City of Newport Beach
Priority Project
Preliminary Water Quality Management Plan (WQMP)

Project Name:

Koll Center Residences Newport

PLANNING APPLICATION NO.:

PA 2015-024

Prepared for:

Owner: KCN A Management, LLC

17755 Sky Park East, Suite 100

Irvine, CA 92614

(949)261-2499

Developer: Shopoff Land Fund II, LP

2 Park Plaza, Suite 700

Irvine, CA 92614

(949)417-1396

Prepared by:

David Evans and Associates, Inc.

Engineer: Mark Reader Registration No. 44917

17782 17th Street, Suite 200

Tustin, CA 92780

(714)665-4500

Prepared: 5/18/16

Revised: 6/26/17

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Project Owner's Certification			
Permit/Application No.	PA 2015-024	Grading Permit No.	
Tract/Parcel Map No.	TTM 17852	Building Permit No.	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)			Parcel 1 of LA2013-007 APN 445-131-28 (Portion)

This Water Quality Management Plan (WQMP) has been prepared for KCN A Management, LLC and Shopoff Land Fund II, LP by David Evans and Associates, Inc. The WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, will have future ownership of 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:			
Title	Brian Rupp / Director - Asset Management		
Company	Shopoff Land Fund II, LP		
Address	2 Park Plaza, Suite 700		
Email	brupp@shopoff.com		
Telephone #	(949) 417-1396		
Signature		Date	

Preparer (Engineer):			
Title	Mark S. Reader, PE / Senior Project Manager	PE Registration #	C 44917
Company	David Evans and Associates		
Address	17782 E. 17th Street, Tustin, CA 92780		
Email	mreader@deainc.com		
Telephone #	(714) 665-4500		

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

Preparer Signature		Date	
Place Stamp Here			

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Attachments

Note: * indicates sections to be provided with Final WQMP Report

Section I Discretionary Permit(s) and Water Quality Conditions

Provide discretionary permit and water quality information. *Refer to Section 2.1 in the Technical Guidance Document (TGD) available from the Orange County Stormwater Program (ocwatersheds.com).*

Project Information			
Permit/Application No.	PA 2015-024	Tract/Parcel Map No.	17852
Additional Information/ Comments:			
Water Quality Conditions			
Water Quality Conditions (list verbatim)	Not Applicable for Preliminary / Concept WQMP. Enclosed WQMP prepared as a technical appendix to the project EIR.		
Watershed-Based Plan Conditions			
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	**WIHMP:** Not Applicable **303(d) Listed Impairments for San Diego Creek and Newport Bay:** Selenium, Toxaphene, Fecal Coliform, Metals, Copper, Sediment Toxicity, Chlordane, DDT, PCB's (Polychlorinated Biphenyls), Indicator Bacteria, Nutrients, Pesticides, Sedimentation/Siltation **TMDL's for San Diego Creek and Newport Bay:** Bacteria Indicators/Pathogens, Nutrients, Pesticides, Sedimentation/Siltation		

Section II Project Description

II.1 Project Description

Provide a detailed project description including:

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

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

Description of Proposed Project		
Development Category (Verbatim from WQMP):	**Category 8:** Significant Redevelopment Project	
Project Area (ac): 12.6	Number of Dwelling Units: 260	SIC Code: 59 (Residential)
Narrative Project Description:	The proposed development is located within the Koll Center in the City of Newport Beach, Orange County, California. The Koll Center Residences Newport includes a 12.6 acre portion of the Koll Center office park. In general, the property is situated within the northerly portion of the Koll Center, and is bordered by Birch Street to the North, Von Karman to the south and existing office buildings and paved parking and drive areas to the East and West. The project development includes 260 residential units, 3400 square feet of ground floor retail, and 1.2 Acres of park. Three new buildings of podium construction will be developed with up to twelve (12) residential levels above two (2) levels of above-ground parking and up to three (3) levels of subterranean parking. In addition, a seven (7) story parking structure with five (5) levels of above ground parking and two (2) levels of subterranean parking will be developed. The project will displace existing surface parking and common landscape areas. The displaced parking has been accounted for in the project design. Anticipated pollutants for the proposed land uses include suspended-solids/sediments, nutrients, heavy metals, pathogens (bacteria/virus), pesticides, oil and grease, toxic organic compounds, and trash and	

<table>
<tr><td></td><td colspan="4">debris.</td></tr>
<tr><td rowspan="2">Project Area</td><td colspan="2">Pervious</td><td colspan="2">Impervious</td></tr>
<tr><td>Area (acres)</td><td>Percentage</td><td>Area
(acres or sq ft)</td><td>Percentage</td></tr>
<tr><td>Pre-Project Conditions</td><td>2.96</td><td>27%</td><td>8.14</td><td>73%</td></tr>
<tr><td>Post-Project Conditions</td><td>3.79</td><td>34%</td><td>7.31</td><td>66%</td></tr>
<tr><td>Drainage Patterns/Connections</td><td colspan="4"><u>Existing (Pre-Developed) Hydrologic Conditions</u>:
The property is currently an office park consisting of buildings, parking lots and landscaping in the parking lot planter islands. Soil classification is largely comprised of 'B' type soils, The reader is instructed to refer to the 'NRCS Hydrologic Soils Groups' Map (Figure XVI-2a from the Orange County Technical Guidance Document, Exhibit 7.III) included in the appendix of this report.

The site currently drains in 2 directions, with approximetly 60% of the drainage running towards Von Karmen Avenue and 40% towards Birch Street. The site is considered relatively flat at 1% to 2% to provide sheet flow within the existing parking lots.

The parking lot drainage is collected by a series of concrete swales which are collected by storm drain lines. From the southerly side of the existing ridge line the flows collected by the onsite SD system connect to the existing storm drain line in Von Karmen Avenue. The drainage area northerly of the existing ridge line is tributary to an existing 60” storm drain line located on the east side of the 5000 Birch Street building which ultimately drains to the collection ponds within Koll Center.

<u>Developed (Post-Developed) Hydrologic Conditions</u>:
The project will maintain the existing drainage pattern of the site, drainage areas south of the high point will drain to Von Karman and drainage areas northerly of the high point will drain to an existing 60” storm drain line located on the east side of the 5000 Birch Street building.

Approximately 3.8 ac of the 12.6 ac site will be landscaped or have a pervious surface, which includes 0.99 ac of pervious area from the 2 park sites. The impervious surface includes walkway areas in the podium area, marsh walkways, roads and parking areas that allow for vehicular traffic, which are anticipated to be paved with asphalt. The balance of the site will consist of either building footprints, sidewalks, or other hardscape feature.</td></tr>
</table>

	Because the percentage of impervious surface will be decreased, runoff volumes will be reduced from the pre-developed condition and therefore, no hydrologic conditions of concern (HCOC) are anticipated as a result of developing the project.

II.2 Potential Stormwater Pollutants

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

Pollutants of Concern			
Pollutant	Circle One: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	E	N	Attached Residential, Retail, Parking, and Street project components
Nutrients	E	N	Attached Residential, Retail, Parking, and Street project components
Heavy Metals	E	N	Retail, Parking and Street project components
Pathogens (Bacteria/Virus)	E	N	Attached Residential, Retail, Parking, and Street project components
Pesticides	E	N	Attached Residential, Retail, Parking, and Street project components
Oil and Grease	E	N	Attached Residential, Retail, Parking, and Street project components
Toxic Organic Compounds	E	N	Retail, Parking and Street project components
Trash and Debris	E	N	Attached Residential, Retail, Parking, and Street project components

II.3 Hydrologic Conditions of Concern

Determine if streams located downstream from the project area are determined to be potentially susceptible to hydromodification impacts. *Refer to Section 2.2.3.1 in the TGD for* NOC *or Section 2.2.3.2 for* <SOC>.

☒ No – Show map. See Hydrology Study attached with this Report

☐ Yes – Describe applicable hydrologic conditions of concern below. *Refer to Section 2.2.3 in the TGD.*

While streams located downstream of the project site are potentially susceptible to hydromodification impacts, there are no 'Hydrologic Conditions of Concern' (HCOC). Because of the increased pervious surface resulting from development of the project, the runoff volume produced by the site is reduced from the existing condition. Approximately 1.30 ac-ft of runoff volume is produced by a 2-year, 24-hour storm event under the post-developed condition. The same frequency and duration storm produces approximately 1.38 ac-ft in the pre-developed condition. This represents just over a 6% decrease in runoff volume. A summary of runoff volumes is provided in the following table. Hydrology calculations for the 2-year, 24-hour storm event are included in the Appendix of this report. Hydrology maps can be found in the Appendix of this report.

Due to roof runoff starting at the building roof 14 stories above ground, the time of concentration will be reduced as a result of the project.

It should be noted that the tributary drainage area in the Table is for drainage areas "A", "B", and "C". The drainage area of 11.1 acres is less than the 12.6 acre project area due to the fact there is no development on the west side of the project.

Koll Center Newport
Runoff Volume Summary
(2-year, 24-hour storm event)

2 Year 24 Hour	Proposed Condition			Existing Condition		
	Area(AC)	Volume (AC-FT)	Flow Rate (CFS)	Area(AC)	Volume (AC-FT)	Flow Rate (CFS)
A	5.0	0.5678	7.87	5.0	0.5947	7.93
B	0.8	0.1096	1.56	0.8	0.1230	1.59
C	5.3	0.6232	8.39	5.3	0.3591	8.47
Total	11.1	1.3006	17.82	11.1	1.3768	17.99

II.4 Post Development Drainage Characteristics

Describe post development drainage characteristics. *Refer to Section 2.2.4 in the TGD.*

The proposed storm drain system will largely maintain the same drainage pattern(s), and connectivity that exists today. Currently there are three (3) locations where the private runoff makes a public connection. Refer to the Existing Hydrology Exhibit attached with this report.

1. Drainage Area "A" collects the building roof and street runoff in catch basins which is conveyed through an onsite storm drain system which connects to the public storm drain in Von Karman.

2. Drainage Area "B" collects the parking lot runoff in catch basins which is conveyed through an onsite storm drain system of which low flows will drain to a drywell system. Storm flows exceeding low flows will continue to flow over the driveway to Birch Street.

3. Drainage Area "C" collects the parking lot and street runoff in catch basins which is conveyed through an onsite storm drain system which connects to the public storm drain located on the east side of 5000 Birch Street.

The storm drain systems that receive the project storm flows discharge into existing drainage ponds to the southerly of the project site. This pond appears to operate as a detention facility before again entering an existing 54-inch RCP within MacArthur Boulevard. These flows discharge to San Diego Creek before ultimately reaching Newport Bay and the Pacific Ocean.

The construction of the proposed buildings will not increase the overall drainage areas from existing to the proposed condition for the three drainage areas noted above. However these individual drainage areas will be slightly altered for the new development. The intent is to remodel the storm drain system which currently exists on site and modify the system to pick up drainage from the proposed development. The connections to the existing public storm drain systems will remain intact.

The site is composed of four landscape zones which include a) The podium b) The plaza and street c) The paseo and d) The park. Within these landscape zones various BMP's will be incorporated to treat the runoff before connecting to the public storm drain system.

II.5 Property Ownership/Management

Describe property ownership/management. *Refer to Section 2.2.5 in the TGD.*

The property will be privately owned and maintained. This includes all street and storm drain improvements as well as all applicable site design, source control, and treatment control BMP's. A 'Homeowners Association' will be formed that will manage and be responsible for the maintenance obligations of the site.

Section III Site Description

III.1 Physical Setting

Fill out table with relevant information. *Refer to Section 2.3.1 in the TGD.*

Planning Area/ Community Name	Koll Center Newport
Location/Address	Von Karman Ave. and Birch St.
	Newport Beach, CA 92660
Land Use	Mixed Use: Residential/Commercial
Zoning	PC (Planned Community)
Acreage	12.6
Predominant Soil Type	'B'

III.2 Site Characteristics

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

Precipitation Zone	*Between 0.7-inches and 0.75-inches (24-hour, 85th percentile rainfall) from Figure XVI-1 (Rainfall Zones) from the Orange County Technical Guidance Document.*
Topography	*The site is relatively flat.*
Drainage Patterns/Connections	*The existing condition contains 3 points of connection. The proposed condition will follow the same drainage pattern and maintain the same points of connection.*
Soil Type, Geology, and Infiltration Properties	*According to the soils report provided by EEI Geotechnical, the Soil classification varies from sand with silt to silty clay. Per page 22 of the report, Section 9.3.1, states the infiltration rates are conducive to direct infiltration of surface stormwater.*

Site Characteristics (continued)	
Hydrogeologic (Groundwater) Conditions	*Per page 7, Section 4.2 states, at the time of our subsurface exploration, a zone of heavy seepage was encountered at depths ranging from 20 to 25 feet below the ground surface. Additionally, pore pressure dissipation testing performed in CPT sounding CPT-1 indicates that groundwater was present at a depth of approximately 23 feet below the ground surface at the time of testing. In general, groundwater is expected to follow the direction of surface topography; therefore, local groundwater flow is expected to be in a general westerly direction. It should be noted that variations in groundwater may result from fluctuations in the ground surface topography, subsurface stratification, rainfall, irrigation, and other factors that may not have been evident at the time of our subsurface exploration.* *Per page 9, Conclusions states, according to nearby groundwater data obtained from the Orange County Water District, the principal groundwater aquifer has ranged from approximately 50 to 110 feet below existing ground surface at the subject property in the past 10 years (Orange County Water District, 2015).*
Geotechnical Conditions (relevant to infiltration)	*Based on the results of field percolation testing, and the overall granular nature of the underlying earth materials encountered during our field exploration, it appears that the percolation/infiltration rates at the site are conducive to direct infiltration of subsurface stormwater at the specific locations and depths tested at the subject property.*
Off-Site Drainage	*N/A*
Utility and Infrastructure Information	*Existing utilities are not anticipated to constrain site design in regards to implementing BMP strategies.*

III.3 Watershed Description

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

Receiving Waters	San Diego Creek (Reach 1) Newport Bay (Lower) Newport Bay (Upper) Pacific Ocean
303(d) Listed Impairments	San Diego Creek (Reach 1) - Selenium, Toxaphene, Fecal Coliform, Sedimentation/Siltation, Nutrients, Pesticides, Metal/Metalloids, Pathogens, Sediment Newport Bay (Upper) - Metals, Copper, Sediment Toxicity, Chlordane, DDT (Dichlorodiphenyl Trichloroethane), PCB's (Polychlorinated Biphenyls), Indicator Bacteria, Nutrients, Pesticides, Sedimentation/Siltation, Other Organics Newport Bay (Lower) - Copper, Sediment Toxicity, Chlordane, DDT, PCB's, Indicator Bacteria, Nutrients, Pesticides, Other Organics
Applicable TMDLs	San Diego Creek (Reach 1) - Indicator Bacteria, Nutrients, Pesticides, Sedimentation/Siltation Newport Bay (Upper) - Indicator Bacteria, Nutrients, Pesticides, Sedimentation/Siltation Newport Bay (Lower) - Nutrients, Pesticides
Pollutants of Concern for the Project	**Primary Pollutants of Concern:** Suspended-Solid / Sediment, Nutrients, Heavy Metals, Pathogens (Bacteria/Virus), Pesticides, and Toxic Organic Compounds **Other Pollutants of Concern:** Oil and Grease, Trash and Debris
Environmentally Sensitive and Special Biological Significant Areas	San Diego Creek (Reach 1) Newport Bay (Upper) Newport Bay (Lower)

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

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

- If the project has an approved WIHMP or equivalent, then any watershed specific criteria must be used and the project can evaluate participation in the approved regional or sub-regional opportunities. The local Permittee planning or NPDES staff should be consulted regarding the existence of an approved WIHMP or equivalent.
- Determine applicable hydromodification control performance criteria. *Refer to Section 7.II-2.4.2.2 of the Model WQMP.*
- Determine applicable LID performance criteria. *Refer to Section 7.II-2.4.3 of the Model WQMP.*
- Determine applicable treatment control BMP performance criteria. *Refer to Section 7.II-*3.2.2 *of the Model WQMP.*
- Calculate the LID design storm capture volume for the project. *Refer to Section 7.II-2.4.3 of the Model WQMP.*

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

Project Performance Criteria (continued)	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	Hydrologic Conditions of Concern (HCOC) do not exist. Refer to Section II.3 'Hydrologic Conditions of Concern' for additional information.
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	**Performance Criteria**: • Goal is to infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume). • A properly designed biotreatment system may only be considered if infiltration, harvest and use, and evapotranspiration (ET) cannot be feasibly implemented for the full design capture volume. In this case, infiltration, harvest and use, and ET practices must be implemented to the greatest extent feasible and biotreatment may be provided for the remaining design capture volume. Or, equivalent LID performance Criteria: LID BMP's must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspire) stormwater runoff up to 80 percent average annual capture efficiency. LID BMPs must be designed to: • Retain, on-site, (infiltrate, harvest and use, or evapotranspire) stormwater runoff as feasible up to the Design Capture Volume, and • Recover (i.e., draw down) the storage volume as soon as possible after a storm event, and, if necessary • Biotreat, on-site, additional runoff, as feasible, up to 80 percent average annual capture efficiency (cumulative, retention plus biotreatment), 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 treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Treatment control BMP's shall be provided that have a medium to high effectiveness for reducing the primary pollutants of concern (POC), as shown in Section III-3 'Watershed Description' of this WQMP. Treatment control BMP's may only be used as an alternative compliance path if the full design capture volume (DCV) cannot be treated by the use of infiltration, retention, and/or biotreatment BMP's
Calculate LID design storm capture volume for Project.	

