Appendix C- Preliminary Water Management Quality Plan

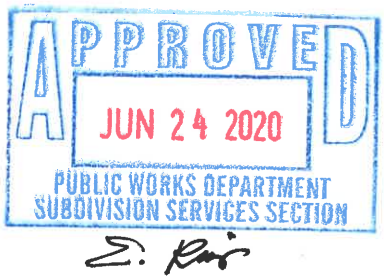
This page is intentionally blank

PRELIMINARY WATER QUALITY MANAGEMENT PLAN

"HOTEL REDEVELOPMENT"

OTH2017-01009

Project Address:
1100 W. Ball Road
Anaheim, CA 92802



Prepared for:

R3 REAL ESTATE DEVELOPERS

6789 Quail Hill Parkway, Suite 731
Irvine, CA 926023
(949) 287-2003

Prepared by:

Hunsaker & Associates Irvine, Inc.
3 Hughes
Irvine, CA 92618
(949) 583-1010

WQMP Preparation Date:
September 16, 2019
Revised: June 12, 2020

W.O. 4344-1

W.O. 4344-1

PRELIMINARY WATER QUALITY MANAGEMENT PLAN

"Hotel Redevelopment"

City of Anaheim, CA

PRELIMINARY
WATER QUALITY
MANAGEMENT PLAN (WQMP)

"HOTEL REDEVELOPMENT"
OTH2017-01009

Project Address:

1100 W. Ball Road

Anaheim, CA 92802

Prepared for:

R3 REAL ESTATE DEVELOPERS

6789 Quail Hill Parkway, Suite 731

Irvine, CA 92603

Phone: (949) 287-2003

Prepared by:

Hunsaker & Associates, Irvine, Inc.

Engineer: Ed Mandich PE Registration No. 59089

3 Hughes

Irvine, CA 92618

(949) 583-1010

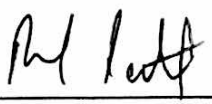
Prepared: September 16, 2019

Revised: November 11, 2019, February 18, 2020, June 12, 2020, June 24, 2020

Project Owner's Certification			
Permit/Application No.	OTH2017-01009	Grading Permit No.	N/A
Tract/Parcel Map No.	N/A	Building Permit No.	N/A
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)			APN 129-291-06

This Water Quality Management Plan (WQMP) has been prepared for R3 Lodging LLC by Hunsaker and Associates Irvine, Inc. The WQMP is intended to comply with the requirements of the local 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 and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

Owner: R3 Lodging LLC			
Name/Title	Mr. Raj Patel/Managing Member		
Company	R3 Lodging LLC		
Address	6789 Quail Hill Parkway, Suite 731		
Email	Raj@R3RED.com		
Telephone #	(949) 287-2003		
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.			
Signature		Date	June 24, 2020

Preparer (Engineer): Ed Mandich			
Title	Project Manager	PE Registration #	59089
Company	Hunsaker and Associates Irvine, Inc.		
Address	3 Hughes, Irvine, CA 92618		
Email	emandich@hunsaker.com		
Telephone #	(949) 583-1010		

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	Ed Mandich	Date	June 24, 2020
Place Stamp Here			

Contents

Page No.

Section I Discretionary Permit(s) and Water Quality Conditions

The project's discretionary permit and water quality information are provided in the following:

Project Infomation			
Permit/Application No. (If applicable)	OTH2017-01009	Grading or Building Permit No. (If applicable)	N/A
Address of Project Site (or Tract Map and Lot Number if no address and APN)	Address: 1100 West Ball Road, Anaheim, CA 92802 APN: 129-291-06		
Water Quality Conditions of Approval or Issuance			
Water Quality Conditions of Approval or Issuance applied to this project. (Please list verbatim)	Per City of Anaheim Municipal Code Title 10, Chapter 09, Section 030.010, project is subject to the requirements of New Development and Significant Redevelopment projects to control urban runoff, in accordance County of Orange Drainage Area Management Plan. *Condition 1 for Final WQMP: As referenced throughout each plan check, it was highly recommended that the applicant perform site specific infiltration to confirm infiltration feasibility. However, after discussions between Fuscoe Engineering, the City, and the applicant, infiltration testing is allowed to be pushed to the Final WQMP. Therefore, infiltration testing must be performed during the Final WQMP to confirm feasibility. As mentioned via plan check documentation, and over the phone, infiltration may be found to be infeasible from less than favorable infiltration rate testing results or the fact that there is prior contamination at the site that may pose concerns with the local groundwater agency. Any changes to the proposed BMP design shown in the Final WQMP, may require additional time and effort in the review of the WQMP.*		
Conceptual WQMP			
Was a Conceptual Water Quality Management Plan previously approved for this project?	No. A conceptual WQMP was not previously approved for this project.		
Watershed-Based Plan Conditions			

Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	The project is located within the Anaheim Bay – Huntington Harbour Watershed. Currently, there is no approved WIHMP for the watershed. Although the project's receiving waters are considered impaired under Section 303(d) of the Clean Water Act, there are currently no TMDL's established for the project's receiving waters.

Section II Project Description

II.1 Project Description

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td>Development Category (Verbatim from WQMP):</td><td colspan="4">Priority Project, 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.

Parking lots of 5,000 square feet or more including associated drive aisle, and potentially exposed to urban stormwater runoff. A parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business or for commerce.</td></tr>
<tr><td rowspan="2">Project Area (ft^2): 42,688 ft2 (0.98 AC – Project Boundary; 0.55 – DMA Limits. The difference of 0.43 acres includes City ROW property, there will be no improvements within the City ROW property)</td><td colspan="2">Number of Dwelling Units: N/A</td><td colspan="2">SIC Code: 5812, 7011</td></tr>
<tr><td colspan="4"></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>0.78</td><td>80%</td><td>0.2</td><td>20%</td></tr>
<tr><td>Post-Project Conditions</td><td>0.2</td><td>20%</td><td>0.78</td><td>80%</td></tr>
<tr><td>Drainage Patterns/Connections</td><td colspan="4">In the pre-development condition, the site is vacant and relatively flat with an elevation of 138 at the southwest corner with very little relief towards the northwest corner with an elevation of 135 above mean sea level. Flows would sheet flow to the curb and gutter in West Ball Road and conveyed to the west to an existing catch basin located at the intersection of West Ball Road and Walnut Street. Storm flows will be picked up in an existing local storm drain facility and conveyed approximately 1,375 feet to the west and connect to an existing O.C.F.C.D facility (C03). Flows will continue to flow to the south and connect to an existing O.C.F.D. facility (C02) at the intersection of Bolsa</td></tr>
</table>

Description of Proposed Project	
	Chica Street and Rancho Road. Flows will continued southerly and ultimately discharge into the Pacific Ocean.

Narrative Project Description:	The proposed project, "Hotel Redevelopment" (The Project), consists of a 0.98-acre parcel of land located just southwest of the intersection of West Ball Road and S Flores Street, in the City Anaheim, California. Specifically, the project site consists of 1100 West Ball Road and is bound to the north by West Ball Road and single-family beyond; to the east by the Best Western; to the south by the Anaheim Maingate Inn; and to the west by the Anaheim Maingate Inn. Two entrances into the project site will be provided via West Ball Road and West Place. The project proposes a 5-story, 75-room Boutique Hotel. Additional improvements include 2 levels of subterranean garage, pool located on the 2nd floor, fitness center, approximate 3,990 square foot roof deck with bar, landscaping, walkways, curb, gutter and storm drain improvements, and related backbone infrastructure improvements (wet and dry utilities). Parking will primarily be provided via 2 levels of subterranean garage. Approximately 78 spaces are proposed for hotel guests, employees and retail patrons. Project parking is consistent with the City's parking requirements. Maximum height for the project's proposed hotel tower is approximately 69'10" from lowest point of natural grade. Proposed open space/landscaping will consist of parkways, courtyards and setback area landscaping and planters located throughout the project site. Total landscaping is anticipated to consist of approximately 0.11acres, 20% of the project site. Paved and other impervious areas of the site include the project's walkways, drive aisles, and other building or paved structure areas. Total impervious area is anticipated to consist of approximately 80% of the project site, or 0.78 acres. Additional improvements include van loading zone, trash loading zone, and truck loading zone. Typical wastes from the hotel are anticipated to be generated daily from the project. These include food wastes, paper products and recyclable materials. Designated trash enclosure areas will be provided in the western portion of the project site for project use. The enclosures shall

	be covered and precluded from wind, rain, storm water run-on and designed to prevent discharge of any leaks or spills from the enclosure area. Trash shall be removed on a weekly basis, or as needed, by the local waste management company. All proposed improvements are shown in the WQMP Site Plan in Section VI of this WQMP. Areas currently not identified will be provided as project planning progresses.

II.2 Potential Stormwater Pollutants

Table 2.1, Anticipated and Potential Pollutants Generated by Land Use Type from the Technical Guidance Document (December 2013) lists the following Pollutants of Concern (POC's) associated with the project:

Pollutants of Concern			
Pollutant	E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	E		Potential sources of sediment include proposed planters and parkway landscaping areas.
Nutrients	E		Potential sources of nutrients include fertilizers, sediment and trash/debris.
Heavy Metals	E		Potential sources include vehicles and automotive fluids.
Pathogens (Bacteria/Virus)	E		Potential sources of pathogens include pets, food wastes and landscaping areas.
Pesticides	E		Potential sources of pesticides include landscaping areas.
Oil and Grease	E		Potential source of oil and grease is parked vehicles.
Toxic Organic Compounds	E		Potential sources include automobiles and other motor vehicles and streets.
Trash and Debris	E		Potential sources include common litter and trash cans from guests and facility users.

II.3 Hydrologic Conditions of Concern

The purpose of this section is to identify any hydrologic conditions of concern (HCOC) with respect to downstream flooding, erosion potential of natural channels downstream, impacts of increased flows on natural habitat, etc. As specified in Section 2.3.3 of the 2013 Model WQMP, projects must identify and mitigate any HCOCs. A HCOC is a combination of upland hydrologic conditions and stream biological and physical conditions that presents a condition of concern for physical and/or biological degradation of streams.

In the North Orange County permit area, HCOCs are considered to exist if any streams located downstream from the project are determined to be potentially susceptible to hydromodification impacts and either of the following conditions exists:

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

or

- Time of concentration (Tc) of post-development runoff for the 2-yr, 24-hr storm event is less than the time of concentration of the pre-development condition for the 2-yr, 24-hr storm event by more than 5 percent.

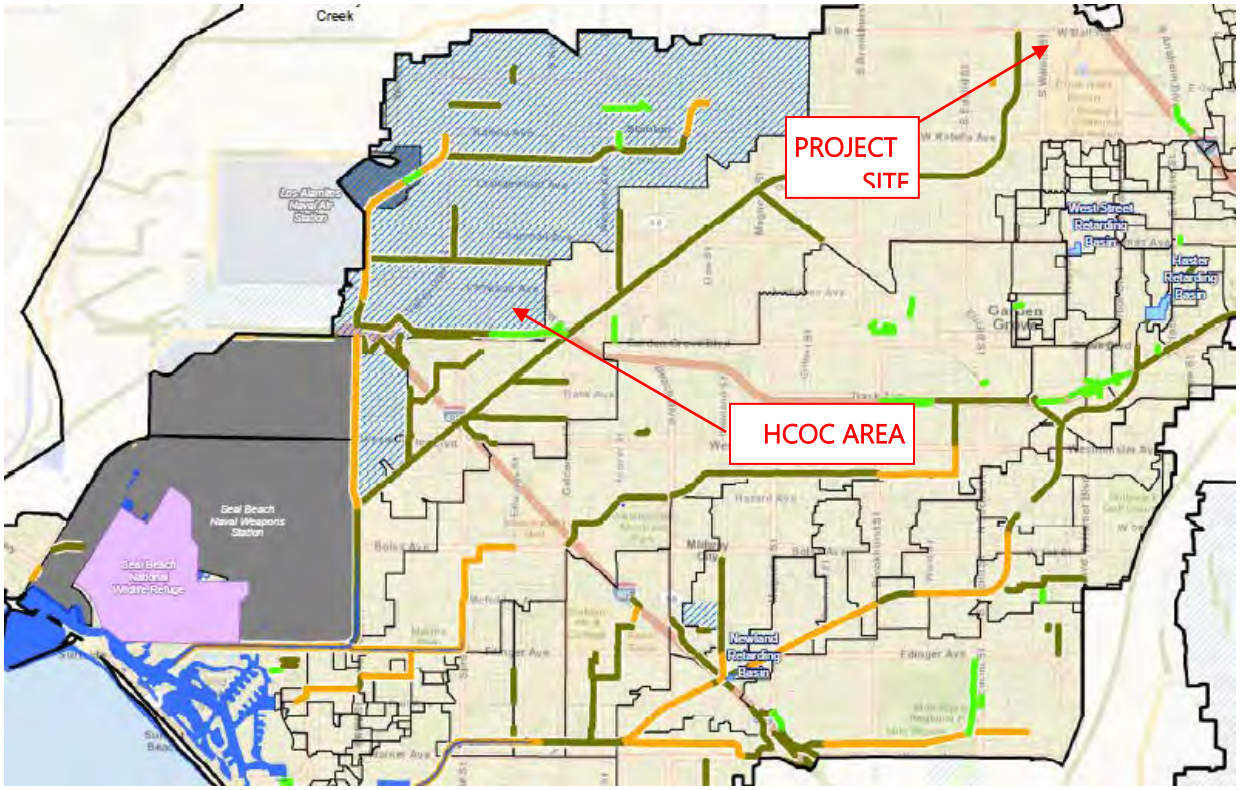
If these conditions do not exist or streams are not potentially susceptible to hydromodification impacts, an HCOC does not exist and hydromodification does not need to be considered further. In the North Orange County permit area, downstream channels are considered not susceptible to hydromodification, and therefore do not have the potential for a HCOC, if all downstream conveyance channels that will receive runoff from the project are engineered, hardened, and regularly maintained to ensure design flow capacity, and no sensitive habitat areas will be affected.

Is the proposed project potentially susceptible to hydromodification impacts?

☒ No – Show map

☐ Yes - Describe applicable hydrology conditions of concern below.

Based on County's current hydromodification susceptibility map (provided on the following page), the project is not subject to the specific 2-year criteria noted above, as the project discharges to fully improved storm drain systems that are not susceptible to hydromodification impacts.


PROJECT SITE
HCOC AREA
Seal Beach Naval Weapons Station
Seal Beach National Wildlife Refuge
Los Alamitos Naval Air Station
West Street Retarding Basin
Newland Retarding Basin

II.4 Post Development Drainage Characteristics

In general, post-development drainage area and flow direction will be consistent with the City's Master Plan of Drainage for the East-Garden Grove-Wintersburg Channel. Runoff from the rooftops of each structure will be directed to area drains and conveyed downward to the proposed storm drain system. Flows would sheet flow to the curb and gutter in West Ball Road and conveyed to the west to an existing catch basin located at the intersection of West Ball Road and Walnut Street. Storm flows will be picked up in an existing local storm drain facility and conveyed approximately 1,375 feet to the west and connect to an existing O.C.F.C.D facility (C03). Flows will continue to flow to the south and connect to an existing O.C.F.D. facility (C02) at the intersection of Bolsa Chica Street and Rancho Road. Flows will continued southerly and ultimately discharge into the Pacific Ocean.

Low Impact Development

To satisfy the project requirements for Low Impact Development (LID) and addressing runoff pollutants of concern, the project proposes to retain water quality flows (non-storm water flows and the Design Capture Volume) from the project's onsite Drainage Management Area (DMA), DMA 1. There is a high point which bifurcate half site draining to the northwest towards Ball Road and half the site draining to the southeast towards West Street.

DMA 1, runoff generated from the southeast portion of the site (roof areas, courtyards, drive aisles, walkways, etc.) will be conveyed to a grate inlet located at the southeast corner and conveyed to a Modular Wetland System for pretreatment then to a subsurface detention facility (48" RCP) located along the northwest boundary near Ball Road, then to 3 Infiltration Drywells

Runoff generated from the northwest portion of the site will flow northerly to a proposed catch basin located at the Ball Road entrance, then to a Modular Wetland System and to 3 Infiltration Drywells. High flows will be conveyed to a proposed inlet in the northwest corner, then connect to an existing 7' x 7' RCB in West Ball Road.

During Final Engineering, any modifications to the sidewalk, parkway or driveway will be addressed in the Final WQMP, and BMP's will be updated accordingly.

II.5 Property Ownership/Management

The property owner, R3 REAL ESTATE DEVELOPERS shall assume all BMP maintenance and inspection responsibilities for the project site until all site responsibilities have been transferred to the Property Owners' Association (POA).

Inspection and maintenance activities are provided in Section V of this WQMP.

Section III Site Description

III.1 Physical Setting

General descriptions of the project area are provided below:

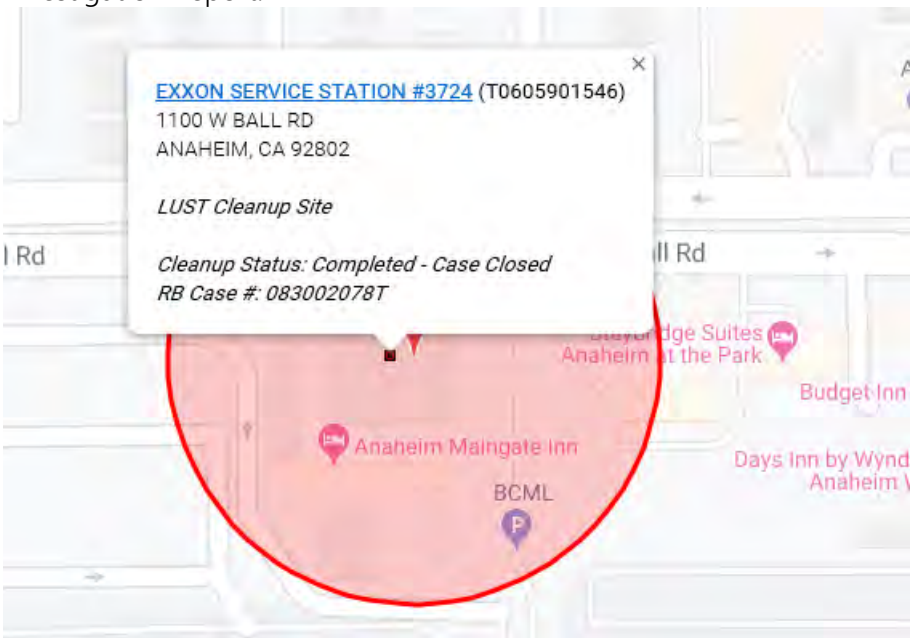
Name of Planned Community/Planning Area (if applicable)	Community Name: N/A Planning Area: N/A
Location/Address	1100 West Ball Road, City of Anaheim, California.
Project Area Description	The proposed project is located just southwest of the intersection of West Ball Road and West Place. The pre-project site consists of a vacant lot. The site is bound to the north by West Ball Road and single-family beyond; to the east by the Best Western; to the south by the Anaheim Maingate Inn; and to the west by the Anaheim Maingate Inn.
General Plan Land Use Designation	Specific Plan 92-2
Zoning	Commercial Recreation (C-R)
Acreage of Project Site	0.98 acres; 0.55 acres (DMA boundary). The difference of 0.43 acres includes City right-of-way property that will not consist of any improvements.
Predominant Soil Type	Based on the County's most recent data, subsurface soils consists of HSG Type A and B soils.

III.2 Site Characteristics

The following table summarizes general characteristics of the project site:

Precipitation Zone	0.85 in.
Topography	In general, the subject site is relatively flat and gently slopes to the south. Onsite elevations range from 138 feet above mean sea level (MSL) in the south to approximately 125.0 feet above MSL to the north.
Drainage Patterns/Connections	In the pre-development condition, the site is vacant and relatively flat with an elevation of 138 at the southwest corner with very little relief towards the northwest corner with an elevation of 135 above mean sea level. Flows would sheet flow to the curb and gutter in West Ball Road and conveyed to the west to an existing catch basin located at the intersection of West Ball Road and Walnut Street. Storm flows will be picked up in an existing local storm drain facility and conveyed approximately 1,375 feet to the west and connect to an existing O.C.F.C.D facility (C03). Flows will continue to flow to the south and connect to an existing O.C.F.D. facility (C02) at the intersection of Bolsa Chica Street and Rancho Road. Flows will continued southerly and ultimately discharge into the Pacific Ocean.
Soil Type, Geology, and Infiltration Properties	The site is underlain by Quaternary (Q) earth materials and artificial fill. Fill was encountered in all of the borings with a thickness of 3 feet. Contact between the fill and the underlying alluvium was exposed within the exploratory borings. Fill generally consist of silty sand with abundant rock fragments that generally range between ¾ and 1 inches in diameter. Alluvium primarily consists of light brown to tan, dense and very dense, silty sand, fine to medium grained. These deposits were encountered within all of the exploratory borings to the depth of the exploration. [1] These soils are considered as HSG A and B soils, which are favorable for infiltration.
Hydrogeologic (Groundwater) Conditions	Based on Figure XVI-2d of the TGD and the project's geotechnical investigation (Attachment E), groundwater is anticipated to be greater than 60' below existing surface. Based on the soils report, subsurface exploration did not encounter groundwater to a depth of 51 feet.
Geotechnical Conditions (relevant to infiltration)	Based on information acquired from the TGD, infiltration of runoff is feasible for the project. Per Geotracker, the site was previously a LUST (Leaking Underground Storage Tank) cleanup site. The previous use was an Exxon Service Station #3724. Per the City of Anaheim Public Utilities

[1] Creative Geotechnical, Inc. *Preliminary Geotechnical Engineering Investigation, Proposed Hotel over Two-Level Subgrade Parking (~24'deep) 1100 West Ball Road, Anaheim, CA 92802, April 12, 2018.*

	letter dated September 15, 1994; Site Closure for Petroleum Hydrocarbon Contamination From Former Exxon Station #7-3724 Located at 1100 W. Ball Road., Anaheim CA, the letter confirms the completion of a site investigation and remedial action for petroleum hydrocarbons at the above site and no further action is required. Additionally, a Shallow Soil Vapor Investigation Report dated August 19, 2015 was prepared by The Reynolds Group. The results of the tests showed soil vapor samples were "non-detect" for volatile organic compounds (VOCs) including all gasoline components, except for tetrachlorethylene (PCE). PCE concentrations are below "Department of Toxic Substance Control (DTSC) Human and Ecological Risk Office (HERO) Note 3" future commercial and residential screening levels. Refer to Attachment E for the closure letter and Shallow Soil Vapor Investigation Report. 
Off-Site Drainage	Off-site run-on is not anticipated.
Utility and Infrastructure Information	Wet and dry utilities are proposed for the project and will connect to existing facilities located in West Ball road and West Place.

III.3 Watershed Description

The following table includes descriptions of the project's receiving waters:

Receiving Waters	East Garden Grove-Wintersburg Channel, Bolsa Bay/Huntington Harbor, Anaheim Bay, Pacific Ocean
303(d) Listed Impairments	East Garden Grove-Wintersburg Channel – Ammonia Bolsa Bay/Huntington Harbor – Chlordane, Copper, Lead, Nickel, Pathogens, PCBs, Sediment Toxicity Anaheim Bay – Sediment Toxicity, PCBs, Nickel, Dieldrin
Applicable TMDLs	TMDLs for the project's receiving waters are currently under development. As such, there are currently no established TMDLs for the project's 303(d) List pollutant.
Pollutants of Concern for the Project	Pollutants of Concern: Suspended Solids/Sediment, Nutrients, Heavy Metals, Pathogens, Pesticides, Oil and Grease, Toxic Organic Compounds, Trash and Debris. Primary Pollutants of Concern: Pathogens, Heavy Metals, Pesticides, Toxic Organic Compounds
Environmentally Sensitive and Special Biological Significant Areas	There are no Areas of Special Biological Significance (ASBS) or ESA's within the project site.

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

Project Performance Criteria		
(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?	YES ☐	NO ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.	A WIHMP has not been approved for the watershed.	
If HCOC exists, list applicable hydromodification control performance criteria	Based on the County's most recent HCOC Susceptibility Map, HCOC do not exist for the project (Refer to Section II.3).	
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	The applicable LID performance criteria are as follows (the project's selected LID performance criteria is provided in bold below): • **Retain, onsite (infiltrate, harvest and use, or evapotranspire) stormwater runoff as feasible up to the Design Capture Volume, and** • Recover (i.e.) drawdown the storage volume as soon as possible after a storm event, and, if necessary • Biotreat, onsite, additional runoff, as feasible, up to 80 percent average annual capture efficiency, and, if necessary • Retain or biotreat, in a regional facility, the remaining runoff up to 80 percent average annual capture efficiency, and, if necessary • Fulfill alternative compliance obligations for runoff volume not retained or biotreated up to 80 percent average annual capture efficiency using treatment controls or other alternative approaches.	
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	N/A. Project proposes the use of LID BMPs to address the project's design capture volume.	

Project Performance Criteria	
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Project's LID DCV has been determined using the following equation: DCV = C x D x A x 43560 sf/ac x 1ft/12in, where: DCV = design storm capture volume, cu-ft = 2,267 cu-ft C = runoff coefficient = (0.75 x imp + 0.15) = 0.75 Imp = impervious fraction of drainage area (ranges from 0 to 1) = 0.80 D = storm depth (inches) = 0.85" A = tributary area (acres) = 0.98 acres*

*Project limits is 0.98 acres. For DCV based on DMA limits, see Section IV. 2.2.

IV.2 Site Design and Drainage Plan

The primary goal of site design principles and techniques is to reduce land development impacts on water quality and downstream hydrologic conditions. Benefits of site design include reductions in the size of downstream BMPs, conveyance systems, pollutant loading and hydromodification impacts.

IV.2.1 Site Design BMPs

The following section describes the site design BMPs that have been incorporated into this project.

Minimize Impervious Area

The project will minimize impervious area by providing all multi-level structures and incorporating landscaping within the project's exposed areas, thereby reducing runoff generated during rain events.

Maximize Natural Infiltration Capacity

The project will take advantage of the favorable native soils onsite and employ the use of Infiltration Wells to infiltrate the project's DCV.

Preserve Existing Drainage Patterns and Time of Concentration

The proposed drainage pattern is consistent with existing drainage patterns.

Disconnect Impervious Areas

Landscaping will be provided adjacent to walkways and other onsite areas to break up the project's impervious areas.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

The pre-project site consists of a hotel resort and retail shops. There are no vegetation and sensitive areas to preserve. All disturbed areas will be paved or landscaped.

Xeriscape Landscaping

Native and/or tolerant landscaping will be incorporated into the site design consistent with City guidelines.

IV.2.2 Drainage Management Areas

Per the TGD, the project site has been divided into Drainage Management Areas (DMAs) to be utilized for defining drainage areas tributary to the project's BMPs. DMA limits have been delineated based on the tributary drainage area for each BMP.

The design capture volume (DCV) and design flow rate utilizing the "Simple Method" described in the TGD Section III.3.1 and III.3.3 are provided below. Locations of DMAs and associated treatment BMPs are provided on the exhibits in Section VI. Per City of Anaheim BMP Guidelines, Pre-treatment for Focused Infiltration, Design Standard #2 – Size Biotreatment BMP for 50% of Flow/Volume, the proposed proprietary BMPs (Modular Wetland System) have been sized for 50% of the design flow rate, as the entire LID design volume is routed a focused Infiltration BMP, 48" RCP Detention System. Additional calculations and TGD Worksheets are provided in Attachment C of this WQMP.

DMA	Tributary Drainage Area (Ac.)	Imp.	C-value	Design Storm Depth (in.)	Simple Method DCV (cu-ft)	Tc (min)	Intensity (in/hr)	Q_{BMP} (cfs)
1	0.55	0.80	0.75	0.85	1272	5	0.26	0.11

IV.3 LID BMP Selection and Project Conformance Analysis

Per the 4th Term MS4 Storm Water Permit (Order No. R8-2009-0030, as amended by Order No. R8-2010-0062), Low Impact Development (LID) BMPs must be incorporated into design features and source controls to reduce project related storm water pollutants. The incorporation of LID BMPs into project design requires evaluation of LID measures in the following BMP hierarchy: infiltration, evapotranspiration, harvest/reuse and biotreatment.

The project proposes the use of infiltration BMPs to address the projects runoff pollutants.

IV.3.1 Hydrologic Source Controls (HSCs)

Hydrologic source controls (HSCs) can be considered to be an integration of site design practices and LID BMPs. The goal of HSCs is to reduce runoff volume for a given drainage area without reducing the site's true impervious area.

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	☐

Name	Included?
Blue roofs	☐
Impervious area reduction (e.g. permeable pavers, site design)	☐

IV.3.2 Infiltration BMPs

Infiltration BMPs are LID BMPs that capture, store and infiltrate storm water runoff. These BMPs are engineered to store a specified volume of water and have no design surface discharge (underdrain or outlet structure) until this volume is exceeded. Examples of infiltration BMPs include infiltration trenches, bioretention without underdrains, Infiltration Wells, permeable pavement, and underground infiltration galleries.

Based to the project's soil type (Type "A" and "B"), the project proposes the use of infiltration wells to address pollutants from project-related runoff. Supporting calculations are provided in Attachment C of this WQMP.

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

BMP Sizing

The proposed BMPs will be sized accordingly its tributary drainage area, as provided in the following table:

DMA	BMP System	$DCV_{SIMPLE.}$ (ft^3)	K_{DESIGN} (in/hr)[1]	DD (hrs)[2]	Capacity (ft^3)	Lat/Long
1	Proprietary Biofiltration (Pre-Treatment) to Subsurface Detention Facility (48" RCP) to Infiltration Well	1272	0.3	48	1272	33.817879°; -117.924742°

[1] *Assuming 0.3" inches per hour is included in this preliminary design and that actual infiltration testing shall be conducted during the Final WQMP stage.*
[2] *Assuming maximum 48 hour drawdown time*

The storage volume provided for the proposed Infiltration Well systems will consist of an underground storage system (Vault) capable of detaining the DMA's DCV and used for infiltration, which will then receive pre-treatment via proprietary filtration (or biofiltration).

