcf)	96.7	96.7
Void Ratio		0.743	0.744
Total Porosity		0.426	0.427
Pore Volume	(cc)	88.3	88.3
Degree of Saturation (%) [S_{meas}]		**49.1**	80.5

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
09/08/21	13:19	1.0	0	0.5815
09/08/21	13:29	1.0	10	0.5815
Add Distilled Water to the Specimen				
09/08/21	14:30	1.0	61	0.5820
09/09/21	5:07	1.0	938	0.5820
09/09/21	6:10	1.0	1001	0.5820

Expansion Index (EI_{meas}) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	**0**

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Shopoff Fountain Valley | Tested By : ACS/GEB | Date: 09/07/21

Project No. : 13255.001 | Checked By: A. Santos | Date: 09/09/21

Boring No.	CPT-2			
Sample No.	B-1			
Sample Depth (ft)	0-5			
Soil Identification:	Pale olive silty sand (SM)			
Wet Weight of Soil + Container (g)	0.00			
Dry Weight of Soil + Container (g)	0.00			
Weight of Container (g)	1.00			
Moisture Content (%)	0.00			
Weight of Soaked Soil (g)	100.03			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	95			
Crucible No.	19			
Furnace Temperature (°C)	860			
Time In / Time Out	6:30/7:15			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	19.8617			
Wt. of Crucible (g)	19.8589			
Wt. of Residue (g) (A)	0.0028			
PPM of Sulfate (A) x 41150	115.22			
PPM of Sulfate, Dry Weight Basis	**115**			

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15			
ml of AgNO3 Soln. Used in Titration (C)	0.7			
PPM of Chloride (C -0.2) * 100 * 30 / B	100			
PPM of Chloride, Dry Wt. Basis	**100**			

pH TEST, DOT California Test 643

pH Value	**7.52**			
Temperature °C	20.1			

SOIL RESISTIVITY TEST
DOT CA TEST 643

Project Name:	Shopoff Fountain Valley		Tested By :	G. Berdy	Date: 08/03/21
Project No. :	13255.001		Checked By:	A. Santos	Date: 09/09/21
Boring No.:	CPT-2		Depth (ft.) :	0-5	
Sample No. :	B-1				

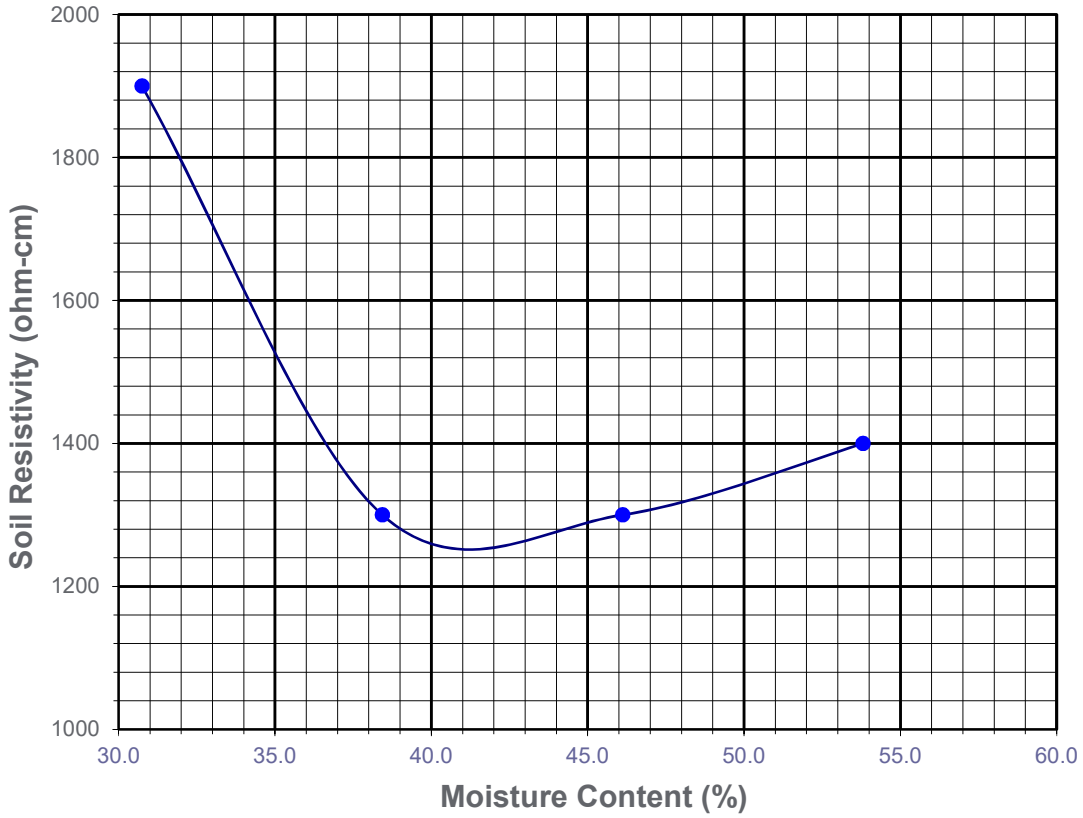
Soil Identification:* Pale olive silty sand (SM)

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	40	30.75	1900	1900
2	50	38.43	1300	1300
3	60	46.12	1300	1300
4	70	53.80	1400	1400
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	0.00
Dry Wt. of Soil + Cont. (g)	0.00
Wt. of Container (g)	1.00
Container No.	
Initial Soil Wt. (g) (Wt)	130.10
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
1250	**41.5**	**115**	**100**	**7.52**	**20.1**



APPENDIX D

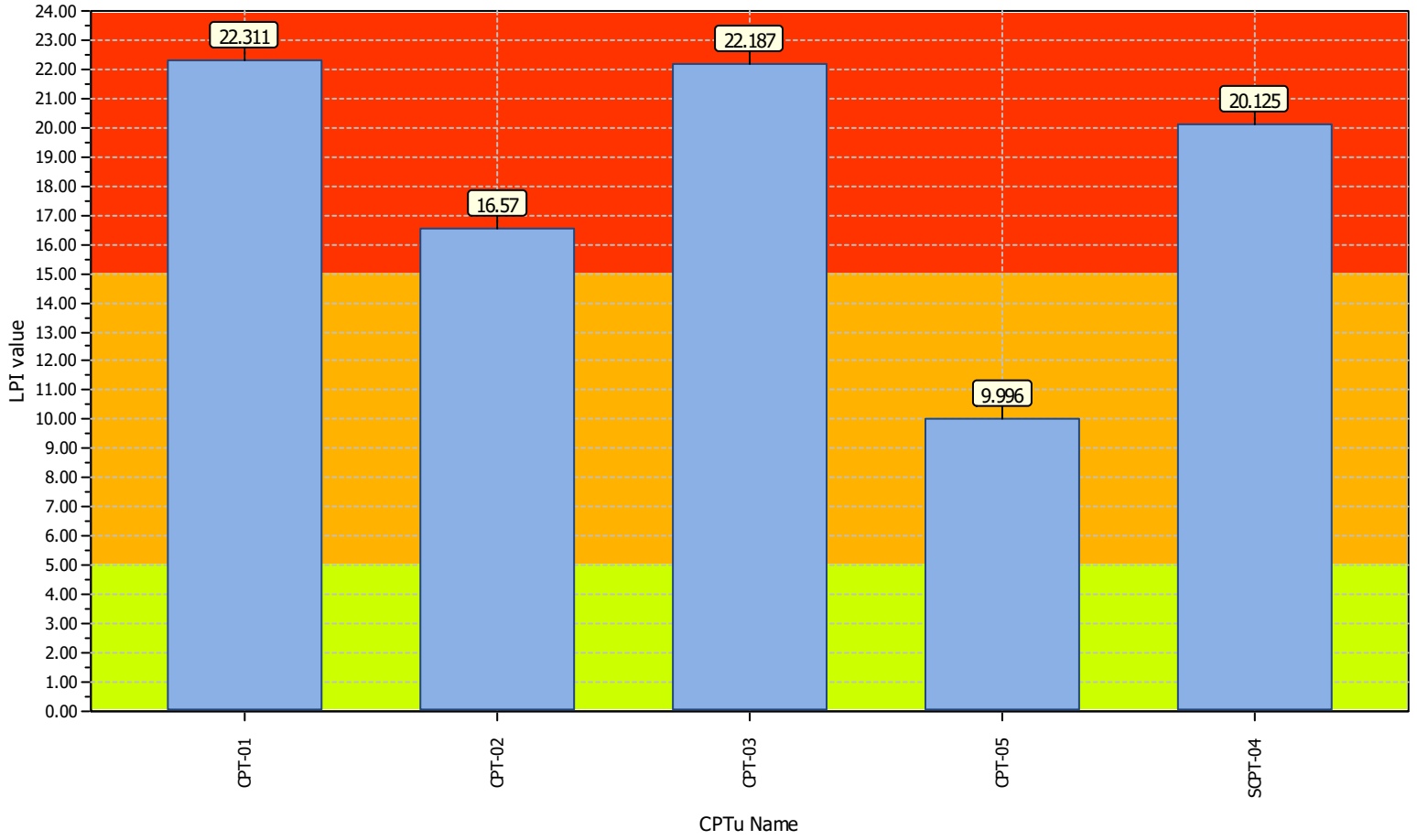
LIQUEFACTION ANALYSIS

Leighton
17781 Cowan, Irvine, CA 92614

Project title : 13255.001 Shopoff Fountain Valley

Location : 16300 Euclid Street, Fountain Valley, CA

Overall Liquefaction Potential Index report

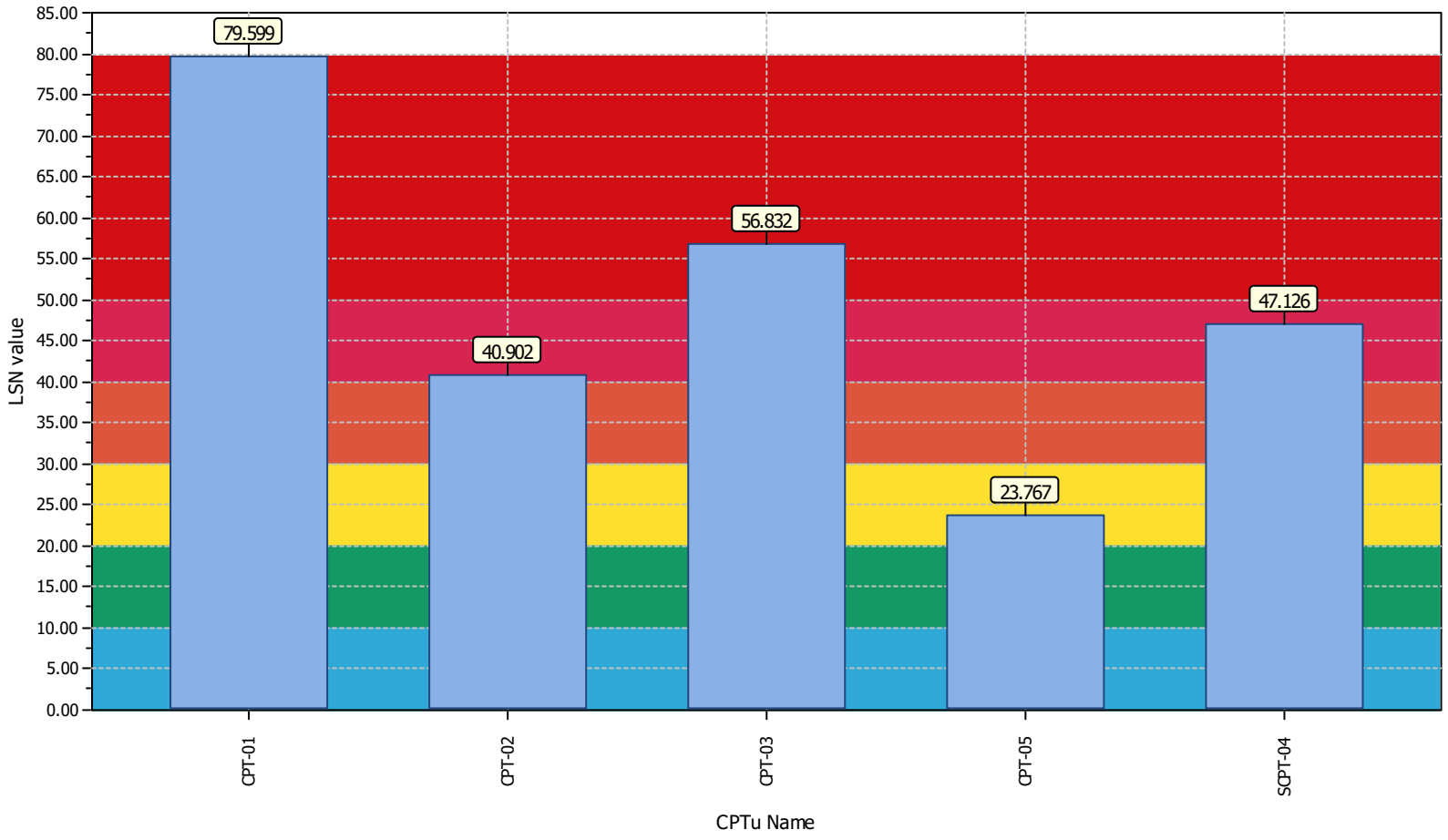


Leighton
17781 Cowan, Irvine, CA 92614

Project title : 13255.001 Shopoff Fountain Valley

Location : 16300 Euclid Street, Fountain Valley, CA

Overall Liquefaction Severity Number report



LSNcolor scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

Total CPT number: 5

0% little liquefaction

0% minor liquefaction

20% moderate liquefaction

0% moderate to major liquefaction

40% major liquefaction

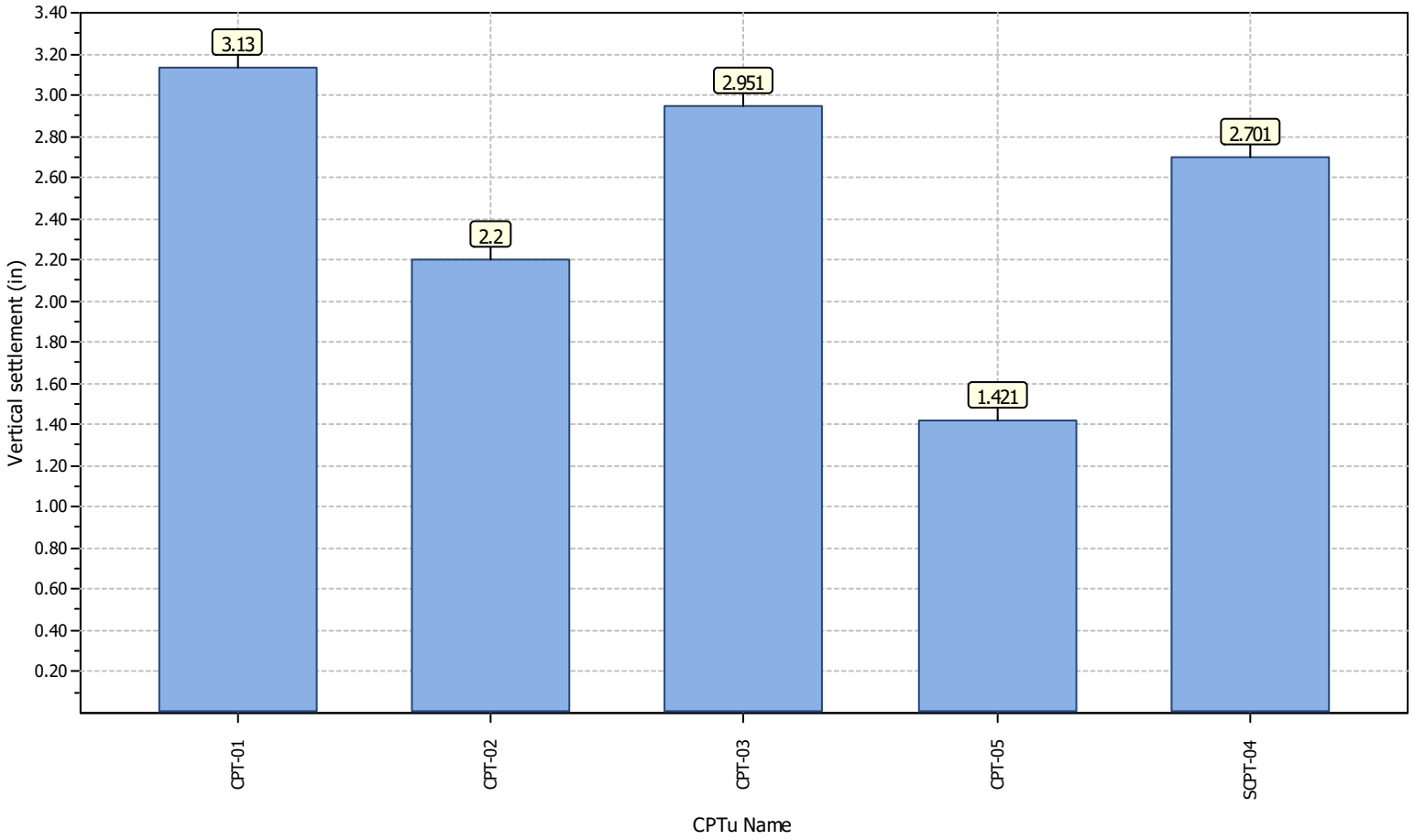
40% severe liquefaction

Leighton
17781 Cowan, Irvine, CA 92614

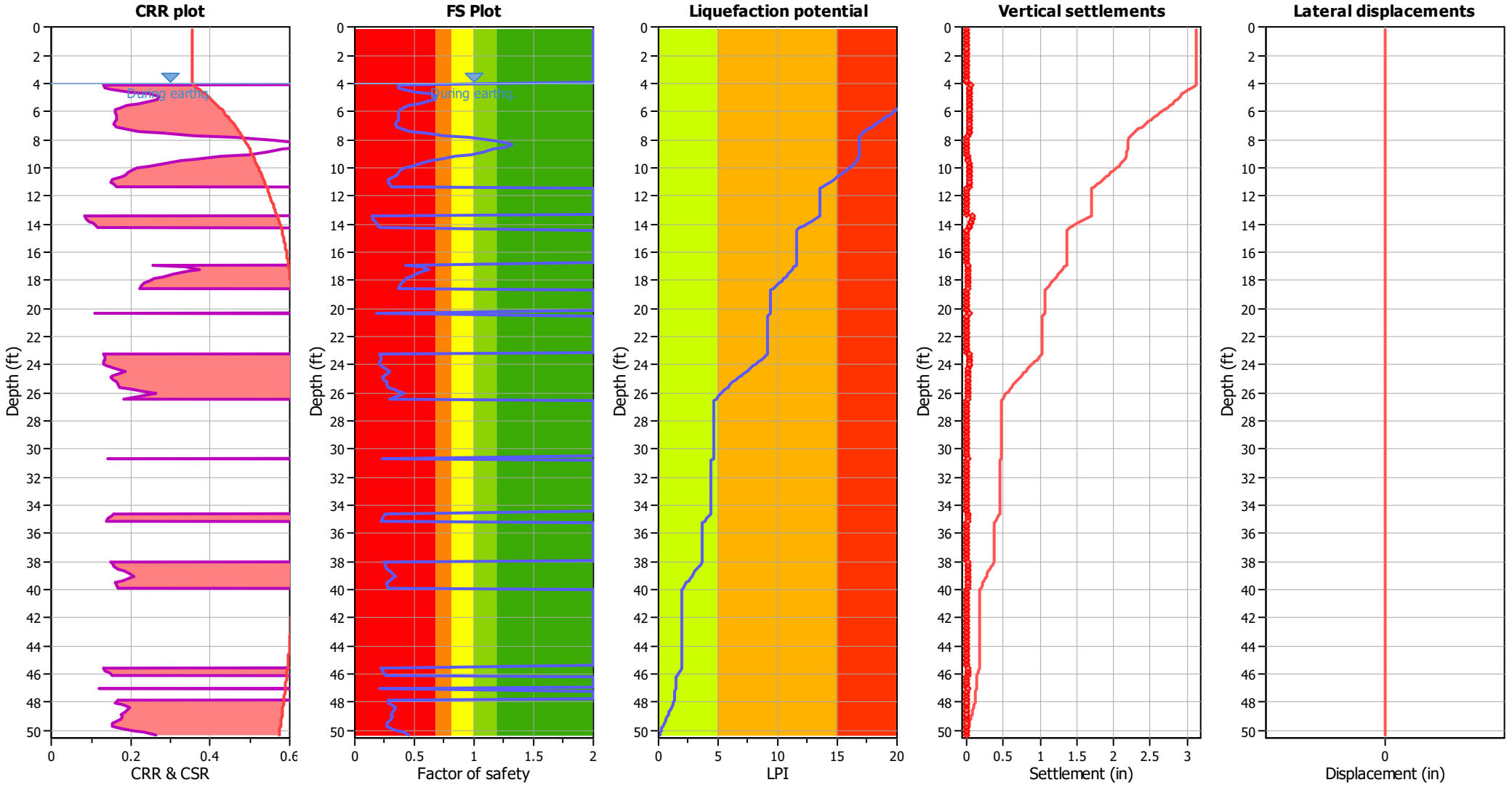
Project title : 13255.001 Shopoff Fountain Valley

Location : 16300 Euclid Street, Fountain Valley, CA

Overall vertical settlements report



Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	4.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.89	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.68	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.90 ft	Fill height:	N/A	Limit depth:	N/A