DMA No.	Drainage Area A (ft^2)	Drainage Area A (ac)	Pervious Area A_p (ft^2)	Imperviou s Ratio imp	Runoff Coefficien t C	Required Design Capture Volume DCV (ft^3)
1.01	7,040	0.16	5,334	0.24	0.332	146.0
1.02	35,175	0.81	10,665	0.70	0.673	1,478.7
1.03	13,740	0.32	428	0.97	0.877	752.8
1.04	3,632	0.08	0	1.00	0.900	204.3
1.05	4,460	0.10	0	1.00	0.900	250.9
1.06	6,387	0.15	0	1.00	0.900	359.3
1.07	4,527	0.10	0	1.00	0.900	254.6
1.08	4,743	0.11	0	1.00	0.900	266.8
1.09	2,986	0.07	0	1.00	0.900	168.0
1.10	4,087	0.09	0	1.00	0.900	229.9
1.11	13,632	0.31	12,013	0.12	0.239	203.7
1.12	2,114	0.05	0	1.00	0.900	118.9
1.13	1,270	0.03	0	1.00	0.900	71.4
1.14	38,527	0.88	31,025	0.19	0.296	712.8
1.15	4,786	0.11	0	1.00	0.900	269.2
1.16	4,295	0.10	0	1.00	0.900	241.6
1.17	35,694	0.82	12,520	0.65	0.637	1,420.9
1.18	5,117	0.12	4,294	0.16	0.271	86.6
1.19	53,443	1.23	13,717	0.74	0.708	2,363.2
1.20	27,690	0.64	8,302	0.70	0.675	1,168.4
1.21	51,200	1.18	16,644	0.67	0.656	2,099.8
1.22	60,326	1.38	33,542	0.44	0.483	1,821.1
1.23	30,783	0.71	5,102	0.83	0.776	1,492.4
1.24	36,851	0.85	5,369	0.85	0.791	1,821.2
1.25	31,195	0.72	5,641	0.82	0.764	1,490.3
Total	**483,700**	**11.1**	**164,596**	**0.66**	**0.457**	**33,286**

IV.2. SITE DESIGN AND DRAINAGE PLAN

Describe site design and drainage plan including

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

Refer to Section 2.4.2 in the TGD.

Site Design Practices Utilized: Hydrologic Source Controls (HSC)

- **Minimize Impervious Area: 1.)** Roadway widths are proposed at the minimum required to satisfy City ordinance and Fire access requirements. 2.) Proposed building types include podium construction and 12- story condominiums. Building vertically rather than horizontally contributes to a minimized building/impervious footprint. 3.) Primary parking is proposed as below ground, covered parking beneath the condominium units, minimizing the impervious area required for parking. 4.) Pervious surface area will be increased approximately 0.83-acres (or roughly 28%) from the existing condition as a result of the project.
- **Maximize Natural Infiltration Capacity:** The project site is within an area designated with a soil classification of 'B' (from Figure XVI-2a from the Technical Guidance Document), and is also on an already developed site. Natural infiltration is possible on the site, except in areas of geological concern due to proximity building structures. The impervious area on site was minimized by a variety of techniques, thereby increasing the potential for natural infiltration to occur.
- **Preserve Existing Drainage Patterns and Time of Concentration:** The existing site is 73 percent impervious surface and uses an underground storm drain system. Under the post-developed conditions, drainage patterns would be consistent with the existing condition. Points of connection to the downstream storm drain systems would also be consistent with the existing condition. Post-developed grading and storm drain design results in a decrease in peak flows and storm drain volumes. Time of Concentration is the time it takes for initial rainfall to travel from the upland areas of a site to the discharge point. Because the existing site and post-devleoped site both are mostly impervious, the calculations assumed a conservative time of concentration of 5 minutes for both conditions..
- **Disconnect Impervious Areas:** Pervious landscaped areas are located throughout the project site. Roof drainage shall be directed landscaped podium gardens. Overflow from the podium gardens will be directed into the landscaped marsh areas at ground level. Wherever site grading allows, walkways and paved areas will surface flow into adjacent landscaped areas, rather than directly discharging to an inlet.
- **Protect Existing Vegetation and Sensitive Areas:** The existing site condition is a fully developed site with 73% impervious surface coverage. The entire site is redeveloped as stated in this report with

additional landscaping than currently exists. Therefore this site design concept is not applicable.

- **Revegetate Disturbed Areas:** The post-development condition increased the amount of pervious surface by approximately 0.83-acres (28%). These pervious surfaces are targeted to be vegetated. In addition, parkway areas along the roadways will include street trees that provide canopy coverage. Native plant species shall be used to the maximum extent practicable while accomplishing the overall landscape goals of the project.

- **Soil Stockpiling and Site Generated Organics:** The existing site condition is a fully developed site with 73% impervious surface coverage. Existing areas of topsoil is minimal. Stockpiling of topsoil material on-site is not anticipated and not considered applicable.

- **Firescaping:** Landscaping shall be provided in accordance with all applicable Fire Code requirements.

- **Xeriscape Landscaping:** Landscaping shall apply the principles of xeriscaping to the maximum extent practicable. Objectives of xeriscaping are to reduce water use, decrease energy use, reduce heating and cooling costs (to adjacent building), minimize runoff from both irrigation and adjacent rooftops, reduce maintenance waste, habitat creation, and lower labor and maintenance costs.

- **Slope and Channel Buffers:** There are no slopes or channels that exist on, or adjacent to, the project site. Any slopes resulting from development of the project shall be stabilized as quickly as possible, and shall be planted with native and drought tolerant plants, or as indicated on an approved Landscape Architect plan.

- **Minimize Land Disturbance:** The proposed project is a redevelopment of an already improved site. The entire project site is targeted for redevelopment. The minimizing land disturbance site design concept is not applicable.

BMP utilization in Site Design to Maximum Extent Practicable (MEP):

Building Roof and Podium Deck

The second hierarchy after HSC's is to consider infiltration. Per the EEI geotechnical report page 22, Section 9.3.3 Structural Setback from Retention Devices states " *It is recommended that retention/ disposal devices be located at least three times their depth, or a minimum of 15 feet (whichever is greater) from the outside edge of the structural foundations."* The structural foundations may be 20 feet deep at the two level subterranean garage and up to 30 feet depth at the three level subterranean garage.

An existing 8" Reclaimed water line exists on Von Karman Avenue. The project proposes to utilize reclaimed water for all of the landscaping on site. **Irrigation water plans are not being provided at this time and the landscape architect will submit later during the design process**. The TGD states …The use of Reclaimed water effectively allows the project proponent to consider harvest and re-use to be infeasible if sufficient reclaimed water supply is available to meet the project demand for harvested water.

The next hierarchy will utilize the bio treatment or bioretention strategy for treating the design capture volume. A major portion of the roof areas and podium decks are proposed to drain to the marsh area. Upon final engineering, if the bio retention facility in the Marsh area is determined to be inadequate to treat the design capture volume, pretreatment will be utilized for the roof drainage using flow through planters that will

be placed in the podium area.

Due to geotechnical concerns related to footing stability in the marsh area, infiltration strategies were not proposed. For this reason, a bioretention basin with underdrain will be incorporated mainly in these landscape marsh areas in between the existing and proposed buildings. The bioretention with underdrain BMP will be lined with an impermeable membrane to ensure infiltration does not occur in these areas.

Plaza area and Streets

Per the reasons stated above, infiltration and/ or Harvest and use methods are not considered for these areas of the project site. The Streets and Plaza Gardens area lack either adequate space or are infeasible to implement these LID BMP strategies.

The proposed bio treatment strategy consists of using proprietary biotreatment devices such as a Modular Wetlands System, or approved equal in streets and parking. Tributary drainage areas and resulting design capture volumes shall be held within the treatment capacities of each bio treatment device. Catch basin (inlet) Modular Wetlands system are proposed and location of the Biotreatment devices can be seen on the BMP Site Plan included in this report.

Proposed Park Areas.

The park areas represent the opportunity to utilize a vegetated swales to treat the DCV. Refer to the WQMP site plan for locations. Vegetated swales provide pollutant removal through settling and filtration in the vegetation lining the channels. Volume reduction can be incorporated by adding a gravel drainage layer underneath the swale allowing additional flows to be retained and infiltrated. **The design of the vegetated swale will be completed during the final engineering phase of the project as the landscape plans become finalized.**

If it is determined that the swale is unable to detain the entire design capture volume then infiltration drywell systems are proposed.

South Parking Structure

Drainage from the parking structure will be collected by a vertical pipe and connect to a downspout type Modular Wetlands System catch basin. The catch basin will then connect a proposed 24" storm drain pipe and directed into an existing 60" storm drain pipe.

The reader shall refer to the 'WQMP Site Plan' included in this report for additional information regarding the site design and drainage concept.

Calculations for the design capture volume and other drainage area characteristics are provided in the table in the previous sub-section of this report (IV.1 - Project Performance Criteria).

The total design capture volume tributary to these landscape areas represents just 9,876.5 cubic-feet of the total 33,286 cubic-feet treatment volume.

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

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

IV.3.1 Hydrologic Source Controls

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

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

IV.3.2 Infiltration BMPs

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

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

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

Please Refer to Appendix 'B' of this report for Infiltration BMP Design calculations.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

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

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

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

N/A

IV.3.4 Biotreatment BMPs

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

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

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

Please Refer to Appendix 'B' of this report for Bio retention BMP calculations.

IV.3.5 Hydromodification Control BMPs

Describe hydromodification control BMPs. See Section 5 TGD. Include sections for selection, suitability, sizing, and infeasibility, as applicable. Detail compliance with Prior Conditions of Approval.

Hydromodification Control BMPs	
BMP Name	**BMP Description**
NONE	

IV.3.6 Regional/Sub-Regional LID BMPs

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

Regional/Sub-Regional LID BMPs
NONE

IV.3.7 Treatment Control BMPs

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

Treatment Control BMPs	
BMP Name	**BMP Description**
NONE	

IV.3.8 Non-structural Source Control BMPs

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

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
N1	Education for Property Owners, Tenants and Occupants	☐	☐	
N2	Activity Restrictions	☐	☐	
N3	Common Area Landscape Management	☐	☐	
N4	BMP Maintenance	☐	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☐	
N6	Local Industrial Permit Compliance	☐	☐	
N7	Spill Contingency Plan	☐	☐	
N8	Underground Storage Tank Compliance	☐	☐	
N9	Hazardous Materials Disclosure Compliance	☐	☐	
N10	Uniform Fire Code Implementation	☐	☐	
N11	Common Area Litter Control	☐	☐	
N12	Employee Training	☐	☐	
N13	Housekeeping of Loading Docks	☐	☐	
N14	Common Area Catch Basin Inspection	☐	☐	
N15	Street Sweeping Private Streets and Parking Lots	☐	☐	
N16	Retail Gasoline Outlets	☐	☐	

NOTE: To be completed with Final WQMP Report.

IV.3.9 Structural Source Control BMPs

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

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

NOTE: To be completed with Final WQMP Report.

IV.4 ALTERNATIVE COMPLIANCE PLAN (IF APPLICABLE)

IV.4.1 Water Quality Credits

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

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td colspan="5">Project Types that Qualify for Water Quality Credits (Select all that apply):</td></tr>
<tr><td colspan="2">☒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>☒ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).</td></tr>
<tr><td colspan="2">☐ Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).</td><td colspan="2">☐ Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned</td><td>☐ Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).</td></tr>
<tr><td>☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.</td><td>☐ Developments in a city center area.</td><td>☐ Developments in historic districts or historic preservation areas.</td><td>☐ Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.</td><td>☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.</td></tr>
<tr><td>Calculation of Water Quality Credits
(if applicable)</td><td colspan="4"></td></tr>
</table>

IV.4.2 Alternative Compliance Plan Information

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

NOTE: To be completed with Final WQMP Report.

Section V Inspection/Maintenance Responsibility for BMPs

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

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Underground Infiltration Basin (Contech CMP Infiltration System or approved equal)	Property Management Association	Regular inspections of system to observe sediment build up and infiltration capacity. Cleaning of accumulated trash, debris, and sediment as determined by inspections. Cleaning is recommended during dry weather. Per manufacturer recommendations	At a minimum, quarterly inspections and within 48-hours following a significant storm event to verify there is no standing water in the chambers. Per manufacturer recommendations.
N1 - Education for Property Owners, Tenants and Occupants	Property Management Association	Provide environmental awareness educational materials made available by the City of Anaheim and/or the County of Orange. These materials will describe the use of chemicals that should be limited to the property, with no discharges of wastes via hosing or other direct discharge to gutters, catch basins and storm drains.	Upon initial tenancy and ongoing thereafter.

N2 - Activity Restrictions	Property Management Association	Use restrictions that may include car washing, rinsing, waste disposal, or other activity potentially detrimental to downstream receiving waters. Restricted activities to be developed by the PMA and implemented through lease terms.	Upon initial tenancy and ongoing thereafter.
N3 - Common Area Landscape Management	Property Management Association	Utilize landscape maintenance practices aimed at minimizing use of irrigation, fertilizers and pesticides. Usage shall be consistent with Management Guidelines for Use of Fertilizers (DAMP Section 5.5). Landscaping shall correlate to the climate, soil, and related natural resources of the area. Plantings shall be grouped with plants of similar water requirements.	Ongoing. Review and revise annually, and as needed.
N4 - BMP Maintenance	Property Management Association	Inspection of all structural and non-structural BMP's. Scheduling of required cleaning and maintenance activities. BMP inspection and any resulting	Varies by BMP. Annually at a minimum (prior to the rainy season).

		maintenance activity shall be performed at regular intervals as part of the overall Landscape Management program, and prior to the start of the rainy season.	
N5 - Title 22 CCR Compliance	Property Management Association	Comply with all applicable local water quality ordinances. The local jurisdiction (City), under local water quality ordinances, have authority to ensure clean stormwater discharges from areas of concern to public properties.	Ongoing. Review and revise annually, and as needed.
N9 - Hazardous Materials Disclosure Compliance	Property Management Association	Comply with State regulations dealing with hazardous materials, enforced by the City on behalf of the State. Hazardous materials shall either be placed in an enclosure that prevents contact with runoff or is protected by a secondary containment structure such as a berm, dyke, or curb. Any storage area containing hazardous materials shall be paved and sufficiently impervious to	Ongoing. Review and revise annually, and as needed.

		contain any leaks and/or spills. Storage areas containing hazardous materials shall have a roof or awning to minimize direct precipitation and collection of stormwater within the secondary containment area. Any stormwater retained within the containment area shall be disposed of in accordance with the applicable hazardous material disposal ordinances. Hazardous materials shall be disposed of at the nearest Hazard Materials Disposal Center. CASQA BMP Handbook SC-34 and SC-60 shall be used as a resource when developing applicable hazardous material cleanup and prevention strategies.	
N10 - Uniform Fire Code Implementation	Property Management Association	Comply with Article 80 of the Uniform Fire Code enforced by the fire protection agency.	Ongoing. Review and revise annually, and as needed.
N11 - Common Area Litter Control	Property Management Association	Good housekeeping practices shall be adhered to that aim to minimize litter and trash production on the site. Good	Ongoing. Review and revise annually, and as needed.

		housekeeping practices include but are not limited to: covering storage areas, using drip pans or absorbent materials when working with oils/greases, checking storage containers regularly for leaks or damage, regular sweeping and clean-up of trash storage and recycling areas, and regular clean-up of loose trash and debris around site. Trash management and litter control procedures on the site aim to reduce pollution of stormwater. Contracted maintenance firms may provide this service during regularly scheduled maintenance, which should consist of litter patrol, proper disposal of pet litter, emptying of trash receptacles, and noting trash disposal violations and reporting the violations to the Owner for correction. CASQA BMP Handbook SC-34 and SC-60 shall be used as a resource when	

		developing applicable trash and litter control cleanup and prevention strategies.	
N12 - Employee Training		Provide employee training / education information to janitorial, maintenance, landscaping, and other staff for activities that may impact water quality. Educational materials will utilize brochures obtained from the City, County and State resources Public Education Materials is available in Attachment E of this WQMP.	Employee training shall take place at a minimum at the time of hiring, and annually thereafter.
N14 - Common Area Catch Basin Inspection	Property Management Association	Conduct regular inspection, cleaning, and maintenance of common area catch basins. Cleaning and maintenance activities may include removal of trash, sediment, debris, or other deleterious material from the catch basin. Catch basins shall be visually inspected for illegal dumping. If illegal dumping has occurred the proper authorities shall be notified as soon as practicable.	At minimum 2-times per year, both before the rainy season and after at least one major storm to check for standing water. Adjust inspection schedule as needed.

N15 - Street Sweeping Private Streets and Parking Lots	Property Management Association	Provide vacuum sweeping for paved areas. Sweeping operations shall be performed during dry weather. CASQA BMP Handbook SC-43 and SC-70 shall be used as a resource for determining the frequency and procedures for providing vacuum sweeping of the paved areas. Sweeping and/or spraying of permeable paver areas is not recommended as it tends to move the sediment rather than remove it. Also, sweeping and spraying may move the sediment deeper into the surface openings, making them more difficult to remove.	At minimum 2-times per year, both before the rainy season and after at least one major storm to check for standing water. Adjust inspection schedule as needed.
S1 - Provide storm drain system stencilling and signage	Property Management Association	Provide stencilling that is easily visible on or near each catch basin. Stencilling shall provide a brief statement, which prohibits the dumping of improper materials into the storm drain.	Stencilling shall be inspected annually, and maintained or repainted as needed.
S3 - Design and construct trash and waste storage areas to reduce pollution introduction	Owner then Property Management Association	All trash enclosure areas shall be paved with an impervious surface, designed not to allow run-on from	During design/construction activities. Ongoing inspection and maintenance

		adjoining areas, designed to divert drainage from adjoining roofs and pavements around the area, screened or walled to prevent off-site transport of trash, and shall include solid roofing or an awning to prevent direct precipitation. Trash area drains to the storm drain system is prohibited.	thereafter.
S4 - Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	Owner then Property Management Association	Implement irrigation methods to minimize runoff of excess irrigation water across impervious surfaces and into the stormwater conveyance system. Such measures include employing rain-triggered shutoff devices to eliminate or reduce irrigation during and immediately after precipitation, using mulches (such as wood chips) to minimize sediment in runoff and to maintain soil infiltration capacity, and coordinating design of the irrigation system and landscape to minimize overspray and runoff. Irrigation systems should consider the	During design/construction activities. Ongoing inspection and maintenance thereafter.

		use of flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or water supply lines. Water conservation devices such as programmable irrigation timers, drip irrigation, and soil moisture sensors should also be considered. Regular inspection and any resulting maintenance of irrigation systems shall be on-going and part of the overall Landscape/Site Management program.	
S5 - Protect slopes and channels and provide energy dissipation	Property Management Association	Protect slopes, channels, and energy dissipation devices so function is maintained. The potential for erosion of slopes and/or channels shall be minimized by incorporating the following BMP's, as applicable: immediate stabilization of disturbed slopes; vegetate slopes with native or drought tolerant vegetation; control and treat	Regular inspection and any resulting maintenance of slopes, channels, and energy dissipation devices shall be on-going and part of the overall Landscape/Site Management program.

		flows in landscaping prior to reaching existing natural drainage system.	