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

Name	Included?
EVAPOTRANSPIRATION	
All HSCs; *See Section IV.3.1*	☐
Surface-based infiltration BMPs	☐
Biotreatment BMPs	☒
HARVEST & REUSE/ RAINWATER HARVESTING	
Above-ground cisterns and basins	☐
Underground detention	☐
Other:	☐

Evapotranspiration

Evapotranspiration BMPs are a class of retention BMPs that discharges stored volume predominately to ET, through some infiltration may occur. ET includes both evaporation and transpiration, and ET BMPs may incorporate one or more of these processes. BMPs must be designed to achieve the maximum feasible ET, where required to demonstrate that the maximum amount of water has been retained on-site. Since ET is not the sole process in the proposed BMPs, specific design and sizing criteria have not been developed for ET-based BMPs.

Harvest and Reuse

Harvest and Reuse (aka. Rainwater Harvesting) BMPs are LID BMPs that capture and store storm water runoff for later use. These BMPs are engineered to store a specified volume of water and have no design surface discharge until this volume is exceeded. Harvest and use BMPs include both above-ground and below-ground cisterns. Examples of uses for harvested water include irrigation, toilet and urinal flushing, vehicle washing, evaporative cooling, industrial processes and other non-potable uses.

The project does not propose the use of harvesting BMPs, as the project has selected the use of infiltration BMPs to meet the project's onsite LID requirements.

IV.3.4 Biotreatment BMPs

Biotreatment BMPs are a class of structural LID BMPs that treat suspended solids and dissolved pollutants in storm water using mechanisms characteristic of biologically active systems. These BMPs are considered treat and release facilities and include treatment mechanisms that employ soil microbes and plants. Additional benefits of these BMPs may include aesthetic enjoyment, recreational use, wildlife habitat and reduction in storm water volume.

BIOTREATMENT		
ID	Name	Included?
BIO-1	Bioretention with underdrains	☐
	Stormwater planter boxes with underdrains	☐
	Rain gardens with underdrains	☐
BIO-5	Constructed wetlands	☐
BIO-2	Vegetated swales	☐
BIO-3	Vegetated filter strips	☐
BIO-7	Proprietary vegetated biotreatment systems	☒
BIO-4	Wet extended detention basin	☐
BIO-6	Dry extended detention basins	☐

In following the hierarchy of LID BMPs for biotreatment, employment of "natural" and non-proprietary BMPs were considered. However, due to the lack of landscaping area and usable parkway area, and the difficulty in conveying gutter flow to parkway landscaping areas (grade differential), the project proposes to employ proprietary biotreatment BMPs for pretreatment.

DMA 1, runoff generated from the southeast portion of the site (roof areas, courtyards, drive aisles, walkways, etc.) will be conveyed to a grate inlet located at the southeast corner and conveyed to a Modular Wetland System for pretreatment then to a subsurface detention facility (48" RCP) located along the northwest boundary near Ball Road, then to 3 Infiltration Drywells.

Runoff generated from the northwest portion of the site will flow northerly to a proposed catch basin located at the Ball Road entrance, then to a Modular Wetland System and to 3 Infiltration Drywells. High flows will be conveyed to a proposed inlet in the northwest corner, then connect to an existing 7' x 7' RCB in West Ball Road.

BIOTREATMENT BMP SUMMARY					
DMA	BMP System	Tributary Drainage Area	Design Intensity (in/hr)	Qdesign	MWS- L-4-4 Capacity
1	2 - Modular Wetland System (MWS-L-4-4)	0.55	0.26	0.11	0.104

**See Attachment C for BMP Calculations for DMA 1 and Sub-DMA's for each of the Modular Wetland Systems. Per City of Anaheim BMP Guidelines, Pre-treatment for Focused Infiltration, Design Standard #2 – Size Biotreatment BMP for 50% of Flow/Volume, the proposed proprietary BMPs (Modular Wetland System) have been sized for 50% of the design flow rate, as the entire LID design volume is routed to a focused Infiltration BMP, 48" RCP Detention System.*

IV.3.5 Hydromodification Control BMPs

Not applicable. Per discussion in Section II.3 of this WQMP, the project does not have hydrologic conditions of concern.

IV.3.6 Regional/Sub-Regional LID BMPs

Not applicable. The project is able to meet LID requirements onsite.

IV.3.7 Treatment Control BMPs

Not applicable. The project is able to meet LID requirements onsite.

IV.3.8 Non-structural Source Control BMPs

The Table below indicates all Non-Structural Source Control BMPs to be utilized in the project. Discussions of the selected BMPs are provided in the BMP Inspection and Maintenance Responsibility Matrix provided in Section V of this WQMP.

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	☒	☐	

Non-Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	Proposed facility will not generate waste subject to Title 22 CCR Compliance.
N6	Local Industrial Permit Compliance	☐	☒	Project is not industrial.
N7	Spill Contingency Plan	☐	☒	Proposed facilities will not generate waste or store materials subject to the requirements of Chapter 6.95 of the CA Health and Safety Code.
N8	Underground Storage Tank Compliance	☐	☒	None proposed.
N9	Hazardous Materials Disclosure Compliance	☐	☒	Proposed project will not store or generate hazardous materials subject to agency requirements.
N10	Uniform Fire Code Implementation	☐	☒	Proposed facility does not propose to store toxic or highly toxic compressed gases.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☒	☐	
N14	Common Area Catch Basin Inspection	☒	☐	

Non-Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	Not in project scope.

A discussion of each selected Non-Structural Source Control BMP is provided in the following section. The implementation of each BMP is described in the Inspection and Maintenance Responsibility Matrix provided in Section V of this WQMP as well as the Operation and Maintenance Plan provided in Attachment B.

N1 Education for Property Owners, Tenants and Occupants – Educational materials will be provided to commercial tenants by owner and periodically thereafter by the POA to inform them of their potential impacts to downstream water quality. Materials include those described in Section VII of this WQMP and provided in the Final WQMP.

N2 Activity Restrictions – Activity restrictions to minimize potential impacts to water quality and with the purpose of protecting water quality will be prescribed lease agreements (retail tenants) or other equally effective measure.

N3 Common Area Landscape Management – Maintenance activities for landscape areas shall be consistent with City, County and manufacturer guidelines for fertilizer and pesticide use (OC DAMP Section 5.5). Maintenance includes trimming, weeding and debris removal and vegetation planting and replacement. Stockpiled materials during maintenance activities shall be placed away from drain inlets and runoff conveyance devices. Wastes shall be properly disposed of or recycled.

N4 BMP Maintenance – Responsibility for implementation, inspection and maintenance of all BMPs (structural and non-structural) shall be consistent with the BMP Inspection and Maintenance Responsibilities Matrix provided in Section V of this WQMP, with documented records of inspections and maintenance activities completed.

N11 Common Area Litter Control – Litter control onsite will include the use of litter patrols, violation reporting and clean up during landscaping maintenance activities and as needed to ensure good housekeeping of the project's common areas.

N12 Employee Training – All employees, contractors and subcontractors of the resort and POA shall be trained on the proper use and staging of landscaping and other materials with the potential to impact runoff and proper clean up of spills and materials.

N13 Housekeeping of Loading Docks – The proposed loading docks and loading areas shall be inspected with use, with area kept in an orderly manner, following good housekeeping practices. Spills, debris and other waste materials shall be cleaned up and property disposed. Area shall be precluded from run-on and runoff as necessary.

N14 Common Area Catch Basin – As required by the TGD, at least 80% of the project's private drainage facilities shall be inspected, cleaned/maintained annually, with 100% of facilities inspected and maintained within a two-year period. Cleaning should take place in the late summer/early fall, prior to the start of the wet season. Records shall be kept to document annual compliance.

N15 Street Sweeping Private Streets and Parking Lots – The project's private drives and parking areas shall be swept, at minimum, on a weekly basis.

IV.3.9 Structural Source Control BMPs

The Table below indicates all Structural Source Control BMPs to be utilized in the project. Discussions of the selected BMPs are provided in text following the table below and in the BMP Inspection and Maintenance Responsibility Matrix provided in Section V of this WQMP.

Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outdoor material storage areas proposed for project use.
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	☐	☒	Not applicable. No large slopes (hillside landscaping) proposed.

Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☒	Not applicable. Project resides in SARWQCB.
S6	Dock areas	☒	☐	
S7	Maintenance bays	☐	☒	None proposed.
S8	Vehicle wash areas	☐	☒	None proposed.
S9	Outdoor processing areas	☐	☒	None proposed.
S10	Equipment wash areas	☐	☒	None proposed.
S11	Fueling areas	☐	☒	None proposed.
S12	Hillside landscaping	☐	☒	None proposed.
S13	Wash water control for food preparation areas	☒	☐	
S14	Community car wash racks	☐	☒	None proposed.

A discussion of each selected Structural Source Control BMP is provided in the following section. The implementation of each BMP and the responsible party are described in the Inspection and Maintenance Responsibility Matrix provided in Section V of this WQMP as well as the Operation and Maintenance Plan provided in Attachment B.

S1 Storm Drain Stenciling – Storm drain stencils or signage prohibiting dumping and discharge of materials ("No Dumping – Drains to Ocean") shall be provided adjacent to each of the project's proposed inlets. The stencils shall be inspected and restenciled as needed to maintain legibility.

S3 Designated Trash Enclosure – Designated trash enclosure areas shall be covered and designed to preclude trash and pad area from run-on, run-off and wind. Any drains within area shall be connected to the sanitary sewer system, with proper approval from the sewer company. Site shall be inspected with use to ensure all materials are disposed of properly.

S4 (SD-10, SD-12) Use Efficient Irrigation Systems and Landscape Design – In conjunction with routine landscaping maintenance activities, inspect irrigation for signs of leaks, overspray and repair or adjust accordingly. Adjust system cycle to accommodate seasonal fluctuations in water demand and temperatures. Ensure use of native or drought tolerant/non-invasive plant species to minimize water consumption.

S6 Dock Areas – Loading areas shall be kept in an orderly manner and designed to prevent the discharge of runoff. Area shall be inspected with use and cleaned up as soon as possible following any spills or waste accumulation. If wash-down of the area is employed, all wash water shall be prevented from entering the storm drain system.

S13 Wash Water Control for Food Preparation Areas – All proposed food service facilities will be equipped with indoor sinks and contained areas for disposal of wash waters containing food wastes. These facilities shall be connected to the sanitary sewer system.

IV.4 Alternative Compliance Plan (If Applicable)

IV.4.1 Water Quality Credits

The project does not propose the use of water quality credits as it is able to meet LID requirements onsite.

<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</td><td>☐</td><td>☐</td><td>☐ Live-work developments, a</td><td>☐ In-fill projects, the</td></tr>
</table>

dedication of undeveloped portions to parks, preservation areas and other pervious uses.	Developments in a city center area.	Developments in historic districts or historic preservation areas.	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.	conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.
Calculation of Water Quality Credits (if applicable)	Not applicable to project.			

IV.4.2 Alternative Compliance Plan Information

Not applicable. The project is able to meet LID BMP requirements onsite to address pollutants in project related storm water runoff.

Section V Inspection/Maintenance Responsibility for BMPs

Refer to the BMP inspection and maintenance responsibility matrix below. Inspection and maintenance records must be kept for a minimum of five years for inspection by the regulatory agencies.

A Property Owner association (POA) shall be established for this project. The POA shall be responsible the long-term funding, inspection and maintenance of all BMPs prescribed in this WQMP.

Until the project's POA has been established, all responsibilities pertaining to this WQMP shall be that of the project developer, R3 REAL ESTATE DEVELOPERS. Contact for the interim responsible party is as follows:

Responsible Party: _____

Contact Name: _____

Address: _____

Phone: _____

Email: _____

Inspection and maintenance activities, frequencies and responsibilities for the project's selected BMPs are provided in the following BMP matrix. Inspection and maintenance records must be kept for a minimum of five years for inspection by the regulatory agencies.

BMP INSPECTION & MAINTENANCE RESPONSIBILITIES MATRIX				
BMP		Inspection/ Maintenance Activities Required	Minimum Frequency	Reponsible Party(s)
HYDROLOGIC SOURCE CONTROL BMPs				
HSC-2	Impervious Area Dispersion	Inspect for standing water and that water infiltrates into underlying soil or evaporates completely.	After significant storm events and monthly with landscaping	Owner/POA
HSC-3	Street Trees	Inspect for overall plant health. Trim vegetation as needed. Replace trees as needed.	Monthly with landscaping	Owner/POA

BMP INSPECTION & MAINTENANCE RESPONSIBILITIES MATRIX				
BMP		Inspection/ Maintenance Activities Required	Minimum Frequency	Reponsible Party(s)
INFILTRATION BMPs				
INF-5	Infiltration Well	Inspect for standing water inside Infiltration Well shaft and that water infiltrates into underlying soil completely. Inspect and remove accumulated sediment and debris in pre-treatment chamber as needed.	After significant storm events, semi-annual and as needed.	Owner/POA
BIOTREATMENT BMPs				
BIO-7	Proprietary Biotreatment (Modular Wetland System or approved equivalent)	Inspect unit for accumulated debris and sediment and plant health; remove trash from screening device and separation chamber; trim vegetation. Remove sediment from pre-chamber, replace pre-filter cartridge media and drain down filter media. Replace wetland media.	Annually 20 years	Owner/POA
INF-7	Subsurface Detention Vault	Inspect for standing water and that water infiltrates into underlying soil completely. Inspect and remove accumulated sediment and debris in pre-treatment chamber as needed	After significant storm events, semi-annual and as needed.	Owner/POA
NON-STRUCTURAL SOURCE CONTROL BMPs				
N1	Education for Property Owners, Tenants and Occupants	Educational materials will be provided to retail tenants commercial tenants by the owner and thereafter on an annual basis by the POA. Materials shall include those provided in Attachment A of this WQMP and any updated materials.	Close of escrow, lease and annually	Owner/POA

BMP INSPECTION & MAINTENANCE RESPONSIBILITIES MATRIX				
BMP		Inspection/ Maintenance Activities Required	Minimum Frequency	Reponsible Party(s)
N2	Activity Restrictions	The Owner will prescribe activity restrictions to protect surface water quality through lease agreements or other equally effective measure, for the property. Upon takeover of site responsibilities by the POA, the POA shall be responsible for ensuring residents and tenant compliance.	Ongoing	Owner/POA
N3	Common Area Landscape Management	Maintenance shall be consistent with County requirements, plus fertilizer and/or pesticide usages shall be consistent with City, County and manufacturer guidelines for use of fertilizers and pesticides (OC DAMP Section 5.5). Maintenance includes mowing, weeding, and debris removal on a monthly basis. Trimming, replanting and replacement of mulch shall be performed on an as-needed basis. Trimmings, clippings, and other waste shall be properly disposed of off-site in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and drain inlets.	Monthly	Owner/POA
N4	BMP Maintenance	Maintenance of BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be maintained by the responsible party and documented with the WQMP, and shall be available for review upon request.	Ongoing	Owner/POA

BMP INSPECTION & MAINTENANCE RESPONSIBILITIES MATRIX				
BMP		Inspection/ Maintenance Activities Required	Minimum Frequency	Reponsible Party(s)
N11	Common Area Litter control	Litter patrol, violations investigation, reporting and other litter control activities shall be performed in conjunction with maintenance activities. Littler collection and removal shall be performed on a weekly basis.	Ongoing patrols. Weekly (minimum) pick up and removal	Owner/POA
N12	Employee Training	All employees, contractors and subcontractors of the POA shall receive training regarding the potential impacts of their actions on downstream water quality, proper material use and staging (for landscaping and other materials) and proper clean up material	Annually and as needed	Owner/POA
N13	Housekeeping of Loading Docks	The proposed loading docks and loading areas shall be inspected with use, with area kept in an orderly manner, following good housekeeping practices. Pills, debris and other waste materials shall be cleaned up and property disposed. Area shall be precluded from run-on and runoff as necessary.	Daily with Use	Owner/POA
N14	Common Area Catch Basin Inspection	Catch basin inlets, area drains, swales, curb-and-gutter systems and other drainage systems shall be inspected prior to October 1st of each year and after large storm events. If necessary, drains shall be cleaned prior to any succeeding rain events. 80% of facilities shall be inspected and cleaned annually, with 100% of facilities inspected and maintained	Annually	Owner/POA

BMP INSPECTION & MAINTENANCE RESPONSIBILITIES MATRIX				
BMP		Inspection/ Maintenance Activities Required	Minimum Frequency	Reponsible Party(s)
N15	Street Sweeping Private Streets	Streets shall be swept on a weekly basis.	Weekly	Owner/POA
STRUCTURAL SOURCE CONTROL BMPs				
S1 SD-13	Provide storm drain system stencilling and signage	Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be re-stenciled as soon as possible.	Annually	Owner/POA
S3 SD-32	Designated Trash Enclosure	Designated trash enclosure areas shall be covered and designed to preclude trash and pad area from run-on, run-off and wind. Any drains within area shall be connected to the sanitary sewer system, with proper approval from the sewer company. Site shall be inspected with use to ensure all materials are disposed of properly.	Daily with Use	Owner/POA
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly 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, weather, day or night time temperatures based on system specifications and local climate patterns.	Monthly	Owner/POA

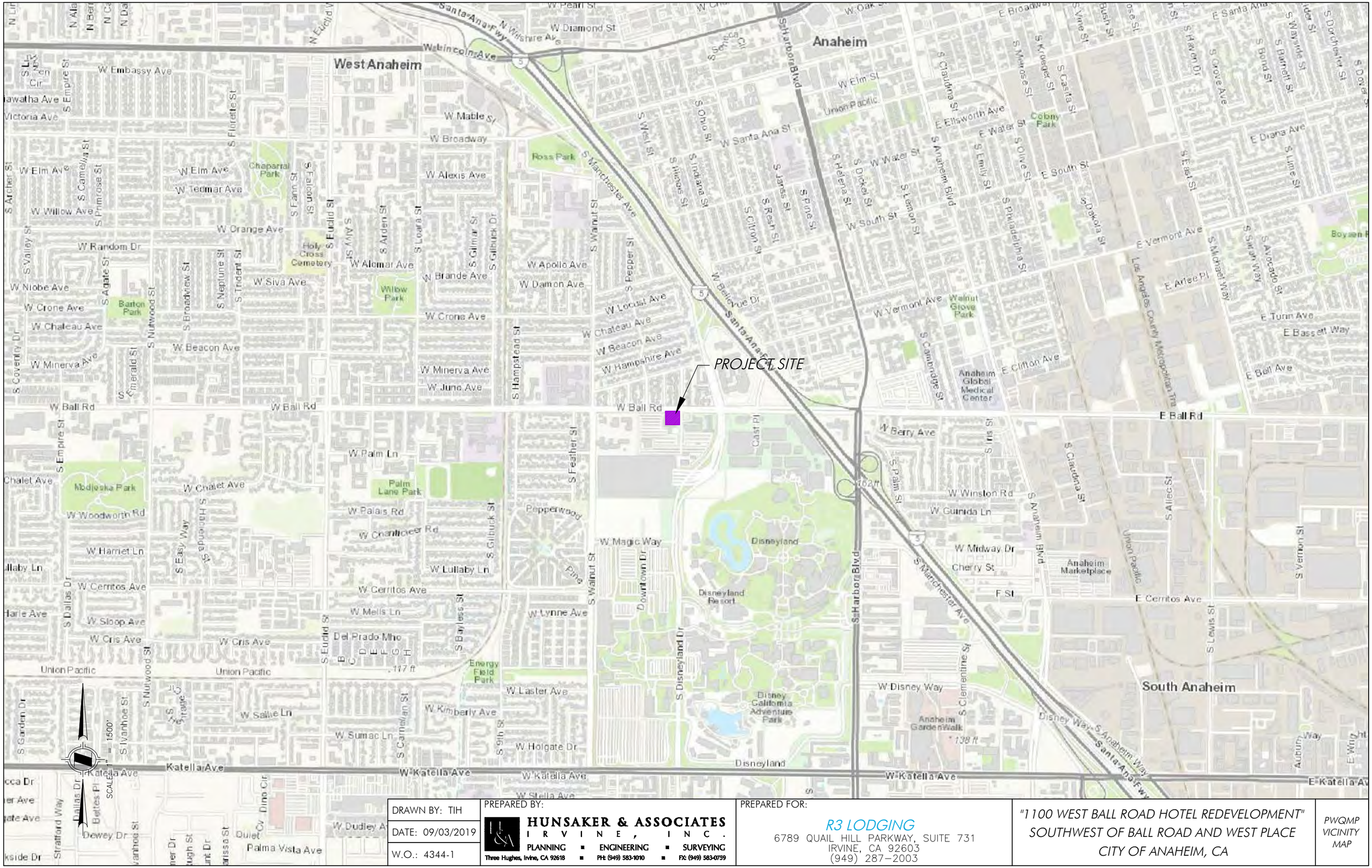
BMP INSPECTION & MAINTENANCE RESPONSIBILITIES MATRIX				
BMP		Inspection/ Maintenance Activities Required	Minimum Frequency	Reponsible Party(s)
S6	Dock Areas	Loading areas shall be kept in an orderly manner and designed to prevent the discharge of runoff. Area shall be inspected with use and cleaned up as soon as possible following any spills or waste accumulation. If wash-down of the area is employed, all wash water shall be prevented from entering the storm drain system.	Daily with Use	Owner/POA
S13	Wash Water Controls for Food Preparation Areas	All proposed food service facilities will be equipped with indoor sinks and contained areas for disposal of wash waters containing food wastes. These facilities shall be connected to the sanitary sewer system.	Daily with Use	Owner/POA

Section VI Site Plan and Drainage Plan

The exhibits provided in this section are to illustrate the post construction BMPs prescribed within this WQMP. Drainage flow information of the proposed project, such as general surface flow lines, concrete or other surface drainage conveyances, and storm drain facilities are also depicted. All structural source control and treatment control BMPs are shown as well.

Exhibits

- Vicinity Map
- Preliminary WQMP Site Plan



DRAWN BY: TIH	PREPARED BY: HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING ■ ENGINEERING ■ SURVEYING Three Hughes, Irvine, CA 92618 ■ PH: (949) 583-1010 ■ FX: (949) 583-0759	PREPARED FOR: R3 LODGING 6789 QUAIL HILL PARKWAY, SUITE 731 IRVINE, CA 92603 (949) 287–2003	"1100 WEST BALL ROAD HOTEL REDEVELOPMENT" SOUTHWEST OF BALL ROAD AND WEST PLACE CITY OF ANAHEIM, CA	PWQMP VICINITY MAP
DATE: 09/03/2019				
W.O.: 4344-1				

DATE: Sep. 03, 2019 11:30:18 AM FILE: F:\1093\Planning\SY_WQ\WQMP\Exhibits\PWQMP_VIC BALL ROAD HOTEL.dwg

BALL ROAD

NAP

LIMITS OF UNDERGROUND PARKING (LEVEL 1 & 2)

ELEV.=136.8

STOP

(134.75 FL)

10%

5%

SED SIDEWALK

48" RCP

4.0%

ONE WAY SERVICE DRIVEWAY

2.0%

1.0%

LIMITS OF UNDERGROUND PARKING (LEVEL 1 & 2)

KITCHEN

DMA1
0.55

WATER FEATURE

HP

5%

0.9%

LAUNDRY

LOBBY

STORAGE

BREAK ROOM

ELEV.= LIMITS OF UNDERGROUND 138.5' PARKING (LEVEL 1&2)

4:1

1:2

WEST STREET

WOMEN'S RESTROOM

MEN'S RESTROOM

ELECTRIC ROOM

PARKING GARAGE ENTRY

RAMP DOWN TO PARKING

6%

SWITCH GEAR LOCATION

ELECTRIC TRANS. 14'X25' ESMT.

14'

25'

3'

LOW FLOW LINE

LIMITS OF UNDERGROUND PARKING (LEVEL 1)

LIMITS OF UNDERGROUND PARKING (LEVEL 2)

ONE WAY SERVICE DRIVEWAY

0.7%

2%

136.80FS

12" PVC

NAP

NAP

NAP

NAP

LEGEND

- PROJECT LIMITS (GROSS AREA)
- PROJECT LIMITS (NET AREA)
- NAP — NOT A PART
- DRAINAGE MANAGEMENT AREA (DMA) LIMITS
- DMA / ACRE — DMA DESIGNATION AND ACRES
- ONSITE FLOW DIRECTION
- OFFSITE FLOW DIRECTION
- PROPOSED STORM DRAIN SYSTEM
- OFFSITE STORM DRAIN SYSTEM
- PROJECT CATCH BASIN INLET WITH BMPS
  S1 STORM DRAIN SYSTEM STENCILING/SIGNAGE
  FULL TRASH CAPTURE BMP (TYPE TBD)
- OFFSITE CATCH BASIN INLET
- COMMON AREA LANDSCAPING WITH BMPS
  S4 EFFICIENT IRRIGATION SYSTEM AND LANDSCAPE DESIGN
- WALKWAY AND PAVEMENT AREAS
- HOTEL BUILDING FOOTPRINT
- PROPOSED 48" RCP (DETENTION SYSTEM)
- WATER FEATURE/FOUNTAIN
- INF-5 INFILTRATION WELL
- BIO-7 PROPRIETARY BIOFILTRATION (MWS OR EQUIVALENT) PRE-TREATMENT
- S3 TRASH ENCLOSURE
- DISCHARGE POINT
- S13 WASH WATER CONTROLS FOR FOOD PREPARATION AREA
- N15 STREET SWEEPING PRIVATE STREETS/PARKING LOTS
- L — LOADING AREA
- GRATE INLET
- JUNCTION STRUCTURE

GRAPHIC SCALE
0 10 20
(IN FEET)
1 INCH = 10 FT.