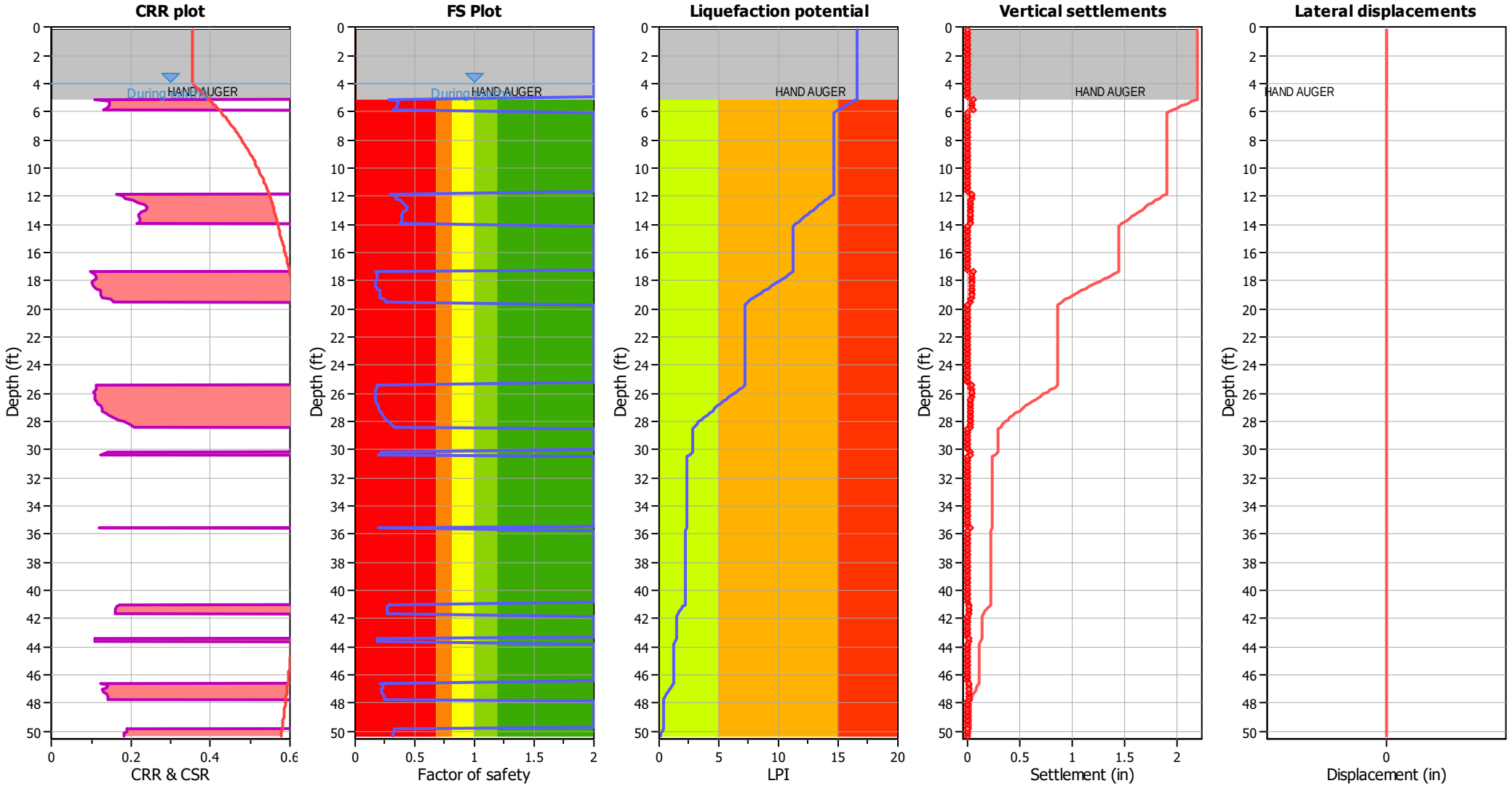
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	4.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.89	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.68	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.90 ft	Fill height:	N/A	Limit depth:	N/A

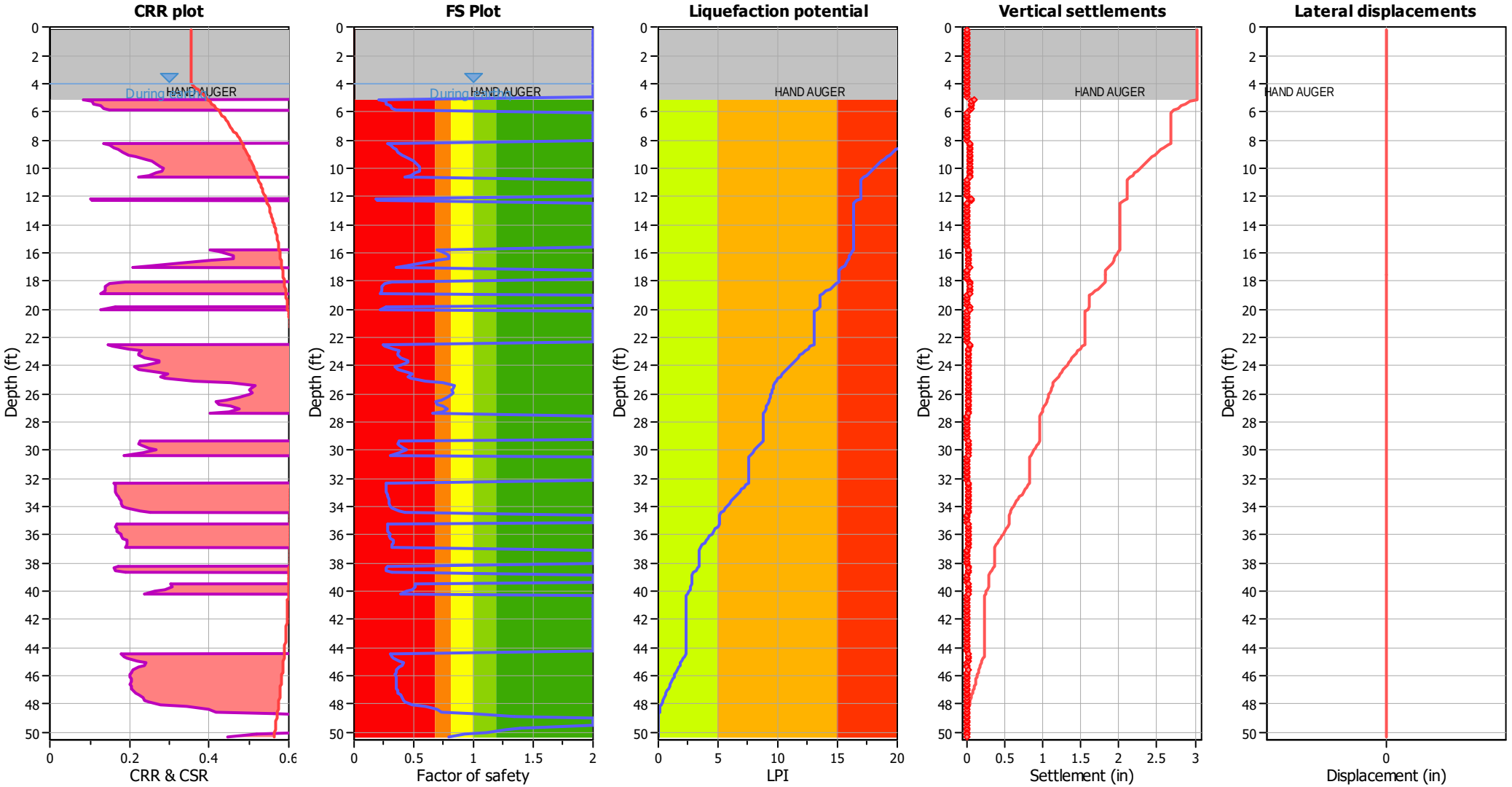
F.S. color scheme

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- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	4.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.89	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.68	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.90 ft	Fill height:	N/A	Limit depth:	N/A

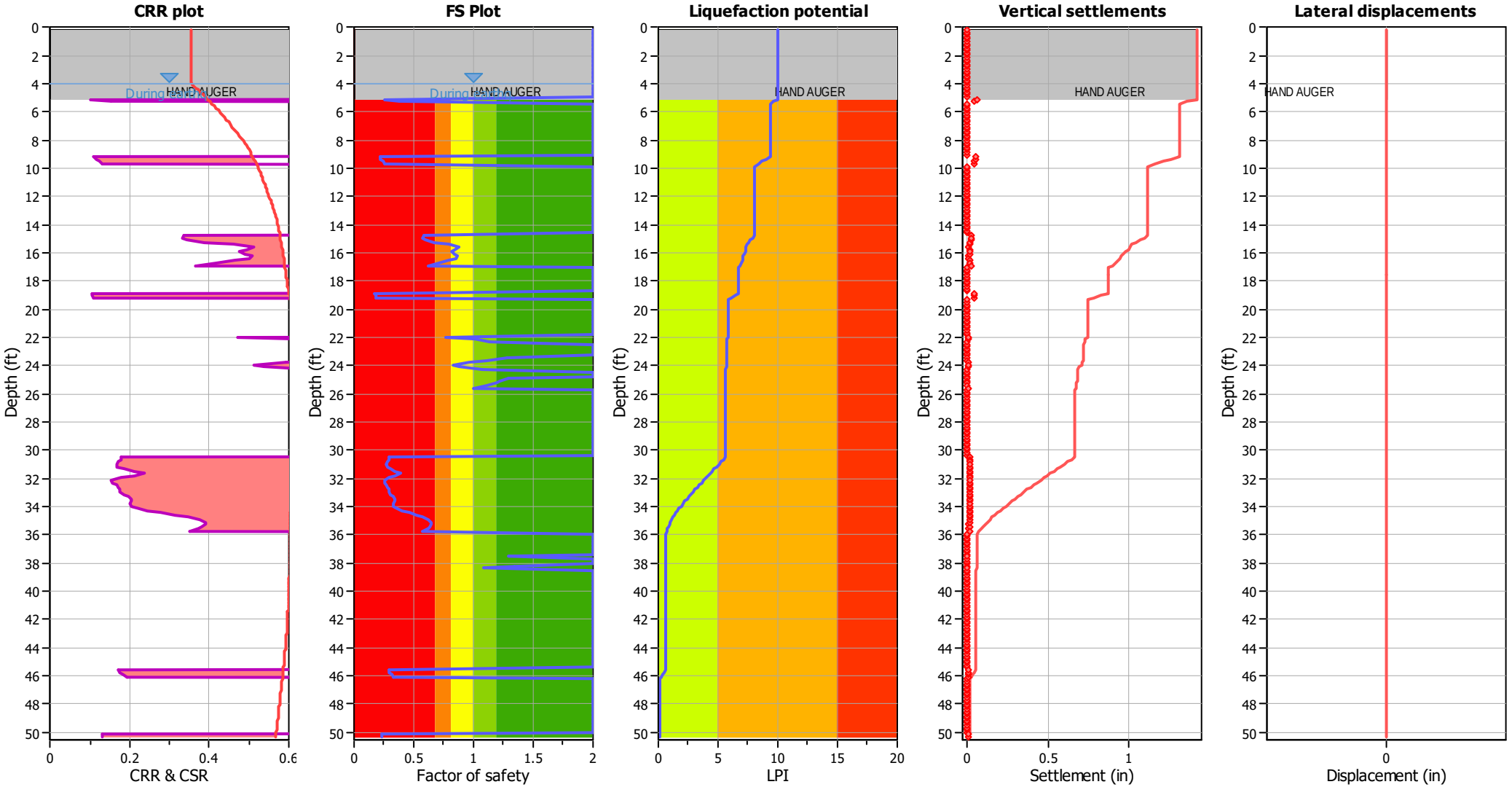
F.S. color scheme

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LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	4.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.89	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.68	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.90 ft	Fill height:	N/A	Limit depth:	N/A

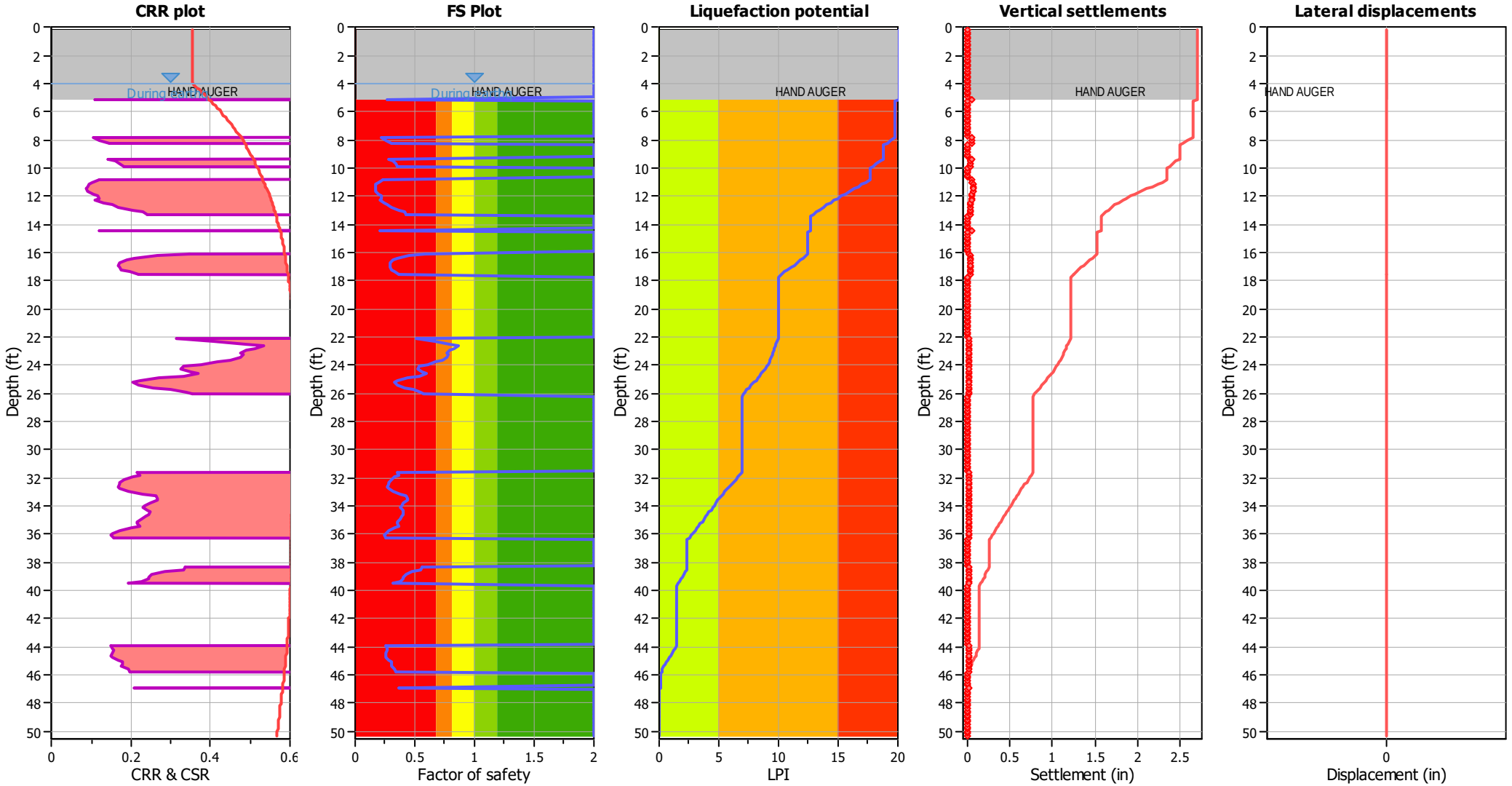
F.S. color scheme

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- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	4.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.89	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.68	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.90 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

ATTACHMENT D

COUNTY SUSCEPTIBILITY ANALYSIS MAP

Susceptibility

Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

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

Tidel Influence

- <= Mean High Water Line (4.28')

Water Body

- Basin
- Lake

Federal & Other Lands

- Seal Beach National Wildlife Refuge
- Airports/Military

San Gabriel-Coyote Creek

Los Alamitos Naval Air Station

Seal Beach Naval Weapons Station

Seal Beach National Wildlife Refuge

West Street Retarding Basin

Haster Retarding Basin

Newland Retarding Basin

Lake Huntington

PROJECT AREA

Santa Ana River

Newport Bay

John Wayne Airport

Pacific Ocean

J-287

0 6,500 13,000 Feet

TITLE: SUSCEPTIBILITY ANALYIS ANAHEIM BAY-HUNTINGTON HARBOR

JOB: ORANGE COUNTY WATERSHED MASTER PLANNING ORANGE CO. CA

SCALE	DESIGNED	DRAWING	CHECKED	DATE	JOB NO.
1" = 6500'	TH	TH	BMP	04/22/10	9526-E

PACE Advanced Water Engineering

FIGURE 2

P:\9526E\6-GIS\Mxds\Workspace\SusceptibleAnalysis_20100422\9526E_AnaheimBay_20100331.mxd

ATTACHMENT E

CALCULATIONS

TGD Section III.1.1 Simple Method Runoff Coefficient For Volume Based Sizing

Project: Euclid & Heil - Preliminary
Designed by: HD
Reviewed by: TG
Date: 11/14/2024

DMA	imp decimal	Design Storm Depth (in)	C	Drainage Area (ac)	DCV (cf)
Apartment Side (DA-1 ; 4.02 AC)					
DMA-1	0.80	0.75	0.75	1.33	2,716
DMA-2	0.80	0.75	0.75	1.56	3,185
DMA-3	0.80	0.75	0.75	0.63	1,286
DMA-4	0.80	0.75	0.75	0.50	1,021
Total (Apartment)	-	-	-	4.02	8,208
For Sale Side (DA-2 ; 14.07 AC)					
DMA-1	0.80	0.75	0.75	2.46	5,023
DMA-2	0.80	0.75	0.75	2.12	4,329
DMA-3	0.80	0.75	0.75	2.23	4,553
DMA-4	0.80	0.75	0.75	2.32	4,737
DMA-5	0.80	0.75	0.75	3.74	7,637
DMA-6	0.80	0.75	0.75	1.20	2,450
Total (For Sale)	-	-	-	14.07	28,729
TOTAL				**18.09**	**36,938**

III.1.1. Simple Method Runoff Coefficient for Volume-Based BMP Sizing

This hydrologic method shall be used to calculate the runoff volume associated with LID and water quality design storms. The runoff volume shall be calculated as:

$$V = C \times d \times A \times 43560\ sf/ac \times 1/12\ in/ft$$ Equation III.1

Where:

V = runoff volume during the design storm event, cu-ft
C = runoff coefficient = $(0.75 \times imp + 0.15)$
imp = impervious fraction of drainage area (ranges from 0 to 1)
d = storm depth (inches)
A = tributary area (acres)

Euclid and Heil
WQMP Flow Rate Calculations

Area	% Impervious	C	I (in/hr)	A (acres)	Q (cfs)	Selected Modular Wetland	Modular Wetland Allowable Q	Lat/Long
Apartment Side (DA-1 ; 4.09 AC)								
DMA-1	80.0%	0.75	0.26	1.40	0.273	MWS-L-8-12	0.346	33.724964, -117.936832
DMA-2	80.0%	0.75	0.26	1.56	0.304	MWS-L-8-16	0.462	33.724626, -117.936836
DMA-3	80.0%	0.75	0.26	0.63	0.123	MWS-L-6-8	0.147	33.724315, -117.936872
DMA-4	80.0%	0.75	0.26	0.50	0.098	MWS-L-4-8	0.115	33.723883, -117.936019
For Sale Side (DA-2; 14.00AC)								
DMA-1	80.0%	0.75	0.26	2.46	0.480	MWS-L-8-16, MWS-L-4-6	0.535	33.724260, -117.933245 33.724703, -117.933219
DMA-2	80.0%	0.75	0.26	2.12	0.413	MWS-L-4-19 (2), MWS-L-4-6 (2)	0.620	33.724260, -117.933245 33.724158, -117.933263 33.723831, -117.933352 33.723826, -117.933469
DMA-3	80.0%	0.75	0.26	2.23	0.435	MWS-L-4-19 (2), MWS-L-4-6	0.547	33.724283, -117.934511 33.724156, -117.934477 33.723826, -117.934512
DMA-4	80.0%	0.75	0.26	2.32	0.452	MWS-L-4-19 (2), MWS-L-4-6	0.547	33.724320, -117.934718 33.724155, -117.934752 33.723825, -117.934700
DMA-5	80.0%	0.75	0.26	3.74	0.729	MWS-L-4-17 (4)	0.824	33.724568, -117.935538 33.724505, -117.935529 33.724310, -117.935635 33.724306, -117.935534
DMA-6	80.0%	0.75	0.26	1.13	0.220	MWS-L-4-21	0.268	33.725201, -117.936722
Offsites								
DMA - O1	90.0%	0.825	0.26	1.24	0.269	MWS-L-8-12	0.346	33.723766, -117,936917
DMA - O2	90.0%	0.825	0.26	0.12	0.026	MWS-L-4-4	0.052	33.723775 -117.932888

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 0	0
Public Park	10 - 25	15
School	30 - 50	40
Single Family Residential: (3)		
2.5 acre lots	5 - 15	10
1 acre lots	10 - 25	20
2 dwellings/acre	20 - 40	30
3-4 dwellings/acre	30 - 50	40
5-7 dwellings/acre	35 - 55	50
8-10 dwellings/acre	50 - 70	60
More than 10 dwellings/acre	65 - 90	80
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 - 100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.