Section VI Site Plan and Drainage Plan

VI.1 SITE PLAN AND DRAINAGE PLAN

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural BMP locations
- Drainage delineations and flow information
- Drainage connections
- BMP details

VI.2 ELECTRONIC DATA SUBMITTAL

The minimum requirement is to provide submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open.

If the local jurisdiction requires specialized electronic document formats (CAD, GIS) to be submitted, this section will be used to describe the contents (e.g., layering, nomenclature, georeferencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

Section VII Educational Materials

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

Education Materials			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☒
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☒
Homeowners Guide for Sustainable Water Use	☒	Proper Maintenance Practices for Your Business	☒
Household Tips	☒	**Other Material**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☒		
Recycle at Your Local Used Oil Collection Center (North County)	☒	Orange County Watersheds Brochure	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	Stormwater General Information (reference City of Newport Beach)	☒
Recycle at Your Local Used Oil Collection Center (South County)	☐	How to Protect our Bay and Ocean (reference City of Newport Beach)	☒
Tips for Maintaining a Septic Tank System	☐	Pollution Reporting (reference City of Newport Beach)	☒
Responsible Pest Control	☒	Hazardous Waste and Oil Recycling (reference City of Newport Beach)	☒
Sewer Spill	☒	Commercial Trash Enclosure (reference San Bernardino County)	☒
Tips for the Home Improvement Projects	☒	Food and Restaurant Pollution Prevention (reference San Bernardino County)	☒
Tips for Horse Care	☐	Managing Fats, Oils, and Greases (reference San Bernardino County)	☒
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	☒		☐

Appendix A - Maps, Figures, and Exhibits

- **Vicinity Map**
- **Figure XVI-1: Orange County Rainfall Zones Map**
- **Figure XVI-2a: NRCS Hydrologic Soils Groups Map**
- **Figure XVI-3d: Susceptibility Analysis Newport Bay-Newport Coastal Streams**
- **Sheet C-1 Technical Site Plan**
- **Sheet H-1 Existing Hydrology Map**
- **Unit Hydrograph Analysis**
- **WQMP Site Plan / BMP Exhibit**

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 05/16/16 File Name kollcenterexistingareaa.out

+++

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 4014

Koll Center
Existing Condition
Area A
2 Year 24 Hour S:140107

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used
+++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
75.0	5.4	1.00	B	0.300	0.280	0.084

Area-averaged adjusted loss rate Fm (In/Hr) = 0.084

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
1.51	0.280	75.0	57.0	7.54	0.018
3.89	0.720	98.0	98.0	0.20	0.890

Area-averaged catchment yield fraction, Y = 0.646
Area-averaged low loss fraction, Yb = 0.354

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+

User entry of time of concentration = 0.083 (hours)
Watershed area = 5.40(Ac.)
Catchment Lag time = 0.066 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 125.5020
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.084(In/Hr)
Average low loss rate fraction (Yb) = 0.354 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:
Using a total area of 5.40(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.190(In)
30-minute factor = 1.000 Adjusted rainfall = 0.400(In)
1-hour factor = 1.000 Adjusted rainfall = 0.530(In)
3-hour factor = 1.000 Adjusted rainfall = 0.890(In)
6-hour factor = 1.000 Adjusted rainfall = 1.220(In)
24-hour factor = 1.000 Adjusted rainfall = 2.050(In)

--

U n i t H y d r o g r a p h

++
++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 65.31 (CFS))		
1	26.066	17.022
2	90.306	41.953
3	100.000	6.331

--

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1900	0.1900
2	0.2533	0.0634
3	0.2998	0.0465
4	0.3379	0.0381
5	0.3707	0.0328
6	0.3999	0.0292
7	0.4257	0.0258

253	0.0036	0.0013	0.0023
254	0.0035	0.0013	0.0023
255	0.0035	0.0012	0.0023
256	0.0035	0.0012	0.0022
257	0.0034	0.0012	0.0022
258	0.0034	0.0012	0.0022
259	0.0034	0.0012	0.0022
260	0.0033	0.0012	0.0022
261	0.0033	0.0012	0.0021
262	0.0033	0.0012	0.0021
263	0.0032	0.0011	0.0021
264	0.0032	0.0011	0.0021
265	0.0032	0.0011	0.0021
266	0.0032	0.0011	0.0020
267	0.0031	0.0011	0.0020
268	0.0031	0.0011	0.0020
269	0.0031	0.0011	0.0020
270	0.0031	0.0011	0.0020
271	0.0030	0.0011	0.0020
272	0.0030	0.0011	0.0019
273	0.0030	0.0011	0.0019
274	0.0030	0.0010	0.0019
275	0.0029	0.0010	0.0019
276	0.0029	0.0010	0.0019
277	0.0029	0.0010	0.0019
278	0.0029	0.0010	0.0019
279	0.0029	0.0010	0.0018
280	0.0028	0.0010	0.0018
281	0.0028	0.0010	0.0018
282	0.0028	0.0010	0.0018
283	0.0028	0.0010	0.0018
284	0.0028	0.0010	0.0018
285	0.0027	0.0010	0.0018
286	0.0027	0.0010	0.0018
287	0.0027	0.0010	0.0017
288	0.0027	0.0009	0.0017

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-

Total soil rain loss = 0.62(In)
Total effective rainfall = 1.43(In)
Peak flow rate in flood hydrograph = 8.56(CFS)

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+

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

-

Hydrograph in 5 Minute intervals ((CFS))

22+20	0.6249	0.13	Q	|	|	|	V |
22+25	0.6258	0.13	Q	|	|	|	V |
22+30	0.6267	0.13	Q	|	|	|	V|
22+35	0.6275	0.13	Q	|	|	|	V|
22+40	0.6284	0.13	Q	|	|	|	V|
22+45	0.6293	0.13	Q	|	|	|	V|
22+50	0.6302	0.13	Q	|	|	|	V|
22+55	0.6310	0.12	Q	|	|	|	V|
23+ 0	0.6319	0.12	Q	|	|	|	V|
23+ 5	0.6327	0.12	Q	|	|	|	V|
23+10	0.6335	0.12	Q	|	|	|	V|
23+15	0.6344	0.12	Q	|	|	|	V|
23+20	0.6352	0.12	Q	|	|	|	V|
23+25	0.6360	0.12	Q	|	|	|	V|
23+30	0.6368	0.12	Q	|	|	|	V|
23+35	0.6377	0.12	Q	|	|	|	V|
23+40	0.6385	0.12	Q	|	|	|	V|
23+45	0.6393	0.12	Q	|	|	|	V|
23+50	0.6400	0.12	Q	|	|	|	V|
23+55	0.6408	0.11	Q	|	|	|	V|
24+ 0	0.6416	0.11	Q	|	|	|	V|
24+ 5	0.6422	0.08	Q	|	|	|	V|
24+10	0.6423	0.01	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

Study date 05/16/16 File Name kollcenterexistingareab.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 4014

Koll Center
Existing Condition
Area B
2 Year 24 Hour S:140107

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
75.0	3.1	1.00	B	0.300	0.270	0.081

Area-averaged adjusted loss rate Fm (In/Hr) = 0.081

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
0.84	0.270	75.0	57.0	7.54	0.018
2.26	0.730	98.0	98.0	0.20	0.890

Area-averaged catchment yield fraction, Y = 0.654
Area-averaged low loss fraction, Yb = 0.346

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+
User entry of time of concentration  =   0.083 (hours)
Watershed area =       3.10(Ac.)
Catchment Lag time =   0.066 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 125.5020
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.081(In/Hr)
Average low loss rate fraction (Yb) = 0.346 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.190(In)
Computed peak 30-minute rainfall =  0.400(In)
Specified peak 1-hour rainfall =  0.530(In)
Computed peak 3-hour rainfall =  0.890(In)
Specified peak 6-hour rainfall =  1.220(In)
Specified peak 24-hour rainfall =  2.050(In)


Rainfall depth area reduction factors:
Using a total area of       3.10(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.190(In)
30-minute factor = 1.000    Adjusted rainfall =  0.400(In)
1-hour factor = 1.000       Adjusted rainfall =  0.530(In)
3-hour factor = 1.000       Adjusted rainfall =  0.890(In)
6-hour factor = 1.000       Adjusted rainfall =  1.220(In)
24-hour factor = 1.000 Adjusted rainfall =  2.050(In)
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                  U n i t  H y d r o g r a p h
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Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
------------------------------------------------------------------------
--
            (K =        37.49 (CFS))

  1               26.066                   9.772
  2               90.306                  24.084
  3              100.000                   3.635
------------------------------------------------------------------------
--
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                (In)
  1              0.1900              0.1900
  2              0.2534              0.0634
  3              0.2999              0.0465
  4              0.3379              0.0381
  5              0.3708              0.0328
  6              0.3999              0.0292
  7              0.4258              0.0258
```

253	0.0036	0.0012	0.0023
254	0.0035	0.0012	0.0023
255	0.0035	0.0012	0.0023
256	0.0035	0.0012	0.0023
257	0.0034	0.0012	0.0022
258	0.0034	0.0012	0.0022
259	0.0034	0.0012	0.0022
260	0.0033	0.0012	0.0022
261	0.0033	0.0011	0.0022
262	0.0033	0.0011	0.0021
263	0.0032	0.0011	0.0021
264	0.0032	0.0011	0.0021
265	0.0032	0.0011	0.0021
266	0.0032	0.0011	0.0021
267	0.0031	0.0011	0.0020
268	0.0031	0.0011	0.0020
269	0.0031	0.0011	0.0020
270	0.0031	0.0011	0.0020
271	0.0030	0.0010	0.0020
272	0.0030	0.0010	0.0020
273	0.0030	0.0010	0.0020
274	0.0030	0.0010	0.0019
275	0.0029	0.0010	0.0019
276	0.0029	0.0010	0.0019
277	0.0029	0.0010	0.0019
278	0.0029	0.0010	0.0019
279	0.0029	0.0010	0.0019
280	0.0028	0.0010	0.0019
281	0.0028	0.0010	0.0018
282	0.0028	0.0010	0.0018
283	0.0028	0.0010	0.0018
284	0.0028	0.0010	0.0018
285	0.0027	0.0009	0.0018
286	0.0027	0.0009	0.0018
287	0.0027	0.0009	0.0018
288	0.0027	0.0009	0.0018

-

-

Total soil rain loss = 0.61(In)
Total effective rainfall = 1.44(In)
Peak flow rate in flood hydrograph = 4.92(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

-

Hydrograph in 5 Minute intervals ((CFS))

22+20	0.3628	0.08	Q				V
22+25	0.3633	0.08	Q				V
22+30	0.3638	0.08	Q				
22+35	0.3643	0.07	Q				
22+40	0.3648	0.07	Q				
22+45	0.3653	0.07	Q				
22+50	0.3658	0.07	Q				
22+55	0.3663	0.07	Q				
23+ 0	0.3668	0.07	Q				
23+ 5	0.3673	0.07	Q				
23+10	0.3678	0.07	Q				
23+15	0.3683	0.07	Q				
23+20	0.3688	0.07	Q				
23+25	0.3693	0.07	Q				
23+30	0.3697	0.07	Q				
23+35	0.3702	0.07	Q				
23+40	0.3707	0.07	Q				
23+45	0.3711	0.07	Q				
23+50	0.3716	0.07	Q				
23+55	0.3721	0.07	Q				
24+ 0	0.3725	0.07	Q				
24+ 5	0.3728	0.05	Q				
24+10	0.3729	0.01	Q				

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 05/16/16   File Name kollcenterexistingareac.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 4014

Koll Center
Existing Condition
Area C
2 Year 24 Hour S:140107

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
75.0	1.0	1.00	B	0.300	0.250	0.075

Area-averaged adjusted loss rate Fm (In/Hr) = 0.075

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
0.25	0.250	75.0	57.0	7.54	0.018
0.75	0.750	98.0	98.0	0.20	0.890

Area-averaged catchment yield fraction, Y = 0.672
Area-averaged low loss fraction, Yb = 0.328

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User entry of time of concentration = 0.083 (hours)
Watershed area = 1.00(Ac.)
Catchment Lag time = 0.066 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 125.5020
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.075(In/Hr)
Average low loss rate fraction (Yb) = 0.328 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:
Using a total area of 1.00(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.190(In)
30-minute factor = 1.000 Adjusted rainfall = 0.400(In)
1-hour factor = 1.000 Adjusted rainfall = 0.530(In)
3-hour factor = 1.000 Adjusted rainfall = 0.890(In)
6-hour factor = 1.000 Adjusted rainfall = 1.220(In)
24-hour factor = 1.000 Adjusted rainfall = 2.050(In)

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U n i t H y d r o g r a p h

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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 12.09 (CFS))	
1	26.066	3.152
2	90.306	7.769
3	100.000	1.172

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Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1900	0.1900
2	0.2534	0.0634
3	0.2999	0.0465
4	0.3380	0.0381
5	0.3708	0.0328
6	0.4000	0.0292
7	0.4258	0.0258

253	0.0036	0.0012	0.0024
254	0.0035	0.0012	0.0024
255	0.0035	0.0011	0.0023
256	0.0035	0.0011	0.0023
257	0.0034	0.0011	0.0023
258	0.0034	0.0011	0.0023
259	0.0034	0.0011	0.0023
260	0.0033	0.0011	0.0022
261	0.0033	0.0011	0.0022
262	0.0033	0.0011	0.0022
263	0.0032	0.0011	0.0022
264	0.0032	0.0011	0.0022
265	0.0032	0.0010	0.0021
266	0.0032	0.0010	0.0021
267	0.0031	0.0010	0.0021
268	0.0031	0.0010	0.0021
269	0.0031	0.0010	0.0021
270	0.0031	0.0010	0.0021
271	0.0030	0.0010	0.0020
272	0.0030	0.0010	0.0020
273	0.0030	0.0010	0.0020
274	0.0030	0.0010	0.0020
275	0.0029	0.0010	0.0020
276	0.0029	0.0010	0.0020
277	0.0029	0.0009	0.0019
278	0.0029	0.0009	0.0019
279	0.0029	0.0009	0.0019
280	0.0028	0.0009	0.0019
281	0.0028	0.0009	0.0019
282	0.0028	0.0009	0.0019
283	0.0028	0.0009	0.0019
284	0.0028	0.0009	0.0018
285	0.0027	0.0009	0.0018
286	0.0027	0.0009	0.0018
287	0.0027	0.0009	0.0018
288	0.0027	0.0009	0.0018

Total soil rain loss = 0.57(In)
Total effective rainfall = 1.48(In)
Peak flow rate in flood hydrograph = 1.59(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

22+20	0.1197	0.03	Q	|	|	|	V |
22+25	0.1198	0.03	Q	|	|	|	V |
22+30	0.1200	0.02	Q	|	|	|	V|
22+35	0.1202	0.02	Q	|	|	|	V|
22+40	0.1203	0.02	Q	|	|	|	V|
22+45	0.1205	0.02	Q	|	|	|	V|
22+50	0.1207	0.02	Q	|	|	|	V|
22+55	0.1208	0.02	Q	|	|	|	V|
23+ 0	0.1210	0.02	Q	|	|	|	V|
23+ 5	0.1212	0.02	Q	|	|	|	V|
23+10	0.1213	0.02	Q	|	|	|	V|
23+15	0.1215	0.02	Q	|	|	|	V|
23+20	0.1216	0.02	Q	|	|	|	V|
23+25	0.1218	0.02	Q	|	|	|	V|
23+30	0.1220	0.02	Q	|	|	|	V|
23+35	0.1221	0.02	Q	|	|	|	V|
23+40	0.1223	0.02	Q	|	|	|	V|
23+45	0.1224	0.02	Q	|	|	|	V|
23+50	0.1226	0.02	Q	|	|	|	V|
23+55	0.1227	0.02	Q	|	|	|	V|
24+ 0	0.1229	0.02	Q	|	|	|	V|
24+ 5	0.1230	0.02	Q	|	|	|	V|
24+10	0.1230	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

Study date 05/16/16 File Name kollcenterproposedareaa.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 4014

Koll Center
Proposed Condition
Area A
2 Year 24 Hour S:140107

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
75.0	5.4	1.00	B	0.300	0.350	0.105

Area-averaged adjusted loss rate Fm (In/Hr) = 0.105

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
1.89	0.350	75.0	57.0	7.54	0.018
3.51	0.650	98.0	98.0	0.20	0.890

Area-averaged catchment yield fraction, Y = 0.585
Area-averaged low loss fraction, Yb = 0.415

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User entry of time of concentration = 0.083 (hours)
Watershed area = 5.40(Ac.)
Catchment Lag time = 0.066 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 125.5020
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.105(In/Hr)
Average low loss rate fraction (Yb) = 0.415 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:
Using a total area of 5.40(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.190(In)
30-minute factor = 1.000 Adjusted rainfall = 0.400(In)
1-hour factor = 1.000 Adjusted rainfall = 0.530(In)
3-hour factor = 1.000 Adjusted rainfall = 0.890(In)
6-hour factor = 1.000 Adjusted rainfall = 1.220(In)
24-hour factor = 1.000 Adjusted rainfall = 2.050(In)

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U n i t H y d r o g r a p h

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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 65.31 (CFS))	
1	26.066	17.022
2	90.306	41.953
3	100.000	6.331

--

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1900	0.1900
2	0.2533	0.0634
3	0.2998	0.0465
4	0.3379	0.0381
5	0.3707	0.0328
6	0.3999	0.0292
7	0.4257	0.0258

253	0.0036	0.0015	0.0021
254	0.0035	0.0015	0.0021
255	0.0035	0.0015	0.0020
256	0.0035	0.0014	0.0020
257	0.0034	0.0014	0.0020
258	0.0034	0.0014	0.0020
259	0.0034	0.0014	0.0020
260	0.0033	0.0014	0.0019
261	0.0033	0.0014	0.0019
262	0.0033	0.0014	0.0019
263	0.0032	0.0013	0.0019
264	0.0032	0.0013	0.0019
265	0.0032	0.0013	0.0019
266	0.0032	0.0013	0.0018
267	0.0031	0.0013	0.0018
268	0.0031	0.0013	0.0018
269	0.0031	0.0013	0.0018
270	0.0031	0.0013	0.0018
271	0.0030	0.0013	0.0018
272	0.0030	0.0012	0.0018
273	0.0030	0.0012	0.0017
274	0.0030	0.0012	0.0017
275	0.0029	0.0012	0.0017
276	0.0029	0.0012	0.0017
277	0.0029	0.0012	0.0017
278	0.0029	0.0012	0.0017
279	0.0029	0.0012	0.0017
280	0.0028	0.0012	0.0017
281	0.0028	0.0012	0.0016
282	0.0028	0.0012	0.0016
283	0.0028	0.0012	0.0016
284	0.0028	0.0011	0.0016
285	0.0027	0.0011	0.0016
286	0.0027	0.0011	0.0016
287	0.0027	0.0011	0.0016
288	0.0027	0.0011	0.0016

Total soil rain loss = 0.73(In)
Total effective rainfall = 1.32(In)
Peak flow rate in flood hydrograph = 8.45(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