PRELIMINARY WATER QUALITY MANAGEMENT PLAN - SITE PLAN

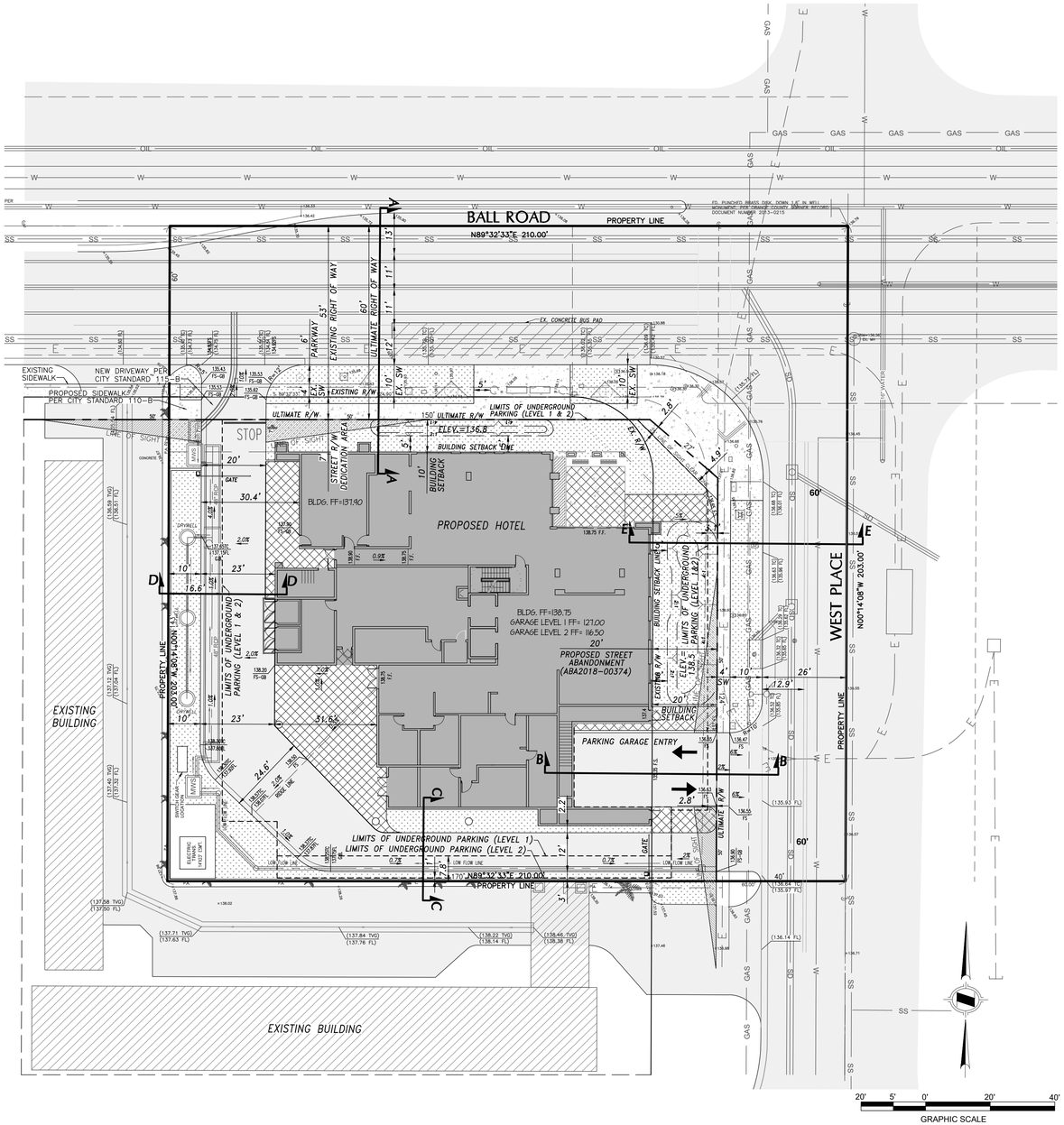
APPLICANT:
R3 LODGING
6789 QUAIL HILL PARKWAY, SUITE 731
IRVINE, CA 92603
(949) 287-2003

PREPARED BY:
HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

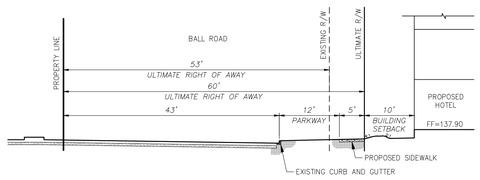
"1100 WEST BALL ROAD" - HOTEL REDEVELOPMENT
SOUTHWEST OF WEST BALL ROAD AND WEST STREET
CITY OF ANAHEIM, CA

DRAFTED BY:	DATE:	W.O. NO:	SHEET NO:
TIH	05/14/2020	4344-1	1 OF 1

DATE: May. 14, 2020 09:04:19 AM FILE: F:\1093\Planning\SY_WQ\WQMP\Exhibits\PWQMP_SP_BALL ROAD HOTEL.dwg

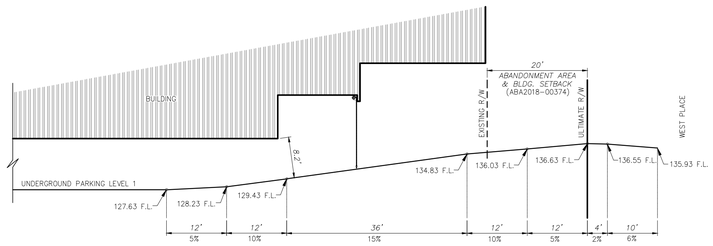


SECTIONS



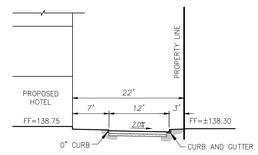
SECTION A–A

BALL ROAD (PUBLIC)
NTS



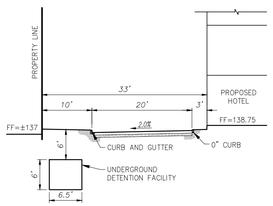
SECTION B–B

RAMP FROM WEST PLACE TO UNDERGROUND PARKING
NTS



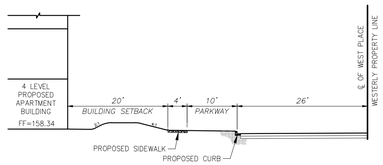
SECTION C–C

UTILITY ACCESS DRIVEWAY
NTS



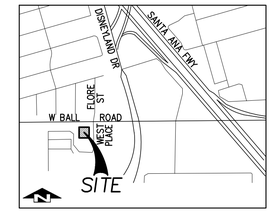
SECTION D–D

UTILITY ACCESS DRIVEWAY
NTS



SECTION E–E

WEST PLACE
PRIVATE



VICINITY MAP

LEGEND

- PROJECT BOUNDARY/PROPERTY LINE
- ULTIMATE R/W
- EXISTING R/W
- EASEMENT LINE
- CENTERLINE
- UNDERGROUND PARKING LIMITS
- BUILDING SETBACK LINE
- PROPOSED SD LINE
- JUNCTION STRUCTURE

NOTES

1. EXISTING STRUCTURES AND SURFACE PARKING AREAS WILL BE DEMOLISHED PRIOR TO CONSTRUCTION PURSUANT TO AN APPROVED DEMOLITION PERMIT.
2. NO GRADING SHALL COMMENCE WITHOUT FIRST OBTAINING A GRADING PERMIT ISSUED BY THE CITY OF ANAHEIM PUBLIC WORKS DEPARTMENT, UNLESS IT IS EXEMPT PER THE CITY OF ANAHEIM MUNICIPAL CODE.
3. ALL PROPOSED GRADING, EROSION CONTROL AND DRAINAGE SHALL BE CONSISTENT WITH THE REQUIREMENTS SET FORTH IN TITLE 17 OF THE CITY OF ANAHEIM MUNICIPAL CODE, THE STATE CONSTRUCTION SAFETY ORDERS, AND ANY SPECIAL REQUIREMENTS OF THE PERMIT.
4. ALL IMPROVEMENTS WITHIN THE PUBLIC RIGHT–OF–WAY SHALL REQUIRE A RIGHT–OF–WAY CONSTRUCTION PERMIT.
5. ALL IMPROVEMENTS TO BE CONSTRUCTED PER CITY OF ANAHEIM STANDARD DETAILS, UNLESS OTHERWISE APPROVED BY CITY ENGINEER.
6. CONSTRUCTION AND GRADING MAY BE DONE IN PHASES.
7. THE R100B(CA) SIGN, INDICATING TOW AWAY ZONE, SHOULD BE INSTALLED AT THE ENTRANCE. AS WELL AS, THE PRIVATE PROPERTY SIGN CONSISTENT WITH ANAHEIM MUNICIPAL CODE SECTION 4.75.090 FOR THE PURPOSES OF TOW–AWAY OUTSIDE OF DISABLED PARKING STALLS.
8. A CASH IN–LIEU PAYMENT SHALL BE REQUIRED FOR THE FUTURE CURB WIDENING OF BALL ROAD TO INCLUDE THE BIKE LANE AND ALL OTHER IMPROVEMENTS THAT WILL BE PART OF THE CURB RELOCATION ALONG THE PROPERTY'S FRONTAGE.
9. DURING THE CONSTRUCTION PHASE OF THIS PROJECT, THE INFILTRATION SYSTEM SHALL BE PHYSICALLY SEPARATED/PROTECTED FROM RUNOFF AND/OR ANY OTHER MATERIAL/LIQUID/DEBRIS.
10. SHORING OPERATIONS SHALL BE LIMITED TO THE ON–SITE LOT AREAS AND SHALL NOT ENCROACH INTO THE PUBLIC RIGHT OF WAY. NO PERMANENT SHORING TIE BACKS OR SOIL NAILS ARE ALLOWED IN THE PUBLIC ROW.
11. EXISTING TREES ON BALL RD. WILL NEED TO BE REMOVED OR RELOCATED PER CITY STANDARDS 520–A, S30–A & 117.

ACREAGE SUMMARY:

PROJECT BOUNDARY = 42,630 S.F. or 0.98 AC.
PARCEL 1 = 24,119 S.F. or 0.55 AC.
STREET R/W DEDICATION AREA = 958 S.F. or 0.02 AC.
STREET R/W ABANDONMENT AREA = 2,713 S.F. or 0.06 AC.

FOR REFERENCE ONLY

DATE: JUNE 10, 2020

NO.	DATE	REVISIONS	APPROVED

DRAWN BY: LP
DESIGNED BY: AO
CHECKED BY: AO/TF

PREPARED FOR:
R3 LODGING
6789 QUAIL HILL PARKWAY
SUITE 731
IRVINE, CA 92603
(949) 287–2003
CONTACT: RAJ PATEL

PREPARED BY:
HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

1100 W. BALL ROAD
HOTEL REDEVELOPMENT
CONCEPTUAL GRADING PLAN
City of Anaheim

SHEET
C-2

W.O.: 4344-1 BALL ROAD HOTEL

FILE: F:\1093\Engineering\Site Plan\C-2 CONCEPTUAL GRADING.dwg

Section VII Educational Materials

Education Materials			
Residential Material (http://www.ocwatersheds.com)	Check If Applicable	Business Material (http://www.ocwatersheds.com)	Check If Applicable
The Ocean Begins at Your Front Door	☐	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☒
Homeowners Guide for Sustainable Water Use	☐	Proper Maintenance Practices for Your Business	☒
Household Tips	☐	Other Material	Check If Attached
Proper Disposal of Household Hazardous Waste	☐		
Recycle at Your Local Used Oil Collection Center (North County)	☐		☐
Recycle at Your Local Used Oil Collection Center (Central County)	☐		☐
Recycle at Your Local Used Oil Collection Center (South County)	☐		☐
Tips for Maintaining a Septic Tank System	☐		☐
Responsible Pest Control	☐		☐
Sewer Spill	☐		☐
Tips for the Home Improvement Projects	☐		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☐		☐
Tips for Pet Care	☐		☐
Tips for Pool Maintenance	☐		☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐		☐
Tips for Projects Using Paint	☐		☐

Attachment A

Educational Materials

(Educational materials to be provided in Final WQMP)

Attachment B

O & M Plan

Operations and Maintenance (O&M) Plan

Water Quality Management Plan

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Non-Structural Source Control BMPs			
Yes	**N1. Education for Property Owners, Tenants and Occupants** Educational materials will be provided to commercial tenants by the owner and thereafter on an annual basis by the POA. Materials shall include those provided in Attachment A of this WQMP and any updated materials.	At lease signing and annually thereafter.	Owner/POA

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N2. Activity Restrictions** The Owner will prescribe activity restrictions to protect surface water quality, through, lease agreements or other equally effective measure, for the property. Upon takeover of site responsibilities by the POA, the POA shall be responsible for ensuring residents and tenant compliance.	Ongoing	Owner/POA

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N3. Common Area Landscape Management** Maintenance shall be consistent with County requirements, plus fertilizer and/or pesticide usages shall be consistent with County guidelines for use of fertilizers and pesticides (OC DAMP Section 5.5). Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting and replacement of mulch shall be performed on an as-needed basis. Trimmings, clippings, and other waste shall be properly disposed of off-site in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and drain inlets.	Monthly	Owner/POA
Yes	**N4. BMP Maintenance** Maintenance of BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be maintained by the responsible party and documented with the WQMP, and shall be available for review upon request.	Ongoing, as prescribed per WQMP.	Owner/POA
No	**N5. Title 22 CCR Compliance** Not applicable to residential projects.		

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	**N6. Local Water Quality Permit Compliance** Not applicable. No local water quality permits are required for the operation of the project.		
No	**N7. Spill Contingency Plan** Not applicable to residential projects.		
No	**N8. Underground Storage Tank Compliance** Not applicable. None onsite.		
No	**N9. Hazardous Materials Disclosure Compliance** Not applicable to residential projects.		
No	**N10. Uniform Fire Code Implementation** Not applicable to residential projects.		
Yes	**N11. Common Area Litter Control** Litter patrol, violations investigation, reporting and other litter control activities shall be performed in conjunction with landscape maintenance activities.	Ongoing patrols. Weekly (minimum) pick up and removal. Monthly inspections with landscaping maintenance.	Owner/POA
Yes	**N12. Employee Training** All employees, contractors and subcontractors of the resort and POA shall receive training regarding the potential impacts of their actions on downstream water quality, proper material use and staging (for landscaping and other materials) and proper clean up material	Annually and as needed	Owner/POA

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N13. Housekeeping of Loading Docks** The proposed loading docks and loading areas shall be inspected with use, with area kept in an orderly manner, following good housekeeping practices. Pills, debris and other waste materials shall be cleaned up and property disposed. Area shall be precluded from run-on and runoff as necessary.	Daily with use	Owner/POA and Tenants
Yes	**N14. Common Area Catch Basin Inspection** Catch basin inlets, area drains, swales, curb-and-gutter systems and other drainage systems shall be inspected prior to October 1st of each year and after large storm events. If necessary, drains shall be cleaned prior to any succeeding rain events. 80% of facilities shall be inspected and cleaned annually, with 100% of facilities inspected and maintained	Annually	Owner/POA
Yes	**N15. Street Sweeping Private Streets and Parking Lots** Streets must be swept at minimum, on a weekly and as needed basis.	Weekly and as needed	Owner/POA

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Structural Source Control BMPs			
Yes	**S1. Provide Storm Drain System Stenciling and Signage** Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be re-stenciled as soon as possible.	Annually	Owner/POA
No	**S2. Design Outdoor Hazardous Material Storage Areas to Reduce Pollutant Introduction** Not applicable. No outdoor storage of hazardous materials onsite.		
Yes	**S3. Design Trash Enclosures to Reduce Pollutant Introduction** Designated trash enclosure areas shall be covered and designed to preclude trash and pad area from run-on, run-off and wind. Any drains within area shall be connected to the sanitary sewer system, with proper approval from the sewer company. Site shall be inspected with use to ensure all materials are disposed of properly.	Daily with use	Owner/POA and Tenants

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**S4. Use Efficient Irrigation Systems and Landscape Design** In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly 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, weather, day or night time temperatures based on system specifications and local climate patterns.	Monthly	Owner/POA
No	**S5. Protect Slopes and Channels** Not applicable. Site is flat.		
Yes	**S6. Loading Dock Areas** Loading areas shall be kept in an orderly manner and designed to prevent the discharge of runoff. Area shall be inspected with use and cleaned up as soon as possible following any spills or waste accumulation. If wash-down of the area is employed, all wash water shall be prevented from entering the storm drain system.	Daily with Use	Owner/POA and Tenants
No	**S7. Maintenance Bays and Docks** Not applicable. None proposed.		
No	**S8. Vehicle Wash Areas** Not applicable. None proposed.		

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	**S9. Outdoor Processing Areas** Not applicable. No outdoor processing onsite.		
No	**S10. Equipment Wash Areas** Not applicable. No wash areas onsite.		
No	**S11. Fueling Areas** Not applicable. No fueling areas onsite.		
No	**S12. Site Design and Landscape Planning (Hillside Landscaping)** Not applicable. Project is not hillside development.		
Yes	**S13. Wash Water Controls for Food Preparation Areas** All proposed food service facilities will be equipped with indoor sinks and contained areas for disposal of wash waters containing food wastes. These facilities shall be connected to the sanitary sewer system.	Daily with Use	Owner/POA and Tenants
No	**S14. Community Car Wash Racks** Not applicable. No community car wash areas onsite.		

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Low Impact Development BMPs			
	BIO-7 Proprietary Biotreatment (Modular Wetland System or approved equivalent) – Inspect unit for accumulated debris and sediment and plant health; remove trash from screening device and separation chamber; trim vegetation. Remove sediment from pre-chamber, replace pre-filter cartridge media and drain down filter media. Replace soil media. **INF-5 Infiltration Wells (Maxwell System by Torrent Resources)** – Inspect for standing water after storm events. Clean out pre-treatment area as needed for sediment and trash/debris.	Annually 5-10 years or as needed After significant storm events, semi-annual and as needed.	Owner/POA
	INF-7 Subsurface Detention System	After significant storm events, semi-annual and as needed.	Owner/POA

Required Permits

No additional permits are necessary for the operation and maintenane of the proposed BMPs.

Forms to Record BMP Implementation, Maintenance, and Inspection

The form that will be used to record implementation, maintenance, and inspection of BMPs is attached.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Attachment C

BMP Calculations and Details

BMP Calculations

Worksheet B: Simple Design Capture Volume Sizing Method (DMA 1)

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.85	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.85	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	0.55	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	0.80	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.75	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	1272	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (Appendix VII)	$K_{measured}$=	0.3	In/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	N/A	
3	Calculate design infiltration rate, $K_{design} = K_{measured} / S_{final}$	K_{design}=	0.3	In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	48	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	1.2	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	1,060	sq-ft
Calculations:				

Kdesign assuming 0.3 inches per hour until site-specific infiltration rates are available in the Final WQMP.

Describe system: Media-Based Filtration (MWS 4x4 unit) pre-treatment discharging to 102' of 48" RCP (detention) to 4' Infiltration Well with 30' of infiltration shaft depth.

Provide drawdown time calculations per applicable BMP Fact Sheet:

DCV_{simple} = 1,272 cu-ft;
Infiltration Well cfs = 0.0026 cfs (Total infiltration surface area / FPS; where K_{design} = 0.3in/hr;
Convert to fps = 0.00032; Surface Area 4' shaft =12.56 SF; Total SF area at 30' shaft depth = 376.80).
DD = (1,272 cu-ft) / (0.0026 cfs X 3600 hrs/s) = 135.99 hours
Number of Drywells Required: 135.03/48 hours = 2.8 Drywells (4' @ 30' Depth); 3 4' drywells will be provided

The minimum BMP footprint required is 1,060 sq-ft and the BMP footprint provided is 1,130 sq-ft.

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter the time of concentration, T_c (min) (See Appendix IV.2)	T_c=	5	
2	Using Figure III.4, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	0.27	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (Worksheet A)	Y_2=	0	%
5	Using Figure III.4, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency(Y_2), I_2	I_2=	0	
6	Determine the design intensity that must be provided by BMP $I_{design}= I_1-I_2$	I_{design}=	0.27	
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	0.55	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	0.80	
3	Calculate runoff coefficient, $C= (0.75 \times imp) + 0.15$	C=	0.75	
4	Calculate design flow rate, $Q_{design}= (C \times i_{design} \times A)$	Q_{design}=	0.11	cfs

Supporting Calculations

Describe system: Proprietary Biotreatment BMPs will be employed to pre-treat project runoff. Runoff will be conveyed as sheet flow, gutter flow and pipe flow to project retention BMP system. Two (2) MWS 4x4 unit pre-treatment to subsurface RCP detention to three (3) infiltration wells.

Per City of Anaheim BMP Guidelines, Pre-treatment for Focused Infiltration, Design Standard #2 – Size Biotreatment BMP for 50% of Flow/Volume, the proposed Modular Wetland Systems have been sized for 50% of the design flow rate, as the entire LID design volume is routed a focused Infiltration BMP, 48" RCP Detention System.

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Sub-DMAs:

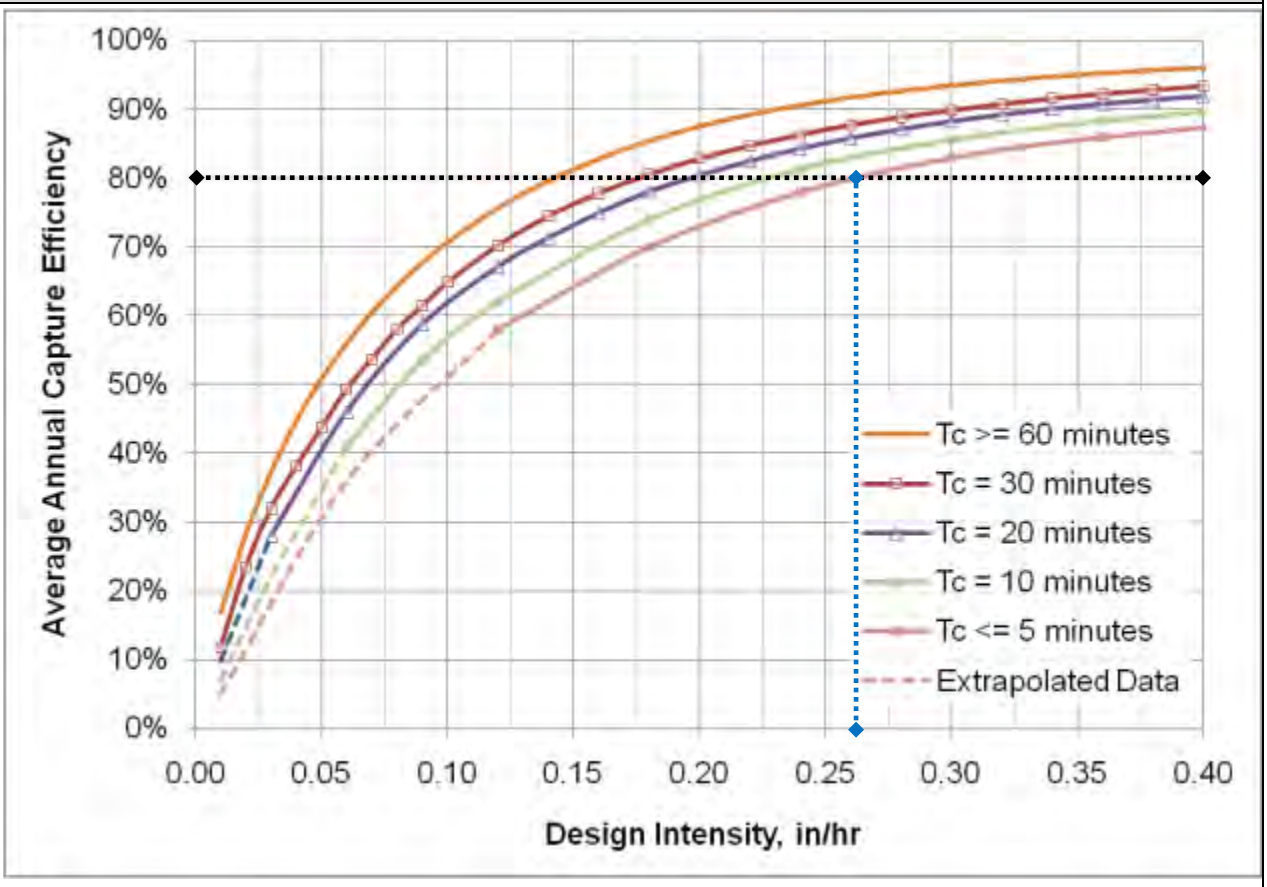
Southeast Portion of Site: 0.275 acres
0.75 x 0.27 x 0.275 = 0.055 cfs (Pretreatment Rate = 0.055 cfs/50%= 0.0275 cfs)

Northwest Portion of Site: 0.275 acres
0.75 x 0.27 x 0.275 = 0.055 cfs (Pretreatment Rate = 0.055 cfs/50% = 0.0275 cfs)

A MWS-L-4-4 is proposed for each sub DMA, this unit has a 0.104 cfs capacity.

Provide time of concentration assumptions: Assuming 5 minute time of concentration.

Graphical Operations



Feasibility Worksheets

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	*Yes*	*No*
1	Would Infiltration BMPs pose significant risk for groundwater related concerns? Refer to Appendix VII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.	x	
Provide basis: Based on TGD and County of Orange GIS data, there are no restrictions for infiltration.			
2	Would Infiltration BMPs pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level? (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert): The BMP can only be located less than 50 feet away from slopes steeper than 15 percent. The BMP can only be located less than eight feet from building foundations or an alternative setback. A study prepared by a geotechnical professional or an available watershed study substantiates that stormwater infiltration would potentially result in significantly increased risks of geotechnical hazards that cannot be mitigated to an acceptable level.		X
Provide basis: Per TGD, site is not located in plume or contamination area.			
3	Would infiltration of the DCV from drainage area violate downstream water rights?		X
Provide basis: No restrictions on water rights for project site.			
	Partial Infeasibility Criteria	*Yes*	*No*
4	Is proposed infiltration facility located on HSG D soils or the site geotechnical investigation identifies presence of soil characteristics which support categorization as D soils?		X
Provide basis: Per NRCS Web Soil Survey data, site resides on HSG Group A and B soils, Soil type also confirmed by geotechnical reports.			

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	*Yes*	*No*
5	Is measured infiltration rate below proposed facility less than 0.3 inches per hour? This calculation shall be based on the methods described in Appendix VII.		X
Provide basis: **Infiltration testing will be conducted during the Final WQMP stage. Assumed infiltration rate of 0.3 inches per hour will be applied to the BMP design for this Preliminary WQMP.**			
6	Would reduction of over pre-developed conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: **Project discharges to storm drains and channels that are not ephemeral.**			
7	Would an increase in infiltration over pre-developed conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: **Based on TGD and county GIS records, no restrictions on infiltration due to groundwater concerns.**			
Infiltration Screening Results (check box corresponding to result):			
8	Is there substantial evidence that infiltration from the project would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII) Provide narrative discussion and supporting evidence: **Per TGD and County of Orange GIS data, project is not located in an area where increase in I&I to the sanitary sewer is of concern.**		X
9	If any answer from row 1-3 is yes: infiltration of any volume is not feasible within the DMA or equivalent. Provide basis: **Yes, the site is a prior contamination site. But the site has been cleaned.**		

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	*Yes*	*No*
10	If any answer from row 4-7 is yes, infiltration is permissible but is not presumed to be feasible for the entire DCV. Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply. Provide basis: Answer to items are "no".		
11	If all answers to rows 1 through 11 are no, infiltration of the full DCV is potentially feasible, BMPs must be designed to infiltrate the full DCV to the maximum extent practicable. Provide basis: Project will infiltrate DCV.		

Summary of Groundwater-related Feasibility Criteria

1	Is project large or small? (as defined by Table C-2) circle one	Large		Small
2	What is the tributary area to the BMP?	A	0.55	acres
3	What type of BMP is proposed?	Subsurface Detention Pipe and Drywell		
4	What is the infiltrating surface area of the proposed BMP?	A_{BMP}	3 - 4' Drywell @ 30' (376.80 sq-ft)	sq-ft
5	What land use activities are present in the tributary area (list all) The project site is currently a vacant lot.			
6	What land use-based risk category is applicable?	L	M	H
7	If M or H, what pretreatment and source isolation BMPs have been considered and are proposed (describe all):			
8	What minimum separation to mounded seasonally high groundwater applies to the proposed BMP? See Appendix C.2 (circle one)	5 ft		10 ft

Summary of Groundwater-related Feasibility Criteria

9	Provide rationale for selection of applicable minimum separation to seasonally high mounded groundwater: Minimum separation from groundwater is more than 10 feet.		
10	What is the separation from the infiltrating surface to seasonally high groundwater? Unknown		ft
11	What is the separation from the infiltrating surface to mounded seasonally high groundwater? Unknown		ft
12	Describe assumptions and methods used for mounding analysis: Based on site exploration, groundwater was not encountered at a depth of 51 feet.		
13	Is the site within a plume protection boundary?	Y N N/A	
14	Is the site within a selenium source area or other natural plume area?	Y N N/A	
15	Is the site within 250 feet of a contaminated site?	Y N N/A	
16	If site-specific study has been prepared, provide citation and briefly summarize relevant findings: Refer to City of Anaheim Letter dated September 15, 1994 "Site Closure For Petroleum Hydrocarbon Contamination From Former Exxon Station #7-3724 Located at 1100 W. Ball Road, Anaheim CA" Findings from this letter stated that there is no apparent threat to groundwater. The general risk appraisal indicates that contamination that is still on-site does not pose a threat to groundwater. There is no apparent threat to public health.		
17	Is the site within 100 feet of a water supply well, spring, or septic system?	Y N N/A	
18	Is infiltration feasible on the site relative to groundwater-related criteria?	Y N	

Summary of Groundwater-related Feasibility Criteria

Provide rationale for feasibility determination: Based on site exploration, groundwater was not encountered at depths of 51 feet.

Note: if a single criterion or group of criteria would render infiltration infeasible, it is not necessary to evaluate every question in this worksheet.

BMP Details

INF-5 Infiltration Well

INF-5: Drywell

Also known as:

- *Soakaway Pits*
- *Infiltration Sumps*
- *Rock Sumps*
- *Underground Injection Controls*

Drywell
Source: K&A Enterprises

Drywells are similar to infiltration trenches in their design and function, but generally have a greater depth to footprint area ratio and can be installed at relatively large depths. A drywell is a subsurface storage facility designed to temporarily store and infiltrate runoff, primarily from rooftops or other impervious areas with low pollutant loading. A drywell may be either a small excavated pit filled with aggregate or a prefabricated storage chamber or pipe segment. Drywells can be used to reduce the volume of runoff from roofs and other relatively clean surfaces. While roofs are generally not a significant source of stormwater pollutants, they can be a major contributor of runoff volumes. Therefore, drywells can indirectly enhance water quality by reducing the water quality design volume that must be treated by other, downstream stormwater management facilities. *Note: A drywell is considered a "Class V Injection Wells" under the federal Underground Injection Control (UIC) Program regulated in California by U.S. EPA Region 9. A UIC permit may be required (for details see http://www.epa.gov/region9/water/groundwater/uic-classv.html).*

Feasibility Screening Considerations

- Drywells shall pass infiltration infeasibility screening criteria (**TGD Section 2.4.2.4**) to be considered for use.
- Dry wells provide a more direct pathway for stormwater to groundwater, therefore pose a greater risk to groundwater quality than surface infiltration systems.

Opportunity Criteria

- Drywells may be used to infiltrate roof runoff, either directly or from the overflow from a cistern.
- Soils are adequate for infiltration or can be amended to provide an adequate infiltration rate.
- Space available for pretreatment (biotreatment or treatment control BMP as described below).
- The drywell must be located in native soil; over-excavated by at least one foot in depth and replaced uniformly without compaction.
- Potential for groundwater contamination can be mitigated through isolation of pollutant sources, pretreatment of inflow, and/or demonstration of adequate treatment capacity of underlying soils.
- Infiltration is into native soil, or depth of engineered fill is ≤ 5 feet from the bottom of the facility to native material and infiltration into fill is approved by a geotechnical professional.

OC-Specific Design Criteria and Considerations

☐ Must comply with local, state, and federal UIC regulations; a permit may be required.

☐ Minimum set-backs from foundations and slopes should be observed

- ☐ Infiltration should not cause geotechnical concerns related to slope stability, liquefaction, or erosion.
- ☐ Minimum separation to mounded seasonally high groundwater of 10 feet shall be observed.
- ☐ Drywells should not receive untreated stormwater runoff, except rooftop runoff. Pretreatment of runoff from other surfaces is necessary to prevent premature failure that results from clogging with fine sediment, and to prevent potential groundwater contamination due to nutrients, salts, and hydrocarbons.
- ☐ Design infiltration rate should be determined with an infiltration test at each drywell location.
- ☐ Drywell should be encased by 1 foot of coarse (3/4" to 2 ½"), round river rock on sides and bottom of facility.
- ☐ Maximum facility depth is 25 feet with the approval of a geotechnical professional; preferred depth less than 10 feet does not require geotechnical approval.
- ☐ If inlet is an underground pipe, a fine mesh screen should be installed to prevent coarse solids from entering drywell.
- ☐ An overflow route must be installed for flows that overtop facility.

Sizing Criteria for Drywells

Drywell sizing is highly site-specific. Sizing calculations shall demonstrate via the methods described in **Appendix III** or via project-specific methods that the system captures and fully discharges the DCV within 48 hours following the end of precipitation, or captures and infiltrates 80 percent of average annual runoff volume.

Configuration for Use in a Treatment Train

- Drywells may be preceded in a treatment train by HSCs in the drainage area, which would reduce the required volume of the drywell.
- Drywells treating any areas other than roof tops must be preceded by a robust biotreatment or conventional treatment capable of addressing all potentially generated pollutants.
- Drywells may be used in conjunction with other infiltration BMPs to increase the infiltration capacity of the entire treatment train system.