3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

ORANGE COUNTY

HYDROLOGY MANUAL

ACTUAL IMPERVIOUS COVER FOR DEVELOPED AREAS

Figure III.4. Capture Efficiency Nomograph for Off-line Flow-based Systems in Orange County

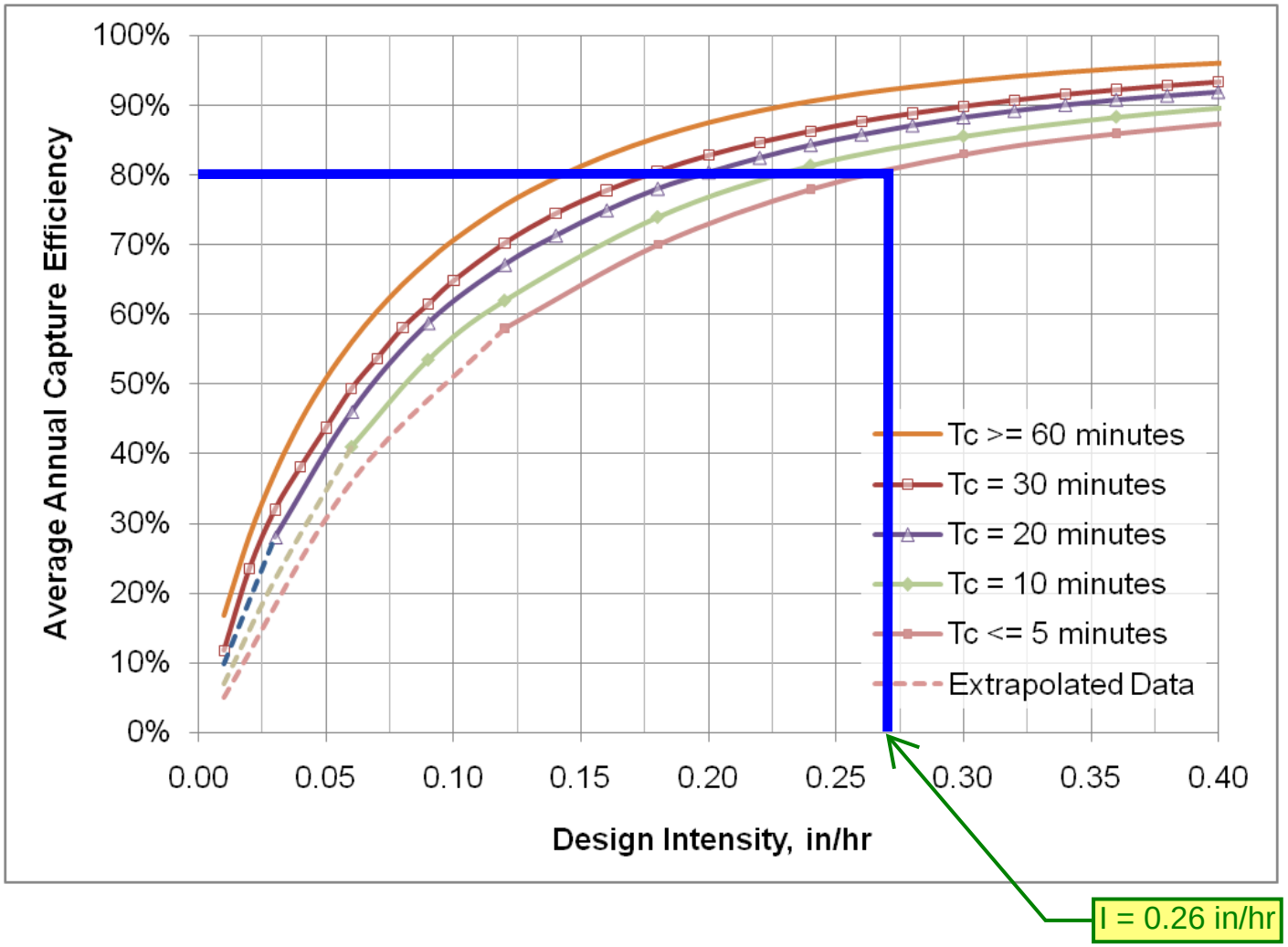


Table VI.1: Table of Multipliers for Computing Remaining Design Storm Intensity

Time of Concentration, minutes	Multiplier to Convert Remaining Fraction of Design Capture Storm Depth to Design Intensity, in/hr
60	0.15
30	0.18
20	0.19
15	0.21
10	0.23
5	0.26

Example VI.4: Computing the Required Design Flowrate to Mitigate Remaining Alternative Compliance Volume

Given:

- 85th percentile, 24-hr storm depth = 0.85 inches (**Figure III.1**)
- Drainage area to proposed flow-based BMP = 1.5 acres
- Imperviousness of drainage area = 80%
- Time of concentration (T_c) of the drainage area = 15 minutes
- Remaining volume (designated to be managed with the proposed BMP) = 1,200 cu-ft

Required:

- Compute required design flowrate to mitigate the alternative compliance volume

Solution:

1) Equivalent storm depth = 1,200 cu-ft × 12 in/ft/[(0.75×0.8+0.15) ×1.5 ac ×43560 sf/ac] = 0.29 inches
2) Fraction of design capture storm depth = 0.29 inches/0.85 inches = 0.35 = 35% of DCV
3) From, Table **VI.1** the multiplier for Tc of 15 minutes is 0.21 in/hr
4) Design intensity equivalent to the remaining unmet volume = 0.21 in/hr × 0.35 = 0.074 in/hr
5) Design flow equivalent to the remaining alternative compliance volume = (0.75×0.8+0.15) × 0.074 in/hr ×1.5 ac = 0.083 cfs
6) This is the design flowrate that must be provided for the 1.5 acre tributary area to address 1,200 cu-ft of remaining volume.

ATTACHMENT F

Educational Materials

LIST OF EDUCATIONAL MATERIAL PROVIDED

1. THE OCEAN BEGINS AT YOUR FRONT DOOR
2. TIPS FOR PEST CONTROL
3. LANDSCAPE MAINTENANCE
4. SC-10 NON-STORMWATER DISCHARGE
5. SC-34 WASTE HANDLING AND DISPOSAL
6. SC-41 BUILDING AND GROUNDS MAINTENANCE
7. SC-43 PARKING/STORAGE AREA MAINTENANCE
8. SC-44 DRAINAGE SYSTEM MANAGEMENT
9. SC-70 ROAD AND STREET MAINTENANCE
10. SD-10 SITE DESIGN AND LANDSCPAE PLANNING
11. SD-12 EFFICIENT IRRIGATION
12. SD-13 STORM DRAIN SIGNAGE
13. SD-32 TRASH STORAGE AREA
14. TIPS FOR LANDSCPAE AND GARDENING
15. BIOCLEAN EDUCATIONAL MATERIAL

The Ocean Begins at Your Front Door



PROJECT Pollution PREVENTION

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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

The Ocean Begins at Your Front Door



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

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.



For More Information

Orange County Stormwater Program

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

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



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.

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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J-301
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Help Prevent Ocean Pollution:

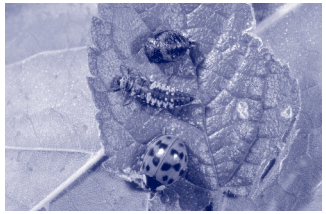
Responsible Pest Control



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.

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

IC7. LANDSCAPE MAINTENANCE

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Properly store and dispose of gardening wastes.
- Use mulch or other erosion control measures on exposed soils.
- Properly manage irrigation and runoff.
- Properly store and dispose of chemicals.
- Properly manage pesticide and herbicide use.
- Properly manage fertilizer use.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	x
Metals	
Bacteria	x
Oil & Grease	
Organics & Toxicants	
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Take steps to reduce landscape maintenance requirements.**
    - Where feasible, retain and/or plant native vegetation with features that are determined to be beneficial. Native vegetation usually requires less maintenance than planting new vegetation.
    - When planting or replanting consider using low water use flowers, trees, shrubs, and groundcovers.
    - Consider alternative landscaping techniques such as naturescaping and xeriscaping.
2. **Properly store and dispose of gardening wastes.**
    - Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage at a permitted landfill or by composting.
    - Do not dispose of gardening wastes in streets, waterways, or storm drainage systems.
    - Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm and/or cover.
3. **Use mulch or other erosion control measures on exposed soils.**

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices"*

4. **Properly manage irrigation and runoff.**
    - Irrigate slowly or pulse irrigate so the infiltration rate of the soil is not exceeded.
    - Inspect irrigation system regularly for leaks and to ensure that excessive runoff is not occurring.
    - If re-claimed water is used for irrigation, ensure that there is no runoff from the landscaped area(s).
    - If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
    - Use automatic timers to minimize runoff.
    - Use popup sprinkler heads in areas with a lot of activity or where pipes may be broken. Consider the use of mechanisms that reduce water flow to broken sprinkler heads.
5. **Properly store and dispose of chemicals.**
    - Implement storage requirements for pesticide products with guidance from the local fire department and/or County Agricultural Commissioner.
    - Provide secondary containment for chemical storage.
    - Dispose of empty containers according to the instructions on the container label.
    - Triple rinse containers and use rinse water as product.
6. **Properly manage pesticide and herbicide use.**
    - Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of pesticides and herbicides and training of applicators and pest control advisors.
    - Follow manufacturers' recommendations and label directions.
    - Use pesticides only if there is an actual pest problem (not on a regular preventative schedule). When applicable use less toxic pesticides that will do the job. Avoid use of copper-based pesticides if possible. Use the minimum amount of chemicals needed for the job.
    - Do not apply pesticides if rain is expected or if wind speeds are above 5 mph.
    - Do not mix or prepare pesticides for application near storm drains. Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the targeted pest.
    - Whenever possible, use mechanical methods of vegetation removal rather than applying herbicides. Use hand weeding where practical.
    - Do not apply any chemicals directly to surface waters, unless the application is approved and permitted by the state. Do not spray pesticides within 100 feet of open waters.
    - Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
    - When conducting mechanical or manual weed control, avoid loosening the soil, which could lead to erosion.
    - Purchase only the amount of pesticide that you can reasonably use in a given time period.
    - Careful soil mixing and layering techniques using a topsoil mix or composted organic material can be used as an effective measure to reduce herbicide use and watering.
7. **Properly manage fertilizer use.**
    - Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers.
    - Follow manufacturers' recommendations and label directions.
    - Employ techniques to minimize off-target application (e.g. spray drift) of fertilizer, including consideration of alternative application techniques. Calibrate fertilizer distributors to avoid excessive application.
    - Periodically test soils for determining proper fertilizer use.
    - Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
    - Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
    - Use slow release fertilizers whenever possible to minimize leaching

8. **Incorporate the following integrated pest management techniques where appropriate:**
    - Mulching can be used to prevent weeds where turf is absent.
    - Remove insects by hand and place in soapy water or vegetable oil. Alternatively, remove insects with water or vacuum them off the plants.
    - Use species-specific traps (e.g. pheromone-based traps or colored sticky cards).
    - Sprinkle the ground surface with abrasive diatomaceous earth to prevent infestations by soft-bodied insects and slugs. Slugs also can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
    - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
    - Small mammals and birds can be excluded using fences, netting, and tree trunk guards.
    - Promote beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seedhead weevils, and spiders that prey on detrimental pest species.

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Educate and train employees on the use of pesticides and pesticide application techniques. Only employees properly trained to use pesticides can apply them.**
3. **Train and encourage employees to use integrated pest management techniques.**
4. **Train employees on proper spill containment and cleanup.**
    - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
    - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
    - Fact sheet IC17 discusses Spill Prevention and Control in detail.
5. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
6. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

California Storm Water Best Management Practice Handbook. Industrial and Commercial. 2003. www.cabmphandbooks.com

California Storm Water Best Management Practice Handbooks. Industrial/Commercial Best Management Practice Handbook. Prepared by Camp Dresser& McKee, Larry Walker Associates, Uribe and Associates, Resources Planning Associates for Stormwater Quality Task Force. March 1993.

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. King County Surface Water Management. July 1995. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Stormwater Management Manual for Western Washington. Volume IV Source Control BMPs. Prepared by Washington State Department of Ecology Water Quality Program. Publication No. 99-14. August 2001.

Water Quality Handbook for Nurseries. Oklahoma Cooperative Extension Service. Division of Agricultural Sciences and Natural Resources. Oklahoma State University. E-951. September 1999.

For additional information contact:

County of Orange/ OC Watersheds
Main: (714) 955-0600
24 hr Water Pollution Hotline: 1-877-89-SPILL
or visit our website at www.ocwatersheds.com

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

Orange County Stormwater Program
www.ocwatersheds.com/publiced/

Municipal Water District of Orange County
www.mwdoc.com

University of California Master Gardeners of Orange County
www.uccemg.com

UC Cooperative Extension OC Water Quality and Water Resources
www.ucanr.org/sites/urbanwatermgmt/



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

J-307







Homeowners Guide for Sustainable Water Use

Low Impact Development, Water Conservation & Pollution Prevention





The Ocean Begins at Your Front Door



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

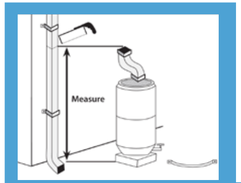
Rainwater harvesting is a great way to save money, prevent pollution and reduce potable water use. To harvest your rainwater, simply redirect the runoff from roofs and downspouts to rain barrels. Rain gardens are another option; these reduce runoff as well as encourage infiltration.

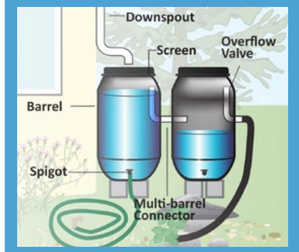
Downspout Disconnection/Redirection

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.

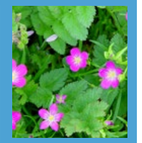
Rain Barrels

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.

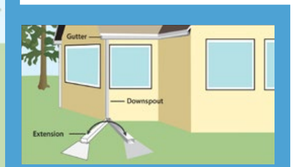




Rain Gardens

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

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

J-309

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.

THE PROBLEM WITH HOUSEHOLD HAZARDOUS WASTE

Clean beaches and healthy creeks, rivers, bays, wetlands, and ocean are important to Orange County. However, when household hazardous waste is not disposed of properly, it can seep into our groundwater or wash into our storm drains and flow untreated to our waterways. Once in the water, these pollutants are not only dangerous for our local wildlife but can be harmful to human health.

Learn How to Properly Dispose of Household Hazardous Waste in Orange County



Who is H_2OC?

H_2OC is YOU. H_2OC is also a cooperative stormwater program which includes all 34 cities in Orange County, the County of Orange, and Orange County Flood Control District (OCFCD). Clean and healthy beaches, creeks, rivers, bays, wetlands, and ocean are important to Orange County. H_2OC provides resources to residents and businesses to encourage personal action and prevent polluted runoff from entering our waterways.

Join Us

Visit **h2oc.org** to learn more about runoff, water pollution, and how you can be the solution to runoff pollution and protect our water resources.

Contact

24-hour Pollution Reporting Hotline:
1-877-89-SPILL (1-877-897-7455)

24-hour Reporting Website:
myOCeServices.ocgov.com

For emergencies, dial 911

*Additional HHW services may be available through your city.

J-311

PROPER DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

TO PROTECT OUR WATERWAYS



H_2OC® STORMWATER PROGRAM

POLLUTION PREVENTION

Any household product that is flammable, corrosive, toxic, or can explode under certain circumstances is considered to be household hazardous waste (HHW). Though we may not think of things like paint, oil, pesticides, electronics, batteries, or household cleaners as hazardous, their chemical composition makes them a potential danger to our safety and our waterways.

Disposal of HHW down the drain, on the ground, into storm drains, or in the trash is illegal and unsafe. Proper disposal of HHW is actually easy. Simply drop off at a Household Hazardous Waste Collection Center (HHWCC) for free disposal and recycling. There are four primary* 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 typically closed on rainy days and major holidays. For more information, call (714) 834-6752, visit oclandfills.com/household-hazardous-waste, or scan the QR code below.



Disposal Tips

- ✓ Use all of the product and discard the container.
- ✓ Consider non-toxic alternatives if possible.
- ✓ Only dispose of HHW at a Household Hazardous Waste Collection Center (HHWCC).
- ✓ Keep your waste in its original container. This will ensure that the container being used is safe and accepted by your HHWCC.
- ✓ Never mix different types of waste as it is potentially dangerous, and will not be accepted by your HHWCC.
- ✓ Place a lid on your container and ensure that it is intact. Cracked or leaking containers will not be accepted at your HHWCC.
- ✓ If the original container is not clearly labeled, mark it with the type of waste. For example, for pesticide sprays, write "pesticide."
- ✓ Place your HHW in a box or tub when transporting it to the HHWCC so it does not spill in your vehicle.

To report illegal dumping of household hazardous waste, call 1-800-69-TOXIC (1-800-698-6942).

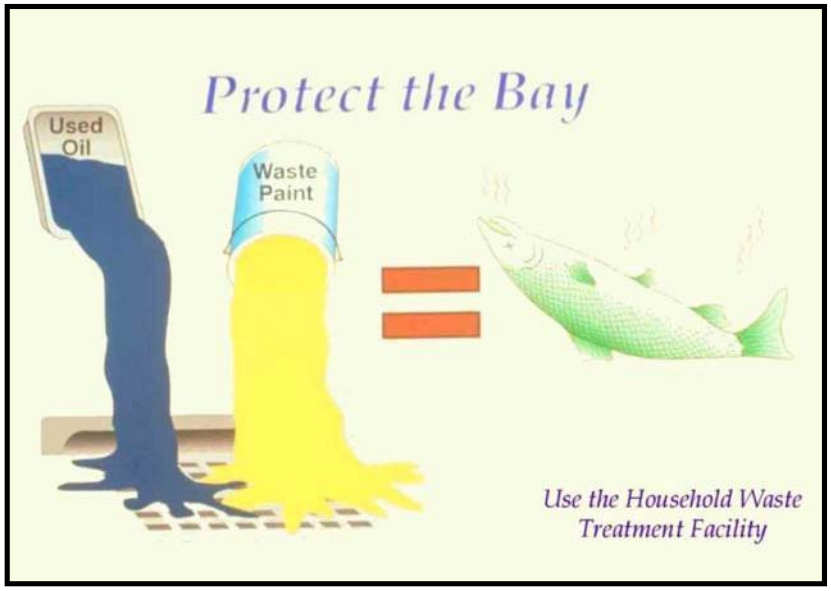
Common Household Hazardous Wastes

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

Some centers also have a "Materials Exchange Program" that lets you take partially used home, garden, and automobile products free of charge.



Non-Stormwater Discharges SC-10



Objectives

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

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Targeted Constituents

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

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

CASQA California Stormwater Quality Association

Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
  - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- 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 or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- 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

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

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

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

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

Waste Handling & Disposal SC-34



Objectives

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

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Targeted Constituents

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

Approach

Pollution Prevention

- Accomplish reduction in the amount of waste generated using the following source controls:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers and protect them from vandalism.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.

Run-on/Runoff Prevention

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropyleneor hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.

- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

- Train staff in pollution prevention measures and proper disposal methods.
- Train employees and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills
- Collect all spilled liquids and properly dispose of them.
- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:
  - Vehicles equipped with baffles for liquid waste
  - Trucks with sealed gates and spill guards for solid waste

Other Considerations (Limitations and Regulations)

Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements

Costs

Capital and O&M costs for these programs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

- None except for maintaining equipment for material tracking program.

Supplemental Information

Further Detail of the BMP

Land Treatment System

Minimize runoff of polluted stormwater from land application by:

- Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, and there is a closed drainage system

- Avoiding application of waste to the site when it is raining or when the ground is saturated with water
- Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site
- Maintaining adequate barriers between the land application site and the receiving waters (planted strips are particularly good)
- Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins
- Performing routine maintenance to ensure the erosion control or site stabilization measures are working

Examples

The port of Long Beach has a state-of-the-art database for identifying potential pollutant sources, documenting facility management practices, and tracking pollutants.

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

Solid Waste Container Best Management Practices – Fact Sheet On-Line Resources – Environmental Health and Safety. Harvard University. 2002.

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

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/

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.

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- 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

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

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

Parking/Storage Area Maintenance SC-43



Objectives

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

Targeted Constituents

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

Description

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

Approach

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

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook)
- Keep accurate maintenance logs to evaluate BMP implementation.

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Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel, and dispose of litter in the trash.

Surface Cleaning

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

- Do not allow discharges to the storm drain.
- Vacuum/pump discharges to a tank or discharge to sanitary sewer.
- Appropriately dispose of spilled materials and absorbents.

Surface Repair

- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.
- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

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

Spill Response and Prevention

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

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

SC-43 Parking/Storage Area Maintenance

Requirements

Costs

Cleaning/sweeping costs can be quite large. Construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot regularly to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities regularly to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Only use only as much water as is necessary for dust control to avoid runoff.

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

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

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/

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).

- 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

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

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

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http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Road and Street Maintenance SC-70



Objectives

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

Targeted Constituents

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

Description

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

Approach

Pollution Prevention

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

Suggested Protocols

Street Sweeping and Cleaning

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

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- 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.

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

Street Repair and Maintenance

Pavement marking

- Schedule pavement marking activities for dry weather.

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

Concrete installation and repair

- Schedule asphalt and concrete activities for dry weather.
- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place 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.
- When making saw cuts in pavement, use as little water as possible and perform during dry weather. Cover each storm drain inlet completely with filter fabric or plastic during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site. Alternatively, a small onsite vacuum may be used to pick up the slurry as this will prohibit slurry from reaching storm drain inlets.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Patching, resurfacing, and surface sealing

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

Equipment cleaning maintenance and storage

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

Bridge and Structure Maintenance

Paint and Paint Removal

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

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

Graffiti Removal

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

Repair Work

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

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

Unpaved Roads and Trails

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

Non-Stormwater Discharges

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

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

Training

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

Spill Response and Prevention

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

Other Considerations

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

Requirements

Costs

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

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

Maintenance

- Not applicable

Supplemental Information

Further Detail of the BMP

Street sweeping

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

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

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

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

Cross-Media Transfer of Pollutants

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

Bridges

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

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

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

De-icing

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

References and Resources

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

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

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

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. 2001. Fresh Concrete and Mortar Application Best Management Practices for the Construction Industry. June.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 2001. Roadwork and Paving Best Management Practices for the Construction Industry. June.

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

Site Design & Landscape Planning SD-10



Design Objectives

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

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

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.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

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

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

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.

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.

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- 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.

Storm Drain Signage SD-13



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

Designing New Installations

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

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

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

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

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

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

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

Placement

- Signage on top of curbs tends to weather and fade.

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

Supplemental Information

Examples

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

Other Resources

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

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

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

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

Maintenance Bays & Docks SD-31



Design Objectives

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

Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair 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 requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

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- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.

- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.

- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.

- Other features may be comparable and equally effective.

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

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

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.



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.

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.

J-361
Printed on Recycled Paper

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.