```
   22+20       0.5758      0.12  Q         |         |         |        V
|
   22+25       0.5767      0.12  Q         |         |         |        V
|
   22+30       0.5775      0.12  Q         |         |         |
V|
   22+35       0.5783      0.12  Q         |         |         |
V|
   22+40       0.5791      0.12  Q         |         |         |
V|
   22+45       0.5799      0.11  Q         |         |         |
V|
   22+50       0.5806      0.11  Q         |         |         |
V|
   22+55       0.5814      0.11  Q         |         |         |
V|
   23+ 0       0.5822      0.11  Q         |         |         |
V|
   23+ 5       0.5830      0.11  Q         |         |         |
V|
   23+10       0.5837      0.11  Q         |         |         |
V|
   23+15       0.5845      0.11  Q         |         |         |
V|
   23+20       0.5852      0.11  Q         |         |         |
V|
   23+25       0.5860      0.11  Q         |         |         |
V|
   23+30       0.5867      0.11  Q         |         |         |
V|
   23+35       0.5874      0.11  Q         |         |         |
V|
   23+40       0.5882      0.11  Q         |         |         |
V|
   23+45       0.5889      0.10  Q         |         |         |
V|
   23+50       0.5896      0.10  Q         |         |         |
V|
   23+55       0.5903      0.10  Q         |         |         |
V|
   24+ 0       0.5910      0.10  Q         |         |         |
V|
   24+ 5       0.5915      0.08  Q         |         |         |
V|
   24+10       0.5916      0.01  Q         |         |         |
V
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

Study date 05/16/16 File Name kollcenterproposedareab.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 4014

Koll Center
Proposed Condition
Area B
2 Year 24 Hour S:140107

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
75.0	3.1	1.00	B	0.300	0.400	0.120

Area-averaged adjusted loss rate Fm (In/Hr) = 0.120

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
1.24	0.400	75.0	57.0	7.54	0.018
1.86	0.600	98.0	98.0	0.20	0.890

Area-averaged catchment yield fraction, Y = 0.541
Area-averaged low loss fraction, Yb = 0.459

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+
User entry of time of concentration  =   0.083 (hours)
Watershed area =       3.10(Ac.)
Catchment Lag time =   0.066 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 125.5020
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.120(In/Hr)
Average low loss rate fraction (Yb) = 0.459 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.190(In)
Computed peak 30-minute rainfall =  0.400(In)
Specified peak 1-hour rainfall =  0.530(In)
Computed peak 3-hour rainfall =  0.890(In)
Specified peak 6-hour rainfall =  1.220(In)
Specified peak 24-hour rainfall =  2.050(In)


Rainfall depth area reduction factors:
Using a total area of       3.10(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.190(In)
30-minute factor = 1.000    Adjusted rainfall =  0.400(In)
1-hour factor = 1.000       Adjusted rainfall =  0.530(In)
3-hour factor = 1.000       Adjusted rainfall =  0.890(In)
6-hour factor = 1.000       Adjusted rainfall =  1.220(In)
24-hour factor = 1.000 Adjusted rainfall =  2.050(In)
------------------------------------------------------------------------
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                  U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
------------------------------------------------------------------------
--
            (K =        37.49 (CFS))

  1               26.066                   9.772
  2               90.306                  24.084
  3              100.000                   3.635
------------------------------------------------------------------------
--
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                (In)
  1              0.1900              0.1900
  2              0.2534              0.0634
  3              0.2999              0.0465
  4              0.3379              0.0381
  5              0.3708              0.0328
  6              0.3999              0.0292
  7              0.4258              0.0258
```

253	0.0036	0.0016	0.0019
254	0.0035	0.0016	0.0019
255	0.0035	0.0016	0.0019
256	0.0035	0.0016	0.0019
257	0.0034	0.0016	0.0019
258	0.0034	0.0016	0.0018
259	0.0034	0.0015	0.0018
260	0.0033	0.0015	0.0018
261	0.0033	0.0015	0.0018
262	0.0033	0.0015	0.0018
263	0.0032	0.0015	0.0018
264	0.0032	0.0015	0.0017
265	0.0032	0.0015	0.0017
266	0.0032	0.0015	0.0017
267	0.0031	0.0014	0.0017
268	0.0031	0.0014	0.0017
269	0.0031	0.0014	0.0017
270	0.0031	0.0014	0.0017
271	0.0030	0.0014	0.0016
272	0.0030	0.0014	0.0016
273	0.0030	0.0014	0.0016
274	0.0030	0.0014	0.0016
275	0.0029	0.0013	0.0016
276	0.0029	0.0013	0.0016
277	0.0029	0.0013	0.0016
278	0.0029	0.0013	0.0016
279	0.0029	0.0013	0.0015
280	0.0028	0.0013	0.0015
281	0.0028	0.0013	0.0015
282	0.0028	0.0013	0.0015
283	0.0028	0.0013	0.0015
284	0.0028	0.0013	0.0015
285	0.0027	0.0013	0.0015
286	0.0027	0.0012	0.0015
287	0.0027	0.0012	0.0015
288	0.0027	0.0012	0.0014

-

-

Total soil rain loss = 0.81(In)
Total effective rainfall = 1.24(In)
Peak flow rate in flood hydrograph = 4.80(CFS)

--

++

+

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

-

Hydrograph in 5 Minute intervals ((CFS))

```
   22+20       0.3106      0.06  Q          |          |          |        V
|
   22+25       0.3110      0.06  Q          |          |          |
V|
   22+30       0.3114      0.06  Q          |          |          |
V|
   22+35       0.3119      0.06  Q          |          |          |
V|
   22+40       0.3123      0.06  Q          |          |          |
V|
   22+45       0.3127      0.06  Q          |          |          |
V|
   22+50       0.3131      0.06  Q          |          |          |
V|
   22+55       0.3135      0.06  Q          |          |          |
V|
   23+ 0       0.3140      0.06  Q          |          |          |
V|
   23+ 5       0.3144      0.06  Q          |          |          |
V|
   23+10       0.3148      0.06  Q          |          |          |
V|
   23+15       0.3152      0.06  Q          |          |          |
V|
   23+20       0.3156      0.06  Q          |          |          |
V|
   23+25       0.3160      0.06  Q          |          |          |
V|
   23+30       0.3163      0.06  Q          |          |          |
V|
   23+35       0.3167      0.06  Q          |          |          |
V|
   23+40       0.3171      0.06  Q          |          |          |
V|
   23+45       0.3175      0.06  Q          |          |          |
V|
   23+50       0.3179      0.06  Q          |          |          |
V|
   23+55       0.3183      0.06  Q          |          |          |
V|
   24+ 0       0.3186      0.05  Q          |          |          |
V|
   24+ 5       0.3189      0.04  Q          |          |          |
V|
   24+10       0.3190      0.01  Q          |          |          |
V
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

Study date 05/16/16 File Name kollcenterproposedareac.out

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+++++

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 4014

--
Koll Center
Proposed Condition
Area C
2 Year 24 Hour S:140107

-

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used
++
+

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
75.0	1.0	1.00	B	0.300	0.350	0.105

Area-averaged adjusted loss rate Fm (In/Hr) = 0.105

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
0.35	0.350	75.0	57.0	7.54	0.018
0.65	0.650	98.0	98.0	0.20	0.890

Area-averaged catchment yield fraction, Y = 0.585
Area-averaged low loss fraction, Yb = 0.415

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+

User entry of time of concentration = 0.083 (hours)
Watershed area = 1.00(Ac.)
Catchment Lag time = 0.066 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 125.5020
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.105(In/Hr)
Average low loss rate fraction (Yb) = 0.415 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:
Using a total area of 1.00(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.190(In)
30-minute factor = 1.000 Adjusted rainfall = 0.400(In)
1-hour factor = 1.000 Adjusted rainfall = 0.530(In)
3-hour factor = 1.000 Adjusted rainfall = 0.890(In)
6-hour factor = 1.000 Adjusted rainfall = 1.220(In)
24-hour factor = 1.000 Adjusted rainfall = 2.050(In)

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U n i t H y d r o g r a p h

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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 12.09 (CFS))	
1	26.066	3.152
2	90.306	7.769
3	100.000	1.172

--

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1900	0.1900
2	0.2534	0.0634
3	0.2999	0.0465
4	0.3380	0.0381
5	0.3708	0.0328
6	0.4000	0.0292
7	0.4258	0.0258

253	0.0036	0.0015	0.0021
254	0.0035	0.0015	0.0021
255	0.0035	0.0015	0.0020
256	0.0035	0.0014	0.0020
257	0.0034	0.0014	0.0020
258	0.0034	0.0014	0.0020
259	0.0034	0.0014	0.0020
260	0.0033	0.0014	0.0019
261	0.0033	0.0014	0.0019
262	0.0033	0.0014	0.0019
263	0.0032	0.0013	0.0019
264	0.0032	0.0013	0.0019
265	0.0032	0.0013	0.0019
266	0.0032	0.0013	0.0018
267	0.0031	0.0013	0.0018
268	0.0031	0.0013	0.0018
269	0.0031	0.0013	0.0018
270	0.0031	0.0013	0.0018
271	0.0030	0.0013	0.0018
272	0.0030	0.0012	0.0018
273	0.0030	0.0012	0.0017
274	0.0030	0.0012	0.0017
275	0.0029	0.0012	0.0017
276	0.0029	0.0012	0.0017
277	0.0029	0.0012	0.0017
278	0.0029	0.0012	0.0017
279	0.0029	0.0012	0.0017
280	0.0028	0.0012	0.0017
281	0.0028	0.0012	0.0016
282	0.0028	0.0012	0.0016
283	0.0028	0.0012	0.0016
284	0.0028	0.0011	0.0016
285	0.0027	0.0011	0.0016
286	0.0027	0.0011	0.0016
287	0.0027	0.0011	0.0016
288	0.0027	0.0011	0.0016

-

-

Total soil rain loss = 0.73(In)
Total effective rainfall = 1.32(In)
Peak flow rate in flood hydrograph = 1.56(CFS)

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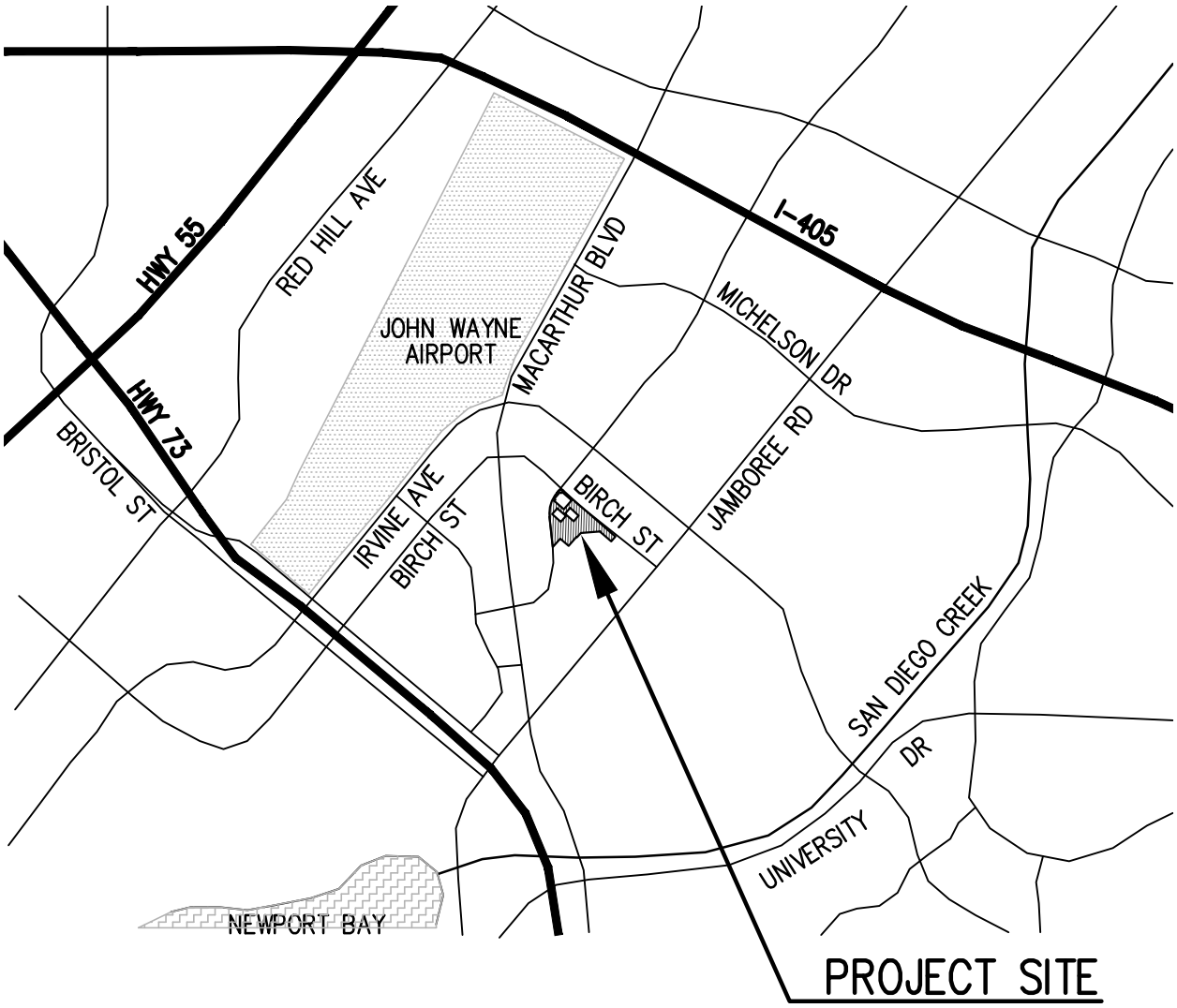
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

-

Hydrograph in 5 Minute intervals ((CFS))

22+20	0.1066	0.02	Q				V
22+25	0.1068	0.02	Q				V
22+30	0.1069	0.02	Q				
22+35	0.1071	0.02	Q				
22+40	0.1072	0.02	Q				
22+45	0.1074	0.02	Q				
22+50	0.1075	0.02	Q				
22+55	0.1077	0.02	Q				
23+ 0	0.1078	0.02	Q				
23+ 5	0.1080	0.02	Q				
23+10	0.1081	0.02	Q				
23+15	0.1082	0.02	Q				
23+20	0.1084	0.02	Q				
23+25	0.1085	0.02	Q				
23+30	0.1087	0.02	Q				
23+35	0.1088	0.02	Q				
23+40	0.1089	0.02	Q				
23+45	0.1091	0.02	Q				
23+50	0.1092	0.02	Q				
23+55	0.1093	0.02	Q				
24+ 0	0.1095	0.02	Q				
24+ 5	0.1095	0.01	Q				
24+10	0.1096	0.00	Q				



N

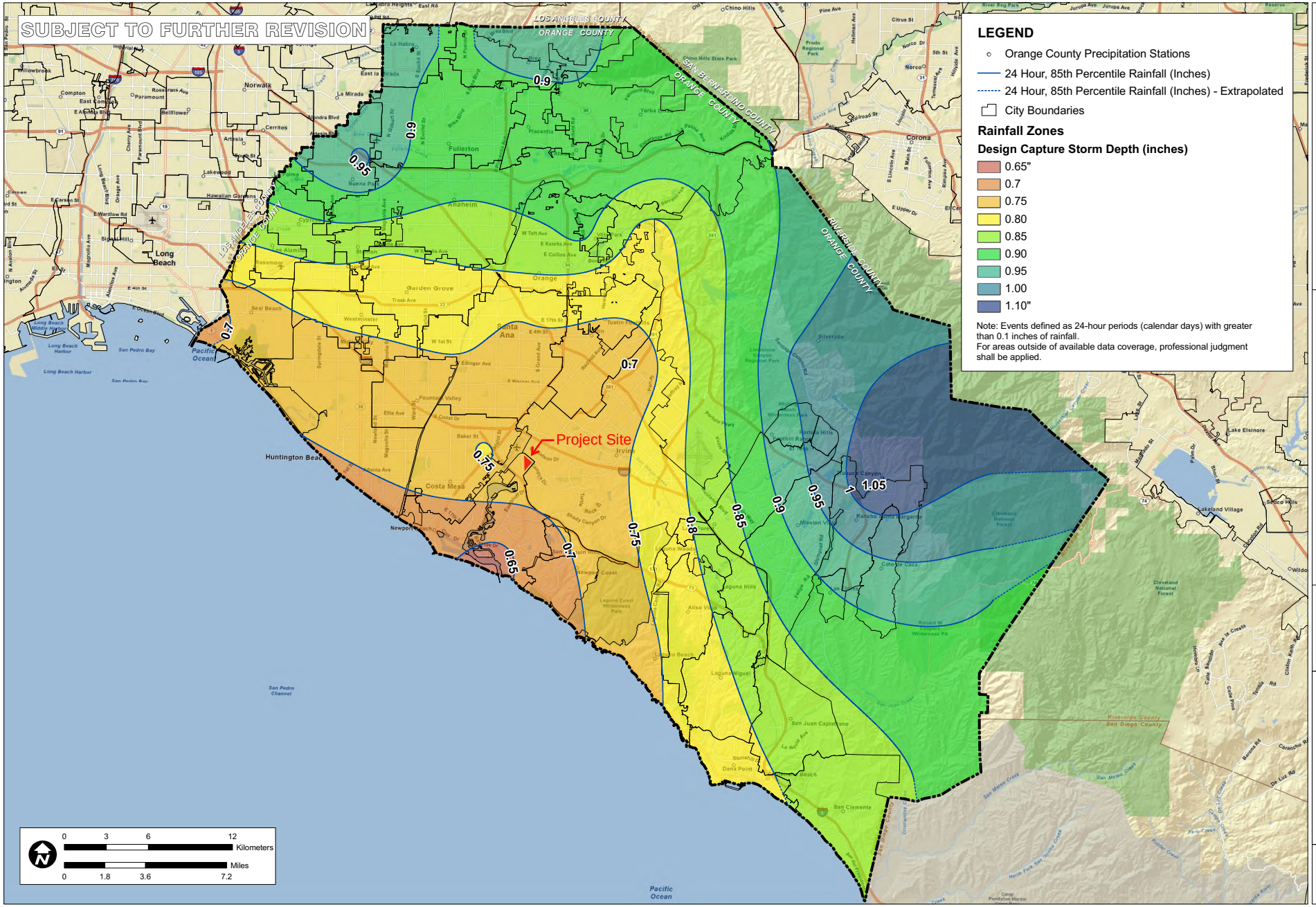
N.T.S.