Additional References for Design Guidance

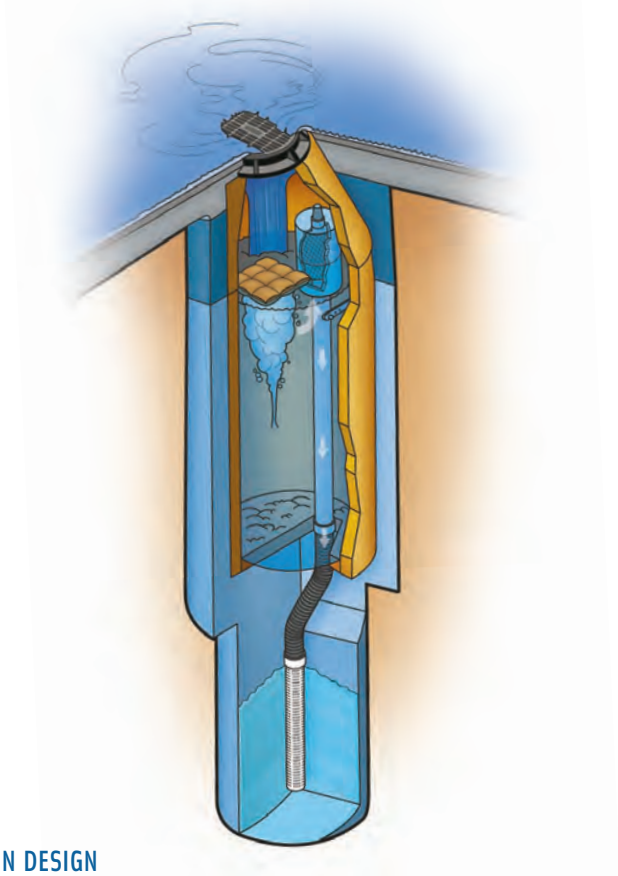
- Stormwater Management in Western Washington (Volume III: Hydrologic Analysis and Flow Control Design BMPs) **http://www.ecy.wa.gov/pubs/0510031.pdf**
- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**
- City of Portland Stormwater Management Manual (Drywell, page 2-87) **http://www.portlandonline.com/bes/index.cfm?c=47954&a=202883**
- San Diego County LID Handbook Appendix 4 (Factsheet 25): **http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf**
- City of Santa Barbara Storm Water BMP Guidance Manual, Chapter 6: **http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf**

MaxWell® IV DRAINAGE SYSTEM

Product Information and Design Features

TORRENT® RESOURCES

The ***MaxWell® IV,*** as manufactured and installed exclusively by Torrent Resources Incorporated, is the industry standard for draining landscaped developments and paved areas. This patented system incorporates the latest refinements in pre-treatment technology.



PROVEN DESIGN

Since 1974, nearly 65,000 MaxWell® Systems have proven their value as a cost-effective solution in a wide variety of drainage applications. They are accepted by state and municipal agencies and are a standard detail in numerous drainage manuals.

ADVANCED PRE-TREATMENT

Industry research, together with Torrent Resources' own experience, have shown that initial storm drainage flows have the greatest impact on system performance. This "first flush" occurs during the first few minutes of runoff, and carries the majority of sediment and debris. This results in the need for effective processing of runoff from landscaped and paved surfaces. In the ***MaxWell® IV,*** preliminary treatment is provided through collection and separation in a deep, large-volume chamber where silt and other heavy particles settle to the bottom. The standard MaxWell IV System has over 1,500 gallons of capacity to contain sediment and debris carried by incoming water. Floating trash, paper, pavement oil, etc. are effectively stopped by the **PureFlo®** Debris Shield on top of the overflow pipe. Water is drained from the system by rising up to the top of the overflow pipe and under the Debris Shield. The solid metal shields are equipped with an internal screen to filter suspended matter and are vented to prevent siphoning of floating surface debris. The drainage assembly returns the cleaned water into the surrounding soil through the **FloFast®** Drainage Screen.

ABSORBENT TECHNOLOGY

The MaxWell IV settling chamber is equipped with an absorbent sponge to provide prompt removal of pavement oils. These floating pillow-like devices are 100% water repellent and literally wick petrochemical compounds from the water. Each sponge has a capacity of up to 128 ounces to accommodate effective, long-term treatment. The absorbent is completely inert and will safely remove runoff constituents down to rainbow sheens that are typically no more than one molecule thick.

SECURITY FEATURES

MaxWell IV Systems include bolted, theft-deterrent, cast iron gratings and covers as standard security features. Special inset castings that are resistant to loosening from accidental impact are available for use in landscaped applications. Machined mating surfaces and "Storm Water Only" wording are standard.

THE MAXWELL FIVE-YEAR WARRANTY

Innovative engineering, quality materials and exacting construction are standard with every MaxWell System designed, manufactured and installed by Torrent Resources Incorporated. The MaxWell Drainage System Warranty is the best in the industry and guarantees against failures due to workmanship or materials for a period of five years from date of completion.

Manufactured and Installed Exclusively by Torrent Resources Incorporated

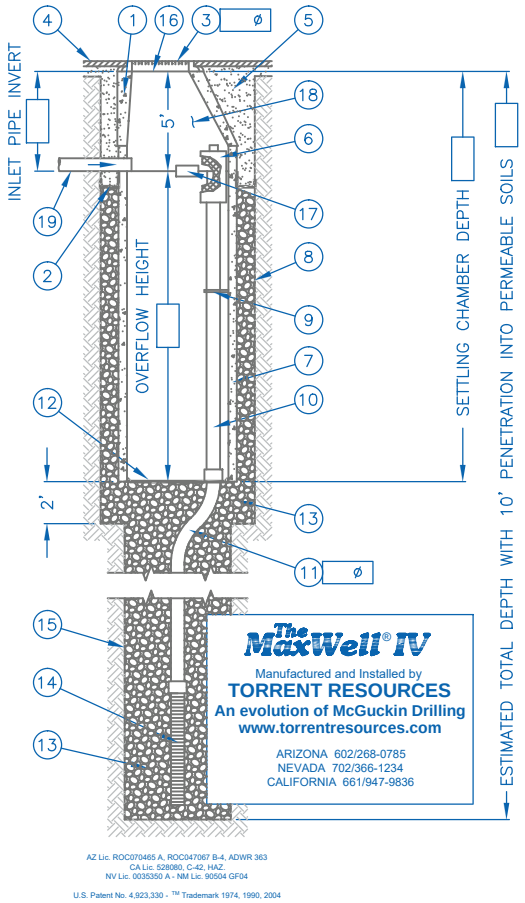
Please see reverse side for additional information

U.S. Patent No. 4,923,330

MAXWELL® IV DRAINAGE SYSTEM DETAIL AND SPECIFICATIONS

ITEM NUMBERS

1. **Manhole Cone** - Modified Flat Bottom.
2. **Moisture Membrane** - 6 Mil. Plastic. Applies only when native material is used for backfill. Place membrane securely against eccentric cone and hole sidewall.
3. **Bolted Ring & Grate** - Diameter as shown. Clean cast iron with wording **"Storm Water Only"** in raised letters. **Bolted in 2 locations** and secured to cone with mortar. Rim elevation ±0.02' of plans.
4. **Graded Basin or Paving** (by Others).
5. **Compacted Base Material** - 1-Sack Slurry except in landscaped installtions with no pipe connections.
6. **PureFlo® Debris Shield** - Rolled 16 ga. steel X 24" length with vented anti-siphon and Internal .265" Max. SWO flattened expanded steel screen X 12" length. **Fusion bonded epoxy coated.**
7. **Pre-cast Liner** - 4000 PSI concrete 48" ID. X 54" OD. **Center in hole** and align sections **to maximize bearing surface.**
8. **Min. 6' Ø Drilled Shaft.**
9. **Support Bracket** - Formed 12 Ga. steel. **Fusion bonded epoxy coated.**
10. **Overflow Pipe** - Sch. 40 PVC mated to drainage pipe at base seal.
11. **Drainage Pipe** - ADS highway grade with TRI-A coupler. **Suspend pipe** during backfill operations to prevent buckling or breakage. Diameter as noted.
12. **Base Seal** - Geotextile or concrete slurry.
13. **Rock** - Washed, sized between 3/8" and 1-1/2" to **best complement soil conditions.**
14. **FloFast® Drainage Screen** - Sch. 40 PVC 0.120" slotted well screen with 32 slots per row/ft.Diameter varies 120" overall length with TRI-B coupler.
15. **Min. 4' Ø Shaft** - Drilled to **maintain permeability** of drainage soils.
16. **Fabric Seal** - U.V. resistant geotextile - **to be removed by customer** at project completion.
17. **Absorbent** – Hydrophobic Petrochemical Sponge. Min. to 128 oz. capacity.
18. **Freeboard Depth** Varies with inlet pipe elevation. Increase settling chamber depth as needed to maintain all inlet pipe elevations above overflow pipe inlet.
19. **Optional Inlet Pipe** (Maximum 4", by Others). Extend moisture membrane and compacted base material or 1 sack slurry backfill below pipe invert.



AZ Lic. ROC070465 A, ROC047067 B-4, ADWR 363
CA Lic. 528080, C-42, HAZ.
NV Lic. 0035350 A - NM Lic. 90504 GF04

U.S. Patent No. 4,923,330 - ™ Trademark 1974, 1990, 2004

The referenced drawing and specifications are available on CAD either through our office or web site. This detail is copyrighted (2004) but may be used as is in construction plans without further release. For information on product application, individual project specifications or site evaluation, contact our Design Staff for no-charge assistance in any phase of your planning.

CALCULATING MAXWELL IV REQUIREMENTS

The type of property, soil permeability, rainfall intensity and local drainage ordinances determine the number and design of MaxWell Systems. For general applications draining retained stormwater, use one standard **MaxWell IV** per the instructions below for up to 3 acres of landscaped contributory area, and up to 1 acre of paved surface. For larger paved surfaces, subdivision drainage, nuisance water drainage, connecting pipes larger than 4" Ø from catch basins or underground storage, or other demanding applications, refer to our **MaxWell® Plus** System. For industrial drainage, including gasoline service stations, our **Envibro® System** may be recommended. For additional considerations, please refer to **"Design Suggestions For Retention And Drainage Systems"** or consult our Design Staff.

COMPLETING THE MAXWELL IV DRAWING

To apply the **MaxWell IV** drawing to your specific project, simply fill in the blue boxes per instructions below. For assistance, please consult our Design Staff.

' ESTIMATED TOTAL DEPTH

The Estimated Total Depth is the approximate depth required to achieve 10 continuous feet of penetration into permeable soils. Torrent utilizes specialized **"crowd"** equipped drill rigs to penetrate difficult, cemented soils and to reach permeable materials at depths up to **180 feet.** Our extensive database of drilling logs and soils information is available for use as a reference. Please contact our Design Staff for site-specific information on your project.

' SETTLING CHAMBER DEPTH

On MaxWell IV Systems of over 30 feet overall depth and up to 0.25cfs design rate, the **standard** Settling Chamber Depth is **18 feet.** For systems exposed to greater contributory area than noted above, extreme service conditions, or that require higher design rates, chamber depths up to 25 feet are recommended.

' OVERFLOW HEIGHT

The Overflow Height and Settling Chamber Depth determine the effectiveness of the settling process. The higher the overflow pipe, the deeper the chamber, the greater the settling capacity. For normal drainage applications, an overflow height of **13 feet** is used with the standard settling chamber depth of **18 feet**. Sites with higher design rates than noted above, heavy debris loading or unusual service conditions require greater settling capacities

"Ø DRAINAGE PIPE

This dimension also applies to the **PureFlo®** Debris Shield, the **FloFast®** Drainage Screen, and fittings. The size selected is based upon system design rates, soil conditions, and the need for adequate venting. Choices are 6", 8", or 12" diameter. Refer to "Design Suggestions for Retention and Drainage Systems" for recommendations on which size best matches your application.

"Ø BOLTED RING & GRATE

Standard models are quality cast iron and available to fit 24" Ø or 30" Ø manhole openings. All units are bolted in two locations with wording "Storm Water Only" in raised letters. For other surface treatments, please refer to "Design Suggestions for Retention and Drainage Systems."

"Ø INLET PIPE INVERT

Pipes up to 4" in diameter from catch basins, underground storage, etc. may be connected into the settling chamber. Inverts deeper than 5 feet will require additional settling chamber depth to maintain effective overflow height.

TORRENT RESOURCES INCORPORATED
1509 East Elwood Street, Phoenix Arizona 85040~1391
phone 602~268~0785 fax 602~268~0820
Nevada 702~366~1234
AZ Lic. ROC070465 A, ROC047067 B-4; ADWR 363
CA Lic. 528080 A, C-42, HAZ ~ NV Lic. 0035350 A ~ NM Lic. 90504 GF04

TORRENT RESOURCES (CA) INCORPORATED
phone 661~947~9836
CA Lic. 886759 A, C-42
www.TorrentResources.com
An evolution of McGuckin Drilling

The watermark for drainage solutions.®

TORRENT® RESOURCES

BIO-7 Proprietary Biotreatment

BIO-7: Proprietary Biotreatment

Proprietary biotreatment devices are devices that are manufactured to mimic natural systems such as bioretention areas by incorporating plants, soil, and microbes engineered to provide treatment at higher flow rates or volumes and with smaller footprints than their natural counterparts. Incoming flows are typically filtered through a planting media (mulch, compost, soil, plants, microbes, etc.) and either infiltrated or collected by an underdrain and delivered to the storm water conveyance system. Tree box filters are an increasingly common type of proprietary biotreatment device that are installed at curb level and filled with a bioretention type soil. For low to moderate flows they operate similarly to bioretention systems and are bypassed during high flows. Tree box filters are highly adaptable solutions that can be used in all types of development and in all types of soils but are especially applicable to dense urban parking lots, street, and roadways.

Also known as:

- *Catch basin planter box*
- *Bioretention vault*
- *Tree box filter*

Proprietary biotreatment
Source: http://www.americastusa.com /index.php/filterra/

Feasibility Screening Considerations

- Proprietary biotreatment devices that are unlined may cause incidental infiltration. Therefore, an evaluation of site conditions should be conducted to evaluate whether the BMP should include an impermeable liner to avoid infiltration into the subsurface.

Opportunity Criteria

- Drainage areas of 0.25 to 1.0 acres.
- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Proprietary biotreatment facilities may also be applied in parking lot islands, traffic circles, road shoulders, and road medians.
- Must not adversely affect the level of flood protection provided by the drainage system.

OC-Specific Design Criteria and Considerations

☐ Frequent maintenance and the use of screens and grates to keep trash out may decrease the likelihood of clogging and prevent obstruction and bypass of incoming flows.

☐ Consult proprietors for specific criteria concerning the design and performance.

☐ Proprietary biotreatment may include specific media to address pollutants of concern. However, for proprietary device to be considered a biotreatment device the media must be capable of supporting rigorous growth of vegetation.

☐ Proprietary systems must be acceptable to the reviewing agency. Reviewing agencies shall have the discretion to request performance information. Reviewing agencies shall have the discretion to deny the use of a proprietary BMP on the grounds of performance, maintenance considerations, or other relevant factors.

☐ In right of way areas, plant selection should not impair traffic lines of site. Local jurisdictions may also limit plant selection in keeping with landscaping themes.

Computing Sizing Criteria for Proprietary Biotreatment Device

- Proprietary biotreatment devices can be volume based or flow-based BMPs.
- Volume-based proprietary devices should be sized using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** or the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs described in **Appendix III.3.2**.
- The required design flowrate for flow-based proprietary devices should be computed using the Capture Efficiency Method for Flow-based BMPs described in **Appendix III.3.3)**.

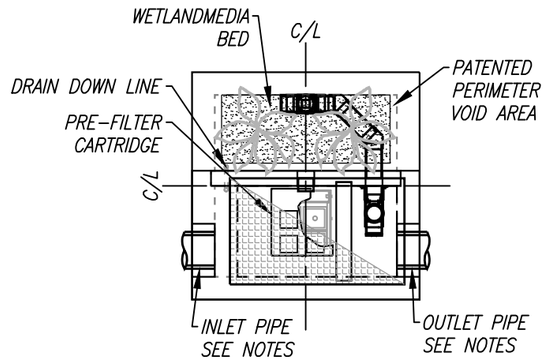
In South Orange County, the provided ponding plus pore volume must be checked to demonstrate that it is greater than 0.75 of the remaining DCV that this BMP is designed to address. Many propretary biotreatment BMPs will not be able to meet the definition of "biofiltration" that applies in South Orange County. See Section III.7 and Worksheet SOC-1.

Additional References for Design Guidance

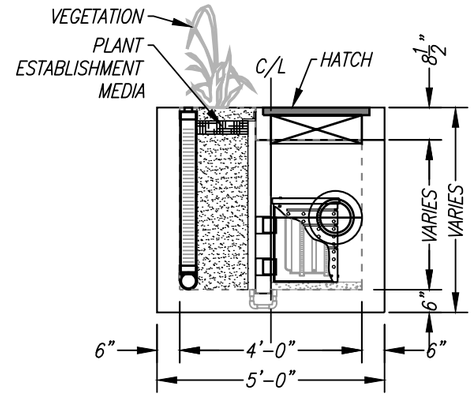
- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 9: **http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf**
- Santa Barbara BMP Guidance Manual, Chapter 6: **http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf**

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

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



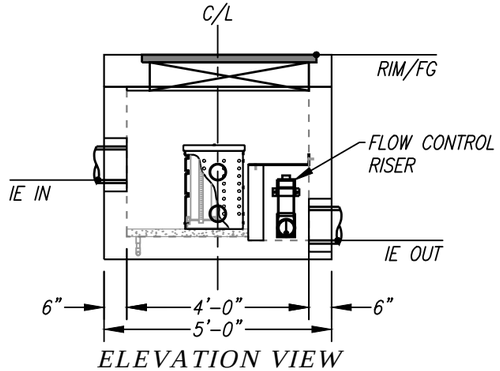
LEFT END VIEW

INSTALLATION NOTES

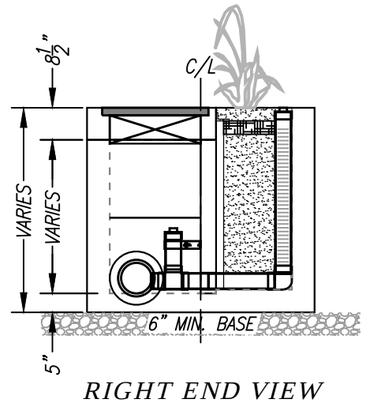
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE 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)	0.052
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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

5/23/19 10:LEF

Bio Clean

A Forterra Company

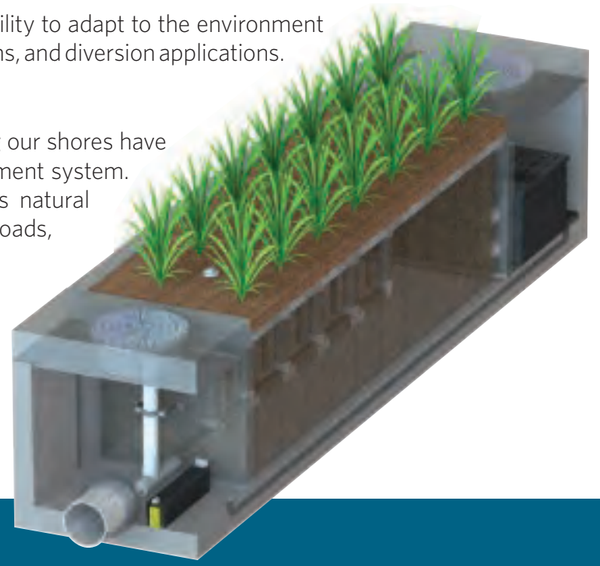
Modular Wetlands® System Linear

A Stormwater Biofiltration Solution

OVERVIEW

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

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



The Urban Impact

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

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

PERFORMANCE

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

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

APPROVALS

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

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

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

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

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

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

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

ADVANTAGES

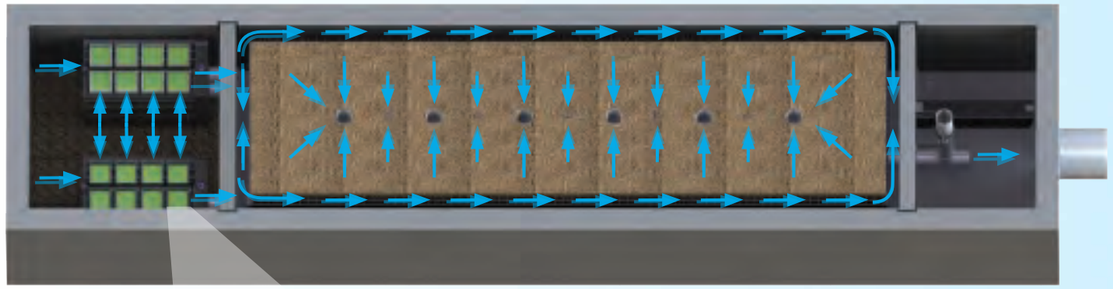
- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

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

- Improves performance
- Reduces footprint
- Minimizes maintenance

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



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

Figure 2, Top View

1 PRETREATMENT

SEPARATION

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

PRE-FILTER CARTRIDGES

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

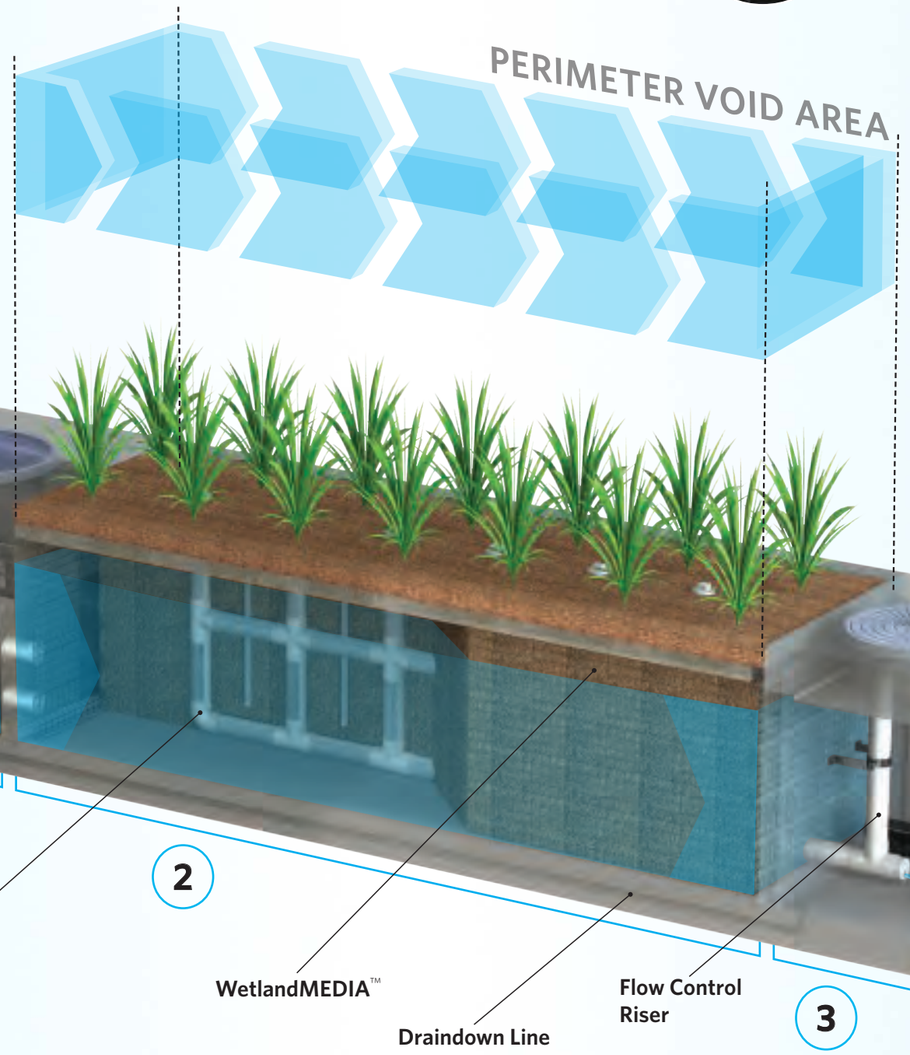


Figure 1

2 BIOFILTRATION

HORIZONTAL FLOW

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

PATENTED PERIMETER VOID AREA

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

WETLANDMEDIA

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

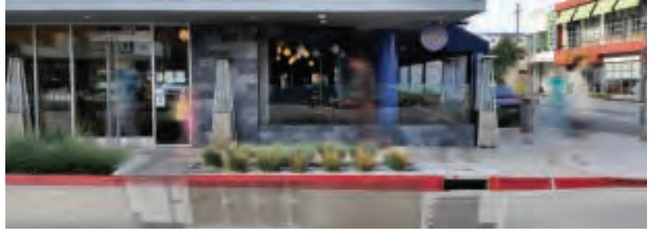
3 DISCHARGE

FLOW CONTROL

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

DRAINDOWN FILTER

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

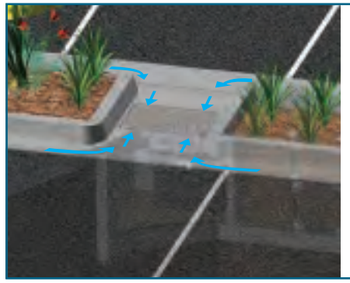


CONFIGURATIONS

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

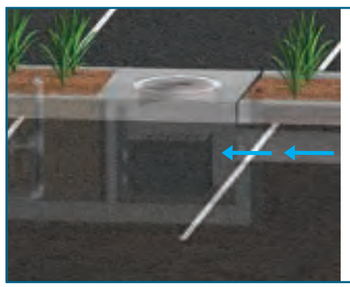
CURB TYPE

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



GRATE TYPE

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



VAULT TYPE

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

DOWNSPOUT TYPE

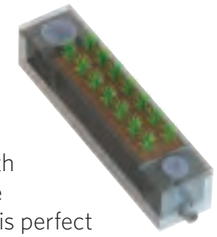
The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be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

ORIENTATIONS

SIDE-BY-SIDE

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

END-TO-END



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

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

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

EXTERNAL DIVERSION WEIR STRUCTURE

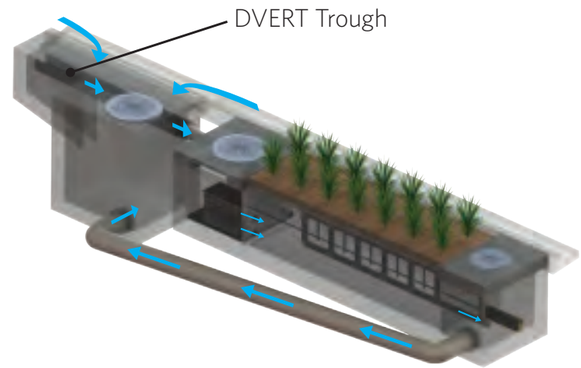
This traditional offline diversion method can be used with the Modular Wetlands® in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert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

FLOW-BY-DESIGN

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

DVERT LOW FLOW DIVERSION

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



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

SPECIFICATIONS

FLOW-BASED DESIGNS

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

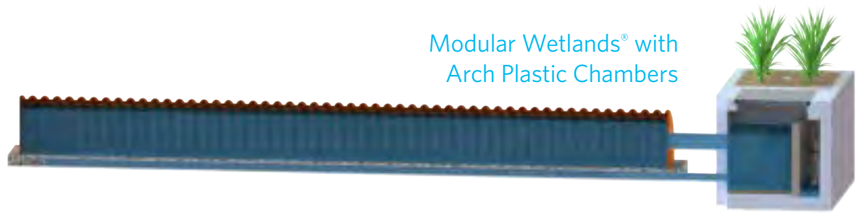
MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117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

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE

Modular Wetlands® with
Box Culvert Prestorage

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



Modular Wetlands® with
Arch Plastic Chambers

DESIGN SUPPORT

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

ADVANTAGES

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

APPLICATIONS

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

INDUSTRIAL

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

RESIDENTIAL

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

STREETS

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

PARKING LOTS

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

COMMERCIAL

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

MIXED USE

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

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION

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

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

INSTALLATION

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

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

MAINTENANCE

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

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

Bio Clean
A Forterra Company

5796 Armada Drive Suite 250
Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

010419R1A

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.

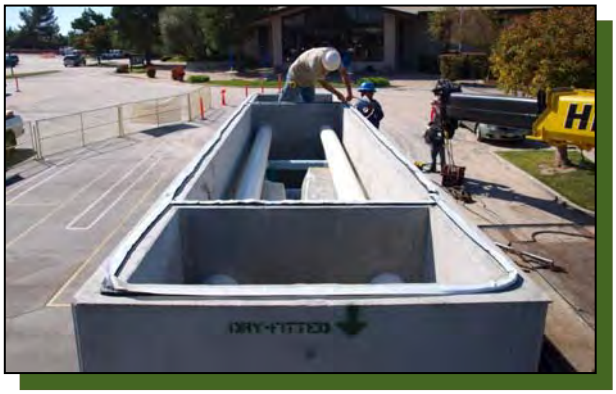
It is the contractor's responsibility to provide suitable lifting equipment to off-load the Modular Wetland unit.