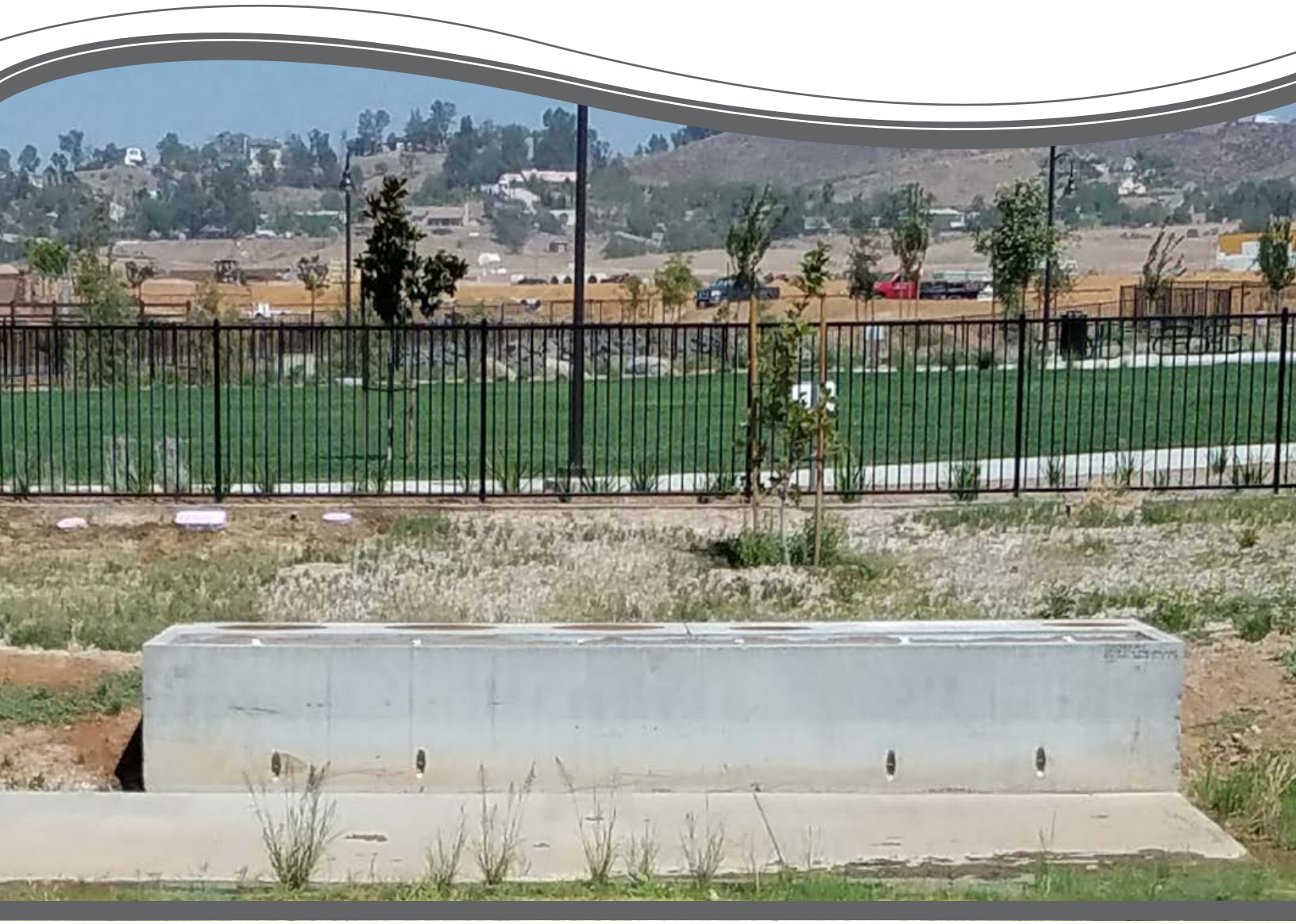
For more information, call (714) 834-6752 or visit www.oclandfills.com

ATTACHMENT G

Operations and Maintenance (O&M) Manual

CONTECH®
ENGINEERED SOLUTIONS

Modular Wetlands® Linear Operatons & Maintenance Manual



MODULAR WETLANDS®

MODULAR WETLANDS LINEAR
OPERATION & MAINTENANCE MANUAL

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OVERVIEW

This operation and maintenance (O&M) manual is for the Modular Wetlands Linear Biofilter (MWL). Please read the instructions and equipment lists closely prior to starting. It is important to follow all necessary safety procedures associated with state and local regulations. Please contact Contech for more information on pre-authorized third-party service providers who can provide inspection and maintenance services in your area. For a list of service providers in your area, please visit www.conteches.com/maintenance.



WARNING

Confined space entry may be required. Contractor to obtain all equipment and training to meet applicable local and OSHA regulations regarding confined space entry. It is the Contractor's or entry personnel's responsibility to always proceed safely.

SAFETY NOTICE & PERSONAL SAFETY EQUIPMENT

Job site safety is a topic and a practice addressed comprehensively by others. The inclusions here are merely reminders to whole areas of Safety Practice that are the responsibility of the Owner(s), Manager(s), and Service Provider(s). OSHA and Canadian OSH, Federal, State/Provincial, and Local Jurisdiction Safety Standards apply on any given site or project. The knowledge and applicability of those responsibilities is the Service Provider's responsibility and outside the scope of Contech Engineered Solutions.



Safety Boots



Gloves



Hard Hat



Eye Protection

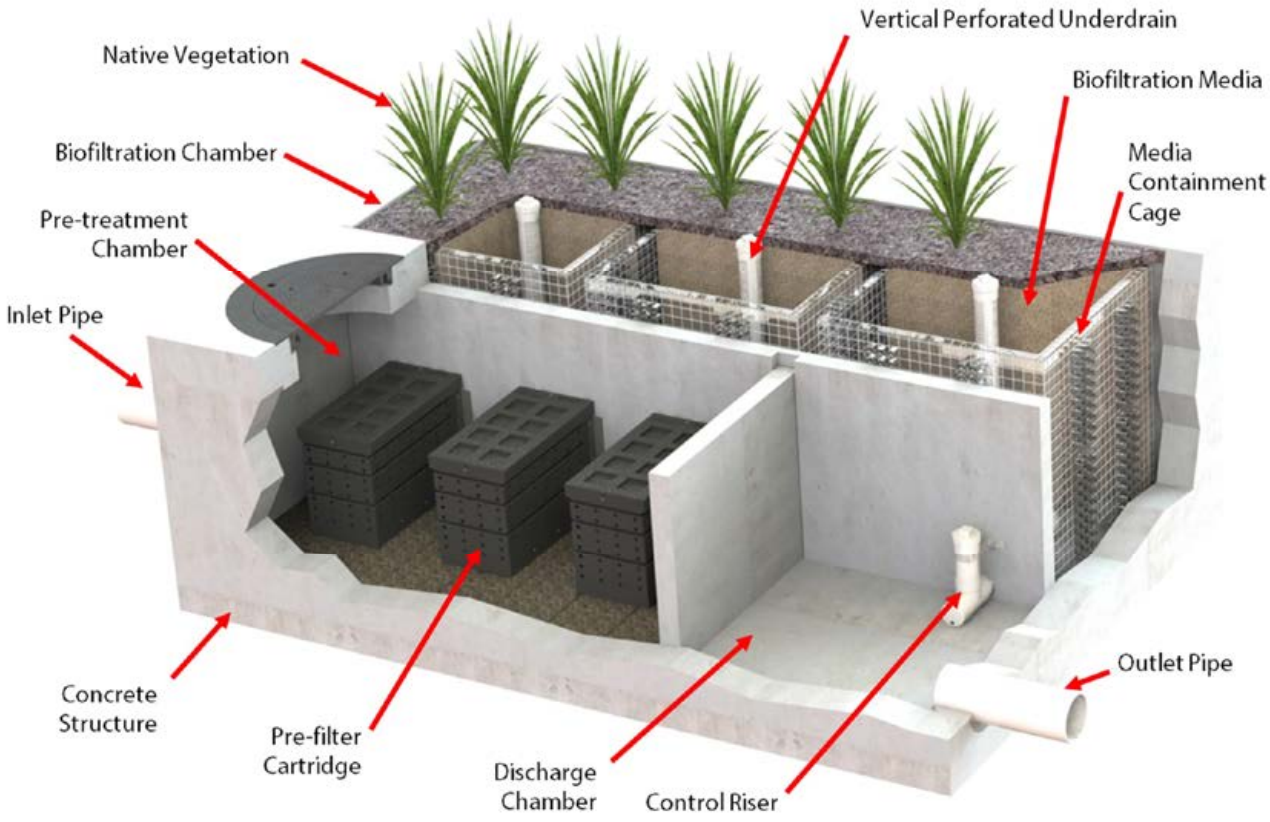


Maintenance and Protection of Traffic Plan

MODULAR WETLANDS LINEAR COMPONENTS LIST

The MWL system comes in multiple sizes and configurations, including side by side or end to end layouts, both as open planters or underground systems. See shop drawings (plans) for project specific details.

The standard MWL system is comprised of the following components:



INSPECTION SUMMARY & EQUIPMENT LIST

Stormwater regulations require BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site-specific loading conditions. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided.

- Inspect pre-treatment, biofiltration, and discharge chambers an average of once every six to twelve months. Varies based on site specific and local conditions.
- Average inspection time is approximately 15 minutes. Always ensure appropriate safety protocol and procedures are followed.

The following is a list of equipment required to allow for simple and effective inspection of the MWL:



Modular Wetlands Linear Inspection Form



Flashlight



Tape Measure



Access Cover Hook



Ratchet
& 7/16" Socket
(if required for older pre-filter cartridges that have two bolts holding the lids on)

INSPECTION & MAINTENANCE NOTES

1. Following maintenance and/or inspection, it is recommended that 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 not require irrigation after initial establishment.

INSPECTION PROCESS

1. Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other information (see inspection form).
2. Observe the inside of the system through the access covers. If minimal light is available and vision into the unit is impaired, utilize a flashlight to see inside the system and all chambers.
3. Look for any out of the ordinary obstructions in the inflow pipe, pre-treatment chamber, biofiltration chamber, discharge chamber or outflow pipe. Write down any observations on the inspection form.
4. Through observation and/or digital photographs, estimate the amount of trash, debris accumulated in the pre-treatment chamber. Utilizing a tape measure or measuring stick, estimate the amount of sediment in this chamber. Record this depth on the inspection form.
5. Through visual observation, inspect the condition of the pre-filter cartridges. Look for excessive build-up of sediment on the cartridges, any build-up on the tops of the cartridges, or clogging of the holes. Record this information on the inspection form. The pre-filter cartridges can be further inspected by removing the cartridge tops and assessing the color of the BioMediaGREEN filter cubes (requires entry into pre-treatment chamber - see notes previous notes regarding confined space entry). Record the color of the material. New material is a light green color. As the media becomes clogged, it will turn darker in color, eventually becoming dark brown or black. The closer to black the media is the higher percentage that the media is exhausted and in need of replacement.



6. The biofiltration chamber is generally maintenance-free due to the system's advanced pre-treatment chamber. For units which have open planters with vegetation, it is recommended that the vegetation be inspected. Look for any plants that are dead or showing signs of disease or other negative stressors. Record the general health of the plants on the inspection form and indicate through visual observation or digital photographs if trimming of the vegetation is required.

7. The discharge chamber houses the control riser (if applicable), drain down filter (only in California - older models), and is connected to the outflow pipe. It is important to check to ensure the orifice is in proper operating condition and free of any obstructions. It is also important to assess the condition of the drain down filter media which utilizes a block form of the BioMediaGREEN. Assess in the same manner as the cubes in the pre-filter cartridge as mentioned above.

8. Finalize the inspection report for analysis by the maintenance manager to determine if maintenance is required.

MAINTENANCE INDICATORS

Based upon the observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components or cartridges.
- Obstructions in the system or its inlet and/or outlet pipes.
- Excessive accumulation of floatables in the pre-treatment chamber in which the length and width of the chamber is fully impacted more than 18".
- Excessive accumulation of sediment in the pre-treatment chamber of more than 6" in depth.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. When media is more than 85% clogged, replacement is required. The darker the BioMediaGREEN, the more clogged it is and in need of replacement.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the drain down filter (California only - older models).
- Overgrown vegetation.

MAINTENANCE SUMMARY & EQUIPMENT LIST

The time has come to maintain your MWL. All necessary pre-maintenance steps must be carried out before maintenance occurs. Once traffic control has been set up per local and state regulations and access covers have been safely opened, the maintenance process can begin. It should be noted that some maintenance activities require confined space entry. All confined space requirements must be strictly followed before entry into the system. In addition, the following is recommended:

- Prepare the maintenance form by writing in the necessary information including project name, location, date & time, unit number and other info (see maintenance form).
- Set up all appropriate safety and maintenance equipment.
- Ensure traffic control is set up and properly positioned.
- Prepared pre-checks (OSHA, safety, confined space entry) are performed.
    - A gas meter should be used to detect the presence of any hazardous gases prior to entering the system. If hazardous gases are present, do not enter the vault. Following appropriate confined space procedures, take steps such as utilizing a venting system to address the hazard. Once it is determined to be safe, enter the system utilizing appropriate entry equipment such as a ladder and tripod with harness.

The following is a list of equipment required for maintenance of the MWL:



Modular Wetlands Linear Maintenance Form



Flashlight



Access Cover Hook



Ratchet
& 7/16" Socket
(if required for older pre-filter cartridges that have two bolts holding the lids on)



Vacuum Assisted Truck with Pressure Washer



Replacement
BioMediaGREEN
(If Required)

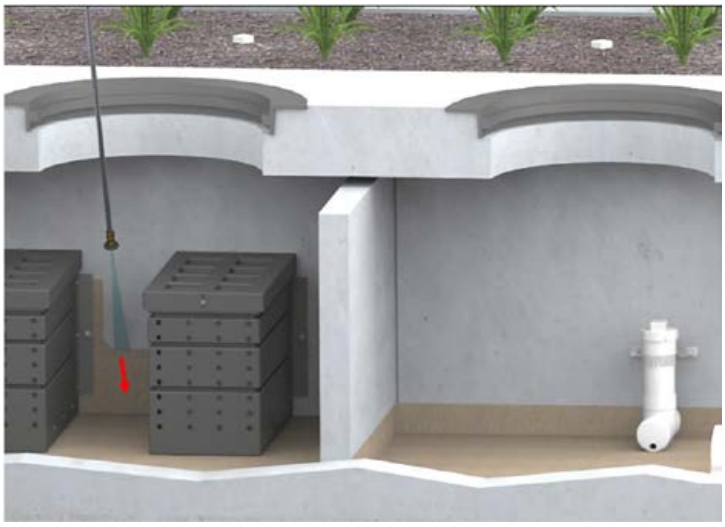
(order BioMediaGREEN from Contech's Maintenance Team members at https://www.conteches.com/maintenance)

MAINTENANCE INSTRUCTIONS



1. ACCESS COVER REMOVAL

Upon determining that the vault is safe for entry, remove all access cover(s) and position the vacuum truck accordingly.



2. PRESSURE WASH SYSTEM CHAMBERS

With the pressure washer, spray down pollutants accumulated on the walls and floors of the pre-treatment and discharge chambers. Then wash any accumulated sediment from the pre-filter cartridge(s).



3. VACUUM SYSTEM CHAMBERS

Vacuum out pre-treatment and discharge chambers and remove all accumulated pollutants including trash, debris, and sediments. Be sure to vacuum the pre-treatment floor until the pervious pavers are visible and clean. **(MWL systems outside of California may or may not have pervious pavers on the floor in the pre-treatment chamber)** If pre-filter cartridges require media replacement, proceed to **Step 4**. If not, replace the access cover(s) and proceed to **Step 7**.



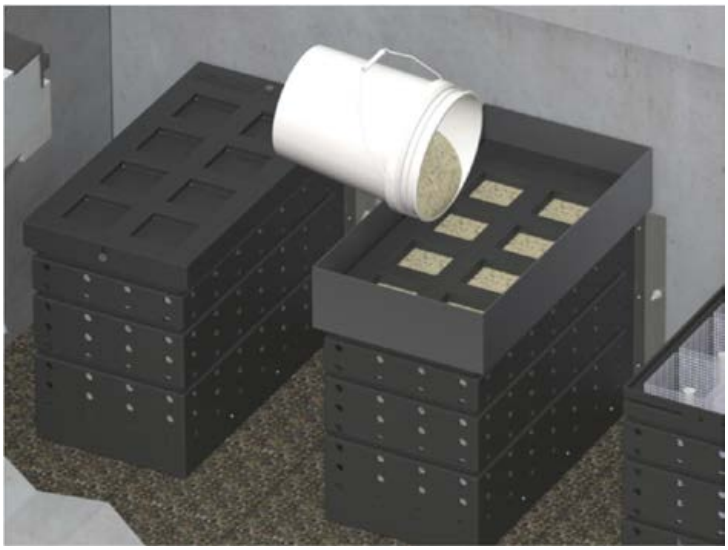
4. PRE-FILTER CARTRIDGE LID REMOVAL

After successfully cleaning out the pre-treatment chamber, enter the chamber and remove the lid(s) from the pre-filter cartridge(s) by removing the two thumb screws. (Older pre-filter cartridges have two bolts holding the lids on that require a 7/16" socket to remove)



5. VACUUM EXISTING PRE-FILTER MEDIA

Utilize the vacuum truck hose or hose extension to remove the filter media from each of the individual media cages. Once filter media has been sucked out, use a pressure washer to spray down the inside of the cartridge and its media cages. Remove cleaned media cages and place to the side. Once removed, the vacuum hose can be inserted into the cartridge to vacuum out any remaining material near the bottom of the cartridge.



6. PRE-FILTER MEDIA REPLACEMENT

Reinstall media cages and fill with new media from the manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. The easiest way to fill the media cages is to utilize a refilling tray that can also be sourced from the manufacturer. Place the refilling tray on top of the cartridge and fill with new bulk media shaking it down into the cages. Using your hands, lightly compact the media into each filter cage. Once the cages are full (each cartridge will hold five heaping 5gal buckets of bulk media), remove the refilling tray and replace the cartridge top, ensuring fasteners are properly tightened.



7. MAINTAINING VEGETATION

In general, the biofiltration chamber is maintenance-free with the exception of maintaining the vegetation. The MWL utilizes vegetation similar to surrounding landscape areas, therefore, trim vegetation to match surrounding vegetation. If any plants have died, replace them with new ones.



8. INSPECT UNDERDRAIN SYSTEM

Each vertical under drain on the biofiltration chamber has a removable threaded cap that can be taken off to check for any blockages or root growth. Once removed, a jetting attachment to the pressure washer can be used to clean out the under drain and orifice riser if needed.

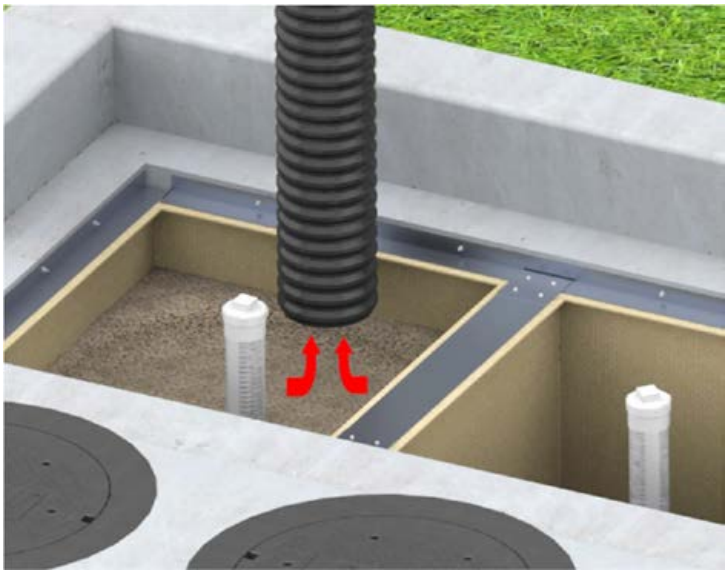


9. REPLACE ACCESS COVERS

Once maintenance is complete, replace all access cover(s)

REPLACING BIOFILTRATION MEDIA IF REQUIRED

As with all biofilter systems, at some point the biofiltration media will need to be replaced, either due to physical clogging or sorptive exhaustion (for dissolved pollutants) of the media ion exchange capacity (to remove dissolved metals and phosphorous). The general life of this media is 10 to 20 years based on site specific conditions and pollutant loading, so replacing the biofiltration media should not be a common occurrence. In the event that the biofiltration media requires replacement, contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new biofiltration media. The quantity of media needed can be determined by providing the model number and unit depth. Media will be provided in super sacks for easy installation. Each sack will weigh between 1,000 and 2,000 lbs. Biofiltration media replacement can be done following the steps below:



1. VACUUM EXISTING BIOFILTRATION MEDIA

Remove the mulch and vegetation to access the biofiltration media, and then position the vacuum truck accordingly. Utilize the vacuum truck to vacuum out all the media. Once all media is removed, use the pressure washer to spray down all the netting and underdrain systems on the inside of the media containment cage. Vacuum out any remaining debris after spraying down netting. Inspect the netting for any damage or holes. If the netting is damaged, it can be repaired or replaced with guidance by the manufacturer.



2. INSTALLING NEW BIOFILTRATION MEDIA

Ensure that the chamber is fully cleaned prior to installation of new media into the media containment cage(s). Media will be provided in super sacks for easy installation. A lifting apparatus (forklift, backhoe, boom truck, or other) is recommended to position the super sack over the biofiltration chamber. Add media in lifts to ensure that the riser pipes remain vertical. Be sure to only fill the media cage(s) up to the same level as the old media.



3. REPLANT VEGETATION

Once the media has been replaced, replant the vegetation and cover biofiltration chamber with approved mulch (if applicable). If the existing vegetation is not being reused, and new vegetation is being planted, you will need to acquire new plant establishment media that will be installed just below the mulch layer at each plant location. (see plan drawings for details). Contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new plant establishment media.

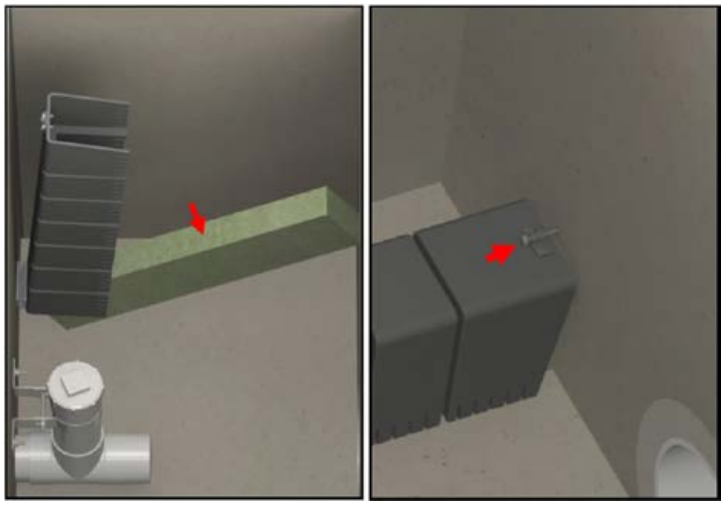
REPLACING DRAIN DOWN FILTER MEDIA (ONLY ON OLDER CALIFORNIA MODELS)

NOTE: The drain down filter is only found on units installed in California prior to 2023
If during inspection it was determined that the drain down filter media requires replacement, contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new media.



1. REMOVE EXISTING DRAIN DOWN MEDIA

Pull knob back to unlock the locking mechanism and lift the drain down filter housing to remove the used BioMediaGREEN filter block.



2. INSTALL NEW DRAIN DOWN MEDIA

Ensure that the chamber and housing are fully cleaned prior to installation of new media, and then insert the new BioMediaGREEN filter block. The media filter block should fit snugly between the chamber walls and be centered under the filter housing. Lower the housing over the filter block and secure the locking mechanism.