UPTOWN NEWPORT PROJECT
VICINITY MAP

DAVID EVANS AND ASSOCIATES INC.
17782 17th Street Suite 200
Tustin California 92780-1947
Phone: 714.665.4500

Job Number:	S:140107
Date:	MARCH 31, 2016
Scale:	N.T.S.
Sheet 1 of	1 Sheets

Drawing Name: S:\140107\Admin\Reports\WQMP\3-31-2016\Appendix 1 Maps Figures and Exhibits\Vicinity Map.dwg
Last Opened: Mar 31, 2016 - 3:06pm by: mbec



TITLE
RAINFALL ZONES

ORANGE COUNTY
TECHNICAL GUIDANCE
DOCUMENT

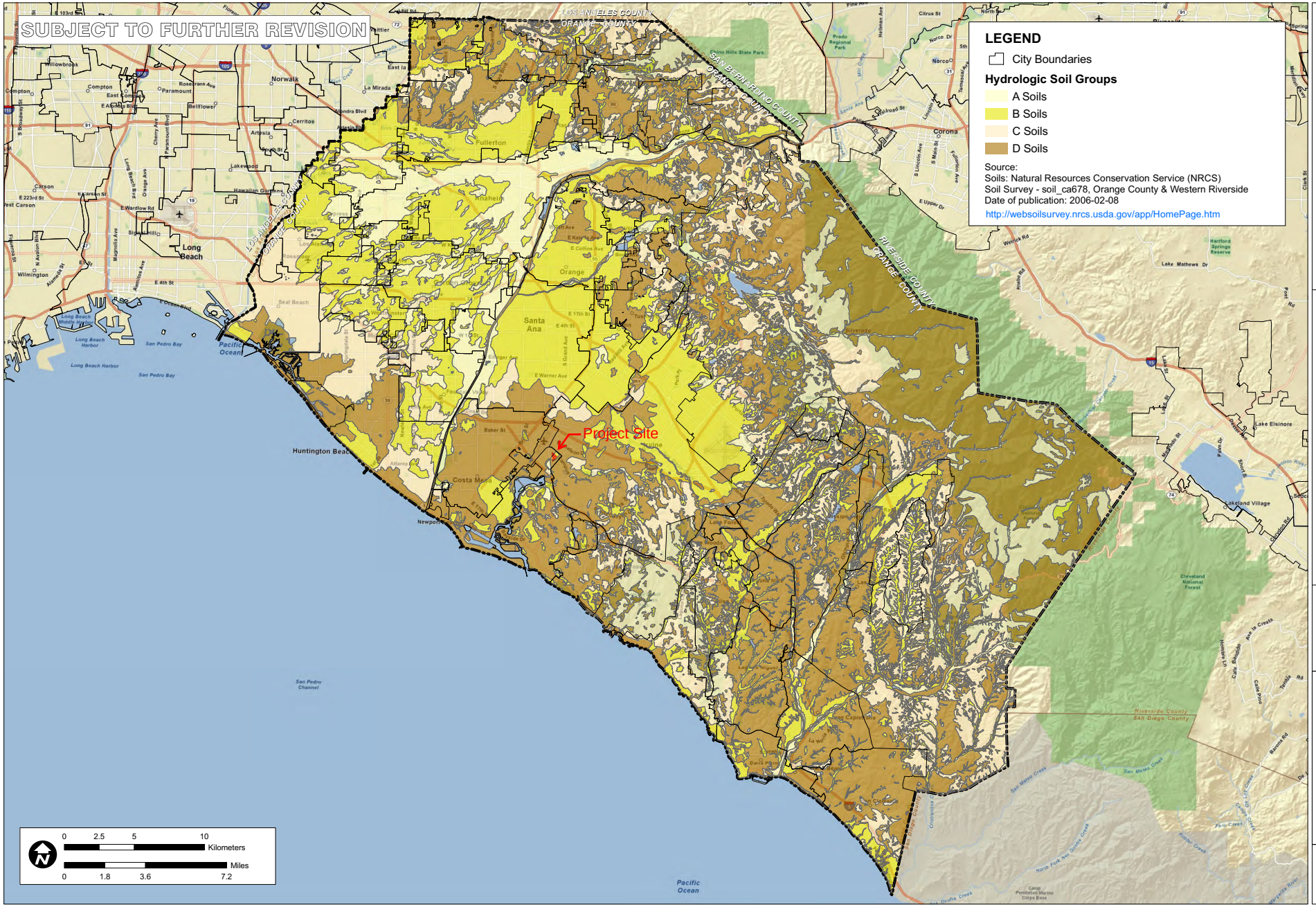
JOB
ORANGE CO.
CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/23/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-1

P:\Y526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\Y526E_FigureXVI-1_RainfallZones_20110215.mxd



TITLE
NRCS HYDROLOGIC SOILS GROUPS

JOB
ORANGE COUNTY INFILTRATION STUDY
CA
ORANGE CO.

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2a

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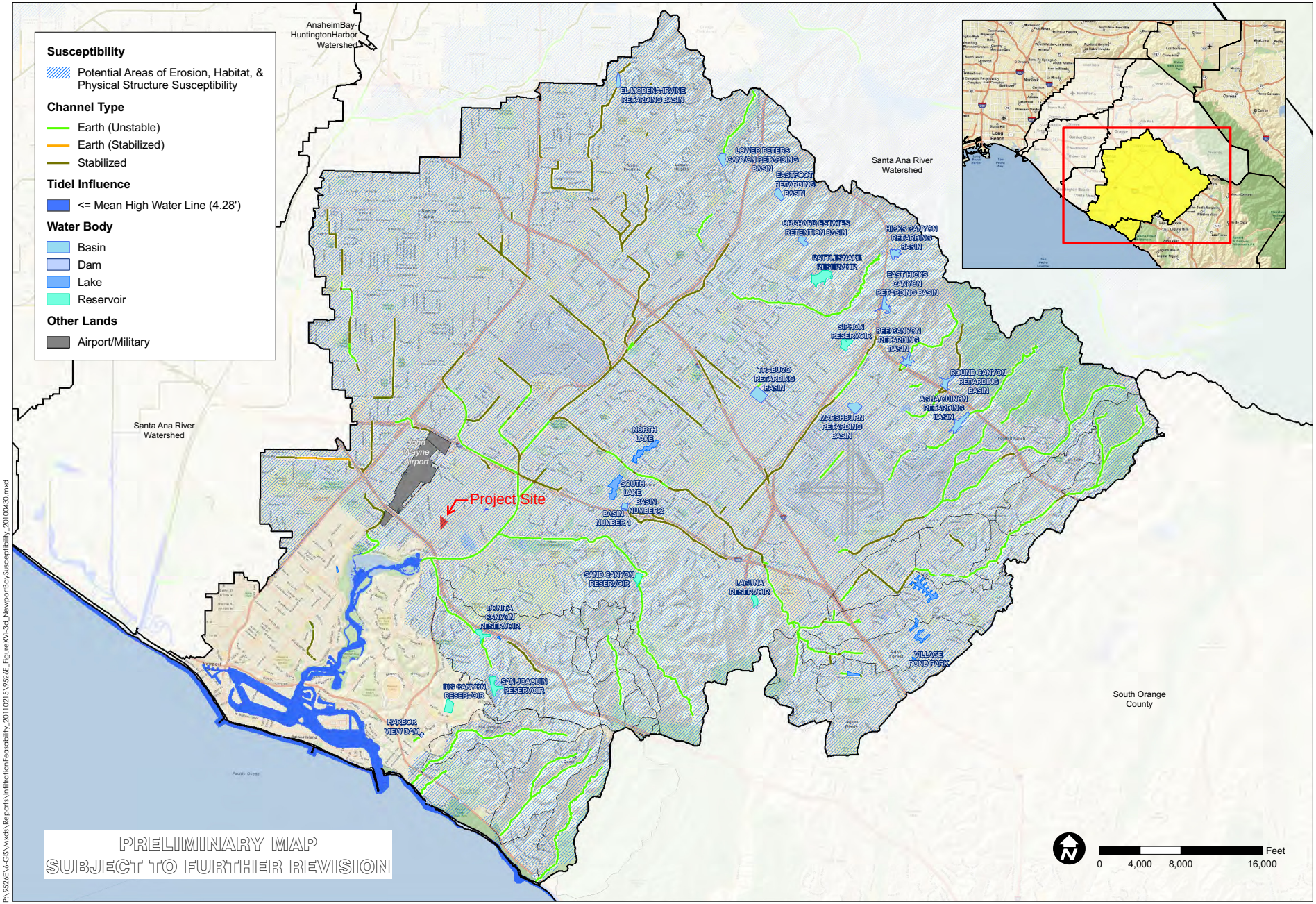

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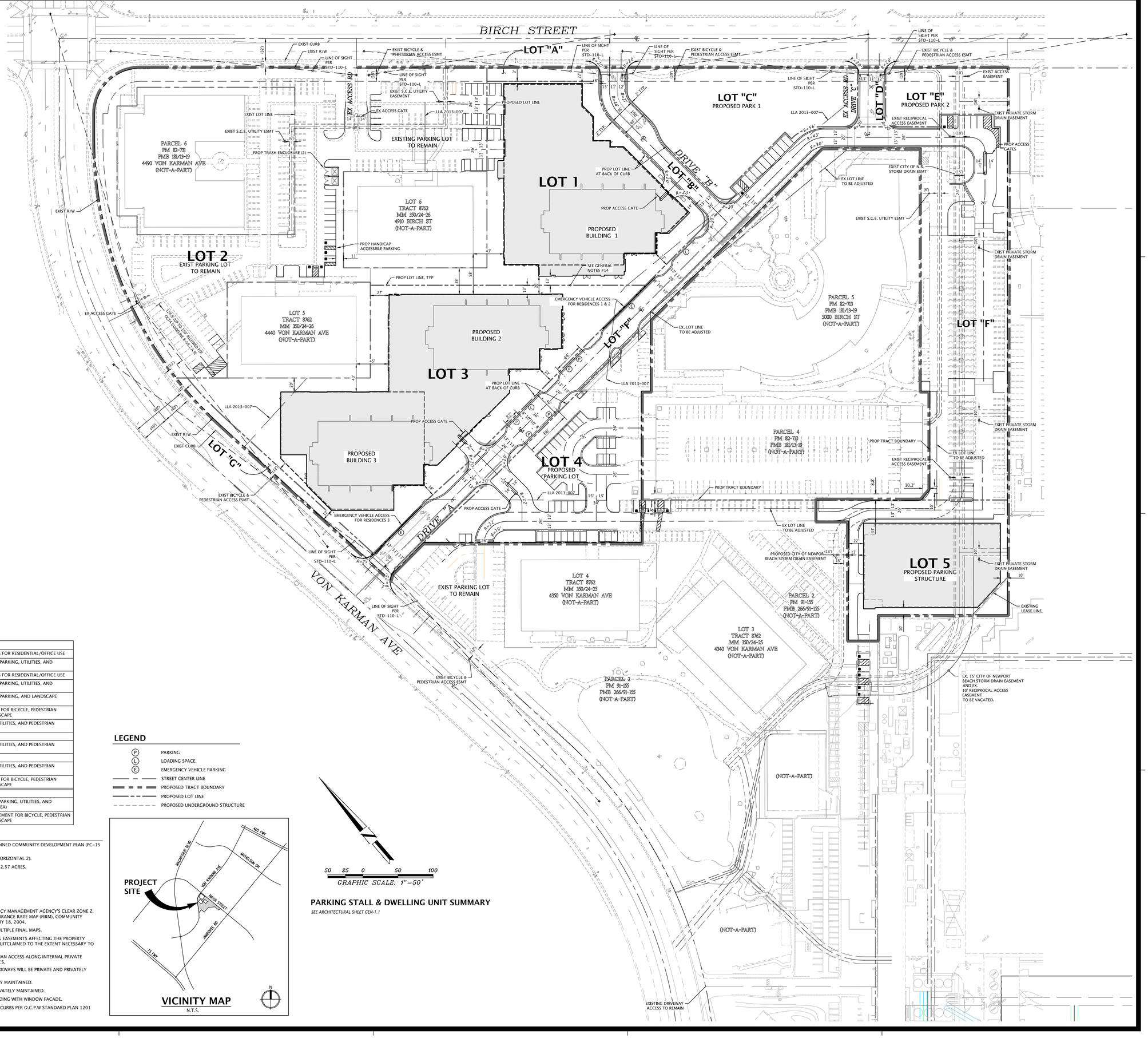
TITLE
SUSCEPTIBILITY ANALYIS
NEWPORT BAY-
NEWPORT COASTAL STREAMS

JOB
ORANGE COUNTY
WATERSHED
MASTER PLANNING
ORANGE CO. CA

SCALE	1" = 4000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-3d



OWNER

KCN A MANAGEMENT, LLC
17755 SKY PARK EAST, SUITE 100
IRVINE, CA 92614
(949) 261-2499

DEVELOPER/ SUBDIVIDER

SHOPOFF LAND FUND II, LP
2 PARK PLAZA, SUITE 700
(949) 417-1396
CONTACT: MICHAEL MURPHY

LAND USE SUMMARY

LOT:	*AREA (ACRE):*	*LAND USE:*
1	1.69	PROPOSED BUILDING FOR RESIDENTIAL/OFFICE USE
2	2.29	PROPOSED ACCESS, PARKING, UTILITIES, AND LANDSCAPE
3	2.51	PROPOSED BUILDING FOR RESIDENTIAL/OFFICE USE
4	1.10	PROPOSED ACCESS, PARKING, UTILITIES, AND LANDSCAPE
5	0.92	PROPOSED ACCESS, PARKING, AND LANDSCAPE
"A"	0.07	EXISTING EASEMENT FOR BICYCLE, PEDESTRIAN ACCESS, AND LANDSCAPE
"B"	0.21	PROPOSED ROAD, UTILITIES, AND PEDESTRIAN ACCESS
"C"	0.86	PROPOSED PARK
"D"	0.08	PROPOSED ROAD, UTILITIES, AND PEDESTRIAN ACCESS
"E"	0.31	PROPOSED PARK
"F"	2.43	PROPOSED ROAD, UTILITIES, AND PEDESTRIAN ACCESS
"G"	0.10	EXISTING EASEMENT FOR BICYCLE, PEDESTRIAN ACCESS, AND LANDSCAPE
TOTAL	12.57	GROSS AREA
NUMBERED	8.51	BUILDING, ACCESS, PARKING, UTILITIES, AND LANDSCAPE (NET AREA)
LETTERED	4.06	PARK; EXISTING EASEMENT FOR BICYCLE, PEDESTRIAN ACCESS, AND LANDSCAPE

GENERAL NOTES

1. ZONING DISTRICT: KOLL CENTER NEWPORT PLANNED COMMUNITY DEVELOPMENT PLAN (PC-15 KOLL CENTER).
2. GENERAL PLAN: MU-H2 (MIXED-USE DISTRICT HORIZONTAL 2).
3. GROSS AREA (NUMBERED & LETTERED LOTS) = 12.57 ACRES.
4. NET AREA (NUMBERED LOTS) = 8.51 ACRES.
5. PARK AREA (LOTS "C", AND "E") = 1.17 ACRES.
6. DENSITY = DWELLING UNITS / NET AREA
   = 260 DU / 8.51 ACRES
   = 30.6 DU/AC
7. THIS PROJECT IS WITHIN THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S CLEAR ZONE Z, AREA OF 500-YEAR FLOOD ON THE FLOOD INSURANCE RATE MAP (FIRM), COMMUNITY PANELMAP NO. 0286, EFFECTIVE DATE: FEBRUARY 18, 2004.
8. THIS TENTATIVE MAP BOUNDARY MAY HAVE MULTIPLE FINAL MAPS.
9. EXISTING EASEMENTS OR PORTIONS OF EXISTING EASEMENTS AFFECTING THE PROPERTY WITHIN THE BOUNDARY OF THIS MAP WILL BE QUITCLAIMED TO THE EXTENT NECESSARY TO ACCOMODATE THE FUTURE LAND USE.
10. ON-SITE PUBLIC PARKING STALLS AND PEDESTRIAN ACCESS ALONG INTERNAL PRIVATE STREETS WILL BE DOCUMENTED WITH THE CC&R'S.
11. ON-SITE SIDEWALKS, PARKING STALLS, AND PARKWAYS WILL BE PRIVATE AND PRIVATELY MAINTAINED.
12. ON-SITE STREETS TO BE PRIVATE AND PRIVATELY MAINTAINED.
13. ON-SITE STORM DRAIN TO BE PRIVATE AND PRIVATELY MAINTAINED.
14. LOT LINE TO BE 20' MIN CLEARANCE FROM BUILDING WITH WINDOW FACADE.
15. ONSITE STREETS WILL HAVE CONCRETE ROLLED CURBS PER O.C.P.W STANDARD PLAN 1201

LEGEND

- (P) PARKING
- (L) LOADING SPACE
- (E) EMERGENCY VEHICLE PARKING
- STREET CENTER LINE
- PROPOSED TRACT BOUNDARY
- PROPOSED LOT LINE
- PROPOSED UNDERGROUND STRUCTURE

VICINITY MAP
N.T.S.