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)

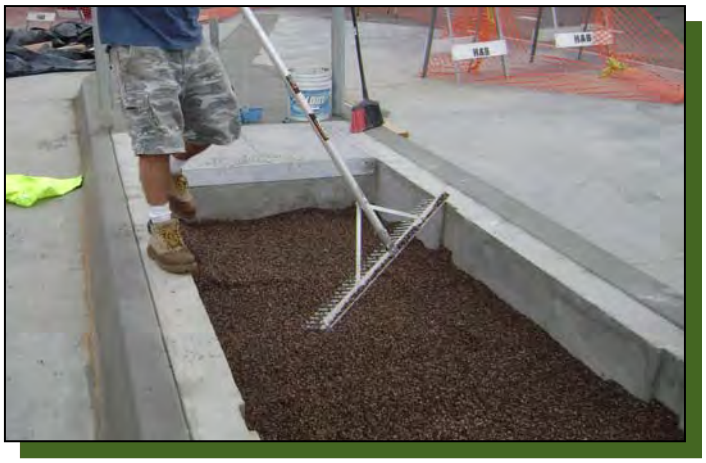
1. Fill WetlandMedia

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.

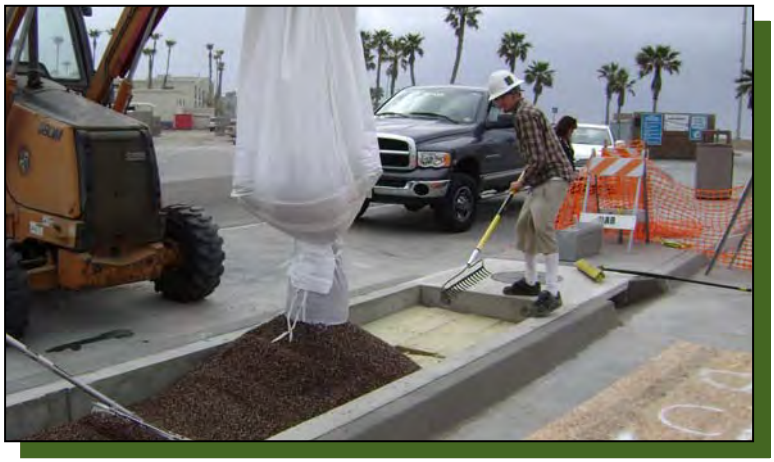


3. Install Plant Propagation Layer

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

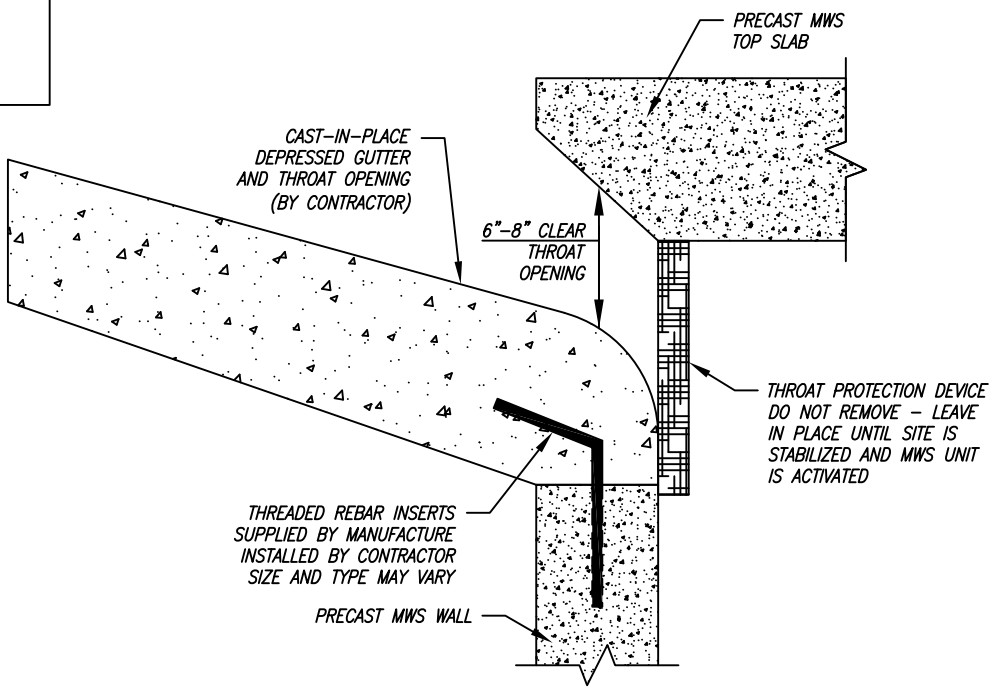
After system is filled with WetlandMedia planting of vegetation can begin. Utilizing 1 gallon plants dig down until The plant propagation blocks are reached. Remove plant and it’s root ball from the container. Set the bottom of the root ball on the tops of the blocks. Fill hole back in with WetlandMedia. 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.

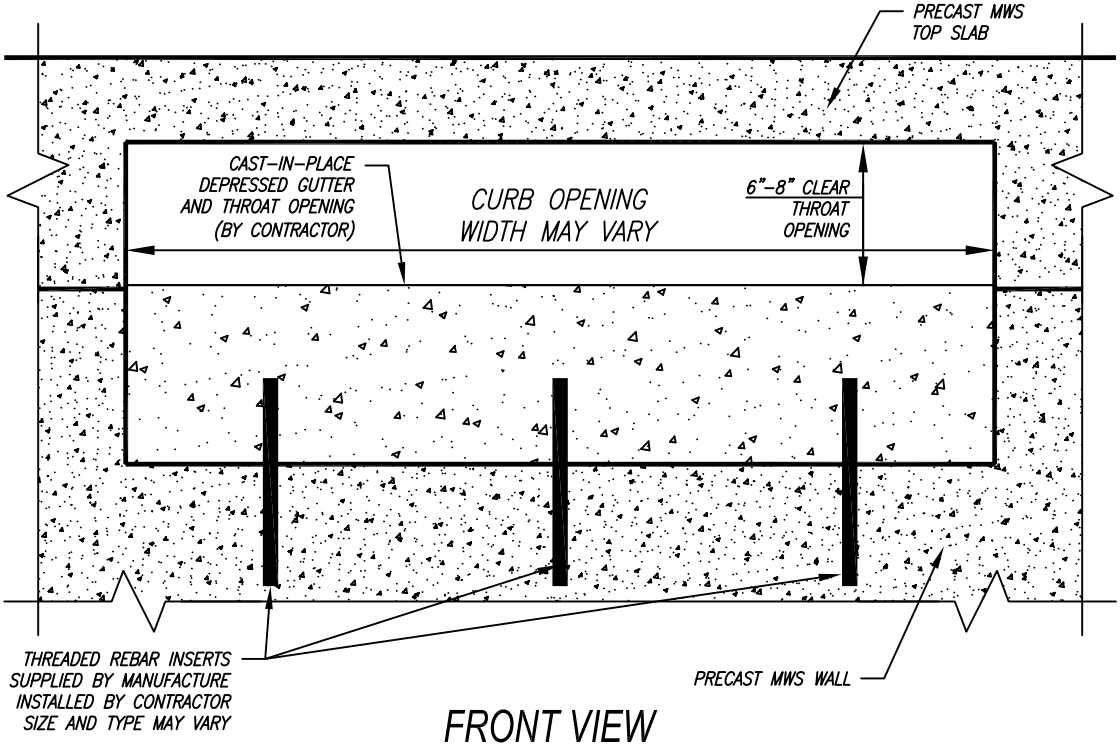
Curb and Gutter Details

Modular Wetland System, Inc.
P. 760.433-7640
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

COMMENTS:

SIZE	DWG. NO.	REV

SCALE NTS	UNITS = INCHES	SHEET 1 OF 1

Weights and Lifting Details

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

www.modularwetlands.com

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.

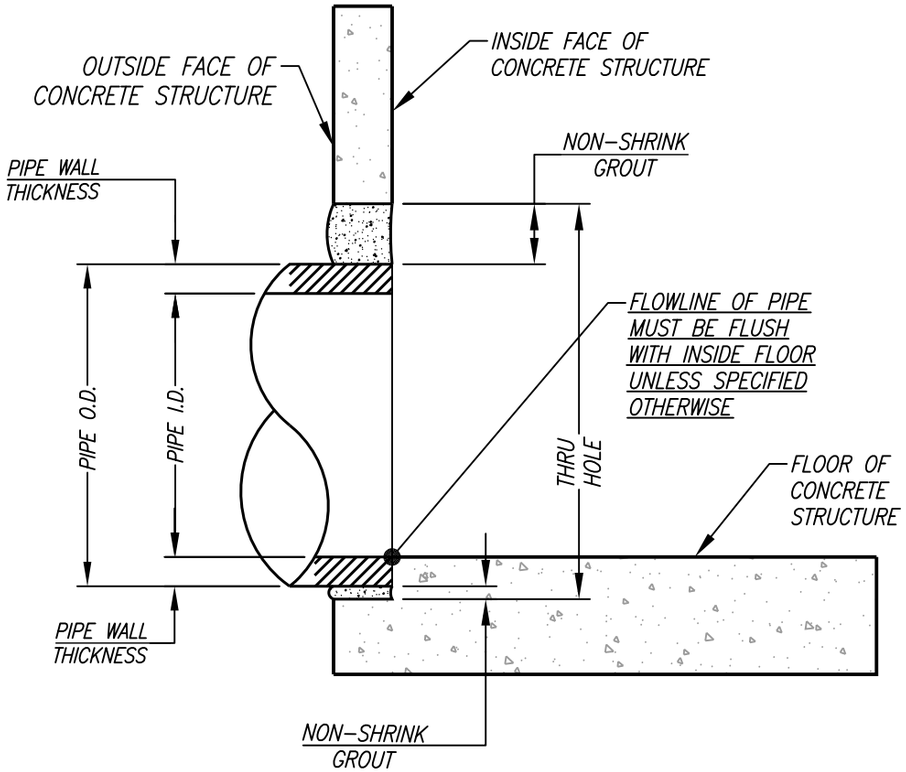
For Questions or Comments Please Call 888-566-3938 or email: info@modularwetlands.com

MODULAR WETLANDS™

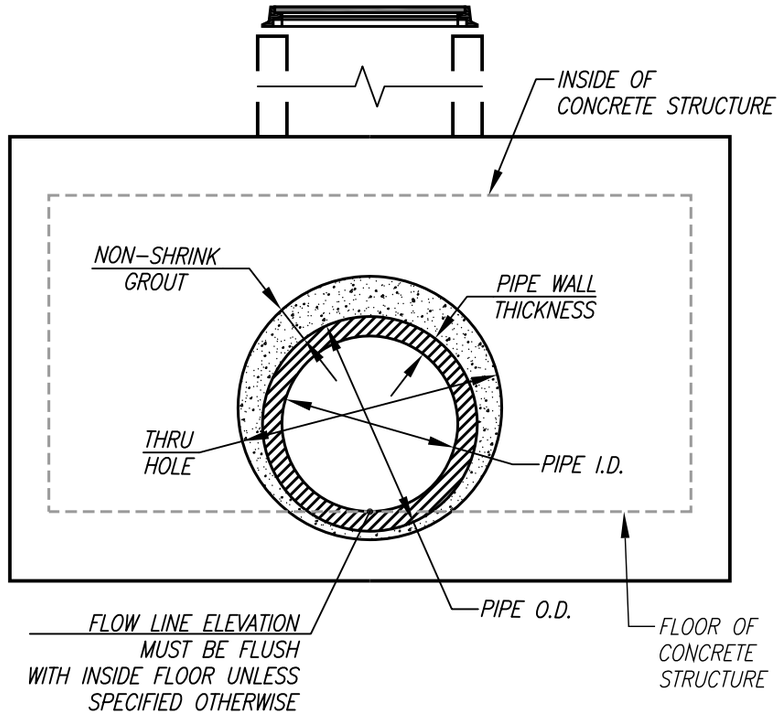
Connection Details

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

www.modularwetlands.com



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.

MODULAR WETLANDS

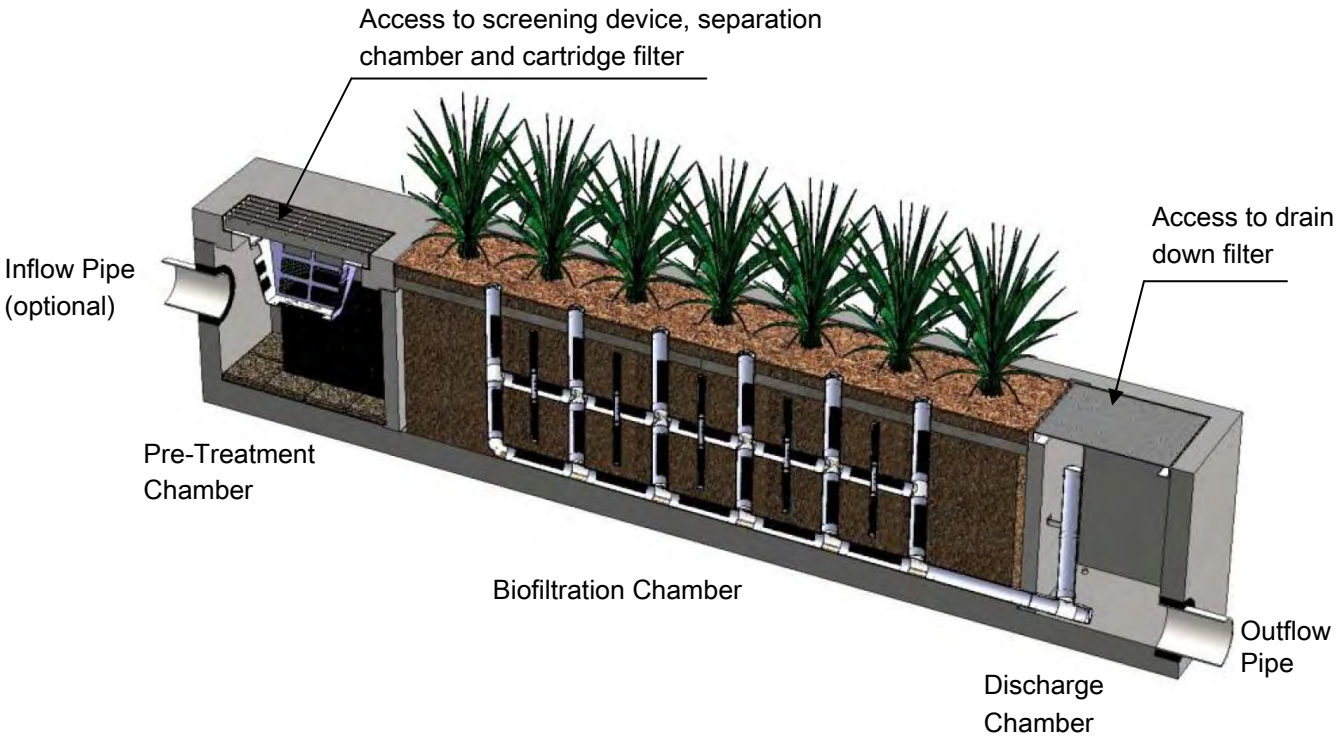
PIPE CONNECTION
STANDARD DETAIL

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

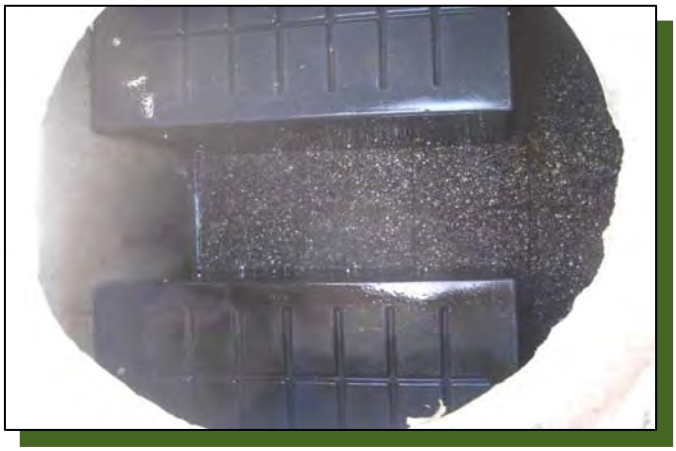
The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

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

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

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

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

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

Weather Condition _____ Additional Notes _____

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

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

Comments:

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

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.

INF-5 Subsurface Detention Vault

INF-7: Underground Infiltration

Underground infiltration is a vault or chamber with an open bottom that used to store runoff and percolate into the subsurface. A number of vendors offer proprietary infiltration products that allow for similar or enhanced rates of infiltration and subsurface storage while offering durable prefrabricated structures. There are many varieties of proprietary infiltration BMPs that can be used for roads and parking lots, parks and open spaces, single and multi-family residential, or mixed-use and commercial uses.

Also known as:

- *Infiltration vault*
- *Recharge vault*

Underground Infiltration

Source: http://www.contech-cpi.com

Feasibility Screening Considerations

- Infiltration bains shall pass infeasible screening criteria to be considered for use.
- Underground infiltration galleries pose a potential risk of groundwater contamination; pretreatment should be used.

Opportunity Criteria

- Soils are adequate for infiltration or can be amended to provide an adequate infiltration rate.
- Appropriate for sites with limited surface space.
- Can be placed beneath roads, parking lots, parks, and athletic fields.
- Potential for groundwater contamination can be mitigated through isolation of pollutant sources, pretreatment of inflow, and/or demonstration of adequate treatment capacity of underlying soils.
- Infiltration is into native soil, or depth of engineered fill is ≤ 5 feet from the bottom of the facility to native material and infiltration into fill is approved by a geotechnical professional.
- Tributary area land uses include mixed-use and commercial, sngle-family and multi-family, roads and parking lots, and parks and open spaces. High pollutant land uses should not be tributary to infiltration BMPs.

OC-Specific Design Criteria and Considerations

☐ Placement of BMPs should observe geotechnical recommendations with respect to geological hazards (e.g. landslides, liquefaction zones, erosion, etc.) and set-backs (e.g., foundations, utilities, roadways, etc.)

☐ Minimum separation to mounded seasonally high groundwater of 10 feet shall be observed.

☐ Minimum pretreatment should be provided upstream of the infiltration facility, and water bypassing pretreatment should not be directed to the facility.

☐ Underground infiltration should not be used for drainage areas with high sediment production potential unless preceded by full treatment control with a BMP effective for sediment removal.

☐ Design infiltration rate should be determined as described in **Appendix VII**.

☐ Inspection ports or similar design features shall be provided to verify continued system performance and identify need for major maintenance.

☐ For infiltration facilities beneath roads and parking areas, structural requirements should meet H-20 load requirements.

Computing Underground Infiltration Device Size

Underground infiltration devices vary by design and by proprietary designs. The sizing method selected for use must be based on the BMP type it most strongly resembles.

- For underground infiltration devices with open pore volume (e.g., vaults, crates, pipe sections, etc), sizing will be most similar to infiltration basins.
- For underground infiltration devices with pore space (e.g., aggregate reservoirs), sizing will be most similar to permeable pavement.

Additional References for Design Guidance

- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 5: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**

Attachment D

WQMP Notice of Transfer of Responsibility

Water Quality Management Plan

Notice of Transfer of Responsibility

Tracking No. Assigned by the City of Anaheim: _____

Submission of this Notice of Transfer of Responsibility constitutes notice to the City of Anaheim that responsibility for the Water Quality Management Plan ("WQMP") for the subject property identified below, and implementation of that plan, is being transferred from the Previous Owner (and his/her agent) of the site (or a portion thereof) to the New Owner, as further discussed.

I. Previous Owner/Previous Responsible Party Information

Company/Individual Name:		Contact Person:	
Title:			
Street Address:			
City:	State:	City:	Phone:

II. Information about Site Transferred

Name of Project (if applicable):		Contact Person:	
Title of WQMP applicable to Site:			
Planning Area (PA) and/or Tract Number(s) for Site Lot Numbers (if Site is a portion of a tract): TBD			
Date WQMP Prepared (and revised if applicable):			
Street Address of Site:			
City: Anaheim	State:	Zip:	Phone:

III. New Owner/New Responsible Party Information

Company/Individual Name:		Contact Person:	
Title:			
Street Address:			
City:	State:	Zip:	Phone:

IV. Ownership Transfer Information

General Description of Site Transferred to New Owner:	General Description of Portion of Project/Parcel Subject to WQMP Retained by Owner (if any):
Lot/Tract Numbers of Site Transferred to New Owner:	
Remaining Lot/Tract Numbers Subject to WQMP Still Held by Owner (if any):	
Date of Ownership Transfer:	

Note: When the Previous Owner is transferring a site that is a portion of a larger project/parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/parcel not transferred shall be set forth as maps attached to this notice. These maps shall show those portions of a project/parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled "Previous Owner," and those portions previously transferred by Previous Owner shall be labeled as "Previously Transferred."

V. Purpose of Transfer

The purpose of this Notice of Transfer of Responsibility are: 1) to track transfer of responsibility for implementation and amendment of the WQMP when property to which the WQMP is transferred from the Previous Owner to the New Owner, and 2) to facilitate notification to a transferee of property subject to a WQMP that such New Owner is now the Responsible Party of record for the WQMP for those portions of the site that it owns.

VI. Certifications

A. Previous Owner

I Certify under penalty of law that I am no longer the owner of the Transferred Site as described in Section II above. I have provided the New Owner with a copy of the WQMP applicable to the Transferred Site that the New Owner is acquiring from the Previous Owner.

Printed Name of Previous Owner Representative:	Title:
Signature of Previous Owner Representative:	Date:

B. New Owner

I Certify under penalty of law that I am the owner of the Transferred Site, as described in Section II above, that I have been provided a copy of the WQMP, and that I have informed myself and understand the New Owner's responsibilities related to the WQMP, its implementation, and Best Management Practices associated with it. I understand that by signing this notice, the New Owner is accepting all ongoing responsibilities for implementation and amendment of the WQMP for the Transferred Site, which the New Owner has acquired from the Previous Owner.

Printed Name of New Owner Representative:	Title:
Signature of New Owner Representative:	Date:

Attachment E

Geotechnical Investigation

July 12, 2019 File No. CEM2019-122

Mr. Raj Patel
R3 Real Estate Developers
15607 S. Normandie Avenue
Gardena, CA 90247

Subject: **APPROVAL OF REPORT- PROPOSED HOTEL PROJECT AT:**
1100 West Ball Road, Anaheim, California
Received/Stamped by the City of Anaheim Public Works Engineering dated June 20, 2019
OTH 2019-01157

References: **FIRST REVIEW RESPONSE-Supplemental Report No. 1**
By: Creative Geotechnical, Inc.
Dated May 30, 2019, Project No. 180113

FIRST REVIEW COMMENTS
By CEM Laboratory Corporation
Dated May 5, 2019, File No. CEM2019-122

PRELIMINARY GEOTECHNICAL ENGINEERING INVESTIGATION
By: Creative Geotechnical, Inc. Dated April 12, 2018
Project No. 180113

Dear Mr. Patel:

CEM Laboratory Corporation reviewed the referenced reports on behalf of the City of Anaheim Building & Safety Division, for compliance with applicable codes, guidelines, and standards of practice.

The referenced geotechnical engineering report and subsequent responses to our comments by the consultant were reviewed. We believe the report is adequate for its intended use hence, approval of the report is recommended.

Should you have any questions, please do not hesitate to contact us at your earliest convenience.

Respectfully submitted,
C.E.M. LAB Corp.

Prepared By: A. Wahab Noori, P.E.

Limitations:

Our review is intended to determine if the submitted report(s) comply with City of Anaheim Codes and generally accepted geotechnical practices within the local area. The scope of our services for this third party review has been limited to a brief review of the above referenced report and associated documents, as supplied by the City of Anaheim. Re-analysis of reported data and/ or calculations and preparation of amended construction or design recommendations are specifically not included within our scope of services. Our review should not be considered as a certification, approval or acceptance of the consultant's work, nor is it meant as an acceptance of liability for final design or construction recommendations made by the geotechnical consultant of record or the project designers or engineers.

Chuck Iverson 3/28/1
fax # 949- 467-3498

I noticed from the case summary there was a little benzene left on-site. Therefore a health risk assessment is required if land use changes.

714-765-4277 D. Wilson

CITY OF ANAHEIM, CALIFORNIA

Public Utilities Department

September 15, 1994

Robert German
Exxon Company, USA
23101 Lake Center Dr., Suite 250
Lake Forest, CA 92630

Subject: Site Closure For Petroleum Hydrocarbon Contamination From Former Exxon Station #7-3724 Located at 1100 W. Ball Rd., Anaheim, CA

Dear Mr. German:

This letter confirms the completion of site investigation and remedial action for petroleum hydrocarbons at the above site. With the provision that the information provided to this Department was accurate and representative of existing conditions, it is the position of this office that no further action is required at this time.

Please be advised that this letter does not relieve you of any liability under the California Health and Safety Code or Water Code for past, present, or future operations at the site. Nor does it relieve you of the responsibility to clean up existing, additional or previously unidentified conditions at the site which cause or threaten to cause pollution or nuisance or otherwise pose a threat to water quality or public health.

Additionally, be advised that changes in the present or proposed use of the site may require further site characterization and mitigation activity. It is the property owner's responsibility to notify this Department of any changes in report content, future contamination findings, or site usage.

If you have any questions, please contact me at (714) 254-6874.

Sincerely,

Richard Wilson

Richard Wilson
Environmental Services Specialist

cc: Ken Williams, SARWQCB
Keith Williams, ERI, 9272 Jeronimo Road, Suite 106, Irvine, CA 92718

CASE SUMMARY AND CLOSURE RATIONALE

Date: June 13, 1994

Site Name: Former Exxon Station #7-3724

Address: 1100 W Ball Rd.

Responsible Party: Mr. Bob German
Senior Environmental Geologist
P.O. Box 19649
Irvine, CA 92713

Current Land Use: Commercial

Future Land Use: Commercial

Adjacent Land Use: Residential

UST Information (number, size, material stored, etc.): Three gasoline tanks (10,000, 8,000 and 6,000 gallon) and one 1,000 gallon waste oil tank. All tanks were single-walled fiberglass.

Contaminant	Highest Conc. Soil (ppm) Initial	Final	Highest Conc. Groundwater (ppb) Initial	Final
1. TPH(g)	420	420	NA	
2. Benzene	0.4	0.4		
3. Toluene	1.4	1.4		
4. Ethylbenzene	0.18	0.18		
5. Xylene	4.3	4.3		

Depth of Highest Benzene Concentration Remaining: 3 feet

Greatest Depth of Benzene Remaining: 3 feet

Depth to groundwater: Approximately 100 feet (Estimated)

Soil Type(s): Sand and silt

Groundwater Zone: Forebay

Case Summary (Cleanup Efforts and Closure Rationale):
On May 26, 1993 the gasoline and waste oil tanks were removed. Anaheim Fire Department directed the collection of 8 soil samples in the tank zone, 6 samples from the dispenser islands and 5 from spoils pile. On August 3, 1993, 5 additional samples were taken from the pipeline area. The samples were analyzed by a certified lab for the presence of TPH and BTEX. No contamination was detected in samples taken from the gasoline tank zone, but the waste oil tank area had TRPH contamination of 27 ppm. The dispenser island samples had TPH and BTEX contamination as high as 27/0.4/1.4/0.18/0.81, respectively.

Additional assessment was conducted around the dispenser islands on July 13, 1994. TPH contamination as high as 405 ppm was found at 10 feet, but no volatile constituents were detected (except 0.4 ppm xylene). On February 28 and March 15, 1994, 7 soil borings were drilled into the dispenser island area. The highest contamination was 420 ppm TPH at 15 feet, and 4.3 ppm xylene at 25 feet. No benzene was detected in any of the borings.

A General Risk Appraisal, as outlined in the LUFT Manual was prepared and submitted. The cumulative contamination index for all four volatiles were well below the LUFT Manual acceptable limits.

Approximately 21 tons of excavated soils from the waste oil excavation were taken to TPS Technologies in Adelanto for recycling. Tank spoils were used to refill the excavation.

Site closure is recommended for the following reasons:

1. Some contaminated soil was removed from the site.

2. There is no apparent threat to groundwater. The General Risk Appraisal indicates that contamination that is still on-site does not pose a threat to groundwater.

3. There is no apparent threat to public health.

Prepared and submitted by:

Richard Wilson
Environmental Services Specialist

Concurrence by:

John Hills
Environmental Services Manager

August 19, 2015
(TRG 8153)

Mr. Richard Wilson
ANAHEIM PUBLIC UTILITIES DEPARTMENT
201 S. Anaheim Boulevard
Anaheim, California 92805

THE
REYNOLDS GROUP
A California Corporation

SITE: **FORMER EXXON STATION #7-3724**
1100 WEST BALL ROAD
ANAHEIM, CALIFORNIA

SUBJECT: **SHALLOW SOIL VAPOR INVESTIGATION REPORT**

Dear Mr. Wilson,

On behalf of our Client, The Reynolds Group (TRG) is pleased to provide this *Shallow Soil Vapor Investigation Report* for the Former Exxon Station #7-3724 located at 1100 West Ball Road in Anaheim, California (see **Figure 1** – Site Location Map). In a letter dated September 15, 1994, the City of Anaheim Public Utilities Department (APUD) confirmed completion of site investigation and remedial action for petroleum hydrocarbon impacts at the Site for commercial land use. Land use at the Site is changing from commercial to residential and, as such, the APUD required a Human Health Risk Assessment (HHRA) at the Site to determine if residual levels of gasoline exists at elevated concentrations.

The work was performed according to TRG's *Workplan for Human Health Risk Assessment*, dated July 10, 2015, submitted to the APUD and subsequently approved in a letter dated July 13, 2015 (see **Attachment A**).

EXECUTIVE SUMMARY

On August 11, 2015, TRG advanced and set eight temporary dual-nested soil vapor probes (see **Figure 2 -** Site Plan with Soil Vapor Sampling Locations). The soil vapor probes were sampled on

August 17, 2015, at the depths of 5 and 15 feet below ground surface (bgs). All 16 soil vapor samples were "non-detect" for volatile organic compounds (VOCs) including all gasoline components, except tetrachloroethylene (PCE). PCE was detected in 15 of the 16 samples at concentrations ranging from 0.054 to 0.173 micrograms per liter (µg/L, see **Table 1**). All of the aforementioned PCE concentrations are below "Department of Toxic Substance Control (DTSC) Human and Ecological Risk Office (HERO) Note 3" future commercial and residential screening levels.