NOTES

CONTECH® ENGINEERED SOLUTIONS

Inspection Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

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

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 _____

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: _____

CONTECH®
ENGINEERED SOLUTIONS

Cleaning and Maintenance Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

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

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

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

Weather Condition _____ Additional Notes _____

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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ENGINEERED SOLUTIONS

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800-338-1122

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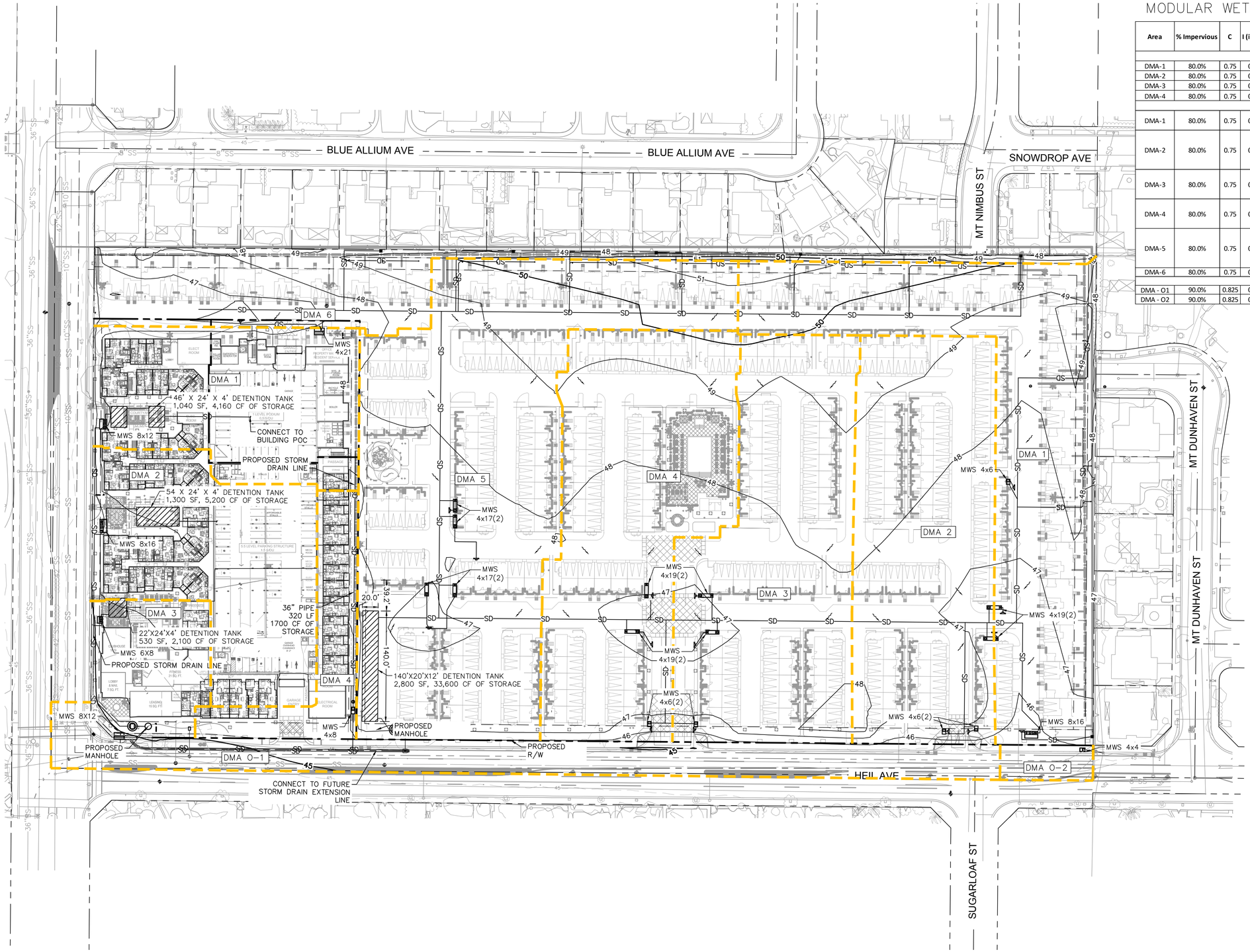
SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

ATTACHMENT H

WQMP Site Plan

Drawing name: K:\ORA_LDEV\094794004 – Euclid and Heil\CADD\Exhibits\WQMP Exhibit\WQMP Exhibit.dwg GRADING AND DRAINAGE OVERALL Jun 05, 2025 3:40pm by: Kevin.Huo
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MODULAR WETLAND SYSTEM SIZING

Area	% Impervious	C	I (in/hr)	A (acres)	Q (cfs)	Selected Modular Wetland	Modular Wetland Allowable Q	Lat/Long
Apartment Side (DA-1 ; 4.09 AC)								
DMA-1	80.0%	0.75	0.26	1.40	0.273	MWS-L-8-12	0.346	33.724964, -117.936832
DMA-2	80.0%	0.75	0.26	1.56	0.304	MWS-L-8-16	0.462	33.724626, -117.936836
DMA-3	80.0%	0.75	0.26	0.63	0.123	MWS-L-6-8	0.147	33.724315, -117.936872
DMA-4	80.0%	0.75	0.26	0.50	0.098	MWS-L-4-8	0.115	33.723883, -117.936019
For Sale Side (DA-2; 14.00AC)								
DMA-1	80.0%	0.75	0.26	2.46	0.480	MWS-L-8-16, MWS-L-4-6	0.535	33.724260, -117.933245 33.724703, -117.933219
DMA-2	80.0%	0.75	0.26	2.12	0.413	MWS-L-4-19 (2), MWS-L-4-6 (2)	0.620	33.724260, -117.933245 33.724158, -117.933263 33.723831, -117.933352 33.723826, -117.933469
DMA-3	80.0%	0.75	0.26	2.23	0.435	MWS-L-4-19 (2), MWS-L-4-6	0.547	33.724283, -117.934511 33.724156, -117.934477 33.723826, -117.934512
DMA-4	80.0%	0.75	0.26	2.32	0.452	MWS-L-4-19 (2), MWS-L-4-6	0.547	33.724320, -117.934718 33.724155, -117.934752 33.723825, -117.934700
DMA-5	80.0%	0.75	0.26	3.74	0.729	MWS-L-4-17 (4)	0.824	33.724568, -117.935538 33.724505, -117.935529 33.724310, -117.935635 33.724306, -117.935534
DMA-6	80.0%	0.75	0.26	1.13	0.220	MWS-L-4-21	0.268	33.725201, -117.936722
Offsites								
DMA - O1	90.0%	0.825	0.26	1.24	0.269	MWS-L-8-12	0.346	33.723766, -117.936917
DMA - O2	90.0%	0.825	0.26	0.12	0.026	MWS-L-4-4	0.052	33.723775 -117.932888

LEGEND

- CENTER LINE
- PROPERTY LINE
- RIGHT OF WAY
- EASEMENT LINE
- XX — EXISTING CONTOUR
- XX — PROPOSED CONTOUR
- LIMITS OF DRAINAGE AREA
- FLOW ARROW
- DA X.XX — DRAINAGE AREA NAME / AREA (IN ACRES)
- SD — EXISTING STORM DRAIN PIPE
- SD — PROPOSED STORM DRAIN PIPE
- PROPOSED STORM DRAIN INLETS WITH STORM DRAIN STENCILING PER STRUCTURAL SOURCE CONTROL BMP NOTE S1 BELOW.
- PROPOSED MANHOLE

MODULAR WETLAND SYSTEM DETAIL 1
N.T.S.

NORTH

GRAPHIC SCALE IN FEET
0 30 60 120
1" = 60'

DIGALERT
DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-422-4133
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

ISSUE	DATE	DESCRIPTION

FC — DRAWN BY
TG — CHECKED BY
JM — RECOMMENDED

LICENSED PROFESSIONAL
JASON MARECHAL
CA LICENSE NUMBER 63164
EXP. DATE: 6/30/2026

Kimley»Horn
1100 W TOWN AND COUNTRY ROAD, SUITE 700
ORANGE, CA 92868
(714) 939-1030
PREPARED UNDER THE DIRECT SUPERVISION OF:
JASON MARECHAL, P.E. NO. 63164 DATE: EXP. 06/30/2026

CITY OF FOUNTAIN VALLEY
DEPARTMENT OF ENGINEERING
APPROVED BY:
FOUNTAIN VALLEY CITY ENGINEER — DATE
REVIEWED AND RECOMMENDED BY: — DATE

SHOPOFF REALTY INVESTMENTS
Transforming Opportunity into Value
16300 EUCLID STREET,
FOUNTAIN VALLEY, CA 92708

CITY OF FOUNTAIN VALLEY

PROPOSED WQMP EXHIBIT

SHEET 1 OF SHEETS 1
CITY PROJECT NO.

ATTACHMENT I

Transfer of Responsibility

ATTACHMENT J

Bio-Clean Modular Wetlands Materials

Installation Guidelines for Modular Wetland System

Delivery & Unloading/Lifting

1. Modular Wetland Systems, Inc. shall deliver the unit(s) to the site in coordination with the Contractor.

2. The Contractor will require spreader bars and chains/cables to safely and securely lift the main structure, risers a set of suitable lifting hooks, knuckles, shackles and eye bolts.

3. The main structure and lid can be lifted together or separately.

   Please see Modular Wetland Weights and Lifting Details. Contact Modular Wetlands for additional lifting details.

Inspection

1. Inspection of the Modular Wetland unit and all parts contained in or shipped outside of the unit shall be inspected at time of delivery by the site Engineer/Inspector and the Contractor. Any non-conformance to approved drawings or damage to any part of the system shall be documented on the Modular Wetland shipping ticket. Damage to the unit during and after unloading shall be corrected at the expense of the Contractor. Any necessary repairs to the Modular Wetland unit shall be made to the acceptance of the Engineer/Inspector.

Site Preparation

1. The Contractor is responsible for providing adequate and complete site/inlet protection when the Modular Wetland unit is installed prior to final site stabilization (full landscaping, grass cover, final paving, and street sweeping completed).

2. The Contractor shall adhere to all jurisdictional and/or OSHA safety rules in providing temporary shoring of the excavation.

3. The Contractor or Owner is responsible for appropriately barricading the Modular Wetland unit from traffic (in accordance with local codes).

Installation Guidelines for Modular Wetland System

Installation

1. Each unit shall be constructed at the locations and elevations according to the sizes shown on the approved drawings. Any modifications to the elevation or location shall be at the direction of and approved by the Engineer.

2. The unit shall be placed on the compacted sub-grade with a minimum 6-inch gravel base matching the final grade of the curb line in the area of the unit. The unit is to be placed such that the unit and top slab match the grade of the curb in the area of the unit. Compact undisturbed sub-grade materials to 95% of maximum density at +1% to 2% of the optimum moisture. Unsuitable material below sub-grade shall be replaced to site engineer's approval. Please see Modular Wetlands Weights and Lifting Details. Contact Modular Wetlands for guidance where slope exceeds 5%.

3. Once the unit is set, the internal wooden forms and protective silt fabric cover must be left intact (if WetlandMedia pre-installed). The top lid(s) should be sealed onto the box section before backfilling, using a non-shrink grout, butyl rubber or similar waterproof seal. The boards on the top of the lid and boards sealed in the unit's throat must NOT be removed. The Supplier will remove these sections at the time of activation.

4. Outlet connections shall be aligned and sealed to meet the approved drawings with modifications necessary to meet site conditions and local regulations. The correct outlet will be marked on the Modular Wetland unit.

5. Backfilling should be performed in a careful manner, bringing the appropriate fill material up in 6-inch lifts on all sides. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of the Modular Wetland unit shall conform to ASTM specification C891 "Standard Practice for Installation of Underground Precast Utility Structures" unless specified otherwise in contract documents.

6. It is the responsibility of the Contractor to provide curb and gutter and transition to the Modular Wetland unit for proper stormwater flow into the system through the throat, pipe or grate opening. A standard drawing of the throat and gutter detail is available in the following section; however the plans and contract documents supersede all standard drawings. Several variations of the standard design are available. Effective bypass for the Modular Wetland System is essential for correct operation (i.e. bypass to an overflow at lower elevation).

Installation Procedure

The contractor **MUST** provide all rigging And lifting apparatus, such as all cables, chains or straps and a set of lifting hooks, shackles, knuckles and eye bolts.



It is the contractor's responsibility to provide suitable lifting equipment to off-load the Modular Wetland unit.

Modular Wetland units are designed to be off-loaded using the contractor's spreader bar.



1. Apply Butyl Tape Seal

Apply butyl tape seal along the top of the box section. Butyl tape seal is provided with every unit.

Modular Wetland installed protective throat board and installed silt fabric must be left in place to protect the unit from construction sediment.



2. Unload and Set Box

Unload the Modular Wetland unit
the prepared hole with appropriate sub-grade.*

* Compacted sub-grade with a minimum
of six inches of gravel base which must match
the final grade of curb line the area of the unit.



3. Set Top On Box

Set the top slab on the box.

The Contractor is responsible for providing
adequate and complete site/inlet protection
when the Modular Wetland is installed prior
to final site stabilization (full landscaping,
grass cover, final paving, and street sweeping
completed).



4. Connect Outfall Pipe

The correct outlet will be marked on the
Modular Wetland.

Invert of outlet pipe **MUST** be even
with the floor of the system.



5. Install Curb & Gutter



It is the responsibility of the Contractor to provide curb and gutter and transition to the Modular Wetland for proper flow into the system through a 5”- 7” throat opening. A standard drawing of the throat and gutter detail in the following section. CONTRACTOR RESPONSIBLE FOR GROUTING IN ANY VISIBLE LIFTING POINTS.

6. Activation



Activation is performed **ONLY** by Modular Wetland personnel.

Activation can occur once the project site is fully stabilized (full landscaping, grass cover, final paving and street sweeping completed) and there is a 5” - 7” throat opening.

Call 760-433-7640 to schedule your activation.

NOTE: WetlandMedia Installation

For Larger models (MWS-L-4-13 and above) the system will be delivered without WetlandMedia pre-installed to minimize pick weight and prevent contamination of the media during construction. For these models the WetlandMedia will be delivered in bulk or in super sacks. It will be responsibility of the contractor to fill the system with the WetlandMedia during the installation process. Installation of the WetlandMedia can be done after the unit is fully installed to avoid contamination. See following pages for details.

WetlandMedia Install (if applicable)

1. Fill WetlandMedia

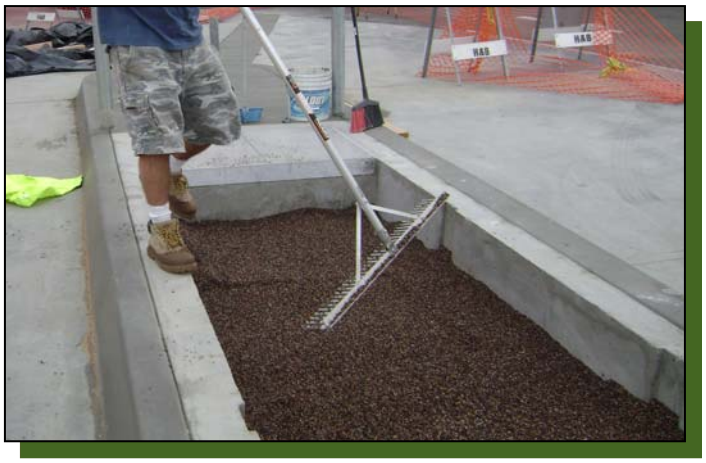
Position super sack of WetlandMedia over wetland chamber. Bottom of sack should not be more than 2' above top of system. Open sack and fill evenly*.

* One to several hundred cubic yards of WetlandMedia will be required based upon the model number and size of the system. For large scale jobs WetlandMedia will be delivered in bulk and will require a bobcat of similar to fill the system. All equipment is the responsibility of the contractor.



2. Install Plant Propagation Layer

Fill WetlandMedia up to 9" below the top of the wetland chamber. Level out the WetlandMedia as shown. Ensure that the level does not vary more than one inch or plant growth will be affected.



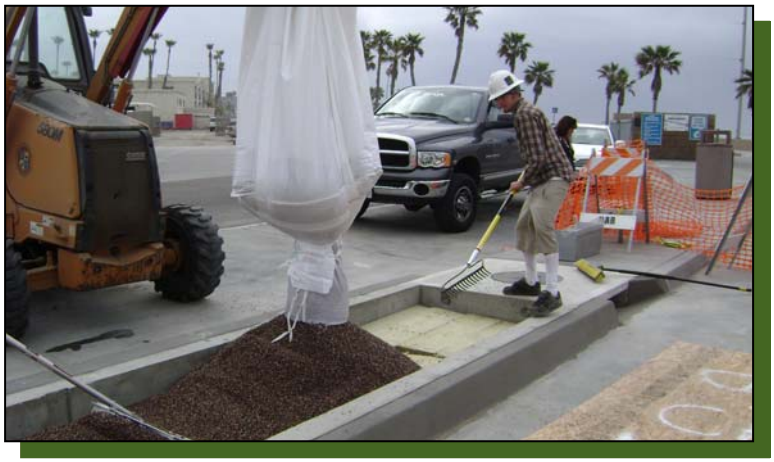
3. Install Plant Propagation Layer

Utilize plant propagation blocks provided by the manufacturer. Each block is approximately 40" by 6" by 3" thick. Blocks shall be placed side by side and end to end and cover the entire length and width of the wetland chamber unless specified.



4. Finish Filling WetlandMedia

After plant propagation blocks are installed repeat step 1 and fill the system to the top of the wetland chamber as shown. WetlandMedia must be filled within 2” of the top of the unit.



5. Planting

After system is filled with WetlandMedia planting of vegetation can begin. Utilizing 1 gallon plants dig down until The plant propagation blocks are reached. Remove plant and it’s root ball from the container. Set the bottom of the root ball on the tops of the blocks. Fill hole back in with WetlandMedia. After planting a thorough watering of the plants is necessary. The plant propagation blocks must be saturated to provide a water source for the plants during the establishment phase. It is recommended that hand watering is done three times a week for the first two months. Hand water can be supplemented with drip or spray irrigation after the second week. Please call the manufacturer for more details on plants, planting arrangement and irrigation options.

NOTE: planting is required on all units, including units delivered with WetlandMedia pre-installed.



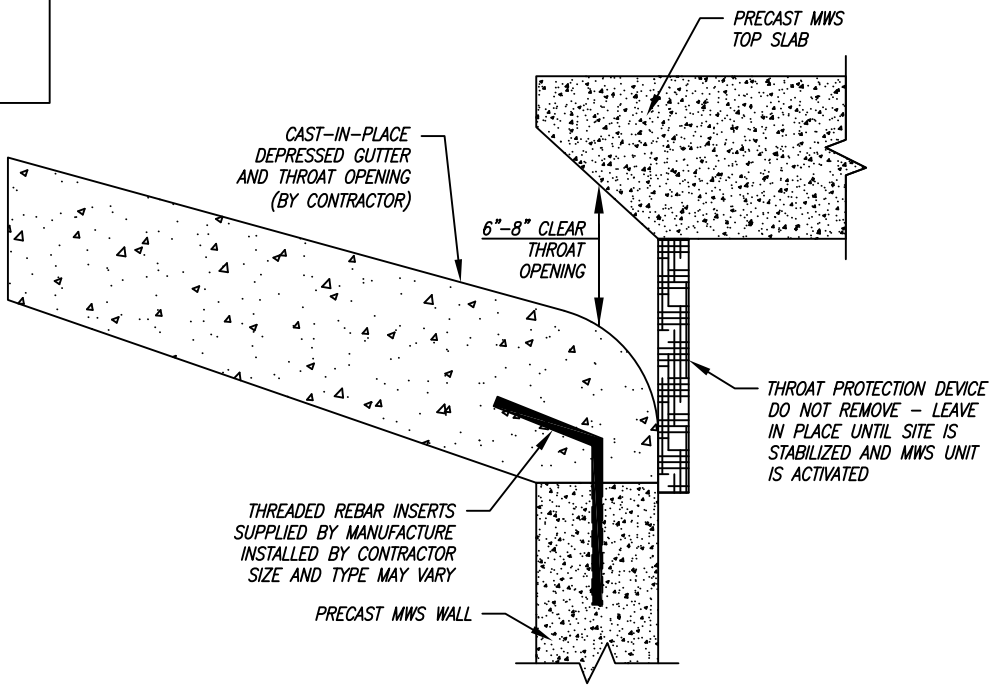


Curb and Gutter Details

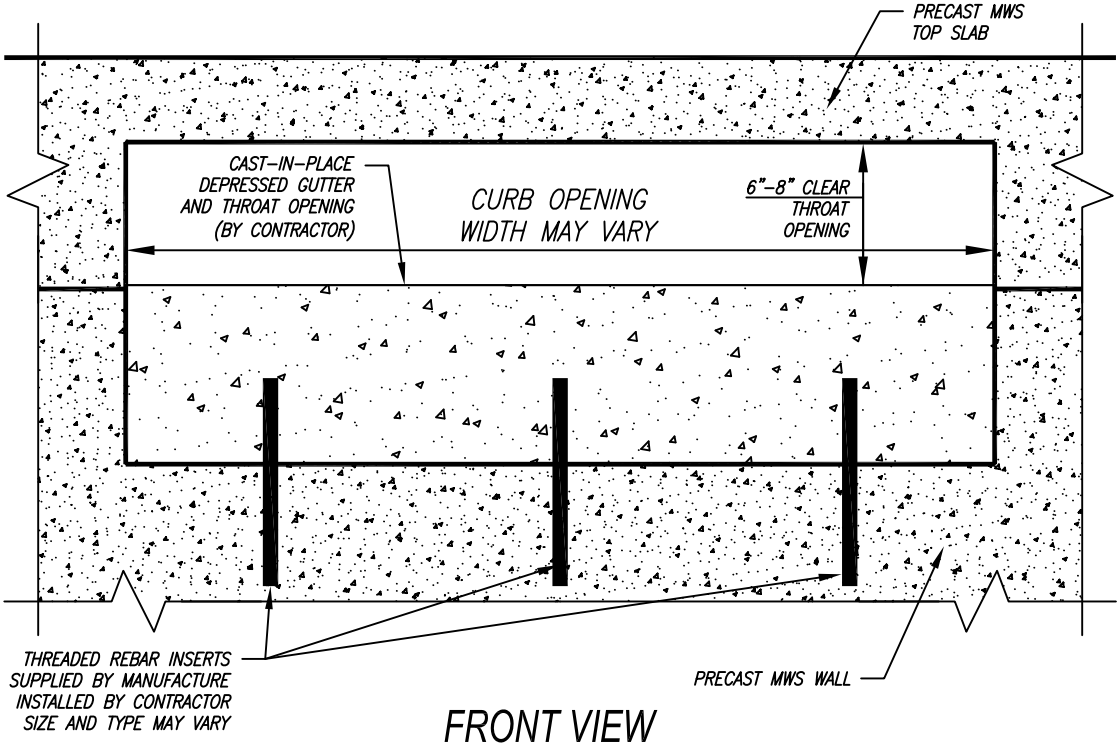


Modular Wetland System, Inc.
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F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com



SECTION VIEW
STANDARD MODULAR WETLAND CURB OPENING



FRONT VIEW
STANDARD MODULAR WETLAND CURB OPENING

MODULAR WETLAND SYSTEMS INC.
P.O. BOX 869
OCEANSIDE, CA 92049
www.ModularWetlands.com

	NAME	DATE
DRAWN	John	5/3/13
EDITED		

TITLE: MWS LINEAR 2.0 CURB INLET DETAILS

PROPRIETARY AND CONFIDENTIAL

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COMMENTS:

J-396

SIZE	DWG. NO.	REV

SCALE NTS	UNITS = INCHES	SHEET 1 OF 1

Weights and Lifting Details



Modular Wetland System, Inc.
P. 760.433-7640
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E. Info@modularwetlands.com

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MWS-L 2.0 Max Pick Weights

Model #	Size (O.D)	Size (I.D)	Unit Weight (lbs)	Media Weight (lbs)	Total Weight (lbs)
MWS-L-4-4	5' x 5'	4' x 4'	7500.0	1607.7	9107.7
MWS-L-4-6 MWS-L-4-6.5	5' x 7' 5 x 7.5'	4' x 6' 4' x 6.5'	11,000 11,500	1798.9	12,619.2 13,119.2
MWS-L-4-8	5' x 9'	8' x 4'	12500	3966	16466
MWS-L-4-13	5' x 14'	13' x 4'	21200	5895	27095
MWS-L-4-15	5' x 16'	15' x 4'	23700	8039	31739
MWS-L-4-17	5' x 18'	17' x 4'	26500	10182	36682
MWS-L-4-19	5' x 20'	19' x 4'	28300	12326	40626
MWS-L-4-21	5' x 22'	21' x 4'	30000	14470	44470
MWS-L-6-8	7' x 9'	6' x 8'	24000	6109	30109
MWS-L-8-8	9' x 9'	8' x 8'	32000	8253	40253
MWS-L-8-12	9' x 13'	8' x 12'	44000	12540	56540
MWS-L-8-16	9' x 17'	8' x 16'	47000	16828	63828
			Max Pick Weight if Shipped Without Media Installed		Max Pick Weight if Shipped With Media Installed

Note: All weights listed hereon are standard max pick weights, actual pick weights may vary based upon state and local regulations and variation in concerte and rebar standards. For project specific pick weights contact the manufacturer prior to shipping of the unit(s). Is is the contractors responsibility to off-load the unit with an adequate size crane. Units are shipped with WetlandMEDIA in superbags and installed by contractor.