50 25 0 50 100
GRAPHIC SCALE: 1"=50'

PARKING STALL & DWELLING UNIT SUMMARY

SEE ARCHITECTURAL SHEET GEN-1.1

SHOPOFF REALTY INVESTMENTS
2 PARK PLAZA, SUITE 700, IRVINE, CA 92614
TELEPHONE: (949) 417-1396

THE KOLL CENTER RESIDENCES NEWPORT
CITY OF NEWPORT BEACH

REGISTERED PROFESSIONAL ENGINEER
JASON CURT PROPST
No. 26229
Exp. 03/31/18
CIVIL
STATE OF CALIFORNIA

REVISIONS

	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

SHEET TITLE

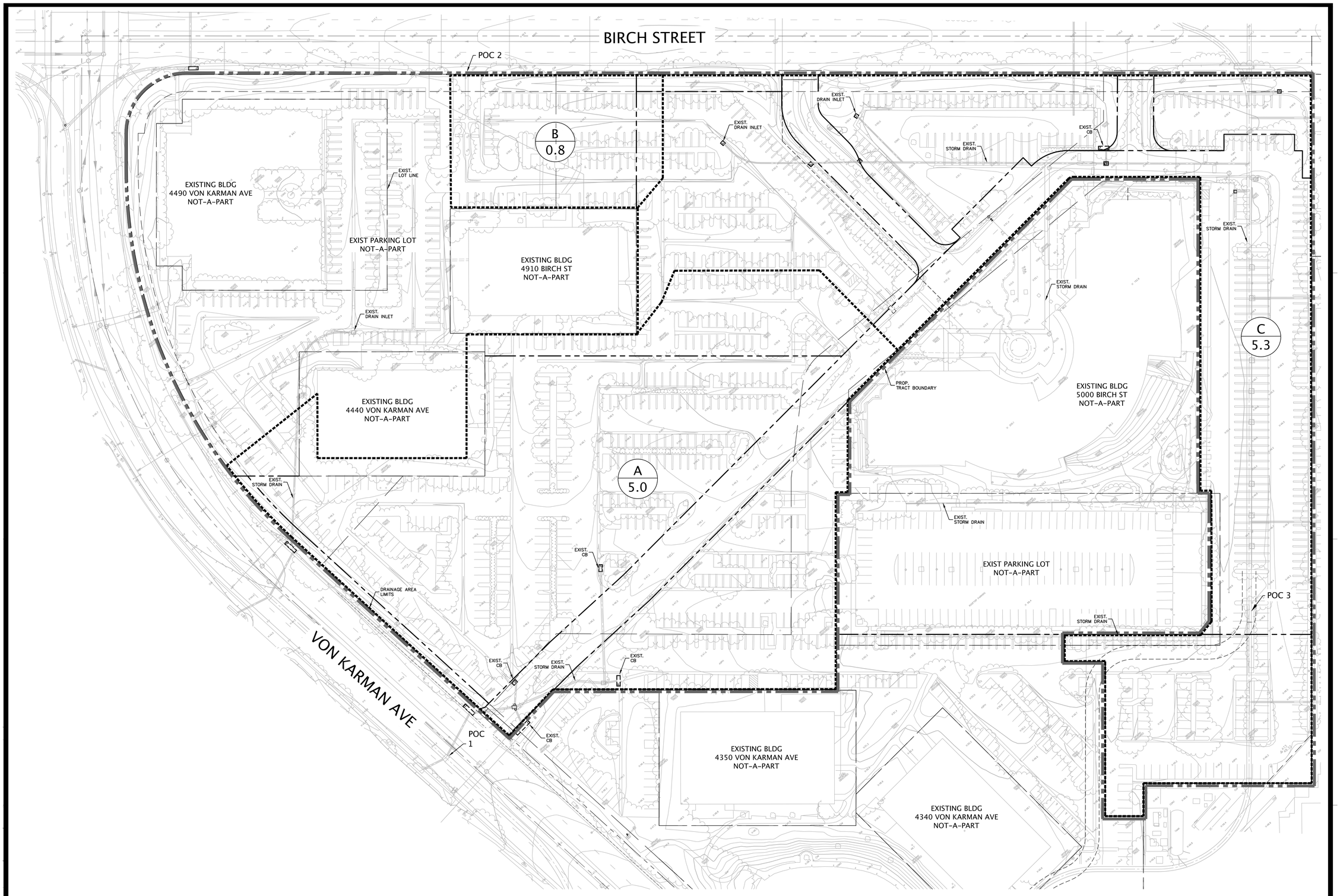
TECHNICAL SITE PLAN

SHEET NUMBER
C-1

JOB NO. SHOPOLF21000
DATE 06/13/2017
SCALE 1"=40'

DAVID EVANS AND ASSOCIATES INC.
17782 17th Street Suite 200
Tustin California 92780-1947
Phone: 714.665.4500

CONCEPTUAL DESIGN



EXISTING HYDROLOGY			
ID	DRAINAGE AREA (AC)	PERVIOUS AREA (AC)	IMPERVIOUS RATIO
A	5.0	1.50	0.72
B	0.8	0.20	0.75
C	5.3	1.26	0.76
Total	11.1	2.96	0.73

LEGEND

- PROPOSED TRACT BOUNDARY
- DRAINAGE AREA LIMITS
- EXISTING LOT LINE

40 20 0 40 80

GRAPHIC SCALE: 1"=40'

SHOPOFF REALTY INVESTMENTS

2 PARK PLAZA, SUITE 700, IRVINE, CA 92614
TELEPHONE: (949) 417-1396

THE KOLL CENTER RESIDENCES NEWPORT
CITY OF NEWPORT BEACH

REGISTERED PROFESSIONAL ENGINEER
JOHN CURT "RODAN"
No. 26229
Exp. 03/31/18
CIVIL
STATE OF CALIFORNIA

REVISIONS

	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

SHEET TITLE

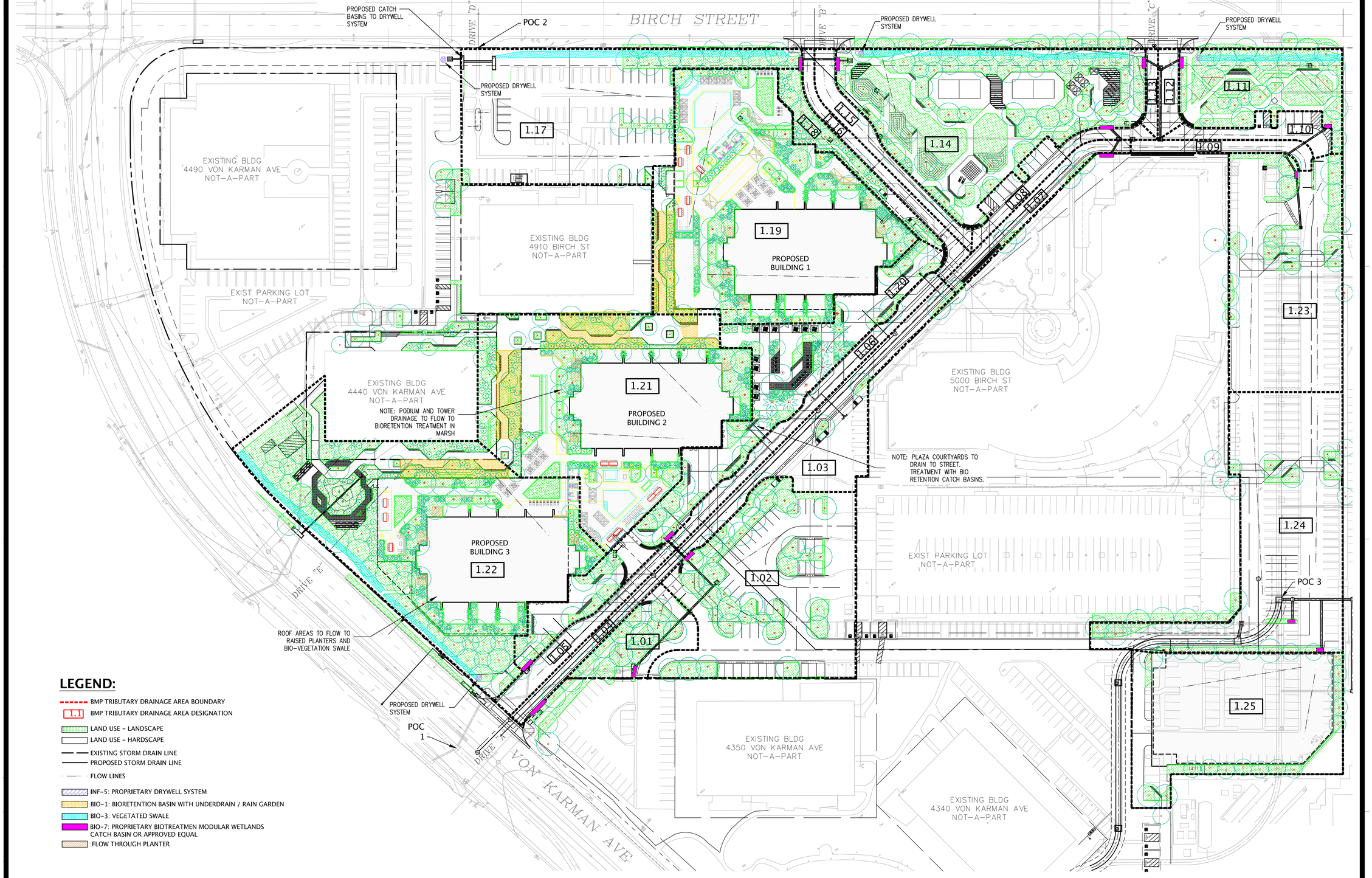
EXISTING HYDROLOGY EXHIBIT FOR WQMP

SHEET NUMBER

H-1

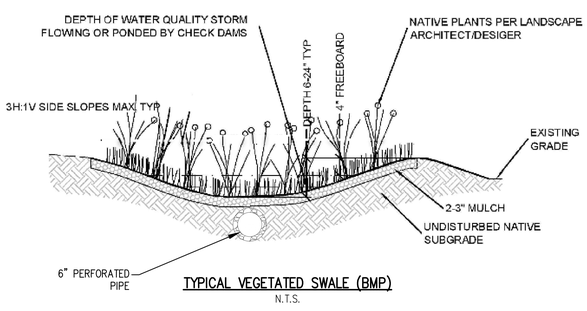
JOB NO. SHOPOLF21000
DATE 08/25/2016
SCALE PER PLAN

DAVID EVANS AND ASSOCIATES INC.
17782 17th Street Suite 200
Tustin California 92780-1947
Phone: 714.665.4500

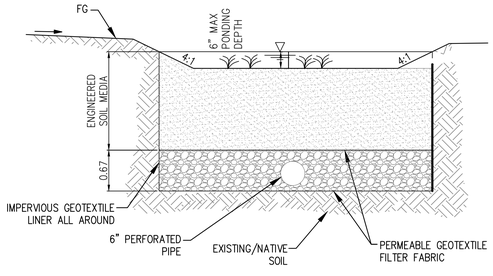


LEGEND:

- BMP TRIBUTARY DRAINAGE AREA BOUNDARY
- 1.1 BMP TRIBUTARY DRAINAGE AREA DESIGNATION
- LAND USE - LANDSCAPE
- LAND USE - HARDSCAPE
- EXISTING STORM DRAIN LINE
- PROPOSED STORM DRAIN LINE
- FLOW LINES
- INF-5: PROPRIETARY DRYWELL SYSTEM
- BIO-1: BIORETENTION BASIN WITH UNDERDRAIN / RAIN GARDEN
- BIO-3: VEGETATED SWALE
- BIO-7: PROPRIETARY BIOTREATMEN MODULAR WETLANDS CATCH BASIN OR APPROVED EQUAL
- :FLOW THROUGH PLANTER



TYPICAL VEGETATED SWALE (BMP)
N.T.S.



TYPICAL BIORETENTION BASIN (BMP)
N.T.S.

PROPOSED HYDROLOGY				
POC	DMA No.	DRAINAGE AREA (AC)	PERVIOUS AREA (AC)	IMPERVIOUS RATIO
1	1.01, 1.02, 1.03, 1.04, 1.05, 1.06, 1.20, 1.21, 1.22	5.0	1.72	0.68
2	1.17	0.8	0.28	0.65
3	1.07, 1.08, 1.09, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.18, 1.19, 1.23, 1.24, 1.25	5.3	1.79	0.71
TOTAL	-	11.1	3.79	0.66

NOTE: PROPOSED PLANTER BOXES ARE SUBJECT TO CHANGE OR REMOVED. TO BE DETERMINED DURING FINAL ENGINEERING

NOTE: THIS PLAN IS CONCEPTUAL ONLY AND IS SUBJECT TO CHANGE

40 20 0 40 80
GRAPHIC SCALE: 1"=40'

THE KOLL CENTER RESIDENCES NEWPORT
CITY OF NEWPORT BEACH

SHOPOFF REALTY INVESTMENTS
2 PARK PLAZA, SUITE 700, IRVINE, CA 92614
TELEPHONE: (949) 417-1396

REGISTERED PROFESSIONAL ENGINEER JOHN CURT YOGAN No. 26229 Exp. 03/31/18 CIVIL STATE OF CALIFORNIA

REVISIONS

	DESCRIPTION	DATE

SHEET TITLE

CONCEPTUAL WATER QUALITY MANAGEMENT PLAN

SHEET NUMBER C-11

JOB NO. SHOPOLF21000
DATE 08/25/2016
SCALE PER PLAN

DAVID EVANS AND ASSOCIATES INC.
17782 17th Street Suite 200
Tustin California 92780-1947
Phone: 714.665.4500

Appendix B - BMP Sizing Worksheets

- **BMP Sizing (Volume and Flow) Calculations**
- **Drywell System**
- **BIO-1: Bioretention with Underdrain**
- **BIO-2: Vegetated Swale**

Hall & Foreman
A Division of David Evans and Associates, Inc.
17782 17th Street, Suite 200
Tustin, CA 92780
714-665-4500

Design Capture Volume Table:

Description:	**Design Capture Volume Calculations**
Project Name:	The Towers at Koll Center
Project No.:	140107
Date:	2016-05-16. 4:55PM
Designed By:	Michael Becerra

A	B	C	D	E	F	K		L
DMA No.	**Drainage Area A (ft^2)**	**Drainage Area A (ac)**	**Pervious Area A_p (ft^2)**	**Impervious Ratio imp**	**Runoff Coefficient C**	**Required Design Capture Volume DCV (ft^3)**	**Required Design Capture Volume DCV (AC-FT)**	**BMP Used**
1.01	33,480	0.77	6,612	0.80	0.752	1,573.3	0.036	BIO-7: Proprietary Biotreatment
1.02	22,700	0.52	9,066	0.60	0.600	851.9	0.020	BIO-1: Bioretention with Underdrain
1.03	23,360	0.54	306	0.99	0.890	1,299.7	0.030	BIO-7: Proprietary Biotreatment
1.04	10,373	0.24	3,319	0.68	0.660	427.9	0.010	BIO-7: Proprietary Biotreatment
1.05	4,539	0.10	0	1.00	0.900	255.3	0.006	BIO-7: Proprietary Biotreatment
1.06	6,692	0.15	0	1.00	0.900	376.4	0.009	BIO-7: Proprietary Biotreatment
1.07	3,816	0.09	268	0.93	0.847	202.1	0.005	BIO-7: Proprietary Biotreatment
1.08	7,722	0.18	0	1.00	0.900	434.4	0.010	BIO-7: Proprietary Biotreatment
1.09	3,568	0.08	0	1.00	0.900	200.7	0.005	BIO-7: Proprietary Biotreatment
1.10	2,696	0.06	0	1.00	0.900	151.6	0.003	BIO-7: Proprietary Biotreatment
1.11	13,930	0.32	9,536	0.32	0.387	336.6	0.008	BIO-3: Vegetated Swale
1.12	2,270	0.05	0	1.00	0.900	127.7	0.003	BIO-7: Proprietary Biotreatment
1.13	40,526	0.93	27,558	0.32	0.390	987.8	0.023	BIO-1: Bioretention with Underdrain
1.14	4,983	0.11	0	1.00	0.900	280.3	0.006	BIO-7: Proprietary Biotreatment
1.15	3,718	0.09	0	1.00	0.900	209.2	0.005	BIO-7: Proprietary Biotreatment
1.17	34,848	0.80	12,304	0.65	0.635	1,383.5	0.032	INF-5: Drywell
1.20	43,055	0.99	13,236	0.69	0.669	1,801.4	0.041	BIO-1: Bioretention with Underdrain & BIO-3: Vegetated Swale
1.21	3,014	0.07	1,205	0.60	0.600	113.1	0.003	BIO-3: Vegetated Swale
1.23	30,472	0.70	7,502	0.75	0.715	1,362.4	0.031	BIO-1: Bioretention with Underdrain
1.24	25,816	0.59	8,369	0.68	0.657	1,059.9	0.024	BIO-1: Bioretention with Underdrain
1.28	23,486	0.54	7,357	0.69	0.665	976.2	0.022	BIO-1: Bioretention with Underdrain
1.30	39,122	0.90	9,506	0.76	0.718	1,755.0	0.040	BIO-1: Bioretention with Underdrain
1.33	10,457	0.24	7,111	0.32	0.390	254.9	0.006	BIO-3: Vegetated Swale
1.34	10,667	0.24	2,011	0.81	0.759	505.7	0.012	INF-5: Drywell
Total	**405,310**	**9.30**	**125,263.55**	**0.69**	**0.485**	**29,595**		