FIELDWORK

Prior to conducting the fieldwork, probe locations were marked and Underground Services Alert (USA) provided utility clearance. In addition, a Well/Boring Permit was obtained from APUD (see **Attachment B**). Soil probes were set on August 11, 2015 and sampled on August 17, 2015.

Soil Vapor Probe Installation

Eight temporary dual-nested soil vapor probes (SV1 through SV8) were established at 5 and 15 ft bgs using a direct push rig and sampled at locations shown on the attached **Figure 2**. The soil vapor sampling followed the April 2012 DTSC *Advisory - Active Soil Gas Investigations* (the *Advisory)*.

Each soil vapor probe was constructed of a 6-inch long stainless steel screen attached to Teflon tubing from the probe screen to the surface. The probe screens were centered vertically in a 1-foot interval of a sand pack and separated by annular seals consisting of dry and hydrated granular bentonite transition seals. Boring logs with soil probe details are provided in **Attachment C**.

Soil Vapor Sampling

Soil gas samples were collected in gas tight glass syringes equipped with Teflon plungers. Tubing placed in the ground for soil gas sampling was purged three different times as recommended by DTSC guidance document. This purge volume test determined how many purges of the soil gas tubing were needed throughout the project. One, three and ten purge volumes were analyzed to make this determination. Three purge volumes were used.

Prior to purging and sampling, a leak test was conducted at each soil vapor probe location to determine whether ambient air was infiltrating into the subsurface and sample collection system. A tracer gas mixture of n-propanol and n-pentane was released at the ambient ground surface and analyzed in each soil vapor sample. A detection of the tracer compound in the subsurface soil vapor sample would have indicated that ambient air intrusion had occurred. No ambient air intrusion was detected during this investigation.

Soil vapor samples were collected from 5 and 15 ft bgs, at a constant low flow rate measuring 200 milliliters per minute (ml/min) as shown by an in-line vacuum gauge. A vacuum reading was recorded on field data sheets for each sample. Soil vapor samples were collected in glass gas-tight syringes equipped with Teflon plungers by a mobile laboratory provided by Jones Environmental, Inc., a California-certified laboratory in Fullerton, California, for analyses of VOCs by Method 8260B.

Once soil vapor samples were collected, each probe was removed and the borehole was backfilled with hydrated granular bentonite.

LABORATORY ANALYSES AND RESULTS

PCE was the only constituent detected in all 16 samples. PCE was detected in 15 of the 16 samples

at concentrations ranging from 0.054 to 0.173 µg/L, which are below DTSC HERO Note 3 future residential and commercial screening levels of 0.41 µg/L and 4.16 µg/L, respectively (see **Table 1** and **Attachment D**). The PCE appears to be very consistent across the Site and is likely part of a regional issue. Because the concentrations were absolutely below both future residential and commercial screening levels, a Human Health Risk Assessment using statistical analysis was not necessary.

REGISTERED PROFESSIONAL STATEMENT

All work on this project was performed under the responsible charge of a California Registered Civil Engineer. The licensed professional whose wet ink signature and seal appears at the end of this report personally supervised all work associated with the project.

Please feel free to reach our Project Manager for this case, Patricia Dean, at 714-381-3898 (cell) or by e-mail to dean@reynolds-group.com if you have any further questions or comments.

Sincerely,
THE REYNOLDS GROUP
a California corporation by:

F. Edward Reynolds, Jr.
CA Registered Civil Engineer #38677

Patricia Dean
Project Manager

Attachments:
Table 1 – Summary of Soil Vapor Sample Results
Figure 1 – Site Location Map
Figure 2 – Site Plan with Soil Vapor Sampling Locations
Attachment A – APUD Workplan Approval Letter
Attachment B – APUD Well/Boring Permit
Attachment C – Boring Logs
Attachment D – Laboratory Analytical Results and Chain of Custody

cc: James Connor, **DAUM COMMERCIAL REAL ESTATE SERVICES**
Jill Ryer Powder, **ENVIRONMENTAL HEALTH DECISIONS**

TABLES

TABLE 1
SUMMARY OF SOIL VAPOR SAMPLE RESULTS
1100 WEST BALL ROAD
ANAHEIM, CALIFORNIA

Sample ID	Date	Sample Depth (feet bgs)	PCE	OTHER VOC'S
SV1-5	8/17/2015	5	0.173	All < RL
SV1-15	8/17/2015	15	0.134	All <RL
SV1-15-DUP	8/17/2015	15	0.135	All <RL
SV2-5	8/17/2015	5	0.106	All <RL
SV2-15	8/17/2015	15	0.159	All <RL
SV3-5	8/17/2015	5	0.170	All <RL
SV3-15	8/17/2015	15	0.151	All <RL
SV4-5	8/17/2015	5	0.114	All <RL
SV4-15	8/17/2015	15	0.133	All <RL
SV5-5	8/17/2015	5	0.144	All <RL
SV5-15	8/17/2015	15	0.139	All <RL
SV6-5	8/17/2015	5	<0.008	All <RL
SV6-15	8/17/2015	15	0.088	All <RL
SV7-5	8/17/2015	5	0.054	All <RL
SV7-15-1PV	8/17/2015	15	0.135	All <RL
SV7-15-3PV	8/17/2015	5	0.132	All <RL
SV7-15-10PV	8/17/2015	15	0.130	All <RL
SV8-5	8/17/2015	5	0.166	All <RL
SV8-15	8/17/2015	15	0.118	All <RL
DTSC HERO Note 3		*Future Residential*	*0.41*	*Varies*
		Future Commercial	*4.16*	*Varies*

Notes:

Results in Micrograms per Liter (ug/L)

bgs = Below ground surface

PCE = Tetrachloroethylene

1V, 3V, 10V = Puge Test 1, 3, and 10 Volumes

DUP = Duplicate Sample

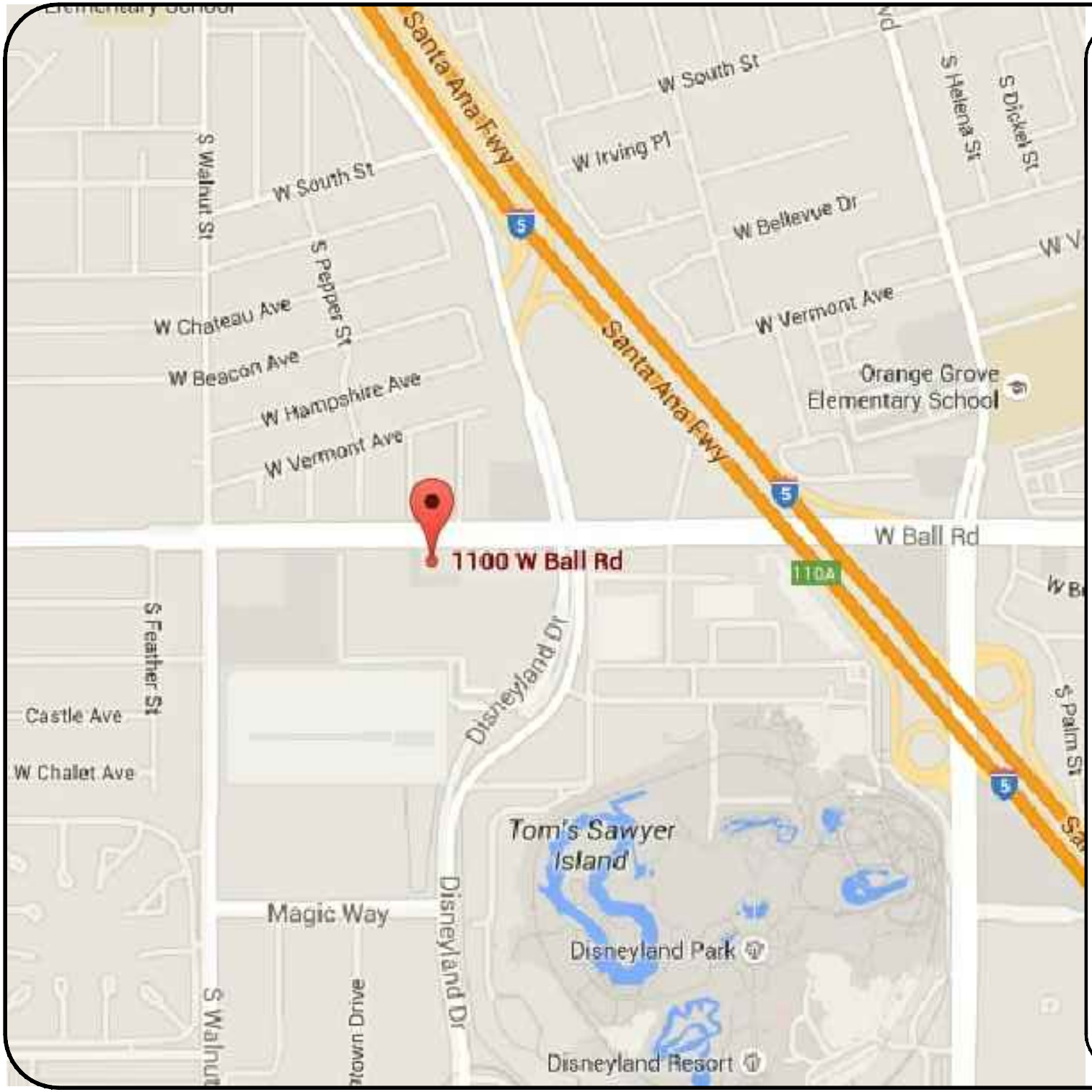
DTSC HERO = Department of Toxic Substances Control (DTSC) Human and Ecological Risk Office (HERO)

Source by: http://www.dtsc.ca.gov/AssessingRisk/upload/HHRA-Note-3-2.pdf

Future Residential attenuation factor = 0.001

Future Commercial attenuation factor = 0.005

FIGURES



General Notes

N
W E
S

* ADAPTED FROM GOOGLE MAPS 2013

Project Details

Name
Daum Commercial Real Estate Services

Address
1100 West Ball Road
Anaheim, California

Number
8153

Figure Details

SITE LOCATION MAP

Figure #
Figure 1

Revise Date
July 2015

Scale

Company Information

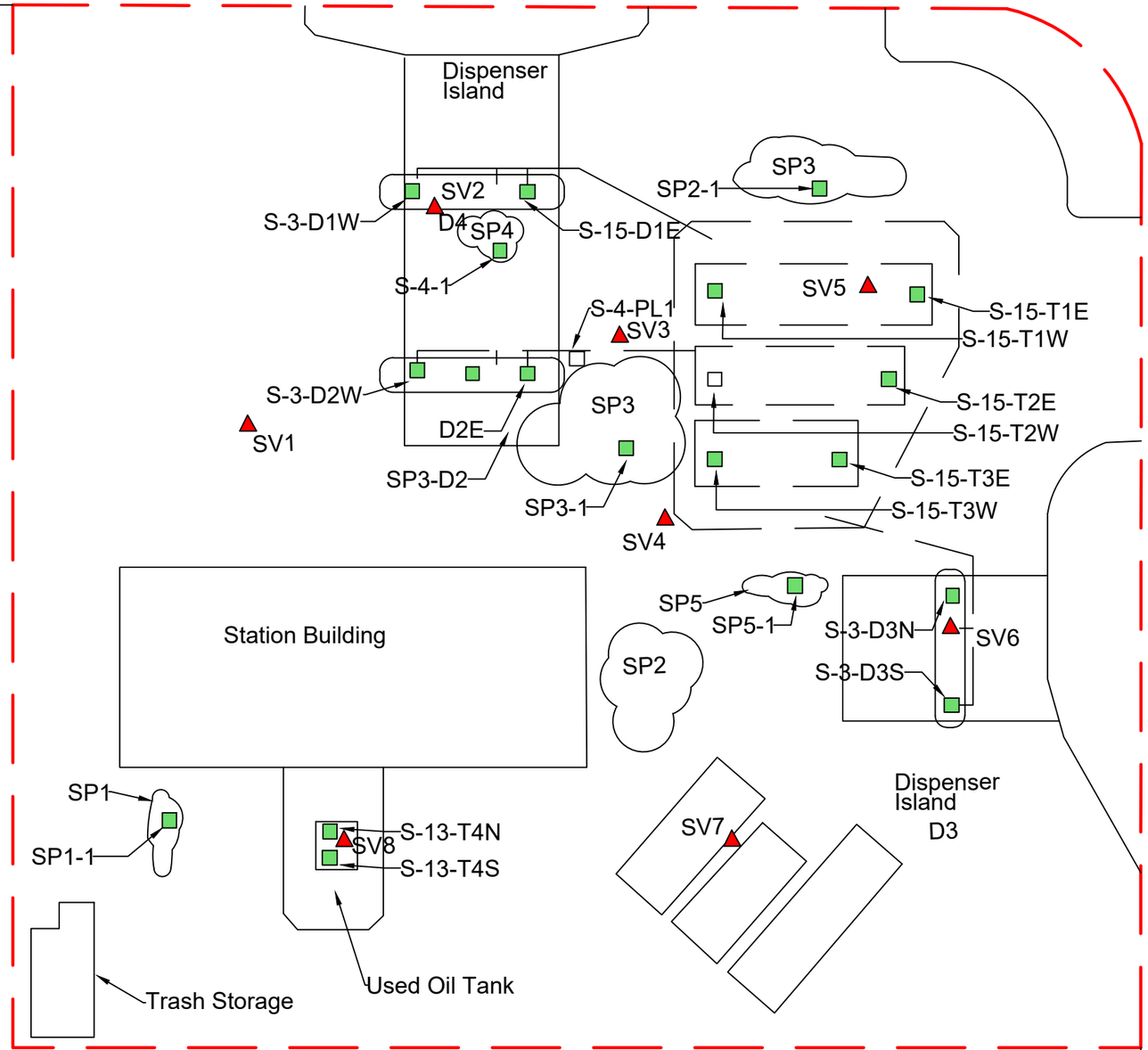
Address
520 West 1st Street
Tustin, CA 92780

Telephone
(714) 730-5397

Fax
(714) 730-6476

THE REYNOLDS GROUP
ENVIRONMENTAL SERVICES

Ball Road



West Place

NORTH

General Notes

- Property Line
- S-15-T1E - Former Sample Location
- SP3 - Former Stockpile Location
- Temporary Dual Nested Soil Vapor Probe Location

Project Details

Name
Daum Commercial Real Estate Services

Address
1100 West Ball Road
Anaheim, California

Number
8153

Figure Details

SITE PLAN WITH SOIL VAPOR SAMPLING LOCATIONS

Figure #
Figure 2

Revise Date
July 2015

0' 20'
Approximate Scale

Scale
1" = 20'

Company Information

Address
520 West 1st Street
Tustin, CA 92780

Telephone
(714) 730-5397

Fax
(714) 730-6476

THE REYNOLDS GROUP
ENVIRONMENTAL SERVICES

ATTACHMENT A

APUD WORKPLAN APPROVAL LETTER

City of Anaheim

PUBLIC UTILITIES DEPARTMENT

Environmental Services

July 13, 2015

James Conner
Daum Commercial Real Estate
21820 Burbank Blvd. #201
Woodland Hills, CA 91367

and

Patricia Dean
The Reynolds Group
P.O. Box 1996
Tustin, CA 92781

Subject: Human Health Risk Assessment Work Plan for 1100 W. Ball Rd. in Anaheim, CA

Dear Ms. Dean,

This Department has reviewed the subject work plan for obtaining soil vapor samples in order to determine if a health risk assessment is needed. The plan appears to follow the DTSC 2012 Advisory for Soil Gas Investigations and the number and locations of samples look to be appropriate for an initial investigation. Therefore, the plan is hereby approved pending acceptance of the following conditions:

1. Obtain a well/boring permit from the City Anaheim prior to installing vapor probes. The following webpage provides well permit information and the application form - http://www.anaheim.net/article.asp?id=1108.
2. Ensure that soil gas is allowed to equilibrate prior to sampling soil gas. Per the DTSC guidelines, do not conduct the purge volume test, leak test and soil gas sampling for at least two hours following vapor probe installation. Document the time of vapor probe completion and vapor sampling.

If you have any questions, please call me at (714) 765-4277 or email at dwilson@anaheim.net.

Sincerely,

Richard Wilson

Richard Wilson
Environmental Services Manager

201 S. Anaheim Boulevard, Suite 601
Anaheim, California 92805

www.anaheim.net

TEL (714) 765-5196 – FAX (714) 765-4135

ATTACHMENT B

WELL/BORING PERMIT

ANAHEIM PUBLIC UTILITIES

WELL/BORING PERMIT

THIS PERMIT IS NOT VALID FOR DRILLING IN CITY RIGHT-OF-WAY UNLESS ACCOMPANIED BY A RIGHT-OF-WAY CONSTRUCTION PERMIT

PERMIT TYPE: ☒ BORINGS ☐ WELL INSTALLATION / REHABILITATION ☐ WELL DESTRUCTION PERMIT # 1490

ADDRESS OR CROSS STREET OF WELL LOCATION: (ATTACH SITE PLAN) 1100 W. Ball Road, Anaheim	WELL OWNER NAME (INDIVIDUAL NAME) Bhagabhai Patel c/o James Connor
SITE/PROJECT NAME: 8153	COMPANY: (IF APPLICABLE) Daum Commercial Real Estate
APPLICANT NAME: Patricia Dean	ADDRESS: 21820 Burbank Boulevard, Suite 201
COMPANY: The Reynolds Group	CITY: STATE/ZIP Woodland Hills, CA 91367
ADDRESS: 520 W. First Street	
CITY: STATE/ZIP Tustin CA 92780	PHONE: EMAIL: (818) 449-1624 James.Conner@daumcommercial.com
PHONE: EMAIL: (714) 381-3898 dean@reynolds-group.com	**NOTIFY WATER INSPECTOR AT LEAST 48 HOURS PRIOR TO START AT (714) 765-4591**
I HEREBY AGREE TO COMPLY WITH ALL ORDINANCES, RULES AND REGULATIONS OF THE CITY OF ANAHEIM AND THE STATE OF CALIFORNIA PERTAINING TO WELL CONSTRUCTION AND DESTRUCTION. I ATTEST THAT I AM AUTHORIZED TO SIGN ON BEHALF OF THE PROPERTY OWNER AND/OR WELL OWNER. ☒ AGREE Patricia Dean SIGNATURE	APPLICANT MUST SUBMIT A COPY OF THE WELL COMPLETION REPORT TO THE ANAHEIM PUBLIC UTILITIES AT THE ADDRESS LISTED ABOVE WITHIN 60 DAYS OF COMPLETION OF WORK OR EMAIL TO MNEWLAND@ANAHEIM.NET **INJECTION WELLS ARE REQUIRED TO BE REGISTERED WITH USEPA AT** HTTP://WWW.EPA.GOV/REGION9/WATER/GROUNDWATER/INJECTION-WELLS-REGISTER.HTML FAX OR EMAIL A COPY OF COMPLETED REGISTRATION FORM TO ANAHEIM PUBLIC UTILITIES AT (714) 765-4135 OR EMAIL TO MNEWLAND@ANAHEIM.NET

PLEASE DESCRIBE WELLS/BORINGS BELOW: (ATTACH ADDITIONAL SHEETS, IF NECESSARY) (USE THE FOLLOWING ACRONYM FOR WELL TYPE: **B** = BORING; **PW** = PRODUCTION WELL; **MW** = MONITORING WELL; **DW** = DEWATERING WELL **IJ** = INJECTION WELL; **VE** = VAPOR EXTRACTION; **VP** = VAPOR PROBE)

WELL ID	TYPE	DIAM (IN.) (Boring)	DEPTH (FT.)	SCREEN INTERVALS	EST. DATE OF DESTRUCTION
18° SV1 through SV8	VP	2	15	5,15	Probes installed August 17, 2015.

ADMINISTRATIVE USE ONLY:

WELL FEE = $128.75 APPLICATION FEE + $80 x N/A (NO. OF WELLS)

TOTAL FEE DUE: $128.75

PAYMENT RECEIVED AND PERMIT AUTHORIZED BY: Marie Mud DATE 7.29.14

ADMINISTRATIVE USE ONLY:

WELL INSPECTED BY:

INSPECTOR NAME DATE

WELL COMPLETION REPORT RECEIVED ☐ YES

ESTIMATED START OF WORK:

ATTACHMENT C

BORING LOGS

THE REYNOLDS GROUP
a California corporation

The Reynolds Group
Environmental Consulting & Contracting
520 West 1st Street
Tustin, CA 92780
Ph: (714) 730-5397
Fx: (714) 730-6476

FIELD BOREHOLE LOG

BOREHOLE NO.: **SV1**

TOTAL DEPTH: **15'**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**Daum Anaheim**	DRILLING CO.:	**MOBI DOS**
ADDRESS:	**1100 W. Ball Road, Anaheim, CA**	RIG TYPE:	**GEOPROBE 5400**
LOGGED BY:	**Charles Ly**	METHOD OF DRILLING:	**DIRECT PUSH METHOD**
DATE(S) DRILLED:	**08/11/2015**	SAMPLING METHODS:	**MACROCORE**

▽ Water level during drilling

▼ Water level in completed well

REVIEWED BY: _____ APPROVED BY: _____

DEPTH (feet)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE ID	RECOVERY	SAMPLE INTERVAL	BLOW COUNT	PID (ppmv)	BORING DIAGRAM	WELL DESCRIPTION
0		Asphalt							Bentonite Plug
		SP: SAND (5, 90, 5, 0), very fine to fine sand, subangular; trace small-medium pebbles, subrounded; trace silt, well sorted, loose, brown							Hydrated granular Teflon Tubing Dry granular
5		SP: At 5' bgs, as above					0.0		6" Stainless Steel Soil Probe Dry granular Teflon Tubing
10		SP: At 10' bgs, as above					0.1 0.1		Hydrated granular
15		SP: At 15' bgs, as above, fine to coarse sand, subangular, poorly sorted					0.0		Dry granular #2/16 Monterrey Sand 6" Stainless Steel Soil Probe

NOTES: Hand augered to 5' below ground surface

THE REYNOLDS GROUP
a California corporation

The Reynolds Group
Environmental Consulting & Contracting
520 West 1st Street
Tustin, CA 92780
Ph: (714) 730-5397
Fx: (714) 730-6476

FIELD BOREHOLE LOG

BOREHOLE NO.: **SV2**

TOTAL DEPTH: **15'**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**Daum Anaheim**	DRILLING CO.:	**MOBI DOS**
ADDRESS:	**1100 W. Ball Road, Anaheim, CA**	RIG TYPE:	**GEOPROBE 5400**
LOGGED BY:	**Charles Ly**	METHOD OF DRILLING:	**DIRECT PUSH METHOD**
DATE(S) DRILLED:	**08/11/2015**	SAMPLING METHODS:	**MACROCORE**

⧖ Water level during drilling

▼ Water level in completed well

REVIEWED BY: _____ APPROVED BY: _____

DEPTH (feet)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE ID	RECOVERY	SAMPLE INTERVAL	BLOW COUNT	PID (ppmv)	BORING DIAGRAM	WELL DESCRIPTION
0		Topsoil							Bentonite Plug
		SP: SAND (5, 90, 5, 0), very fine to fine sand, subangular; trace small-medium pebbles, subrounded; trace silt, well sorted, loose, brown							Hydrated granular Teflon Tubing Dry granular
5		SP: At 5', as above					0.0		6" Stainless Steel Soil Probe Dry granular
		SP: At 7' bgs, as above; fine to coarse sand, subangular; poorly sorted					0.1		Teflon Tubing
10		SP: At 10' bgs, as above; very fine to fine sand, subangular					0.1		Hydrated granular
									Dry granular
15		SP: At 15' bgs, as above					0.0		#2/16 Monterrey Sand 6" Stainless Steel Soil Probe

NOTES: Hand augered to 5' below ground surface

THE REYNOLDS GROUP
a California corporation

The Reynolds Group
Environmental Consulting & Contracting
520 West 1st Street
Tustin, CA 92780
Ph: (714) 730-5397
Fx: (714) 730-6476

FIELD BOREHOLE LOG

BOREHOLE NO.: **SV3**

TOTAL DEPTH: **15'**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**Daum Anaheim**	DRILLING CO.:	**MOBI DOS**
ADDRESS:	**1100 W. Ball Road, Anaheim, CA**	RIG TYPE:	**GEOPROBE 5400**
LOGGED BY:	**Charles Ly**	METHOD OF DRILLING:	**DIRECT PUSH METHOD**
DATE(S) DRILLED:	**08/11/2015**	SAMPLING METHODS:	**MACROCORE**

▽ Water level during drilling

▼ Water level in completed well

REVIEWED BY: _____ APPROVED BY: _____

DEPTH (feet)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE ID	RECOVERY	SAMPLE INTERVAL	BLOW COUNT	PID (ppmv)	BORING DIAGRAM	WELL DESCRIPTION
0		Topsoil							Bentonite Plug
		SP: SAND (5, 90, 5, 0), very fine to fine sand, subangular; trace small-medium pebbles, subrounded; trace silt, well sorted, loose, brown							Hydrated granular Teflon Tubing
5		SP: At 5', as above					0.0		Dry granular 6" Stainless Steel Soil Probe Dry granular
		SP: At 7' bgs, as above; fine to coarse sand, subangular; poorly sorted					0.1		Teflon Tubing
10		SP: At 10' bgs, as above; very fine to fine sand, subangular					0.1		Hydrated granular
15		SP: At 15' bgs, as above					0.0		Dry granular #2/16 Monterrey Sand 6" Stainless Steel Soil Probe

NOTES: Hand augered to 5' below ground surface

THE REYNOLDS GROUP
a California corporation

The Reynolds Group
Environmental Consulting & Contracting
520 West 1st Street
Tustin, CA 92780
Ph: (714) 730-5397
Fx: (714) 730-6476

FIELD BOREHOLE LOG

BOREHOLE NO.: **SV4**

TOTAL DEPTH: **15'**

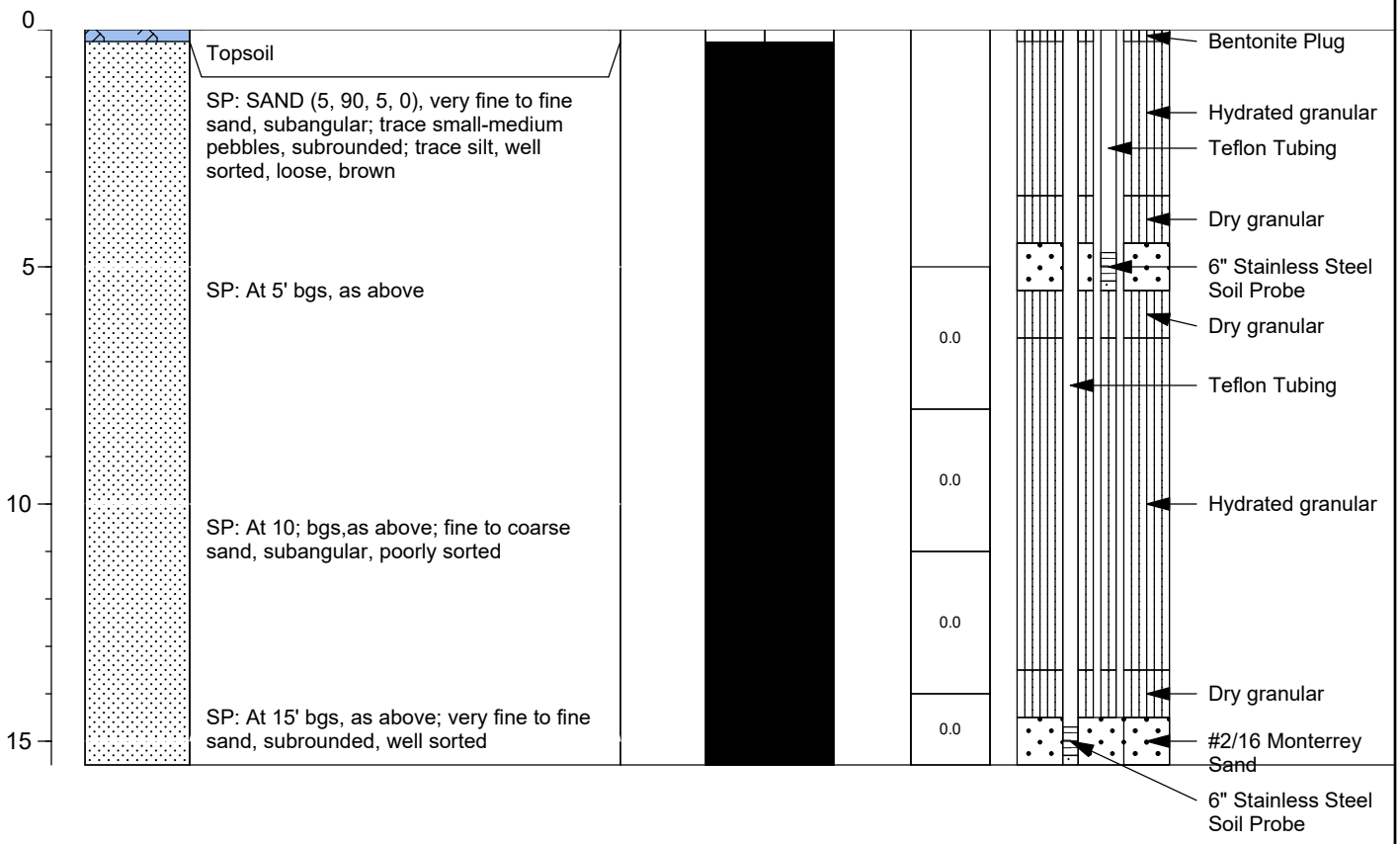
PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**Daum Anaheim**	DRILLING CO.:	**MOBI DOS**
ADDRESS:	**1100 W. Ball Road, Anaheim, CA**	RIG TYPE:	**GEOPROBE 5400**
LOGGED BY:	**Charles Ly**	METHOD OF DRILLING:	**DIRECT PUSH METHOD**
DATE(S) DRILLED:	**08/11/2015**	SAMPLING METHODS:	**MACROCORE**