When Available see project contract terms, if lifting points are on the inside of the unit due to custom designs or installations requiring pionts to be on the inside the media will be shipped in bags and the contractor will be reponsibile to install after the unit is installed. For example, units places against a wall.

For Questions or Comments Please Call 888-566-3938 or email: info@modularwetlands.com

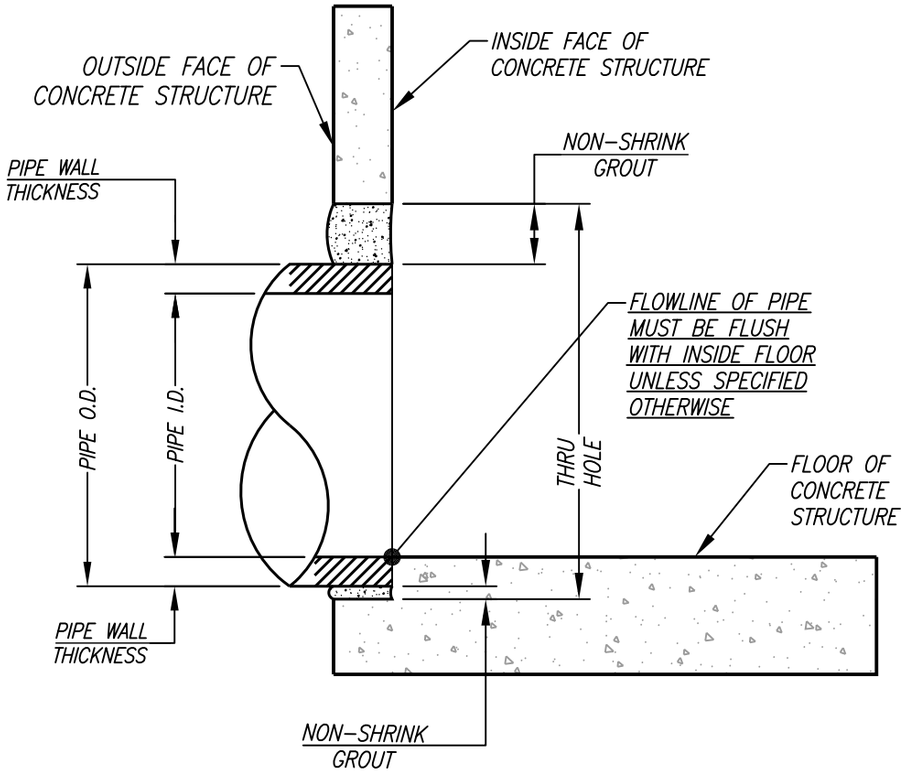
MODULAR WETLANDS™

Connection Details

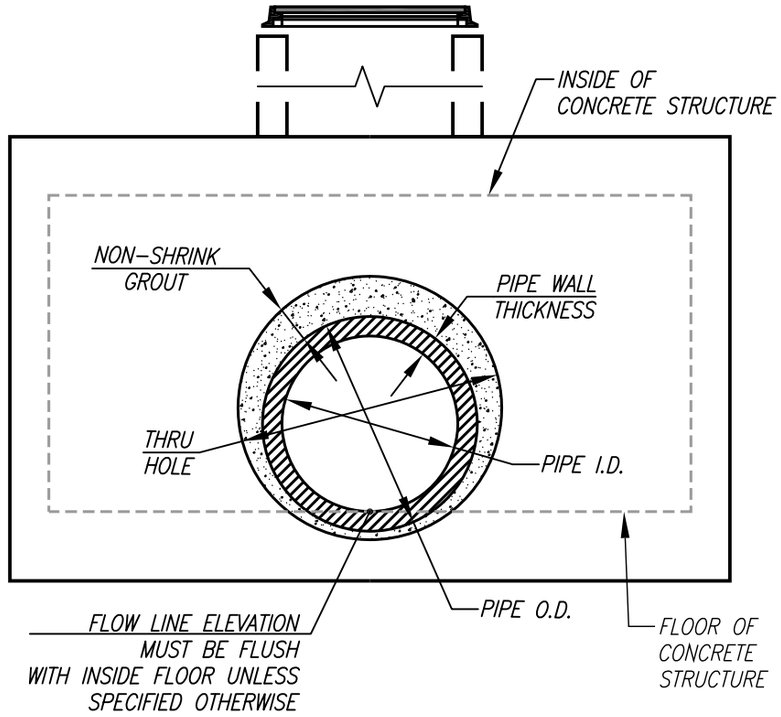


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E. Info@modularwetlands.com

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ELEVATION VIEW



END VIEW

INSTALLATION NOTES

1. ALL CONNECTION PIPES SUPPLIED AND INSTALLED BY CONTRACTOR. MODULAR WETLAND UNIT WILL BE DELIVERED WITH A THRU HOLE AND ITS THE CONTRACTORS RESPONSIBILITY TO SUPPLY PIPE, AND ALL LABOR AND MATERIAL TO CONNECT PIPE AND SEAL UNIT WATER TIGHT INCLUDING BUT NOT LIMITED TO GROUT, CONCRETE LUG, REBAR, PLUG, ANCHORS, COUPLER, FITTINGS AND/OR ALL SUPPORT AND CONNECTING HARDWARE.
2. ALL CONNECTIONS ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH) ALL PIPE FLOWLINES SHALL BE FLUSH WITH INSIDE FLOOR UNLESS SPECIFIED OTHERWISE.
3. ALL GROUT AND/OR CONCRETE SHALL BE NON–SHRINK AND MEET OR EXCEED LOCAL PIPE CONNECTION STANDARDS.
4. REFER TO AGENCY SPECIFICATIONS WHERE APPLICABLE.

THE PRODUCT DESCRIBED MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

PROPRIETARY AND CONFIDENTIAL:

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MODULAR WETLANDS

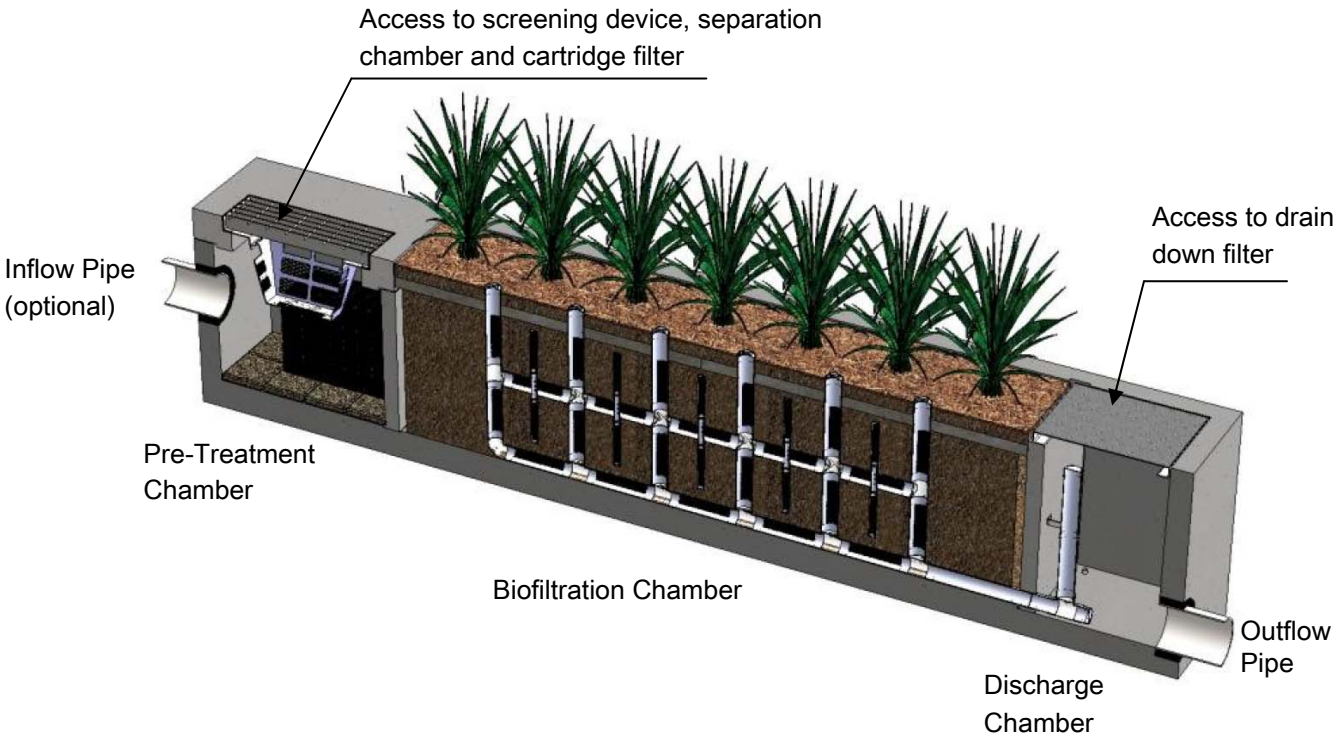
PIPE CONNECTION
STANDARD DETAIL

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

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

System Diagram



Maintenance Procedures

Screening Device

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

Separation Chamber

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

Cartridge Filters

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

Drain Down Filter

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

Maintenance Notes

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

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

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

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

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

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

Maintenance Procedure Illustration

Screening Device

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



Separation Chamber

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







Cartridge Filters

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







Drain Down Filter

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



Trim Vegetation

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









Inspection Form



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

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

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

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

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

Weather Condition _____ Additional Notes _____

Inspection Checklist

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

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

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

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

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes:

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

Maintenance Report



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P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

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

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

Weather Condition _____ Additional Notes _____

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

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

Comments:

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

Bio Clean

A Forterra Company

Modular Wetlands® System Linear

A Stormwater Biofiltration Solution

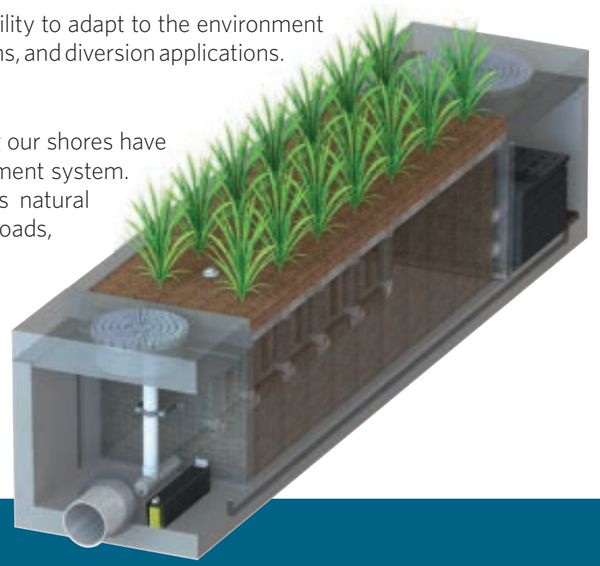


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OVERVIEW

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

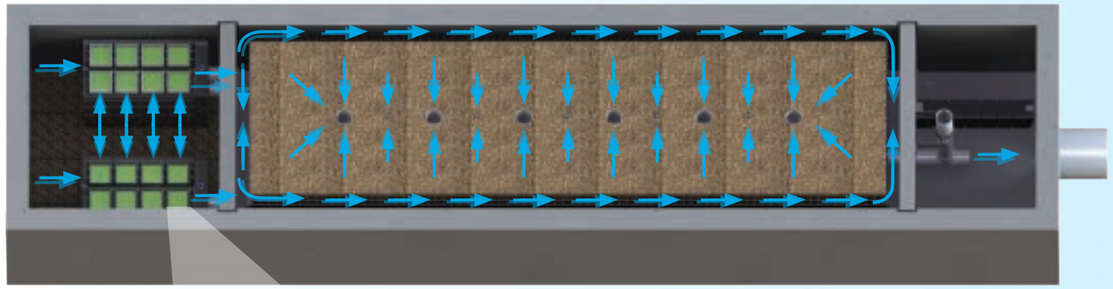
- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

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

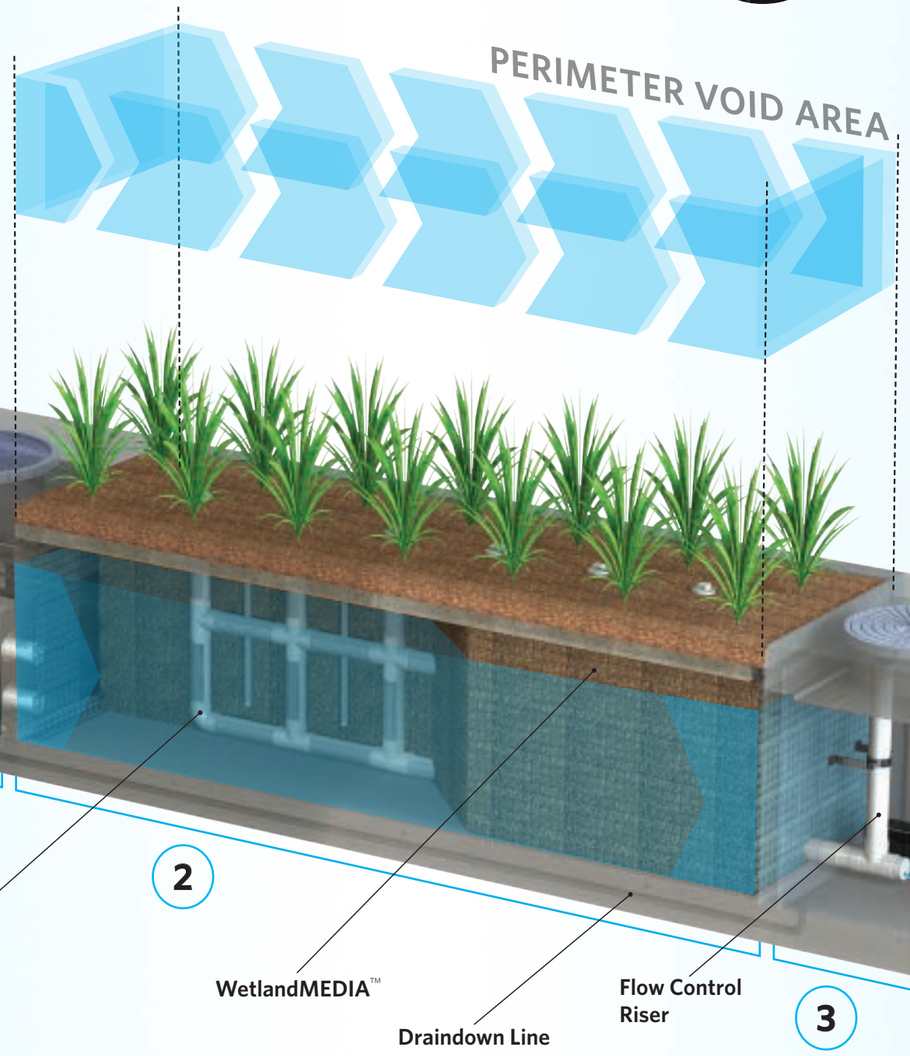


Figure 1

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

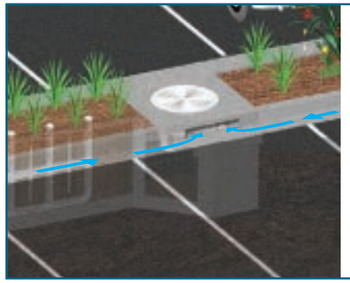
- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated





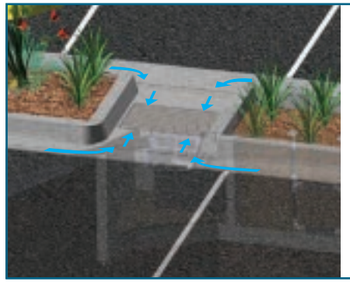
CONFIGURATIONS

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.



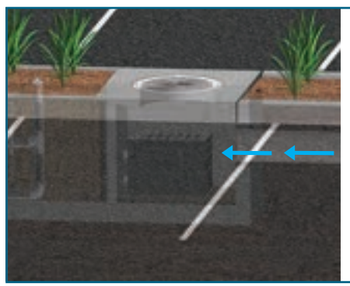
CURB TYPE

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.

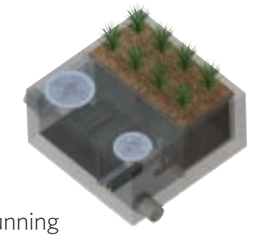


DOWNSPOUT TYPE

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.

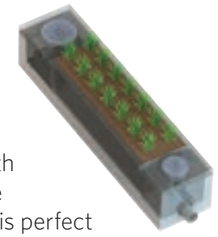
ORIENTATIONS

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

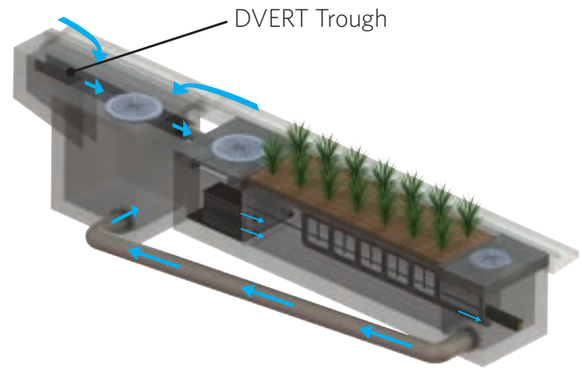
This traditional offline diversion method can be used with the Modular Wetlands® in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert 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

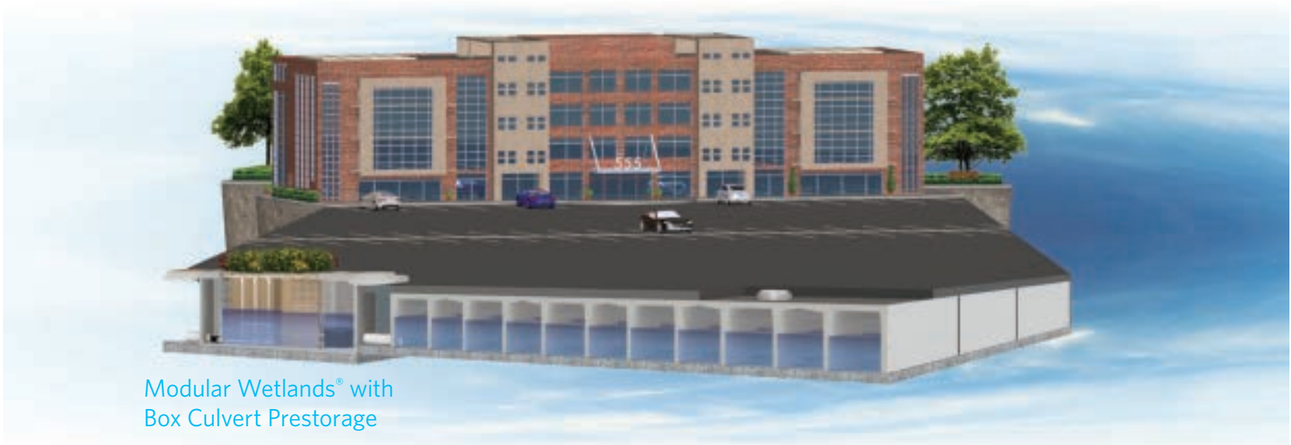
FLOW-BASED DESIGNS

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

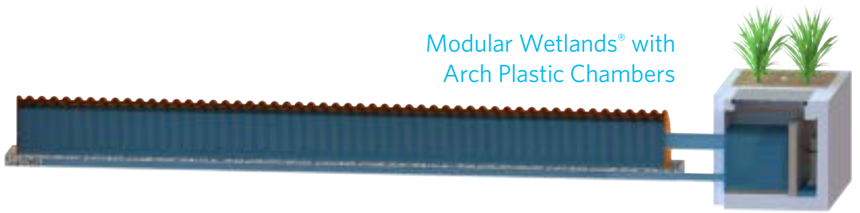
VOLUME-BASED DESIGNS

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.