DAVID EVANS AND ASSOCIATES INC.
17782 17th Street, Suite 200
Tustin, CA 92780
714-655-4500

DMA No.	Design Capture Volume DCV (ft^3)	Design Infiltration Rate of Media K_{media} (in/hr)	Depth of Ponding d_P (ft)	Drawdown Time DD_P (hr)	Storm Durating Routing T_{route} (hr)	Depth of Water Filtered During the Storm Event d_{filter} (ft)	Required Bioretention Area A_{req} (ft^2)	Design Bioretention Area A_{design} (ft^2)	Bioretention Width w_{BMP} (ft)	Bioretention Length L_{BMP} (ft)	Untreated Area A_{unt} (ft^2)	BMP Check
Marsh 1, Area=35375 sqft, Pervious=8991.44 sqft												
A	B	C	D	E	F	G	H	I	J	K	L	M
DMA No.	Design Capture Volume DCV (ft^3)	Design Infiltration Rate of Media K_{media} (in/hr)	Depth of Ponding d_P (ft)	Drawdown Time DD_P (hr)	Storm Durating Routing T_{route} (hr)	Depth of Water Filtered During the Storm Event d_{filter} (ft)	Required Bioretention Area A_{req} (ft^2)	Design Bioretention Area A_{design} (ft^2)	Bioretention Width w_{BMP} (ft)	Bioretention Length L_{BMP} (ft)	Untreated Area A_{unt} (ft^2)	BMP Check
	1,568	2.50	0.50	2.4	3.0	0.50	**1,568**	**1,600**	15.00	106.67	0	OK

Marsh 2 A=26206.85 sqft, Pervious=5980.82 sqft

A	B	C	D	E	F	G	H	I	J	K	L	M
DMA No.	Design Capture Volume DCV (ft^3)	Design Infiltration Rate of Media K_{media} (in/hr)	Depth of Ponding d_P (ft)	Drawdown Time DD_P (hr)	Storm Durating Routing T_{route} (hr)	Depth of Water Filtered During the Storm Event d_{filter} (ft)	Required Bioretention Area A_{req} (ft^2)	Design Bioretention Area A_{design} (ft^2)	Bioretention Width w_{BMP} (ft)	Bioretention Length L_{BMP} (ft)	Untreated Area A_{unt} (ft^2)	BMP Check
	1,194	2.50	0.50	2.4	3.0	0.50	**1,194**	**1,200**	15.00	80.00	0	0

Marsh 3 A=26054.27 sqft, Pervious=8120.07 sqft

A	B	C	D	E	F	G	H	I	J	K	L	M
DMA No.	Design Capture Volume DCV (ft^3)	Design Infiltration Rate of Media K_{media} (in/hr)	Depth of Ponding d_P (ft)	Drawdown Time DD_P (hr)	Storm Durating Routing T_{route} (hr)	Depth of Water Filtered During the Storm Event d_{filter} (ft)	Required Bioretention Area A_{req} (ft^2)	Design Bioretention Area A_{design} (ft^2)	Bioretention Width w_{BMP} (ft)	Bioretention Length L_{BMP} (ft)	Untreated Area A_{unt} (ft^2)	BMP Check
	1,085	2.50	0.50	2.4	3.0	0.50	**1,085**	**1,100**	15.00	73.33	0	0

Marsh 4 A=54357 sqft, Pervious= 12816 sqft

A	B	C	D	E	F	G	H	I	J	K	L	M
DMA No.	Design Capture Volume DCV (ft^3)	Design Infiltration Rate of Media K_{media} (in/hr)	Depth of Ponding d_P (ft)	Drawdown Time DD_P (hr)	Storm Durating Routing T_{route} (hr)	Depth of Water Filtered During the Storm Event d_{filter} (ft)	Required Bioretention Area A_{req} (ft^2)	Design Bioretention Area A_{design} (ft^2)	Bioretention Width w_{BMP} (ft)	Bioretention Length L_{BMP} (ft)	Untreated Area A_{unt} (ft^2)	BMP Check
	2,457	2.50	0.50	2.4	3.0	0.50	**2,457**	**2,500**	15.00	166.67	0	0
	2,457	2.50	1.00	4.8	3.0	0.63	**1,512**	**1,600**	15.00	106.67	0	0
	2,457	2.50	1.50	7.2	4.0	0.83	**1,053**	**1,100**	15.00	73.33	0	0

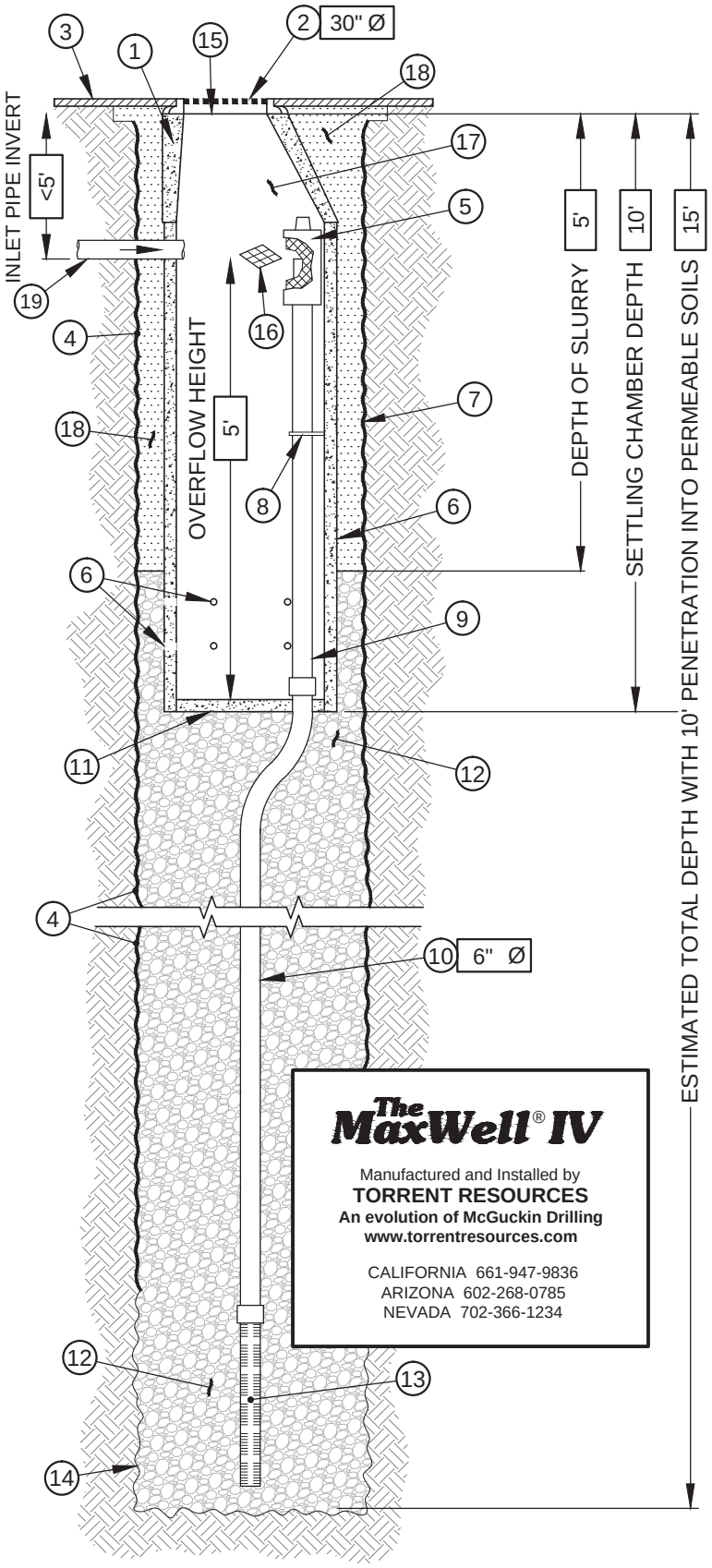
Conclusion: Marsh areas have capacity to treat tributary DCV's.

DEA Koll Center 15

The MaxWell® IV Drainage System Detail And Specifications

ITEM NUMBERS

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **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.
3. **GRADED BASIN OR PAVING** (BY OTHERS).
4. NON-WOVEN GEOTEXTILE SLEEVE, MIRAFITM/ 140 NL. HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
5. **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**.
6. **PRE-CAST LINER** - 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE** AND ALIGN SECTIONS **TO MAXIMIZE BEARING SURFACE**. **EIGHT (8) PERFORATIONS PER FOOT, 2 ROWS MINIMUM.**
7. **MIN. 6' Ø DRILLED SHAFT**.
8. **SUPPORT BRACKET** - FORMED 12 GA. STEEL. **FUSION BONDED EPOXY COATED**.
9. **OVERFLOW PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
10. **DRAINAGE PIPE** - ADS HIGHWAY GRADE WITH TRI-A COUPLER. **SUSPEND PIPE** DURING BACKFILL OPERATIONS TO PREVENT BUCKLING OR BREAKAGE. DIAMETER AS NOTED.
11. **BASE SEAL** - GEOTEXTILE OR CONCRETE SLURRY.
12. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2" TO **BEST COMPLEMENT SOIL CONDITIONS**.
13. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. 120" OVERALL LENGTH WITH TRI-B COUPLER.
14. **MIN. 6' Ø SHAFT** - DRILLED TO **MAINTAIN PERMEABILITY** OF DRAINAGE SOILS.
15. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION.
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, TWO PER CHAMBER.
17. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE SETTLING CHAMBER DEPTH AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE OVERFLOW PIPE INLET.
18. STABILIZED BACKFILL - SIX-SACK SLURRY MIX.
19. **INLET PIPE** (BY OTHERS).



DEA Koll Center 40

The MaxWell® IV Drainage System Detail And Specifications

ITEM NUMBERS

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10. **DRAINAGE PIPE** - ADS HIGHWAY GRADE WITH TRI-A COUPLER. **SUSPEND PIPE** DURING BACKFILL OPERATIONS TO PREVENT BUCKLING OR BREAKAGE. DIAMETER AS NOTED.
11. **BASE SEAL** - GEOTEXTILE OR CONCRETE SLURRY.
12. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2" TO **BEST COMPLEMENT SOIL CONDITIONS**.
13. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. 120" OVERALL LENGTH WITH TRI-B COUPLER.
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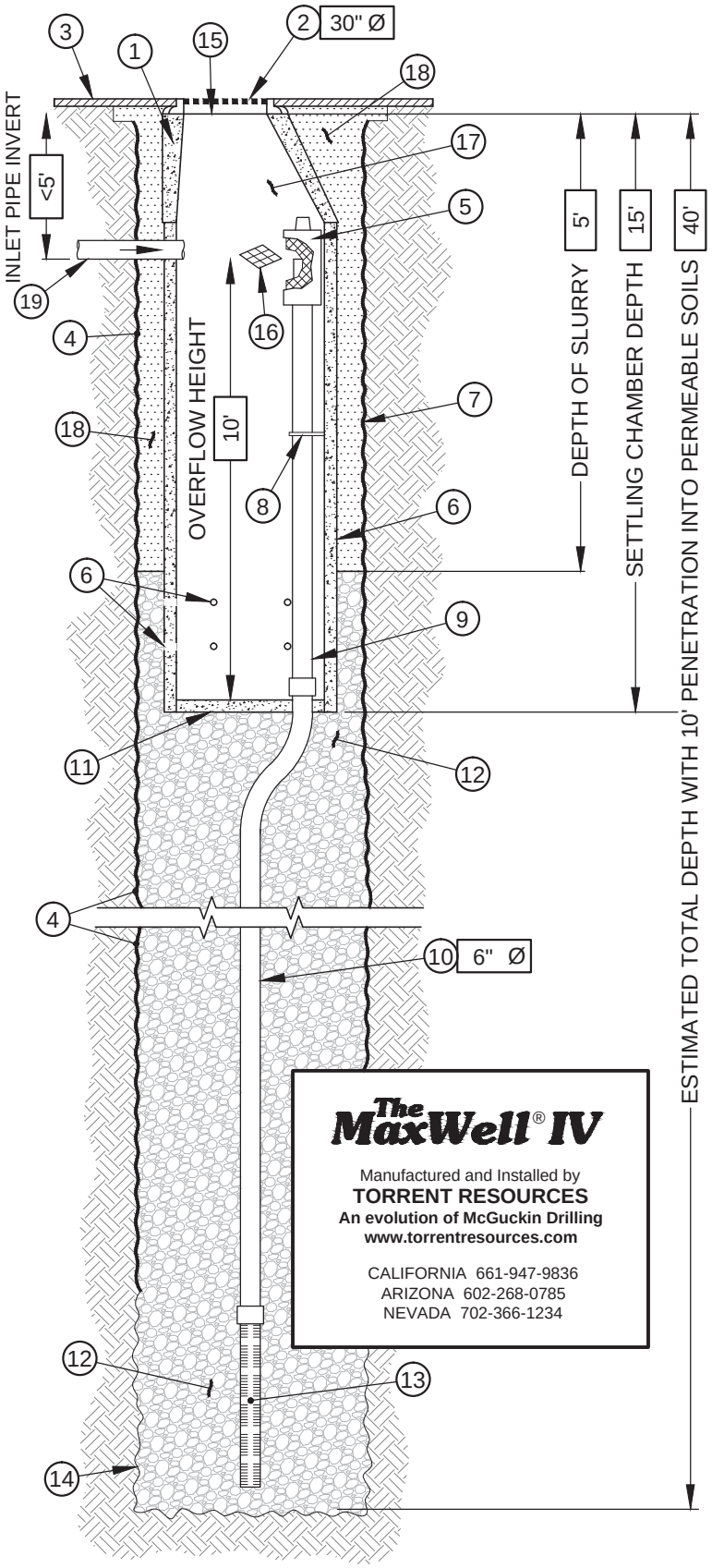
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, TWO PER CHAMBER.
17. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE SETTLING CHAMBER DEPTH AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE OVERFLOW PIPE INLET.
18. STABILIZED BACKFILL - SIX-SACK SLURRY MIX.
19. **INLET PIPE** (BY OTHERS).



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TORRENT RESOURCES

April 13, 2016

Torrent Resources (CA), Inc.
3201 East Guasti Road, Suite 100
Ontario, California 91761

Flow Based Infiltration Calculations
MaxWell Drainage Systems

Project: Koll Center, Irvine, California **15' MaxDepth**

- Average infiltration rate provided from Geotechnical Engineers report: 27 inches/hour.
- 27 in/hr is converted to feet per second by dividing rate by 12"/foot and 3600sec/hr.
- The result is 0.000625 feet per second. Applying a safety factor of 3:1 the design rate is 0.000208 feet per second.

15' Maximum depth recognizing GW at 25' BG

- Infiltration will begin 5' below grade.
- Each foot of depth from 5' below grade is a minimum of 4' diameter providing 12.56 square feet of surface area per foot of depth. One 15' deep drywell will provide 125 square feet of infiltration zone.
- 125sf x 0.000208f/s = 0.026cfs.
- One drywell working at this rate will infiltrate a retained or stored volume of 4,492cf in 48 hours.
- The volume stored in the drywell chamber and void in the rock is 150 cubic feet.

Kevin C. White
California Operations Manager
Torrent Resources (CA), Inc.

Torrent Resources (CA) Incorporated
3200 Guasti Road Suite 100
Ontario California 91761

phone 661-947-9836

www.TorrentResources.com

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TORRENT RESOURCES

April 13, 2016

Torrent Resources (CA), Inc.
3201 East Guasti Road, Suite 100
Ontario, California 91761

Flow Based Infiltration Calculations
MaxWell Drainage Systems

Project: Koll Center, Irvine, California **40' MaxDepth**

- Average infiltration rate provided from Geotechnical Engineers report: 27 inches/hour.
- 27 in/hr is converted to feet per second by dividing rate by 12"/foot and 3600sec/hr.
- The result is 0.000625 feet per second. Applying a safety factor of 3:1 the design rate is 0.000208 feet per second.

40' Maximum depth recognizing GW at 50' BG

- Infiltration will begin 10' below grade.
- Each foot of depth from 10' below grade is a minimum of 4' diameter providing 12.56 square feet of surface area per foot of depth. One 40' deep drywell will provide 376 square feet of infiltration zone.
- 376sf x 0.000208f/s = 0.078cfs.
- One drywell working at this rate will infiltrate a retained or stored volume of 13,514cf in 48 hours.
- The volume stored in the drywell chamber and void in the rock is 313 cubic feet.

Kevin C. White
California Operations Manager
Torrent Resources (CA), Inc.

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Ontario California 91761

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XIV.5. Biotreatment BMP Fact Sheets (BIO)

Conceptual criteria for biotreatment BMP selection, design, and maintenance are contained in **Appendix XII**. These criteria are generally applicable to the design of biotreatment BMPs in Orange County and BMP-specific guidance is provided in the following fact sheets.

Note: Biotreatment BMPs shall be designed to provide the maximum feasible infiltration and ET based on criteria contained in ***Appendix*** **XI.2.**

BIO-1: Bioretention with Underdrains

Also known as:

- *Rain gardens with underdrains*
- *Vegetated media filter*
- *Downspout planter boxes*

Bioretention
Source: Geosyntec Consultants

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plants. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants. Bioretention with an underdrain are utilized for areas with low permeability native soils or steep slopes where the underdrain system that routes the treated runoff to the storm drain system rather than depending entirely on infiltration. **Bioretention must be designed without an underdrain** in areas of high soil permeability.

Feasibility Screening Considerations

- If there are no hazards associated with infiltration (such as groundwater concerns, contaminant plumes or geotechnical concerns), **bioinfiltration facilities**, which achieve partial infiltration, should be used to maximize infiltration.
- Bioretention with underdrain facilities should be lined if contaminant plumes or geotechnical concerns exist. If high groundwater is the reason for infiltration infeasibility, bioretention facilities with underdrains do not need to be lined.