⧖ Water level during drilling

▼ Water level in completed well

REVIEWED BY: _____ APPROVED BY: _____

DEPTH (feet)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE ID	RECOVERY	SAMPLE INTERVAL	BLOW COUNT	PID (ppmv)	BORING DIAGRAM	WELL DESCRIPTION



NOTES: Hand augered to 5' below ground surface

THE REYNOLDS GROUP
a California corporation

The Reynolds Group
Environmental Consulting & Contracting
520 West 1st Street
Tustin, CA 92780
Ph: (714) 730-5397
Fx: (714) 730-6476

FIELD BOREHOLE LOG

BOREHOLE NO.: **SV5**

TOTAL DEPTH: **15'**

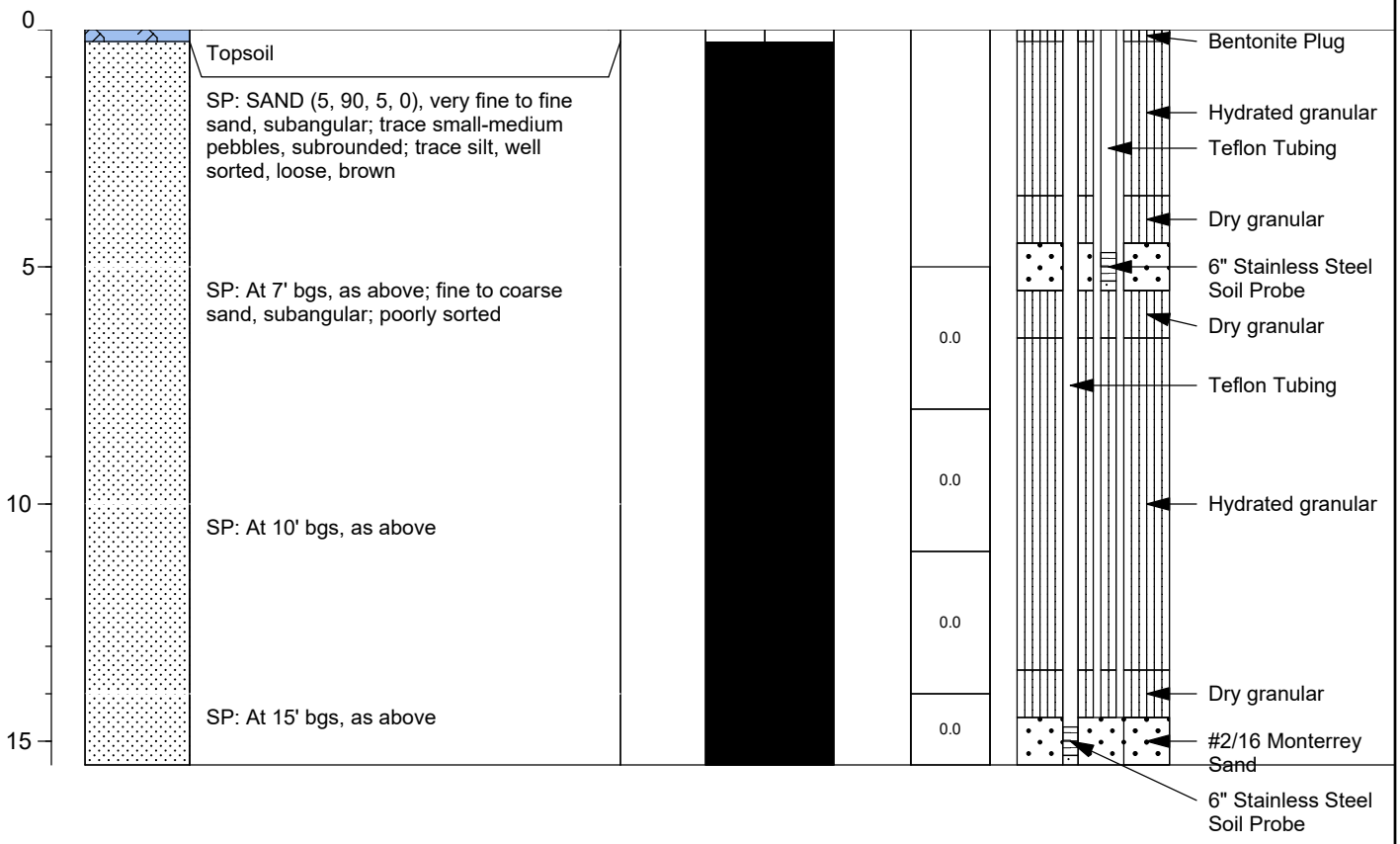
PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**Daum Anaheim**	DRILLING CO.:	**MOBI DOS**
ADDRESS:	**1100 W. Ball Road, Anaheim, CA**	RIG TYPE:	**GEOPROBE 5400**
LOGGED BY:	**Charles Ly**	METHOD OF DRILLING:	**DIRECT PUSH METHOD**
DATE(S) DRILLED:	**08/11/2015**	SAMPLING METHODS:	**MACROCORE**

▽ Water level during drilling

▼ Water level in completed well

REVIEWED BY: _____ APPROVED BY: _____

DEPTH (feet)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE ID	RECOVERY	SAMPLE INTERVAL	BLOW COUNT	PID (ppmv)	BORING DIAGRAM	WELL DESCRIPTION



NOTES: Hand augered to 5' below ground surface

THE REYNOLDS GROUP
a California corporation

The Reynolds Group
Environmental Consulting & Contracting
520 West 1st Street
Tustin, CA 92780
Ph: (714) 730-5397
Fx: (714) 730-6476

FIELD BOREHOLE LOG

BOREHOLE NO.: **SV6**

TOTAL DEPTH: **15'**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**Daum Anaheim**	DRILLING CO.:	**MOBI DOS**
ADDRESS:	**1100 W. Ball Road, Anaheim, CA**	RIG TYPE:	**GEOPROBE 5400**
LOGGED BY:	**Charles Ly**	METHOD OF DRILLING:	**DIRECT PUSH METHOD**
DATE(S) DRILLED:	**08/11/2015**	SAMPLING METHODS:	**MACROCORE**

▽ Water level during drilling

▼ Water level in completed well

REVIEWED BY: _____ APPROVED BY: _____

DEPTH (feet)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE ID	RECOVERY	SAMPLE INTERVAL	BLOW COUNT	PID (ppmv)	BORING DIAGRAM	WELL DESCRIPTION
0		Topsoil							Bentonite Plug
		SP: SAND (5, 90, 5, 0), very fine to fine sand, subangular; trace small-medium pebbles, subrounded; trace silt, well sorted, loose, brown							Hydrated granular Teflon Tubing Dry granular
5		SP: At 5' bgs, as above					0.0		6" Stainless Steel Soil Probe Dry granular Teflon Tubing
		SP: At 8' bgs, as above					0.0		
10		SP: At 10' bgs, as above					0.0		Hydrated granular
		SP: At 15' bgs, as above					0.0		Dry granular #2/16 Monterrey Sand 6" Stainless Steel Soil Probe
15									

NOTES: Hand augered to 5' below ground surface (bgs)

The Reynolds Group
Environmental Consulting & Contracting
520 West 1st Street
Tustin, CA 92780
Ph: (714) 730-5397
Fx: (714) 730-6476

FIELD BOREHOLE LOG

BOREHOLE NO.: **SV7**

TOTAL DEPTH: **15'**

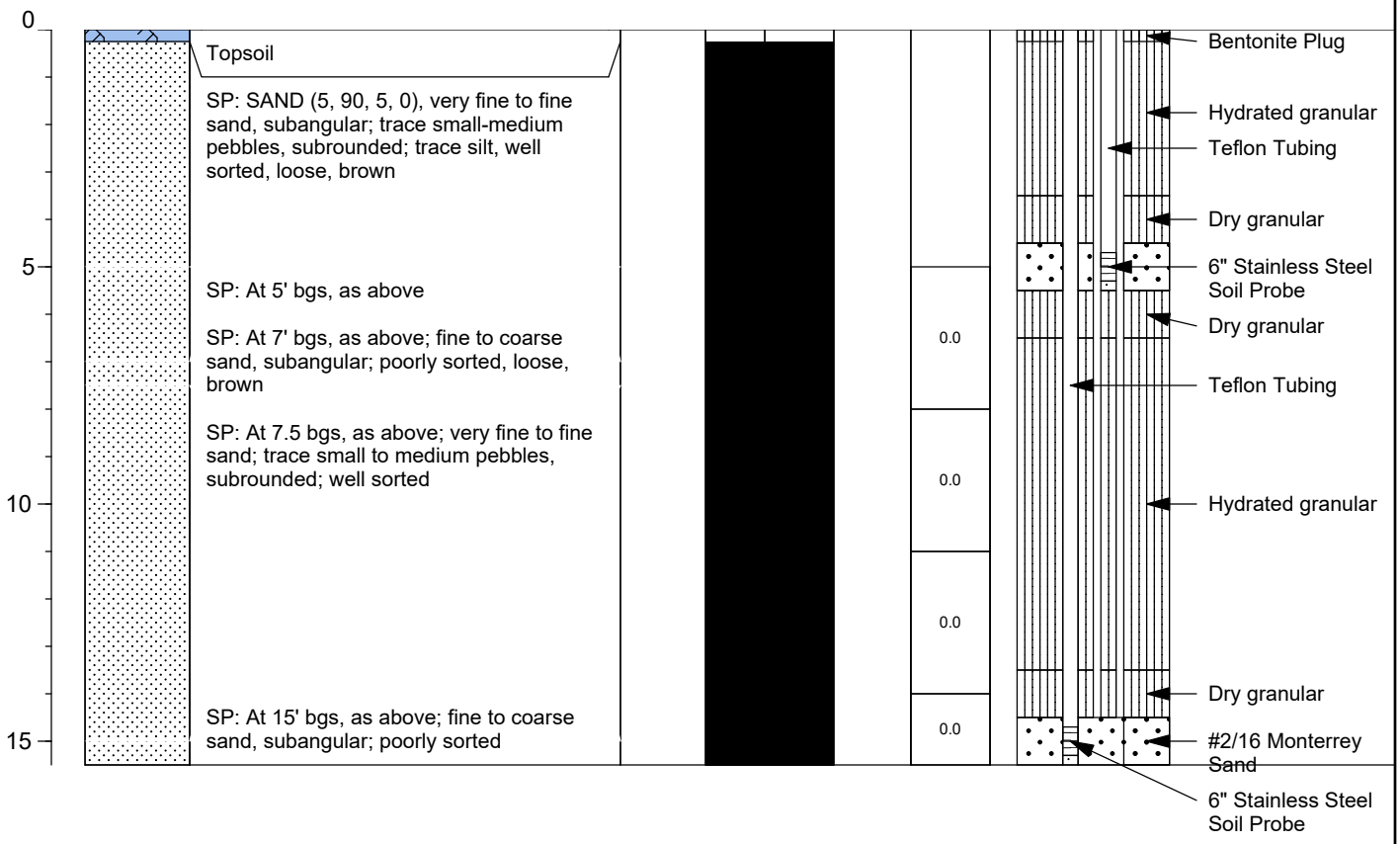
PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**Daum Anaheim**	DRILLING CO.:	**MOBI DOS**
ADDRESS:	**1100 W. Ball Road, Anaheim, CA**	RIG TYPE:	**GEOPROBE 5400**
LOGGED BY:	**Charles Ly**	METHOD OF DRILLING:	**DIRECT PUSH METHOD**
DATE(S) DRILLED:	**08/11/2015**	SAMPLING METHODS:	**MACROCORE**

⧖ Water level during drilling

▼ Water level in completed well

REVIEWED BY: _____ APPROVED BY: _____

DEPTH (feet)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE ID	RECOVERY	SAMPLE INTERVAL	BLOW COUNT	PID (ppmv)	BORING DIAGRAM	WELL DESCRIPTION



NOTES: Hand augered to 5' below ground surface

THE REYNOLDS GROUP
a California corporation

The Reynolds Group
Environmental Consulting & Contracting
520 West 1st Street
Tustin, CA 92780
Ph: (714) 730-5397
Fx: (714) 730-6476

FIELD BOREHOLE LOG

BOREHOLE NO.: **SV8**

TOTAL DEPTH: **15'**

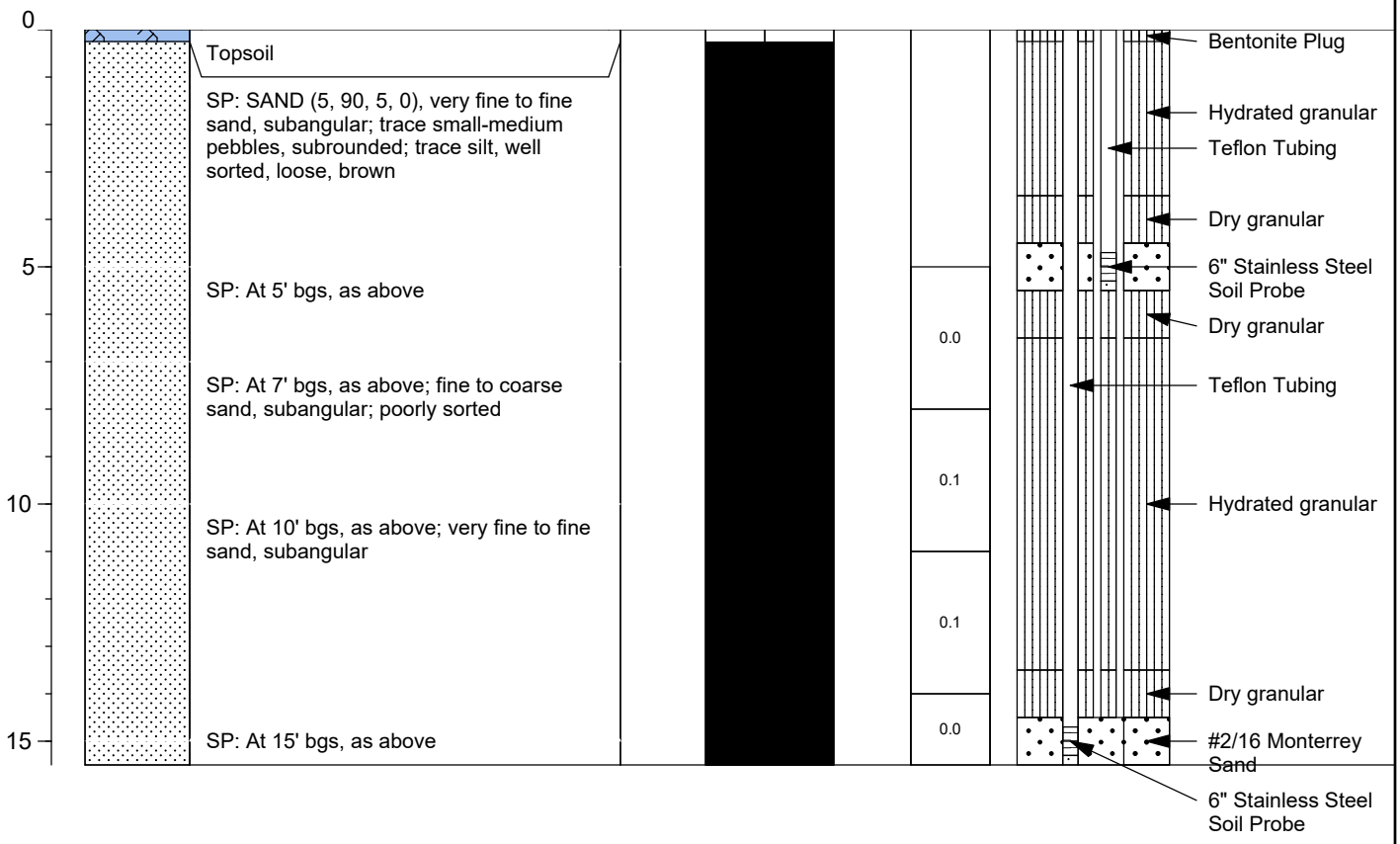
PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**Daum Anaheim**	DRILLING CO.:	**MOBI DOS**
ADDRESS:	**1100 W. Ball Road, Anaheim, CA**	RIG TYPE:	**GEOPROBE 5400**
LOGGED BY:	**Charles Ly**	METHOD OF DRILLING:	**DIRECT PUSH METHOD**
DATE(S) DRILLED:	**08/11/2015**	SAMPLING METHODS:	**MACROCORE**

⧖ Water level during drilling

▼ Water level in completed well

REVIEWED BY: _____ APPROVED BY: _____

DEPTH (feet)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE ID	RECOVERY	SAMPLE INTERVAL	BLOW COUNT	PID (ppmv)	BORING DIAGRAM	WELL DESCRIPTION



NOTES: Hand augered to 5' below ground surface

ATTACHMENT D

LABORATORY ANALYTICAL REPORT AND CHAIN OF CUSTODY

JONES ENVIRONMENTAL, INC.
P.O. BOX 5387 | FULLERTON, CA 92838
(714) 449-9937 | FAX (714) 449-9685

JONES ENVIRONMENTAL
LABORATORY RESULTS

Client:	Reynolds Group	**Report date:**	8/17/2015
Client Address:	P.O.Box 1996	**JEL Ref. No.:**	D-0983
	Tustin, CA 92781	**Client Ref. No.:**	8153
Attn:	Patricia Dean	**Date Sampled:**	8/17/2015
		Date Received:	8/17/2015
Project Name:	8153PATEL	**Date Analyzed:**	8/17/2015
Project Address:	1100 W. Ball Road	**Physical State:**	Soil Gas
	Anaheim, CA		

ANALYSES REQUESTED

1. EPA 8260B - Volatile Organics by GC/MS + Oxygenates

Sampling – Soil Gas samples were collected in glass gas-tight syringes equipped with Teflon plungers. Tubing placed in the ground for soil gas sampling was purged three different times as recommended by DTSC/RWQCB guidance documents. This purge test determined how many purges of the soil gas tubing were needed throughout the project. One, three and ten purge volumes were analyzed to make this determination.

A tracer gas mixture of n-propanol and n-pentane was placed at the tubing-surface interface before sampling. These compounds were analyzed during the 8260B analytical run to determine if there were surface leaks into the subsurface due to improper installation of the probe. No n-propanol or n-pentane was found in any of the samples reported herein.

The sampling rate was approximately 200 cc/min except when noted differently on the chain of custody record using a gas tight syringe. 3 purge volumes were used.

Prior to purging and sampling of soil gas at each point, a shut-in test was conducted to check for leaks in the above ground fittings. The shut-in test was performed on the above ground apparatus by evacuating the line to a vacuum of 100 inches of water, sealing the entire system and watching the vacuum for at least one minute. A vacuum gauge attached in parallel to the apparatus measured the vacuum. If there was any observable loss of vacuum, the fittings were adjusted as needed until the vacuum did not change noticeably. The soil gas sample was then taken.

No flow conditions occur when a sampling rate greater than 10 mL/min cannot be maintained without applying a vacuum greater than 100 inches of water to the sampling train. The sampling train is left at a vacuum for no less than three minutes. If the vacuum does not subside appreciably after three minutes, the sample location is determined to be a no flow sample.

Analytical – Soil Gas samples were analyzed using EPA Method 8260 that includes extra compounds required by DTSC/RWQCB (such as Freon 113). Instrument Continuing Calibration Verification, QC Reference Standards, Instrument Blanks and Sampling Blanks were analyzed every 12 hours as prescribed by the method. In addition, Matrix Spike (MS) and Matrix Spike Duplicates (MSD) were analyzed with each batch of Soil Gas samples. A duplicate/replicate sample was analyzed each day of the sampling activity. All samples were injected into the GC/MS system within 30 minutes of sampling.

Approval: 

Steve Jones, Ph.D.
Laboratory Manager

JONES ENVIRONMENTAL, INC.
P.O. Box 5387 | FULLERTON, CA 92838
(714) 449-9937 | FAX (714) 449-9685

JONES ENVIRONMENTAL LABORATORY RESULTS

Client:	Reynolds Group	**Report date:**	8/17/2015
Client Address:	P.O.Box 1996	**JEL Ref. No.:**	D-0983
	Tustin, CA 92781	**Client Ref. No.:**	8153
Attn:	Patricia Dean	**Date Sampled:**	8/17/2015
		Date Received:	8/17/2015
Project:	8153PATEL	**Date Analyzed:**	8/17/2015
Project Address:	1100 W. Ball Road	**Physical State:**	Soil Gas
	Anaheim, CA		

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	**SV7-15' 1PV**	**SV7-15' 3PV**	**SV7-15' 10PV**	**SV7-5'**	**SV8-15'**		
JEL ID:	**D-0983-01**	**D-0983-02**	**D-0983-03**	**D-0983-04**	**D-0983-05**	**Practical Quantitation Limit**	**Units**
Analytes:							
Benzene	ND	ND	ND	ND	ND	0.008	µg/L
Bromobenzene	ND	ND	ND	ND	ND	0.008	µg/L
Bromodichloromethane	ND	ND	ND	ND	ND	0.008	µg/L
Bromoform	ND	ND	ND	ND	ND	0.008	µg/L
n-Butylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
sec-Butylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
tert-Butylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Carbon tetrachloride	ND	ND	ND	ND	ND	0.008	µg/L
Chlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
Chloroform	ND	ND	ND	ND	ND	0.008	µg/L
2-Chlorotoluene	ND	ND	ND	ND	ND	0.008	µg/L
4-Chlorotoluene	ND	ND	ND	ND	ND	0.008	µg/L
Dibromochloromethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	0.008	µg/L
Dibromomethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2- Dichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
Dichlorodifluoromethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethene	ND	ND	ND	ND	ND	0.008	µg/L
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	0.008	µg/L
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,3-Dichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
2,2-Dichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloropropene	ND	ND	ND	ND	ND	0.008	µg/L

JONES ENVIRONMENTAL LABORATORY RESULTS

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	**SV7-15' 1PV**	**SV7-15' 3PV**	**SV7-15' 10PV**	**SV7-5'**	**SV8-15'**		
JEL ID:	**D-0983-01**	**D-0983-02**	**D-0983-03**	**D-0983-04**	**D-0983-05**	**Practical Quantitation Limit**	**Units**
Analytes:							
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	0.008	µg/L
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	0.008	µg/L
Ethylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Freon 113	ND	ND	ND	ND	ND	0.040	µg/L
Hexachlorobutadiene	ND	ND	ND	ND	ND	0.008	µg/L
Isopropylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
4-Isopropyltoluene	ND	ND	ND	ND	ND	0.008	µg/L
Methylene chloride	ND	ND	ND	ND	ND	0.008	µg/L
Naphthalene	ND	ND	ND	ND	ND	0.008	µg/L
n-Propylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Styrene	ND	ND	ND	ND	ND	0.008	µg/L
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.008	µg/L
Tetrachloroethylene	**0.135**	**0.132**	**0.130**	**0.054**	**0.118**	0.008	µg/L
Toluene	ND	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
Trichloroethylene	ND	ND	ND	ND	ND	0.008	µg/L
Trichlorofluoromethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Vinyl chloride	ND	ND	ND	ND	ND	0.008	µg/L
Xylenes	ND	ND	ND	ND	ND	0.008	µg/L
MTBE	ND	ND	ND	ND	ND	0.040	µg/L
Ethyl-tert-butylether	ND	ND	ND	ND	ND	0.040	µg/L
Di-isopropylether	ND	ND	ND	ND	ND	0.040	µg/L
tert-amylmethylether	ND	ND	ND	ND	ND	0.040	µg/L
tert-Butylalcohol	ND	ND	ND	ND	ND	0.400	µg/L
TIC:							
n-propanol	ND	ND	ND	ND	ND	0.080	µg/L
n-pentane	ND	ND	ND	ND	ND	0.008	µg/L
Dilution Factor	1	1	1	1	1		
Surrogate Recoveries:						**QC Limits**	
Dibromofluoromethane	100%	91%	98%	91%	94%	75 - 125	
Toluene-d_8	99%	98%	102%	106%	102%	75 - 125	
4-Bromofluorobenzene	99%	98%	99%	94%	97%	75 - 125	
	D1-081715-D-0983	D1-081715-D-0983	D1-081715-D-0983	D2-081715-D-0983	D1-081715-D-0983		

ND= Not Detected

JONES ENVIRONMENTAL, INC.
P.O. Box 5387 | FULLERTON, CA 92838
(714) 449-9937 | FAX (714) 449-9685

JONES ENVIRONMENTAL LABORATORY RESULTS

Client:	Reynolds Group	**Report date:**	8/17/2015
Client Address:	P.O.Box 1996	**JEL Ref. No.:**	D-0983
	Tustin, CA 92781	**Client Ref. No.:**	8153
Attn:	Patricia Dean	**Date Sampled:**	8/17/2015
		Date Received:	8/17/2015
Project:	8153PATEL	**Date Analyzed:**	8/17/2015
Project Address:	1100 W. Ball Road	**Physical State:**	Soil Gas
	Anaheim, CA		

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	**SV8-5'**	**SV6-15'**	**SV6-5'**	**SV5-15'**	**SV5-5'**		
JEL ID:	**D-0983-06**	**D-0983-07**	**D-0983-08**	**D-0983-09**	**D-0983-10**	**Practical Quantitation Limit**	**Units**
Analytes:							
Benzene	ND	ND	ND	ND	ND	0.008	µg/L
Bromobenzene	ND	ND	ND	ND	ND	0.008	µg/L
Bromodichloromethane	ND	ND	ND	ND	ND	0.008	µg/L
Bromoform	ND	ND	ND	ND	ND	0.008	µg/L
n-Butylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
sec-Butylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
tert-Butylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Carbon tetrachloride	ND	ND	ND	ND	ND	0.008	µg/L
Chlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
Chloroform	ND	ND	ND	ND	ND	0.008	µg/L
2-Chlorotoluene	ND	ND	ND	ND	ND	0.008	µg/L
4-Chlorotoluene	ND	ND	ND	ND	ND	0.008	µg/L
Dibromochloromethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	0.008	µg/L
Dibromomethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2- Dichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
Dichlorodifluoromethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethene	ND	ND	ND	ND	ND	0.008	µg/L
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	0.008	µg/L
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,3-Dichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
2,2-Dichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloropropene	ND	ND	ND	ND	ND	0.008	µg/L

JONES ENVIRONMENTAL LABORATORY RESULTS

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	**SV8-5'**	**SV6-15'**	**SV6-5'**	**SV5-15'**	**SV5-5'**		
JEL ID:	**D-0983-06**	**D-0983-07**	**D-0983-08**	**D-0983-09**	**D-0983-10**	**Practical Quantitation Limit**	**Units**
Analytes:							
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	0.008	µg/L
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	0.008	µg/L
Ethylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Freon 113	ND	ND	ND	ND	ND	0.040	µg/L
Hexachlorobutadiene	ND	ND	ND	ND	ND	0.008	µg/L
Isopropylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
4-Isopropyltoluene	ND	ND	ND	ND	ND	0.008	µg/L
Methylene chloride	ND	ND	ND	ND	ND	0.008	µg/L
Naphthalene	ND	ND	ND	ND	ND	0.008	µg/L
n-Propylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Styrene	ND	ND	ND	ND	ND	0.008	µg/L
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.008	µg/L
Tetrachloroethylene	**0.166**	**0.088**	ND	**0.139**	**0.144**	0.008	µg/L
Toluene	ND	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
Trichloroethylene	ND	ND	ND	ND	ND	0.008	µg/L
Trichlorofluoromethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Vinyl chloride	ND	ND	ND	ND	ND	0.008	µg/L
Xylenes	ND	ND	ND	ND	ND	0.008	µg/L
MTBE	ND	ND	ND	ND	ND	0.040	µg/L
Ethyl-tert-butylether	ND	ND	ND	ND	ND	0.040	µg/L
Di-isopropylether	ND	ND	ND	ND	ND	0.040	µg/L
tert-amylmethylether	ND	ND	ND	ND	ND	0.040	µg/L
tert-Butylalcohol	ND	ND	ND	ND	ND	0.400	µg/L
TIC:							
n-propanol	ND	ND	ND	ND	ND	0.080	µg/L
n-pentane	ND	ND	ND	ND	ND	0.008	µg/L
Dilution Factor	1	1	1	1	1		
Surrogate Recoveries:						**QC Limits**	
Dibromofluoromethane	75%	98%	86%	95%	92%	75 - 125	
Toluene-d_8	78%	99%	89%	97%	73%	75 - 125	
4-Bromofluorobenzene	89%	95%	118%	96%	126%	75 - 125	
	D2-081715-D-0983	D1-081715-D-0983	D2-081715-D-0983	D1-081715-D-0983	D2-081715-D-0983		

ND= Not Detected

JONES ENVIRONMENTAL, INC.
P.O. Box 5387 | FULLERTON, CA 92838
(714) 449-9937 | FAX (714) 449-9685

JONES ENVIRONMENTAL LABORATORY RESULTS

Client:	Reynolds Group	**Report date:**	8/17/2015
Client Address:	P.O.Box 1996	**JEL Ref. No.:**	D-0983
	Tustin, CA 92781	**Client Ref. No.:**	8153
Attn:	Patricia Dean	**Date Sampled:**	8/17/2015
		Date Received:	8/17/2015
Project:	8153PATEL	**Date Analyzed:**	8/17/2015
Project Address:	1100 W. Ball Road	**Physical State:**	Soil Gas
	Anaheim, CA		