Bio Clean
A Forterra Company

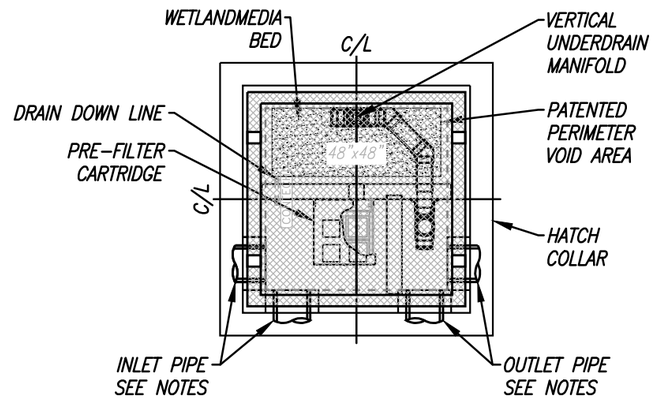
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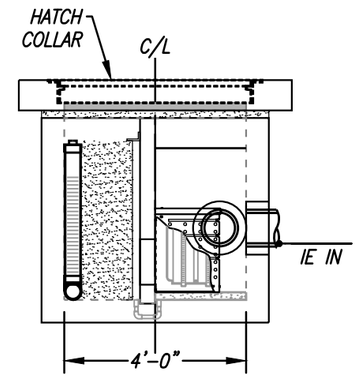
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SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.052
PRETREATMENT LOADING RATE (GPM/SF)			3.0 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			_____ (CF
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

* PRELIMINARY ONLY - NOT FOR CONSTRUCTION



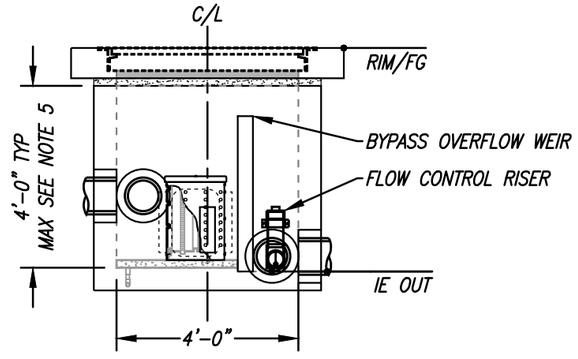
PLAN VIEW



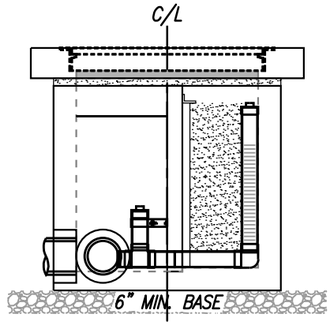
LEFT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
3. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
4. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.
5. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.



ELEVATION VIEW



RIGHT END VIEW

MODULAR WETLANDS
FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

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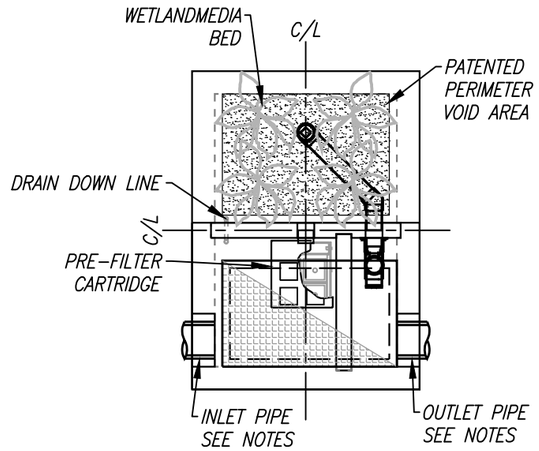
CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

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

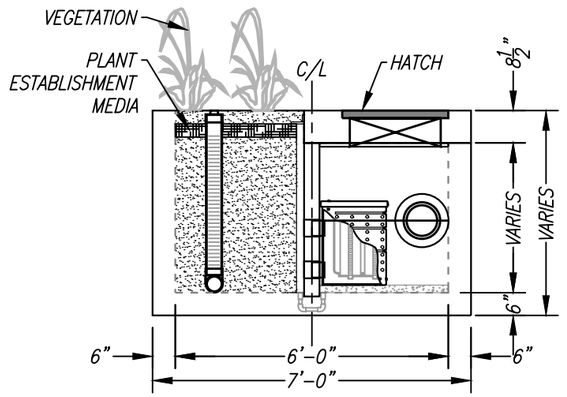
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SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.073	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER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

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



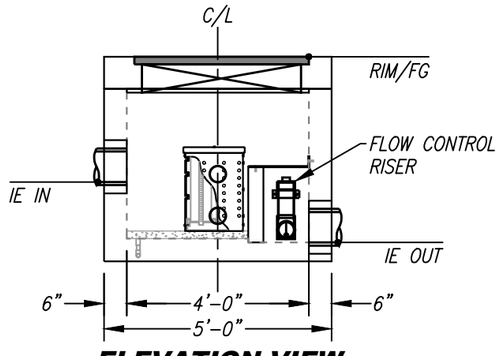
LEFT END VIEW

INSTALLATION NOTES

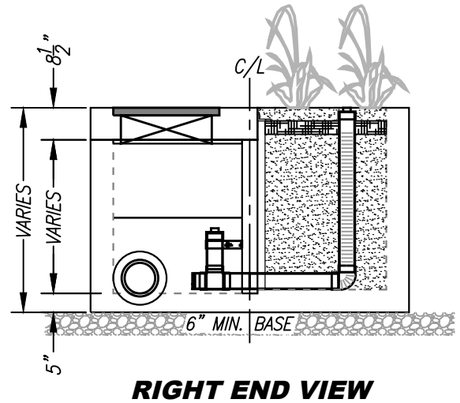
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2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

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



ELEVATION VIEW



RIGHT END VIEW

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

MODULAR WETLANDS
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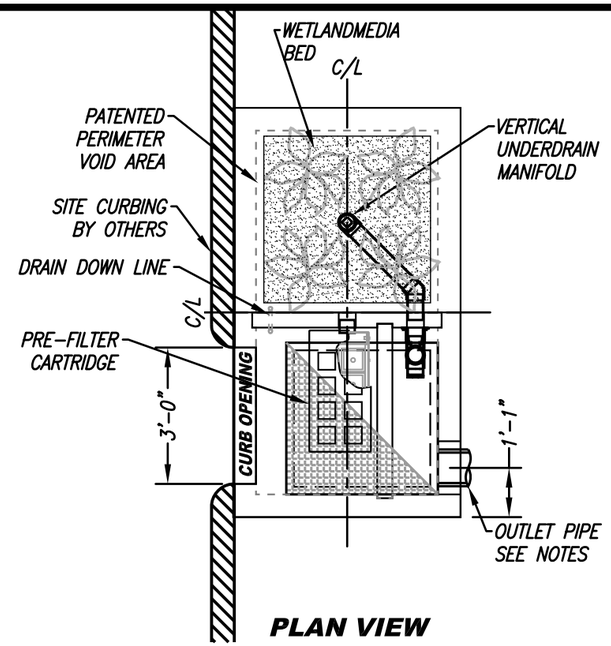
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Bio Clean
A Forterra Company

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

5/23/19 10:EE

SITE SPECIFIC DATA			
PROJECT NUMBER			
ORDER NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
		0.115	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	36" X 36"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			TBD
ORIFICE SIZE (DIA. INCHES)			TBD
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			



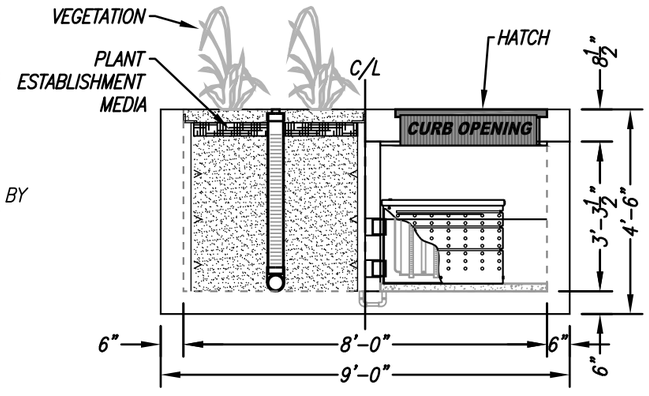
PLAN VIEW

INSTALLATION NOTES

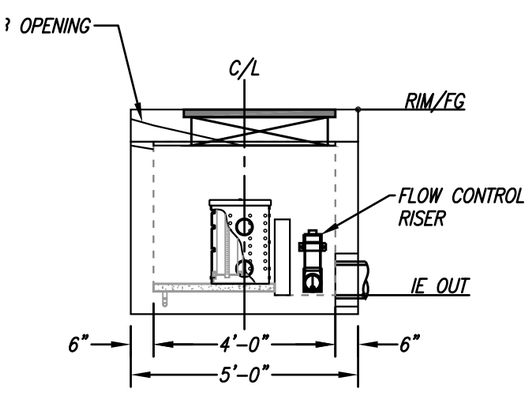
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GENERAL NOTES

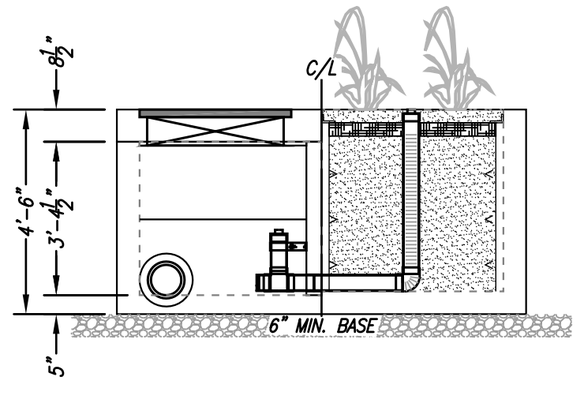
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LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

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

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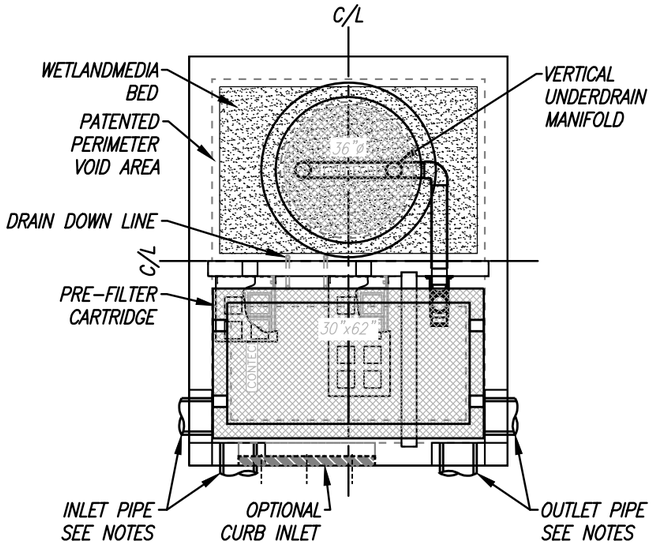
J-420

Bio Clean
A Forterra Company

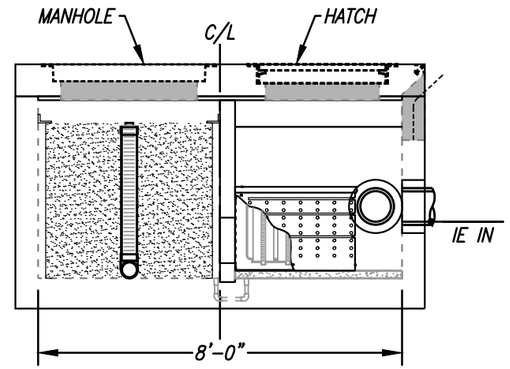
MWS-L-4-8-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.147
PRETREATMENT LOADING RATE (GPM/SF)			2.1 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			_____ (CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

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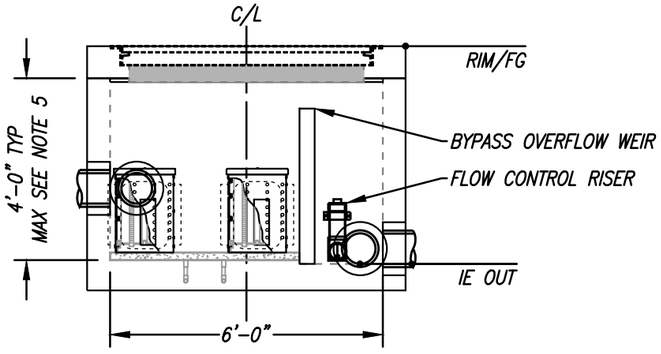
PLAN VIEW



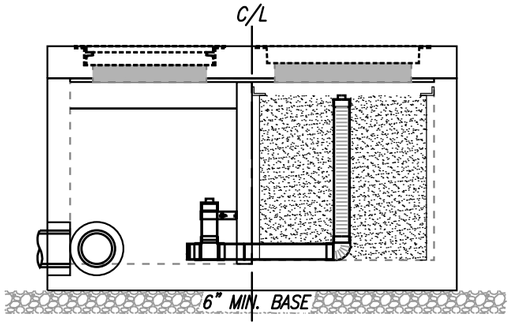
LEFT END VIEW

INSTALLATION NOTES

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5. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.



ELEVATION VIEW



RIGHT END VIEW

MODULAR WETLANDS
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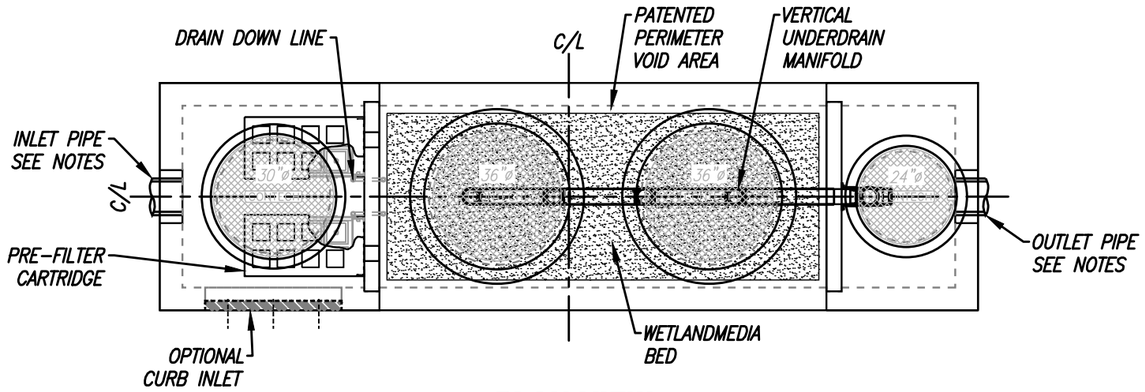
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MWS-L-6-8-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

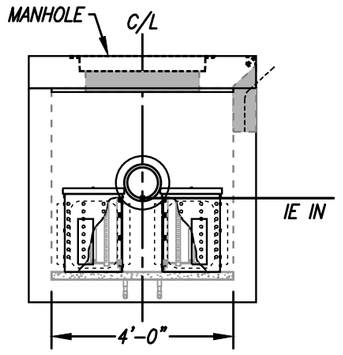
10/10/23SCOTT.SERTICH

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.206
PRETREATMENT LOADING RATE (GPM/SF)			2.1 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			_____ (CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

* PRELIMINARY ONLY - NOT FOR CONSTRUCTION



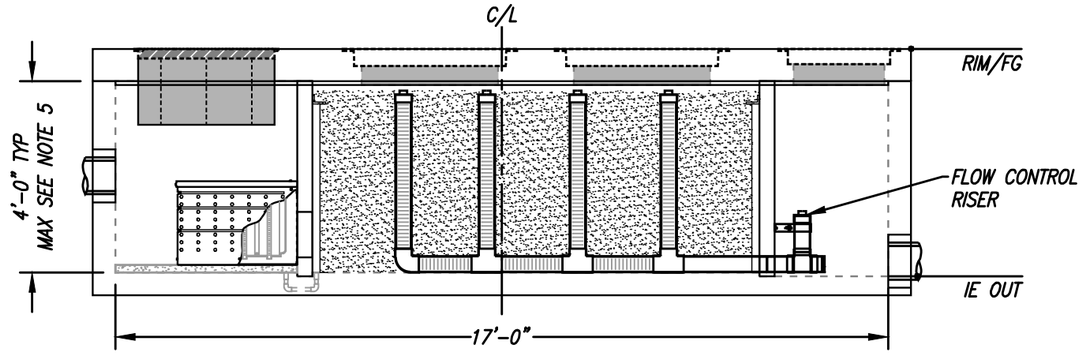
PLAN VIEW



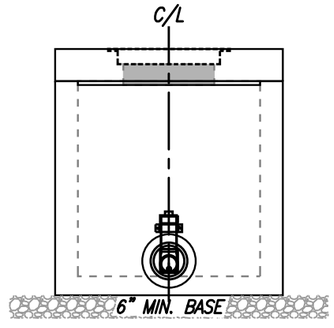
LEFT END VIEW

INSTALLATION NOTES

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5. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.



ELEVATION VIEW



RIGHT END VIEW

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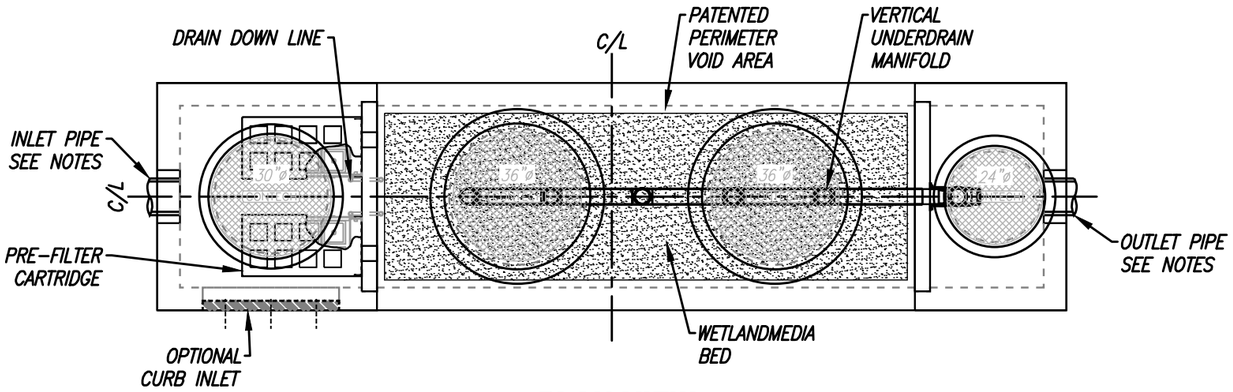
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MWS-L-4-17-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

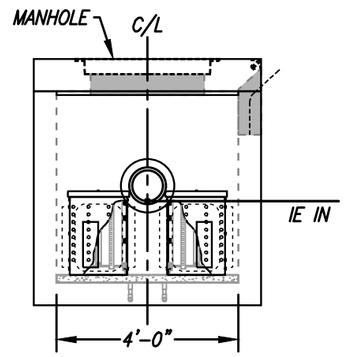
1/12/24TIM.GIRARD

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.237
PRETREATMENT LOADING RATE (GPM/SF)			2.1 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			_____ (CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

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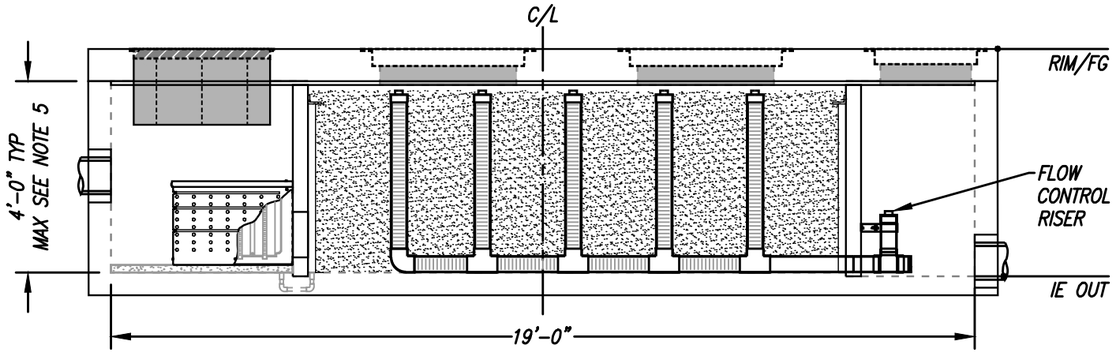
PLAN VIEW



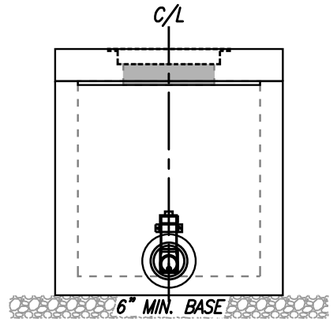
LEFT END VIEW

INSTALLATION NOTES

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ELEVATION VIEW



RIGHT END VIEW

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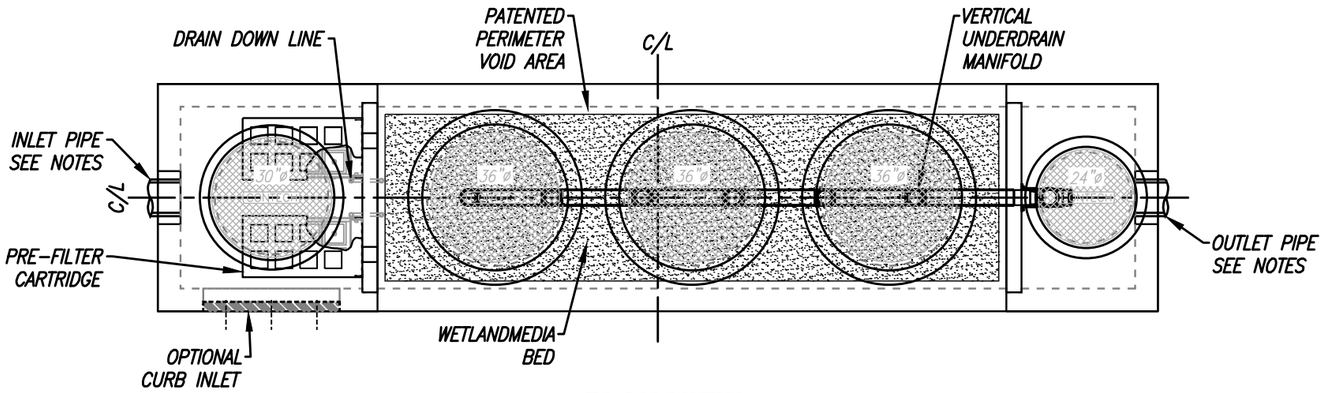
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MWS-L-4-19-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

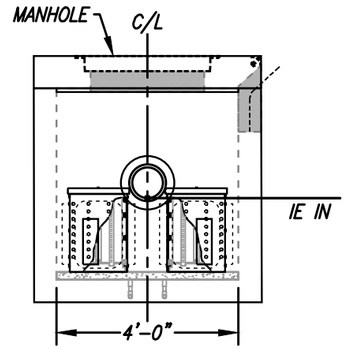
1/12/24TIM.GIRARD

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.268
PRETREATMENT LOADING RATE (GPM/SF)			3.0 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			_____ (CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

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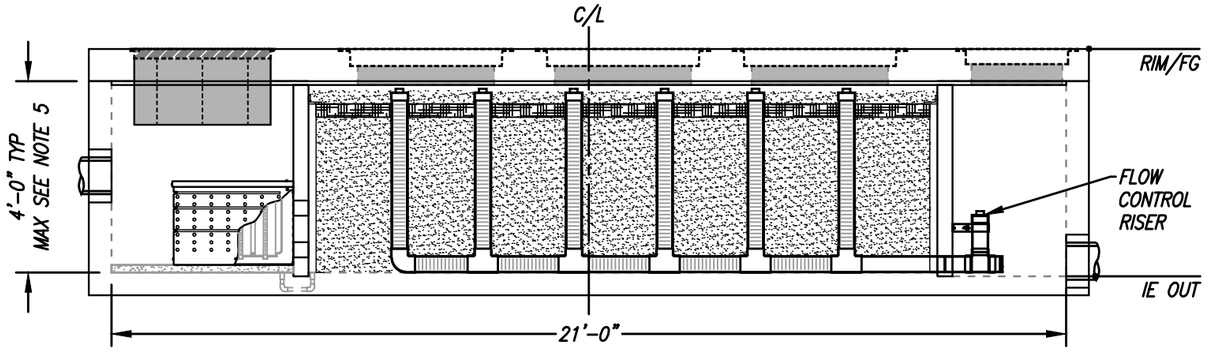
PLAN VIEW



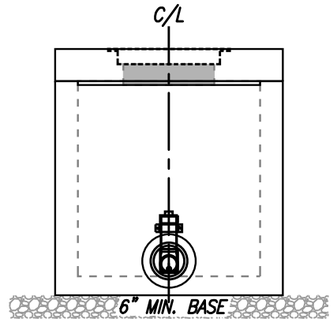
LEFT END VIEW

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ELEVATION VIEW



RIGHT END VIEW

MODULAR WETLANDS
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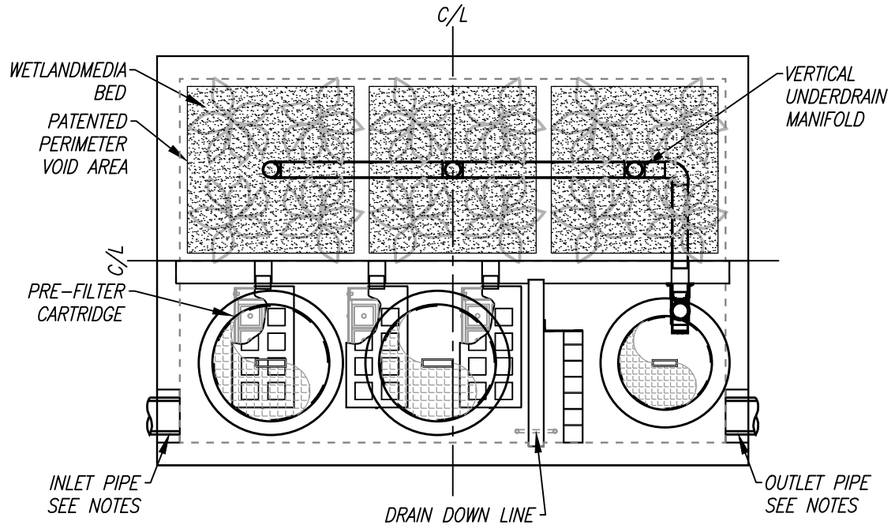
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MWS-L-4-21-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

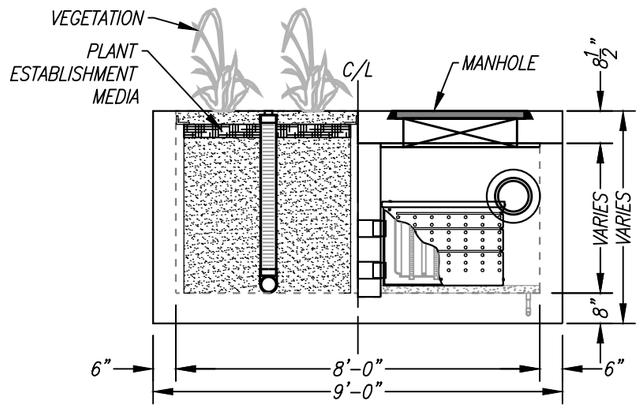
1/12/24TIM.GIRARD

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.346	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



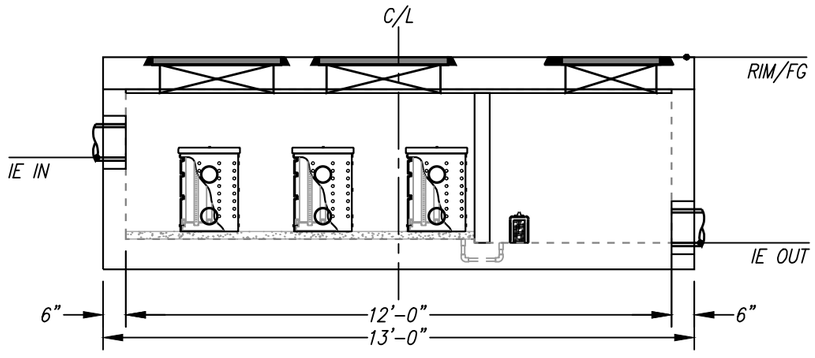
LEFT END VIEW

INSTALLATION NOTES

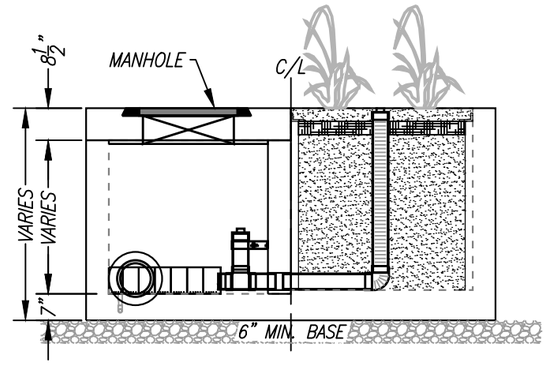
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ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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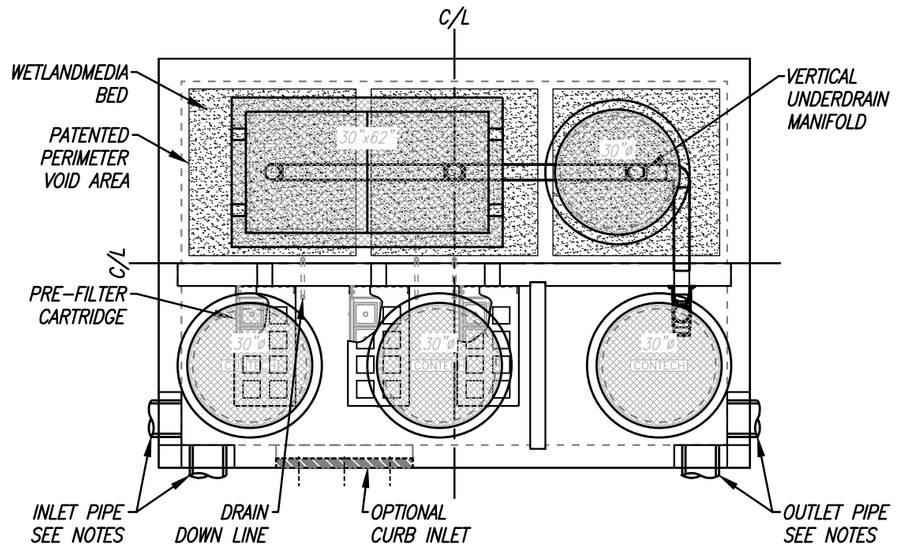
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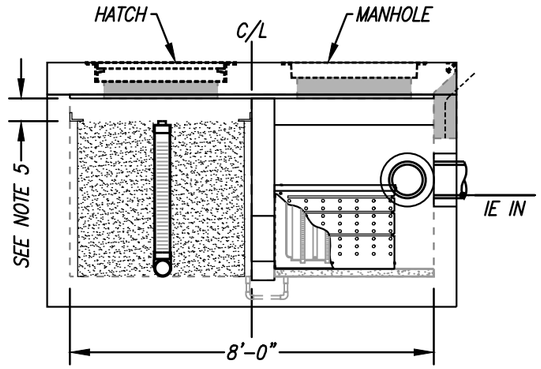
MWS-L-8-12-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.346
PRETREATMENT LOADING RATE (GPM/SF)			2.1 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			_____ (CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

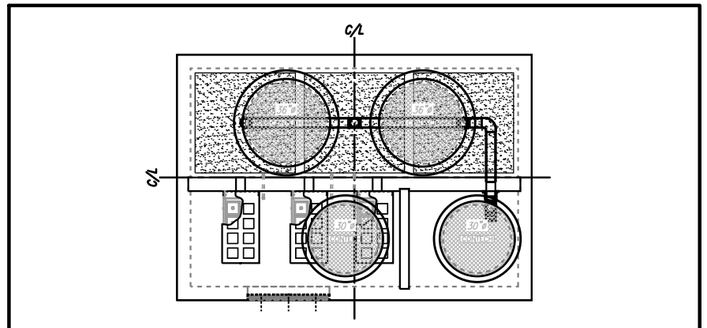
* PRELIMINARY ONLY - NOT FOR CONSTRUCTION



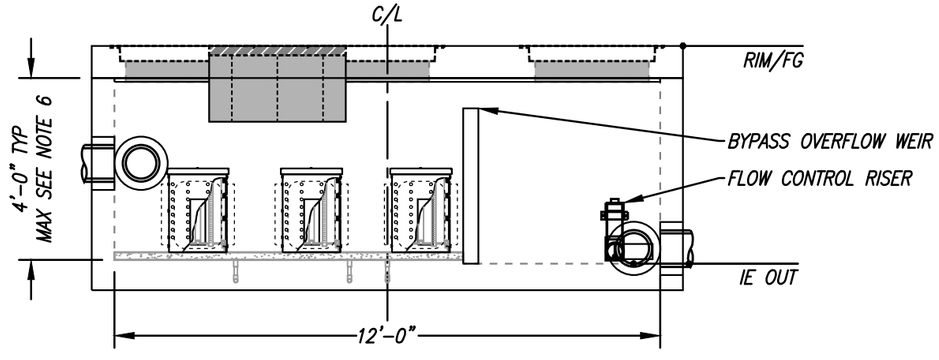
PLAN VIEW



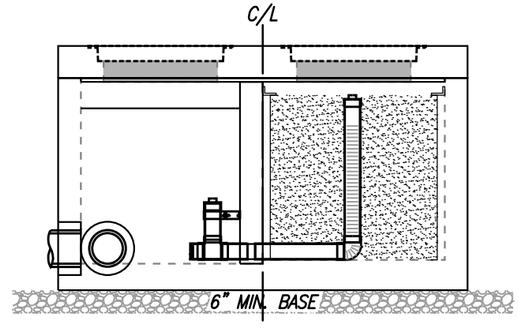
LEFT END VIEW



ALTERNATE DEEP ORIENTATION



ELEVATION VIEW



RIGHT END VIEW

INSTALLATION NOTES

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4. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.
5. ALTERNATE DEEP FRAME & COVER ORIENTATION USED WHEN CEILING TO MEDIA DISTANCE IS 2.5' OR GREATER.
6. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.

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FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

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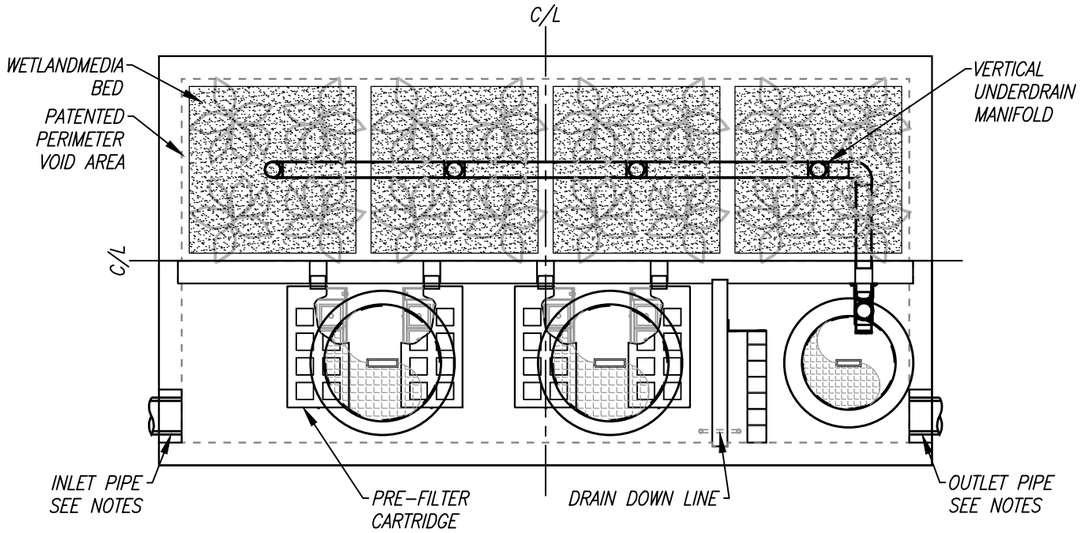
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MWS-L-8-12-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

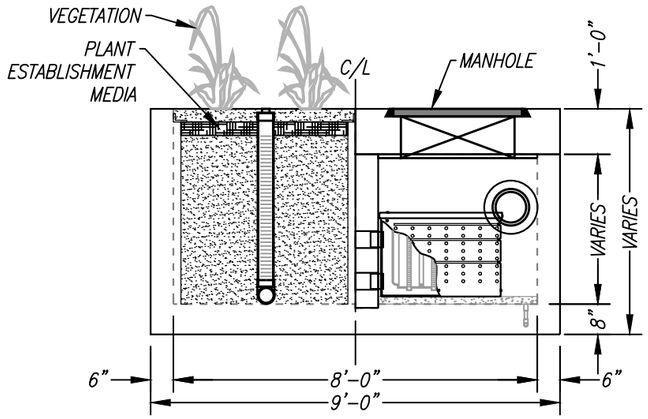
8/14/23SCOTT.SERTICH

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.462	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



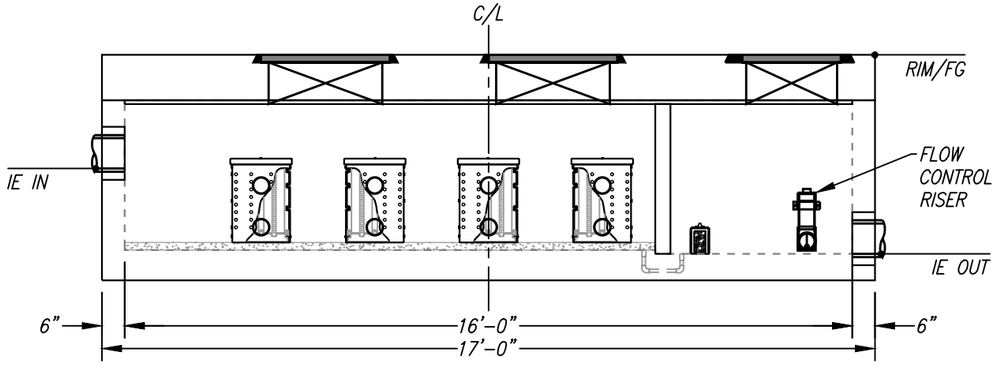
LEFT END VIEW

INSTALLATION NOTES

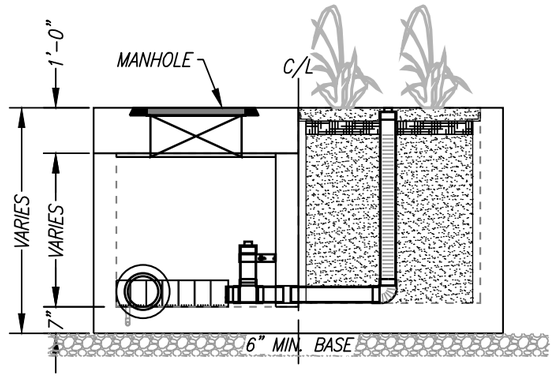
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ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.462
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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MWS-L-8-16-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/23/19 10:LEF

Section [_____]
Modular Subsurface Flow Wetland System

PART 1 – GENERAL

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

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

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

Corporate Headquarters:
Bio Clean Environmental Service, Inc.
2972 San Luis Rey Road
Oceanside, CA 92058
Phone: (760) 433-7640
Fax: (760) 433-3176
www.biocleanenvironmental.net

Corporate Headquarters:
Modular Wetland Systems, Inc.
P.O. Box 869
Oceanside, CA 92049
Phone: (760) 433-7650
www.modularwetlands.net

01.04.00 Submittals

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

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

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

01.04.03 Inspection and maintenance documentation submitted upon request.

01.05.00 Work Included

01.05.01 Specification requirements for installation of MSFWS.

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

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

01.06.00 Reference Standards

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

PART 2 – COMPONENTS

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

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

02.01.00 Pretreatment Chamber Components

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

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

02.02.00 Biofiltration Chamber Components

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

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

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

02.03.00 Discharge Chamber

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

PART 3 – PERFORMANCE

03.01.00 General

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

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

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

Minimum Treatment Capabilities

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

PART 4 - EXECUTION

04.01.00 General

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

04.02.00 Installation

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

04.02.01 Grading and Excavation site shall be properly surveyed by a registered professional surveyor, and clearly marked with excavation limits and elevations. After site is marked it is the responsibility of the contractor to contact local utility companies and/or DigAlert to check for underground utilities. All grading permits shall be approved by governing agencies before commencement of grading and excavation. Soil conditions shall be tested in accordance with the governing agencies requirements. All earth removed shall be transported, disposed, stored, and handled per governing agencies standards. It is the responsibility of the contractor to install and maintain proper erosion control measures during grading and excavation operations.

04.02.02 Compaction – All soil shall be compacted per registered professional soils engineer's recommendations prior to installation of MSFWS components.

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

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

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

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

04.03.00 Shipping, Storage and Handling

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

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

04.04.00 Maintenance and Inspection

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

components shall be inspected by a qualified person once a year and results of inspection shall be kept in an inspection log.

04.04.02 Maintenance – The manufacturer recommends cleaning and debris removal maintenance of once a year and replacement of the Cartridge Filters as needed. The maintenance shall be performed by someone qualified. A Maintenance Manual is available upon request from the manufacturer. The manual has detailed information regarding the maintenance of the MSFWS. A Maintenance/Inspection record shall be kept by the maintenance operator. The record shall include any maintenance activities preformed, amount and description of debris collected, and the condition of the filter.

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

PART 5 – QUALITY ASSURNACE

05.01.00 Warranty

The Manufacturer shall guarantee the MSFWS against all manufacturing defects in materials and workmanship for a period of (5) years from the date of delivery to the _____. The manufacturer shall be notified of repair or replacement issues in writing within the warranty period. The MSFWS is limited to recommended application for which it was designed.

05.02.00 Performance Certification

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

ATTACHMENT K

Engineering Conditions of Approval

WQMP REVIEW SUMMARY

The following is a summary of major concerns relative to this WQMP submittal:

The PWQMP is close to approvable. Redline comments are provided within this checklist. All comments are minor corrections to be made prior to resubmittal. Comments that are noted as "Condition for Final WQMP" can be deferred to the Final WQMP. These conditions are summarized below and should be included in Attachment K of the Preliminary WQMP for future reference in the Final WQMP, if they are not addressed in the next submittal.

Conditions for Final WQMP:

1. *For Sale Side DMAs should be delineated for each individual MWS BMP and not grouped, as was done for DMAs 1-5. Each LID BMP must have it's own tributary area delineated to ensure BMP sizing is done properly.*
2. *Include TGD Table 2.7 Infiltration Feasibility Worksheet and Worksheet J Summary of Harvested Water Demand and Feasibility to support infeasibility assertion in Sections IV.3.2 and IV.3.3 of the Final WQMP.*
3. *Apartment Side proposed detention systems are 4 feet deep in addition to cover, which would result in the need for MWS units to be deeper than standard units. Ensure that MWS units are not deeper than 8 feet in order to consider 100% biotreatment. Also, any unit deeper than 3.6 feet must use specific plants that have deep root systems recommended by the manufacturer, in the final design.*
4. *Include an O&M Plan in Attachment G of the WQMP, in addition to the MWS Maintenance Manual. The O&M Matrix in Section V is not sufficient.*
5. *Ensure labels and callouts in WQMP Exhibit do not obscure/obstruct storm drain infrastructure or drainage/BMP features.*
6. *Provide LID Treatment for Right-of-Way improvements along Heil Avenue and Euclid Street. The Right-of-Way improvement proposed are not deemed Routine Maintenance since the "use" of the area is changing and the area exceeds the 5,000 square foot threshold for redevelopment projects. Therefore, LID treatment is required for the Right-of-Way improvement area.*