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	**SV4-15'**	**SV4-5'**	**SV3-15'**	**SV3-5'**	**SV2-15'**		
JEL ID:	**D-0983-11**	**D-0983-12**	**D-0983-13**	**D-0983-14**	**D-0983-15**	**Practical Quantitation Limit**	**Units**
Analytes:							
Benzene	ND	ND	ND	ND	ND	0.008	µg/L
Bromobenzene	ND	ND	ND	ND	ND	0.008	µg/L
Bromodichloromethane	ND	ND	ND	ND	ND	0.008	µg/L
Bromoform	ND	ND	ND	ND	ND	0.008	µg/L
n-Butylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
sec-Butylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
tert-Butylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Carbon tetrachloride	ND	ND	ND	ND	ND	0.008	µg/L
Chlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
Chloroform	ND	ND	ND	ND	ND	0.008	µg/L
2-Chlorotoluene	ND	ND	ND	ND	ND	0.008	µg/L
4-Chlorotoluene	ND	ND	ND	ND	ND	0.008	µg/L
Dibromochloromethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	0.008	µg/L
Dibromomethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2- Dichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
Dichlorodifluoromethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethene	ND	ND	ND	ND	ND	0.008	µg/L
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	0.008	µg/L
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,3-Dichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
2,2-Dichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloropropene	ND	ND	ND	ND	ND	0.008	µg/L

JONES ENVIRONMENTAL LABORATORY RESULTS

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	**SV4-15'**	**SV4-5'**	**SV3-15'**	**SV3-5'**	**SV2-15'**		
JEL ID:	**D-0983-11**	**D-0983-12**	**D-0983-13**	**D-0983-14**	**D-0983-15**	**Practical Quantitation Limit**	**Units**
Analytes:							
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	0.008	µg/L
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	0.008	µg/L
Ethylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Freon 113	ND	ND	ND	ND	ND	0.040	µg/L
Hexachlorobutadiene	ND	ND	ND	ND	ND	0.008	µg/L
Isopropylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
4-Isopropyltoluene	ND	ND	ND	ND	ND	0.008	µg/L
Methylene chloride	ND	ND	ND	ND	ND	0.008	µg/L
Naphthalene	ND	ND	ND	ND	ND	0.008	µg/L
n-Propylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Styrene	ND	ND	ND	ND	ND	0.008	µg/L
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.008	µg/L
Tetrachloroethylene	**0.133**	**0.114**	**0.151**	**0.170**	**0.159**	0.008	µg/L
Toluene	ND	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	0.008	µg/L
Trichloroethylene	ND	ND	ND	ND	ND	0.008	µg/L
Trichlorofluoromethane	ND	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	0.008	µg/L
Vinyl chloride	ND	ND	ND	ND	ND	0.008	µg/L
Xylenes	ND	ND	ND	ND	ND	0.008	µg/L
MTBE	ND	ND	ND	ND	ND	0.040	µg/L
Ethyl-tert-butylether	ND	ND	ND	ND	ND	0.040	µg/L
Di-isopropylether	ND	ND	ND	ND	ND	0.040	µg/L
tert-amylmethylether	ND	ND	ND	ND	ND	0.040	µg/L
tert-Butylalcohol	ND	ND	ND	ND	ND	0.400	µg/L
TIC:							
n-propanol	ND	ND	ND	ND	ND	0.080	µg/L
n-pentane	ND	ND	ND	ND	ND	0.008	µg/L
Dilution Factor	1	1	1	1	1		
Surrogate Recoveries:						**QC Limits**	
Dibromofluoromethane	98%	96%	90%	104%	101%	75 - 125	
Toluene-d_8	99%	69%	100%	82%	100%	75 - 125	
4-Bromofluorobenzene	97%	100%	98%	116%	99%	75 - 125	
	D1-081715-D-0983	D2-081715-D-0983	D1-081715-D-0983	D2-081715-D-0983	D1-081715-D-0983		

ND= Not Detected

JONES ENVIRONMENTAL, INC.
P.O. Box 5387 | FULLERTON, CA 92838
(714) 449-9937 | FAX (714) 449-9685

JONES ENVIRONMENTAL LABORATORY RESULTS

Client:	Reynolds Group	**Report date:**	8/17/2015
Client Address:	P.O.Box 1996	**JEL Ref. No.:**	D-0983
	Tustin, CA 92781	**Client Ref. No.:**	8153
Attn:	Patricia Dean	**Date Sampled:**	8/17/2015
		Date Received:	8/17/2015
Project:	8153PATEL	**Date Analyzed:**	8/17/2015
Project Address:	1100 W. Ball Road	**Physical State:**	Soil Gas
	Anaheim, CA		

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	**SV2-5'**	**SV1-15'**	**SV1-15' DUP**	**SV1-5'**		
JEL ID:	**D-0983-16**	**D-0983-17**	**D-0983-18**	**D-0983-19**	**Practical Quantitation Limit**	**Units**
Analytes:						
Benzene	ND	ND	ND	ND	0.008	µg/L
Bromobenzene	ND	ND	ND	ND	0.008	µg/L
Bromodichloromethane	ND	ND	ND	ND	0.008	µg/L
Bromoform	ND	ND	ND	ND	0.008	µg/L
n-Butylbenzene	ND	ND	ND	ND	0.008	µg/L
sec-Butylbenzene	ND	ND	ND	ND	0.008	µg/L
tert-Butylbenzene	ND	ND	ND	ND	0.008	µg/L
Carbon tetrachloride	ND	ND	ND	ND	0.008	µg/L
Chlorobenzene	ND	ND	ND	ND	0.008	µg/L
Chloroform	ND	ND	ND	ND	0.008	µg/L
2-Chlorotoluene	ND	ND	ND	ND	0.008	µg/L
4-Chlorotoluene	ND	ND	ND	ND	0.008	µg/L
Dibromochloromethane	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	0.008	µg/L
Dibromomethane	ND	ND	ND	ND	0.008	µg/L
1,2- Dichlorobenzene	ND	ND	ND	ND	0.008	µg/L
1,3-Dichlorobenzene	ND	ND	ND	ND	0.008	µg/L
1,4-Dichlorobenzene	ND	ND	ND	ND	0.008	µg/L
Dichlorodifluoromethane	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethane	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloroethane	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethene	ND	ND	ND	ND	0.008	µg/L
cis-1,2-Dichloroethene	ND	ND	ND	ND	0.008	µg/L
trans-1,2-Dichloroethene	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloropropane	ND	ND	ND	ND	0.008	µg/L
1,3-Dichloropropane	ND	ND	ND	ND	0.008	µg/L
2,2-Dichloropropane	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloropropene	ND	ND	ND	ND	0.008	µg/L

JONES ENVIRONMENTAL LABORATORY RESULTS

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	SV2-5'	SV1-15'	SV1-15' DUP	SV1-5'		
JEL ID:	D-0983-16	D-0983-17	D-0983-18	D-0983-19	Practical Quantitation Limit	Units
Analytes:						
cis-1,3-Dichloropropene	ND	ND	ND	ND	0.008	µg/L
trans-1,3-Dichloropropene	ND	ND	ND	ND	0.008	µg/L
Ethylbenzene	ND	ND	ND	ND	0.008	µg/L
Freon 113	ND	ND	ND	ND	0.040	µg/L
Hexachlorobutadiene	ND	ND	ND	ND	0.008	µg/L
Isopropylbenzene	ND	ND	ND	ND	0.008	µg/L
4-Isopropyltoluene	ND	ND	ND	ND	0.008	µg/L
Methylene chloride	ND	ND	ND	ND	0.008	µg/L
Naphthalene	ND	ND	ND	ND	0.008	µg/L
n-Propylbenzene	ND	ND	ND	ND	0.008	µg/L
Styrene	ND	ND	ND	ND	0.008	µg/L
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	0.008	µg/L
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.008	µg/L
Tetrachloroethylene	**0.106**	**0.134**	**0.135**	**0.173**	0.008	µg/L
Toluene	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichlorobenzene	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trichlorobenzene	ND	ND	ND	ND	0.008	µg/L
1,1,1-Trichloroethane	ND	ND	ND	ND	0.008	µg/L
1,1,2-Trichloroethane	ND	ND	ND	ND	0.008	µg/L
Trichloroethylene	ND	ND	ND	ND	0.008	µg/L
Trichlorofluoromethane	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichloropropane	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trimethylbenzene	ND	ND	ND	ND	0.008	µg/L
1,3,5-Trimethylbenzene	ND	ND	ND	ND	0.008	µg/L
Vinyl chloride	ND	ND	ND	ND	0.008	µg/L
Xylenes	ND	ND	ND	ND	0.008	µg/L
MTBE	ND	ND	ND	ND	0.040	µg/L
Ethyl-tert-butylether	ND	ND	ND	ND	0.040	µg/L
Di-isopropylether	ND	ND	ND	ND	0.040	µg/L
tert-amylmethylether	ND	ND	ND	ND	0.040	µg/L
tert-Butylalcohol	ND	ND	ND	ND	0.400	µg/L
TIC:						
n-propanol	ND	ND	ND	ND	0.080	µg/L
n-pentane	ND	ND	ND	ND	0.008	µg/L
Dilution Factor	1	1	1	1		
Surrogate Recoveries:					**QC Limits**	
Dibromofluoromethane	84%	103%	102%	92%	75 - 125	
Toluene-d_8	122%	98%	99%	74%	75 - 125	
4-Bromofluorobenzene	112%	94%	95%	135%	75 - 125	
	D2-081715-D-0983	D1-081715-D-0983	D1-081715-D-0983	D2-081715-D-0983		

ND= Not Detected

JONES ENVIRONMENTAL, INC.
P.O. Box 5387 | FULLERTON, CA 92838
(714) 449-9937 | FAX (714) 449-9685

JONES ENVIRONMENTAL LABORATORY RESULTS

Client:	Reynolds Group	**Report date:**	8/17/2015
Client Address:	P.O.Box 1996	**JEL Ref. No.:**	D-0983
	Tustin, CA 92781	**Client Ref. No.:**	8153
Attn:	Patricia Dean	**Date Sampled:**	8/17/2015
		Date Received:	8/17/2015
Project:	8153PATEL	**Date Analyzed:**	8/17/2015
Project Address:	1100 W. Ball Road	**Physical State:**	Soil Gas
	Anaheim, CA		

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	METHOD BLANK	SAMPLING BLANK	METHOD BLANK	SAMPLING BLANK		
JEL ID:	D-0983-20	D-0983-21	D-0983-25	D-0983-26	**Practical Quantitation Limit**	**Units**
Analytes:						
Benzene	ND	ND	ND	ND	0.008	µg/L
Bromobenzene	ND	ND	ND	ND	0.008	µg/L
Bromodichloromethane	ND	ND	ND	ND	0.008	µg/L
Bromoform	ND	ND	ND	ND	0.008	µg/L
n-Butylbenzene	ND	ND	ND	ND	0.008	µg/L
sec-Butylbenzene	ND	ND	ND	ND	0.008	µg/L
tert-Butylbenzene	ND	ND	ND	ND	0.008	µg/L
Carbon tetrachloride	ND	ND	ND	ND	0.008	µg/L
Chlorobenzene	ND	ND	ND	ND	0.008	µg/L
Chloroform	ND	ND	ND	ND	0.008	µg/L
2-Chlorotoluene	ND	ND	ND	ND	0.008	µg/L
4-Chlorotoluene	ND	ND	ND	ND	0.008	µg/L
Dibromochloromethane	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	0.008	µg/L
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	0.008	µg/L
Dibromomethane	ND	ND	ND	ND	0.008	µg/L
1,2- Dichlorobenzene	ND	ND	ND	ND	0.008	µg/L
1,3-Dichlorobenzene	ND	ND	ND	ND	0.008	µg/L
1,4-Dichlorobenzene	ND	ND	ND	ND	0.008	µg/L
Dichlorodifluoromethane	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethane	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloroethane	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloroethene	ND	ND	ND	ND	0.008	µg/L
cis-1,2-Dichloroethene	ND	ND	ND	ND	0.008	µg/L
trans-1,2-Dichloroethene	ND	ND	ND	ND	0.008	µg/L
1,2-Dichloropropane	ND	ND	ND	ND	0.008	µg/L
1,3-Dichloropropane	ND	ND	ND	ND	0.008	µg/L
2,2-Dichloropropane	ND	ND	ND	ND	0.008	µg/L
1,1-Dichloropropene	ND	ND	ND	ND	0.008	µg/L

JONES ENVIRONMENTAL LABORATORY RESULTS

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample ID:	METHOD BLANK	SAMPLING BLANK	METHOD BLANK	SAMPLING BLANK		
JEL ID:	D-0983-20	D-0983-21	D-0983-25	D-0983-26	Practical Quantitation Limit	Units
Analytes:						
cis-1,3-Dichloropropene	ND	ND	ND	ND	0.008	µg/L
trans-1,3-Dichloropropene	ND	ND	ND	ND	0.008	µg/L
Ethylbenzene	ND	ND	ND	ND	0.008	µg/L
Freon 113	ND	ND	ND	ND	0.040	µg/L
Hexachlorobutadiene	ND	ND	ND	ND	0.008	µg/L
Isopropylbenzene	ND	ND	ND	ND	0.008	µg/L
4-Isopropyltoluene	ND	ND	ND	ND	0.008	µg/L
Methylene chloride	ND	ND	ND	ND	0.008	µg/L
Naphthalene	ND	ND	ND	ND	0.008	µg/L
n-Propylbenzene	ND	ND	ND	ND	0.008	µg/L
Styrene	ND	ND	ND	ND	0.008	µg/L
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	0.008	µg/L
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.008	µg/L
Tetrachloroethylene	ND	ND	ND	ND	0.008	µg/L
Toluene	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichlorobenzene	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trichlorobenzene	ND	ND	ND	ND	0.008	µg/L
1,1,1-Trichloroethane	ND	ND	ND	ND	0.008	µg/L
1,1,2-Trichloroethane	ND	ND	ND	ND	0.008	µg/L
Trichloroethylene	ND	ND	ND	ND	0.008	µg/L
Trichlorofluoromethane	ND	ND	ND	ND	0.008	µg/L
1,2,3-Trichloropropane	ND	ND	ND	ND	0.008	µg/L
1,2,4-Trimethylbenzene	ND	ND	ND	ND	0.008	µg/L
1,3,5-Trimethylbenzene	ND	ND	ND	ND	0.008	µg/L
Vinyl chloride	ND	ND	ND	ND	0.008	µg/L
Xylenes	ND	ND	ND	ND	0.008	µg/L
MTBE	ND	ND	ND	ND	0.040	µg/L
Ethyl-tert-butylether	ND	ND	ND	ND	0.040	µg/L
Di-isopropylether	ND	ND	ND	ND	0.040	µg/L
tert-amylmethylether	ND	ND	ND	ND	0.040	µg/L
tert-Butylalcohol	ND	ND	ND	ND	0.400	µg/L
TIC:						
n-propanol	ND	ND	ND	ND	0.080	µg/L
n-pentane	ND	ND	ND	ND	0.008	µg/L
Dilution Factor	1	1	1	1		
Surrogate Recoveries:					**QC Limits**	
Dibromofluoromethane	95%	98%	102%	112%	75 - 125	
Toluene-d_8	101%	99%	94%	81%	75 - 125	
4-Bromofluorobenzene	98%	102%	98%	93%	75 - 125	
	D1-081715-D-0983	D1-081715-D-0983	D2-081715-D-0983	D2-081715-D-0983		

ND= Not Detected

JONES ENVIRONMENTAL, INC.
P.O. Box 5387 | FULLERTON, CA 92838
(714) 449-9937 | FAX (714) 449-9685

JONES ENVIRONMENTAL
QUALITY CONTROL INFORMATION

Client:	Reynolds Group	**Report date:**	8/17/2015
Client Address:	P.O.Box 1996	**JEL Ref. No.:**	D-0983
	Tustin, CA 92781	**Client Ref. No.:**	8153
Attn:	Patricia Dean	**Date Sampled:**	8/17/2015
		Date Received:	8/17/2015
Project:	8153PATEL	**Date Analyzed:**	8/17/2015
Project Address:	1100 W. Ball Road	**Physical State:**	Soil Gas
	Anaheim, CA		

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample Spiked: Ambient Air **GC#:** D1-081715-D-0983

JEL ID:	**D-0983-23**	**D-0983-24**			**D-0983-22**	
Parameter	MS Recovery (%)	MSD Recovery (%)	RPD	Acceptability Range (%)	LCS	Acceptability Range (%)
Vinyl Chloride	156%	147%	5.8%	60-140	157%	70-130
1,1-Dichloroethylene	100%	102%	1.9%	60-140	98%	70-130
Cis-1,2-Dichloroethene	99%	98%	0.8%	70-130	96%	70-130
1,1,1-Trichloroethane	107%	107%	0.0%	70-130	100%	70-130
Benzene	101%	101%	0.4%	70-130	106%	70-130
Trichloroethylene	109%	110%	0.3%	70-130	105%	70-130
Toluene	102%	103%	0.9%	70-130	101%	70-130
Tetrachloroethene	109%	108%	1.6%	70-130	103%	70-130
Chlorobenzene	102%	103%	0.7%	70-130	103%	70-130
Ethylbenzene	93%	93%	0.0%	70-130	105%	70-130
1,2,4 Trimethylbenzene	107%	103%	4.0%	70-130	113%	70-130
Surrogate Recovery:						
Dibromofluoromethane	104%	100%		75-125	99%	75-125
Toluene-d_8	105%	102%		75-125	105%	75-125
4-Bromofluorobenzene	102%	97%		75-125	104%	75-125

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference; Acceptability range for RPD is ≤ 15%

JONES ENVIRONMENTAL, INC.
P.O. Box 5387 | FULLERTON, CA 92838
(714) 449-9937 | FAX (714) 449-9685

JONES ENVIRONMENTAL
QUALITY CONTROL INFORMATION

Client:	Reynolds Group	**Report date:**	8/17/2015
Client Address:	P.O.Box 1996	**JEL Ref. No.:**	D-0983
	Tustin, CA 92781	**Client Ref. No.:**	8153
Attn:	Patricia Dean	**Date Sampled:**	8/17/2015
		Date Received:	8/17/2015
Project:	8153PATEL	**Date Analyzed:**	8/17/2015
Project Address:	1100 W. Ball Road	**Physical State:**	Soil Gas
	Anaheim, CA		

EPA 8260B-Volatile Organics by GC/MS + Oxygenates

Sample Spiked: Ambient Air **GC#:** D2-081715-D-0983

JEL ID:	**D-0983-28**	**D-0983-29**			**D-0983-27**	
Parameter	MS Recovery (%)	MSD Recovery (%)	RPD	Acceptability Range (%)	LCS	Acceptability Range (%)
Vinyl Chloride	116%	113%	2.1%	60-140	92%	70-130
1,1-Dichloroethylene	70%	68%	2.4%	60-140	70%	70-130
Cis-1,2-Dichloroethene	106%	105%	1.5%	70-130	84%	70-130
1,1,1-Trichloroethane	111%	108%	2.7%	70-130	98%	70-130
Benzene	92%	91%	1.4%	70-130	93%	70-130
Trichloroethylene	103%	106%	2.6%	70-130	99%	70-130
Toluene	106%	100%	5.9%	70-130	97%	70-130
Tetrachloroethene	103%	102%	1.8%	70-130	92%	70-130
Chlorobenzene	116%	113%	2.2%	70-130	102%	70-130
Ethylbenzene	115%	114%	1.3%	70-130	103%	70-130
1,2,4 Trimethylbenzene	122%	118%	3.0%	70-130	106%	70-130
Surrogate Recovery:						
Dibromofluoromethane	94%	94%		75-125	101%	75-125
Toluene-d_8	94%	94%		75-125	94%	75-125
4-Bromofluorobenzene	101%	102%		75-125	102%	75-125

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference; Acceptability range for RPD is ≤ 15%

JONES ENVIRONMENTAL, INC.
11007 Forest Place
Santa Fe Springs, CA 90670
(714) 449-9937
(562) 646-1611
www.jonesenv.com

Chain-of-Custody Record

Client: THE REYNOLDS GROUP
Date: 8/17/15
Project Name: ASH ANAHEIM
Client Project #: 8153
Project Address: 1100 W. BALL ROAD, ANAHEIM, CA
Project Contact: PATRICIA DEAN

Turn Around Requested:
- ☐ Immediate Attention
- ☐ Rush 24-48 Hours
- ☐ Rush 72-96 Hours
- ☐ Normal
- ☒ Mobile Lab

SOIL GAS
Purge Number: ☐ 1P ☐ 3P ☐ 7P ☐ 10P
Purge Rate: 200 cc/min
Shut in Test (Y) / N
Tracer:
- ☑ n-propanol
- ☑ n-pentane
- ☐ 1,1-DFA
- ☐ Helium
- ☐ _____

JEL Project #: D-0983
Page 1 of 1
Lab Use Only
Sample Condition as Received:
Chilled ☐ yes ☑ no
Sealed ☑ yes ☐ no

Sample ID	Purge Number	Purge Volume	Date	Sample Collection Time	Sample Analysis Time	Laboratory Sample Number	Sample Matrix: Soil (S), Sludge (SL), Aqueous (A), Soil Gas (SG)	BTEX 8260	Analysis Requested	Analysis Requested	Magnehelic Vacuum (In/H_2O)	Number of Containers	Remarks/Special Instructions
SV7-1.5 1PV	1	488	8/17/15	07:31	07:43	D-0983-01	SG	X				<2	2	GLASS GAS TIGHT SYRINGE
SV7-1.5 3PV	3	~~1304~~ 1465	8/17/15	07:52	08:03	D-0983-02	SG	X				<2	2	
SV7-1.5 10PV	10	4883	8/17/15	08:10	08:21	D-0983-03	SG	X				<2	2	
SV7-5'	3	1301	8/17/15	08:30	08:39	D-0983-04	SG	X				<2	2	
SV8-1.5'	3	1465	8/17/15	08:45	08:57	D-0983-05	SG	X				<2	2	
SV8-5'	3	1301	8/17/15	08:55	09:07	D-0983-06	SG	X				<2	2	
SV6-1.5'	3	1465	8/17/15	09:09	09:20	D-0983-07	SG	X				<2	2	
SV6-5'	3	1301	8/17/15	09:15	09:25	D-0983-08	SG	X				<2	2	
SV5-1.5'	3	1465	8/17/15	09:28	09:40	D-0983-09	SG	X				<2	2	
SV5-5'	3	1301	8/17/15	09:33	09:45	D-0983-10	SG	X				<2	2	

❶ Relinquished by (signature)	Date 8/17/15	❷ Received by (signature)	Date 8/17/15		**Total Number of Containers**
Company TRG	Time 11:35	Company JEL	Time 11:35		
❸ Relinquished by (signature)	Date	❹ Received by Laboratory (signature)	Date	The delivery of samples and the signature on this Chain of Custody form constitutes authorization to perform the analyses specified above under the Terms and Conditions set forth on the back hereof.	
Company	Time	Company	Time	☐ EDD ☐ EDF	

JONES ENVIRONMENTAL, INC.
11007 Forest Place
Santa Fe Springs, CA 90670
(714) 449-9937
(562) 646-1611
www.jonesenv.com

Chain-of-Custody Record

Client: THE REYNOLDS GROUP
Date: 8/17/15
Project Name: ASH ANAHEIM
Client Project #: 8153
Project Address: 1100 W. BALL ROAD, ANAHEIM, CA
Project Contact: PATRICIA DEAN

Turn Around Requested:
- ☐ Immediate Attention
- ☐ Rush 24-48 Hours
- ☐ Rush 72-96 Hours
- ☐ Normal
- ☒ Mobile Lab

SOIL GAS
Purge Number: ☐ 1P ☒ 3P ☐ 7P ☐ 10P
Purge Rate: 200 cc/min
Shut in Test (Y) / N
Tracer:
- ☐ n-propanol
- ☑ n-pentane
- ☐ 1,1-DFA
- ☐ Helium
- ☐ _____

JEL Project #: D-0983
Page 2 of 2

Lab Use Only
Sample Condition as Received:
Chilled ☐ yes ☒ no
Sealed ☒ yes ☐ no

Sample ID	Purge Number	Purge Volume	Date	Sample Collection Time	Sample Analysis Time	Laboratory Sample Number	Sample Matrix: Soil (S), Sludge (SL), Aqueous (A), Soil Gas (SG)	EPA 8260				Analysis Requested: Magnehelic Vacuum (in/H_2O)	Number of Containers	Remarks/Special Instructions
SV4-15'	3	1465	8/17/15	09:48	10:00	D-0983-11	SG	X				<2	2	GLASS GAS TIGHT SYRINGE
SV4-5'	3	1301	8/17/15	09:56	10:05	D-0983-12	SG	X				<2	2	
SV3-15'	3	1465	8/17/15	10:11	10:22	D-0983-13	SG	X				<2	2	
SV3-5'	3	1301	8/17/15	10:17	10:29	D-0983-14	SG	X				<2	2	
SV2-15'	3	1465	8/17/15	10:31	10:42	D-0983-15	SG	X				<2	2	
SV2-5'	3	1301	8/17/15	10:39	10:49	D-0983-16	SG	X				<2	2	
SV1-15'	3	1465	8/17/15	10:52	11:02	D-0983-17	SG	X				<2	2	
SV1-15' DUP	3	1465	8/17/15	10:52	11:22	D-0983-18	SG	X				<2	2	
SV1-5'	3	1301	8/17/15	10:58	11:09	D-0983-19	SG	X				<2	2	

❶ Relinquished by (signature)	Date 8/17/15	❷ Received by (signature)	Date 8/17/15	Total Number of Containers
Company TRG	Time 1135	Company JEL	Time 11:35	
❸ Relinquished by (signature)	Date	❹ Received by Laboratory (signature)	Date	The delivery of samples and the signature on this Chain of Custody form constitutes authorization to perform the analyses specified above under the Terms and Conditions set forth on the back hereof.
Company	Time	Company	Time	☐ EDD ☐ EDF

From:	Stephanie Castle Zinn
To:	Ted Frattone; Martin Parker
Cc:	Esperanza Rios; Keith Linker; Mostafa Komaee; Howard Wen; April McMillian
Subject:	WQMP for the Hotel Redevelopment Project OTH2017-01009 is "Approvable". Final Approval Pending corrections/resubmittal
Date:	Wednesday, June 24, 2020 4:04:52 PM
Attachments:	image001.png image006.png image007.png image008.png image009.png image010.jpg image011.png OTH2017-01009 Approved Cover Page.pdf

---

Hello Ted and Martin,

Regarding the Preliminary WQMP for Hotel Redevelopment Project (OTH2017-0100), the WQMP is "approvable" pending the inclusion of the items listed below, addressing two minor comments, and incorporating documentation for one condition for the Final WQMP in the next Preliminary WQMP submittal. Please note that this most recent submittal in EPC will be marked as "CORRECTIONS"; however, the next submittal will be "APPROVED WITH CONDITIONS" as long as it addresses the items below:

- Please include signed cover sheet (attached) in place of the current cover sheet
- Please include updated signed Owner's and Engineer's Certification Pages reflecting the most recent revision date
- As noted in EPC, Please provide water quality flow rate in DMA DCV/Q summary table instead of pretreatment BMP design flow rate
- As noted on EPC, Provide rough estimate of sub-DMAs for MWS pretreatment sizing. It appears DMA 1 is split into two sub-DMAs that will be flowing to two separate MWS units prior to detention and infiltration; please provide these calculations to confirm MWS sizing is appropriate for pretreatment purposes.
- Include this email as a new attachment to the Preliminary WQMP in the next submittal to memorialize the condition that must be addressed in the Final WQMP which is provided below.
    - Condition 1 for Final WQMP: As referenced throughout each plan check, it was highly recommended that the applicant perform site specific infiltration to confirm infiltration feasibility. However, after discussions between Fuscoe Engineering, the City, and the applicant, infiltration testing is allowed to be pushed to the Final WQMP. Therefore, infiltration testing must be performed during the Final WQMP to confirm feasibility. As mentioned via plan check documentation, and over the phone, infiltration may be found to be infeasible from less than favorable infiltration rate testing results or the fact that there is prior contamination at the site that may pose concerns with the local groundwater agency. Any changes to the proposed BMP design shown in the Final WQMP, may require additional time and effort in the review of the WQMP.

Once these items are included in the WQMP, the applicant should follow the City's standard E-Plan Check submittal process (for any questions, please contact PWEPC@anaheim.net). *Electronic PDF versions of the Final Approved WQMP should be compiled directly from the original electronic source*

files (.docx, .dwg, etc.) to preserve integrity and quality, minimize file size and allow search functionality. Scanned versions of the final report will not be accepted with the exception of the signed Owner's Certification page, the signed Engineer's Certification page and the approved Cover Page. Please submit via web-based file transfer or via email (only if file is smaller than 10 MB) to Fuscoe Engineering Plan Checker. The Plan Checker will confirm receipt of WQMP via email.

In addition, in order to expedite the review, please also email an electronic copy of the WQMP to the Fuscoe Engineering Plan Checker.

Note that any changes that are made to the grading plans that affect the WQMP or WQMP site plan will require a revised WQMP to be resubmitted for an additional review to ensure consistency. These edits can be a result of grading plan checks, client requests, or internal design changes.

Once the resubmittal is received and accepted by the City, Fuscoe Engineering will review and ensure it satisfies all the requirements above, it will be approved in final and you will receive an email confirmation the City. Only after the Final WQMP is approved, will the City Case Engineer consider allowing Mylar Grading Plan submittal.

Please let me know if you have any questions.

Stephanie

STEPHANIE CASTLE ZINN | *Project Manager – Water Resources*
scastlezinn@fuscoe.com

SUMMERTIME HOURS MAY 26 - SEP 4: M-TH 7:30 AM – 5:30 PM | F 8:00 AM – NOON

FUSCOE ENGINEERING, INC.
an employee owned company

16795 Von Karman, Suite 100, Irvine, CA 92606
949.474.1960 | fuscoe.com

IRVINE . SAN DIEGO . ONTARIO . LOS ANGELES

2019 TWP

full circle thinking®