Opportunity Criteria

- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Bioretention may also be applied in parking lot islands, cul-de-sacs, traffic circles, road shoulders, road medians, and next to buildings in planter boxes.
- Drainage area is ≤ 5 acres. ✓
- Area is available for infiltration. ✓

- Site must have adequate relief between land surface and the stormwater conveyance system to permit vertical percolation through the soil media and collection and conveyance in underdrain to stormwater conveyance system.

OC-Specific Design Criteria and Considerations

- ☐ Ponding depth should not exceed 18 inches; fencing may be required if ponding depth is greater than 6 inches to mitigate drowning.
- ☐ The minimum soil depth is 2 feet (3 feet is preferred).
- ☐ The maximum drawdown time of the bioretention ponding area is 48 hours. The maximum drawdown time of the planting media and gravel drainage layer is 96 hours, if applicable.
- ☐ Infiltration pathways may need to be restricted due to the close proximity of roads, foundations, or other infrastructure. A geomembrane liner, or other equivalent water proofing, may be placed along the vertical walls to reduce lateral flows. This liner should have a minimum thickness of 30 mils.
- ☐ If infiltration in bioretention location is hazardous due to groundwater or geotechnical concerns, a geomembrane liner must be installed at the base of the bioretention facility. This liner should have a minimum thickness of 30 mils.
- ☐ The planting media placed in the cell shall be designed per the recommendations contained in MISC-1: Planting/Storage Media
- ☐ Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 hours; native place species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent feasible
- ☐ The bioretention area should be covered with 2-4 inches (average 3 inches) or mulch at the start and an additional placement of 1-2 inches of mulch should be added annually.
- ☐ Underdrain should be sized with a 6 inch minimum diameter and have a 0.5% minimum slope. Underdrain should be slotted polyvinyl chloride (PVC) pipe; underdrain pipe should be more than 5 feet from tree locations (if space allows).
- ☐ A gravel blanket or bedding is required for the underdrain pipe(s). At least 0.5 feet of washed aggregate must be placed below, to the top, and to the sides of the underdrain pipe(s).
- ☐ An overflow device is required at the top of the bioretention area ponding depth.
- ☐ Dispersed flow or energy dissipation (i.e. splash rocks) for piped inlets should be provided at basin inlet to prevent erosion.
- ☐ Ponding area side slopes shall be no steeper than 3:1 (H:V) unless designed as a planter box BMP with appropriate consideration for trip and fall hazards.

Simple Sizing Method for Bioretention with Underdrain

If the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** is used to size a bioretention with underdrain facility, the user selects the basin depth and then determines the appropriate surface area to capture the DCV. The sizing steps are as follows:

Step 1: Determine DCV

Calculate the DCV using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1**.

Step 2: Verify that the Ponding Depth will Draw Down within 48 Hours

The ponding area drawdown time can be calculated using the following equation:

$DD_P = (d_P / K_{MEDIA}) \times 12$ in/ft

Where:

DD_P = time to drain ponded water, hours

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

If the drawdown time exceeds 48 hours, adjust ponding depth and/or media infiltration rate until 48 hour drawdown time is achieved.

Step 3: Determine the Depth of Water Filtered During Design Capture Storm

The depth of water filtered during the design capture storm can be estimated as the amount routed through the media during the storm, or the ponding depth, whichever is smaller.

$d_{FILTERED}$ = Minimum [$((K_{MEDIA} \times T_{ROUTING})/12)$, d_P]

Where:

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

$T_{ROUTING}$ = storm duration that may be assumed for routing calculations; this should be assumed to be no greater than 3 hours. If the designer desires to account for further routing effects, the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) should be used.

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

Step 4: Determine the Facility Surface Area

$A = DCV / (d_P + d_{FILTERED})$

Where:

A = required area of bioretention facility, sq-ft

DCV = design capture volume, cu-ft

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

Capture Efficiency Method for Bioretention with Underdrains

If the bioretention geometry has already been defined and the user wishes to account more explicitly for routing, the user can determine the required footprint area using the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to determine the fraction of the DCV that must be provided to manage 80 percent of average annual runoff volume. This method accounts for drawdown time different than 48 hours.

Step 1: Determine the drawdown time associated with the selected basin geometry

$DD = (d_p / K_{DESIGN}) \times 12$ in/ft

Where:

DD = time to completely drain infiltration basin ponding depth, hours

d_P = bioretention ponding depth, ft (should be less than or equal to 1.5 ft)

K_{DESIGN} = design media infiltration rate, in/hr (assume 2.5 inches per hour unless otherwise proposed)

If drawdown is less than 3 hours, the drawdown time should be rounded to 3 hours or the Capture Efficiency Method for Flow-based BMPs (See **Appendix III.3.3**) shall be used.

Step 2: Determine the Required Adjusted DCV for this Drawdown Time

Use the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to calculate the fraction of the DCV the basin must hold to achieve 80 percent capture of average annual stormwater runoff volume based on the basin drawdown time calculated above.

Step 3: Determine the Basin Infiltrating Area Needed

The required infiltrating area (i.e. the surface area of the top of the media layer) can be calculated using the following equation:

A = Design Volume / d_p

Where:

A = required infiltrating area, sq-ft (measured at the media surface)

Design Volume = fraction of DCV, adjusted for drawdown, cu-ft (see Step 2)

d_p = ponding depth of water stored in bioretention area, ft (from Step 1)

This does not include the side slopes, access roads, etc. which would increase bioretention footprint. If the area required is greater than the selected basin area, adjust surface area or adjust ponding depth and recalculate required area until the required area is achieved.

Configuration for Use in a Treatment Train

- Bioretention areas may be preceeded in a treatment train by HSCs in the drainage area, which would reduce the required design volume of the bioretention cell. For example, bioretention could be used to manage overflow from a cistern.
- Bioretention areas can be used to provide pretreatment for underground infiltration systems.

Additional References for Design Guidance

- CASQA BMP Handbook for New and Redevelopment: http://www.cabmphandbooks.com/Documents/Development/TC-32.pdf
- SMC LID Manual (pp 68): http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 5: http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf
- San Diego County LID Handbook Appendix 4 (Factsheet 7): http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.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
- County of Los Angeles Low Impact Development Standards Manual, Chapter 5: http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf

BIO-2: Vegetated Swale

Also known as:

- *Bioswale*
- *Biofiltration swale*
- *Grass swale*

Vegetated Swale
Source: Geosyntec Consultants

Vegetated swale filters (vegetated swales) are open, shallow channels with low-lying vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. Vegetated swales provide pollutant removal through settling and filtration in the vegetation (usually grasses) lining the channels. In addition, they provide the opportunity for volume reduction through infiltration and ET, and reduce the flow velocity in addition to conveying storm water runoff. Where soil conditions allow, volume reduction in vegetated swales can be enhanced by adding a gravel drainage layer underneath the swale allowing additional flows to be retained and infiltrated. Where slopes are shallow and soil conditions limit or prohibit infiltration, an underdrain system or low flow channel for dry weather flows may be required to minimize ponding and convey treated and/or dry weather flows to an acceptable discharge point. An effective vegetated swale achieves uniform sheet flow through a densely vegetated area for a period of several minutes. The vegetation in the swale can vary depending on its location within the project area and is generally the choice of the designer, subject to the design criteria outlined in this section.

Feasibility Screening Considerations

- Swales may cause incidental infiltration; however, infiltration is not a mandatory mechanism for pollutant removal for swales and it may create hazards in some circumstances. Therefore, conditions should be evaluated to determine whether circumstances require an impermeable liner to avoid infiltration into the subsurface.

Opportunity Criteria

- Open areas are needed for vegetated swales, including, but not limited to, road shoulders, road medians, parks and athletic fields and can be constructed in residential or commercial areas.
- Site slope is less than 10 percent.
- Drainage area is ≤ 5 acres.
- Vegetated swales must not interfere with flood control functions of existing conveyance and detention structures.

OC-Specific Design Criteria and Considerations

☐ Swales should have a minimum bottom width of 2 feet and a maximum bottom width of 10 feet. Swale dividers should be used if the bottom width must exceed 10 feet to promote even distribution of flow across the swale. Local juridictions may require larger minimum widths based on maintenance requirements.

☐ The channel side slope should not exceed 2:1 (H:V) for a total swale depth of 1 foot or less. For deeper swales or mowed grass swales, the maximum channel side slope should be 3:1. Where space is constrained, swales may have vertical concrete or block walls provided that slope

stability, maintenance access and public safety considerations are met.

- ☐ The minimum swale length for biotreatment applications is 100 feet. The minimum residence time for flows in the swale is 10 minutes.
- ☐ If slope is less than 1.5%, underdrains should be provided for the length of the swale
- ☐ A gravel blanket or bedding is required around the underdrain pipe(s). At least 0.5 feet of washed aggregate must be placed below, to the top, and to the sides of the underdrain pipe(s).
- ☐ If an underdrain is included, an amended soil layer of 1 foot minimum thickness must be provided above the underdrain meeting the specifications of MISC-1: Planting/Storage Media.
- ☐ The maximum bed slope in flow direction should not exceed 6% (unles check dams are provided).
- ☐ The maximum flow velocity should not exceed 1.0 ft/sec for water quality treatment swales.
- ☐ For infrequently mowed swales, a maximum flow depth of 4 inches should be implemented. For frequently mowed turf swales, the maximum flow depth is 2 inches.
- ☐ The vegetation height should be maintained between 4 to 6 inches.
- ☐ Gradual meandering bends in the swale are desirable for aesthetic purposes and to promote slower flow and particulate settling.
- ☐ Blockages in the swale that result in uneven flow distribution and points of concentrated flow should be avoided. Blockages that should be avoided include trees, bushes, light pole piers, and utility vaults or pads.

Sizing Method for Vegetated Swales

The Design Capture Method for Flow-based BMPs should be used to determine the design flowrate for a vegetated swale. The user then selects the design flow depth and longitudinal slope and uses the sizing steps below to determine the length and width of the swale. The sizing steps are as follows:

Step 1: Determine Design Flowrate (Q)

Calculate the Design Flowrate (Q) using the Capture Efficiency Method for Flow-based BMPs (See **Appendix III.3.3**). Inputs include the time of concentration of the catchment (T_c) and the capture efficiency achieved upstream by HSCs or other BMPs.

Step 2: Estimate the Swale Bottom Width

For shallow flow depths, channel side slopes can be ignored and the bottom width can be calculated using a simplified form of Manning's formula:

$$b = (Q \times n_{WQ}) / (1.49 \times y^{1.67} \times s^{0.5})$$

Where:

b = estimated swale bottom width, ft

Q = design flowrate, cfs

n_{WQ} = Manning's roughness coefficient for shallow flow conditions, use 0.2 unless other information is available

y = design flow depth, ft (not to exceed 4 inches or 0.33 ft)

s = longitudinal slope in flow direction, ft/ft (not to exceed 0.06)

If b is between 2 and 10 feet, proceed to step 3.

If b is less than 2 feet, increase b to 2 feet and recalculate design flow depth using the following:

$y = ((Q \times n_{WQ}) / (1.49 \times b \times s^{0.5}))^{0.6}$

If b is greater than 10 feet, one of the following steps is necessary:

- Increase longitudinal slope to a maximum of 6% or 0.06, and recalculate b
- Increase design flow depth to a maximum of 4 inches or 0.33 ft, and recalculate b
- Install a divider lengthwise along swale bottom at least three-quarters of the swale length, beginning at the inlet. The swale width can be increased to 16 feet if a divider is provided.

Step 3: Determine Design Flow Velocity

Calculate the design flow velocity using the following equation:

$V_{WQ} = Q / A_{WQ}$

Where:

V_{WQ} = design flow velocity, fps

Q = design flowrate, cfs

$A_{WQ} = by + Zy^2$, cross sectional area of flow at design depth

Z = side slope length per unit height

If the design flow velocity exceeds 1 foot per second, design parameters in Step 2 should be adjusted (slope, bottom width, or design flow depth) until V_{WQ} is equal or less than 1 fps.

Step 4: Calculate Swale Length

Calculate the swale length needed to achieve a minimum hydraulic residence time of 10 minutes using the following equation:

$L = 60 \times t_{HR} \times V_{WQ}$

Where:

L = swale length, ft

t_{HR} = hydraulic residence time, min (minimum 10 minutes)

V_{WQ} = design flow velocity, fps

Step 5: If Needed, Adjust Swale Length to Site Constraints

Note that oftentimes swale length can be accomodated by providing a meandering swale. However, if swale length is too large for the site, the length can be adjusted as follows:

- Calculate the swale treatment top area (A_{top}), based on the swale length calculated in Step 4:

$A_{TOP} = (b_i + b_{SLOPE}) \times L_i$

Where:

A_{TOP} = top area (ft^2) at the design treatment depth

b_i = bottom width (ft), calculated in Step 2

b_{SLOPE} = the additional top width (ft) above the side slope for the design water depth (for 3:1 side slopes and a 4-inch water depth, b_{slope} = 2 feet)

L_i = initial length (ft) calculated in Step 4

- Use the swale top area and a reduced swale length (L_f) to increase the bottom width, using the following equation:

$L_F = A_{TOP} / (b_F + b_{SLOPE})$

Where:

L_F = reduced swale length (ft)

b_F = increased bottom width (ft)

- Recalculate V_{WQ} according to Step 3 using the revised cross-sectional area A_{WQ} based on the increased bottom width (b_F). Revise the design as necessary if the design flow velocity exceeds 1 foot per second.
- Recalculate to ensure that the 10 minute retention time is retained.

Configuration for Use in a Treatment Train

- Vegetated swales can be incorporated in a treatment train to provide enhanced water quality treatment and reductions in runoff volume and rate. For example, if a vegetated swale is placed upgradient of a dry extended detention (ED) basin, the rate and volume of water flowing to the dry ED basin can be reduced and the water quality enhanced. As another example, dry ED basins may be placed upstream a vegetated swale to reduce the size of the vegetated swale.
- Vegetated swales can be used as pretreatment for infiltration BMPs.
- If designed with an infiltration sump, vegetated "bioinfiltration" swales can provide retention and biotreatment capacity.

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

Santa Barbara BMP Guidance Manual, Chapter 6:
http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf

- County of San Diego Drainage Design Manual for design criteria, Section 5.5:
http://www.co.san-diego.ca.us/dpw/floodcontrol/floodcontrolpdf/drainage-designmanual05.pdf

County of Los Angeles Low Impact Development Standards Manual, Chapter 5:
http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf

- Los Angeles County Stormwater BMP Design and Maintenance Manual:
http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf

Appendix C - Proprietary Product Data Sheets

- **BIO-7: Proprietary Biotreatment: Modular Wetlands (or approved equal)**

MWS Linear | ***Configurations***

The MWS 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

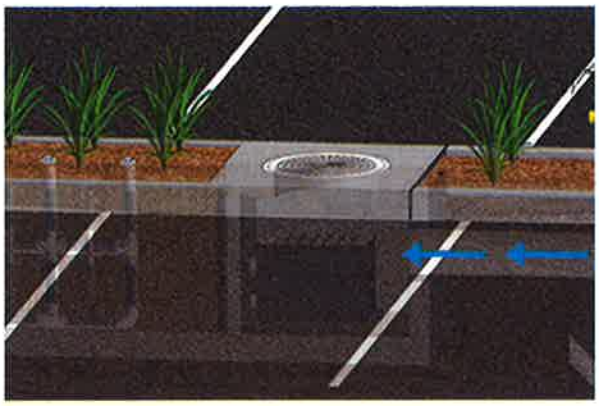
The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along road ways and parking lots. It can be used in sump or flow by

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 pre-treatment chamber. It has the added benefit of allowing for pedestrian access over

conditions. Length of curb opening varies based on model and size.

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 pre-treatment chamber, meaning the MWS Linear 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 roof top 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.

Appendix D - Inspection and Maintenance Guidelines

NOTE: To be provided with Final WQMP.

Appendix E - Geotechnical Reference Data

- **Applicable Pages from Geotechnical Report**

2.3 Geologic Setting

Regionally, the subject property lies within the Peninsular Ranges Geomorphic Province of southern California. This province consists of a series of ranges separated by northwest trending valleys; sub parallel to branches of the San Andreas Fault (CGS, 2002).The Peninsular Ranges geomorphic province, one of the largest geomorphic units in western North America, extends from the Transverse Ranges geomorphic province and the Los Angeles Basin, south to Baja California. It is bound on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province. The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks (CGS, 2002). Major fault zones and subordinate fault zones found in the Peninsular Ranges Province typically trend in a northwest-southeast direction.

Regional geologic maps of the subject property and vicinity (published by the United States Geological Survey - USGS) indicate the property is underlain by late to middle Pleistocene-aged Old Paralic deposits overlain by alluvial fan deposits (map symbol $Qopf_a$). The alluvial fan deposits generally consist of cobble, gravel, sand and silt deposits issued from confined valleys, while the old paralic deposits generally consist of fine-grained sand, silt, and clay from lake, playa and estuarine deposits.

The subject property is located within an area of California known to contain a number of active and potentially active faults. The property is not located within a State of California Earthquake Fault Zone (Hart and Bryant, 1997). The active San Joaquin Hills fault is located approximately 2.6 miles from the property.

Regional seismic hazard maps (CDMG, 2001) for the subject property area indicate that the property is located within an area that is not considered susceptible to landsliding, liquefaction and/or seismic induced settlement. Additionally, no historic landslides were mapped within or adjacent to the property, nor were there any indication of landslides encountered during our site reconnaissance.

2.4 Groundwater

At the time of our subsurface exploration, a zone of heavy seepage was encountered at depths ranging from 20 to 25 feet below the ground surface. Additionally, pore pressure dissipation testing performed in CPT sounding CPT-1 indicates that groundwater was present at a depth of approximately 23 feet below the ground surface at the time of testing.

According to nearby groundwater data obtained from the Orange County Water District, the principal groundwater aquifer has ranged from approximately 50 to 110 feet below existing ground surface at the subject property in the past 10 years (Orange County Water District, 2015). In general, groundwater is expected to follow the direction of surface topography; therefore, local groundwater flow is expected to be in a general westerly direction. It should be noted that variations in groundwater may result from fluctuations in the ground surface topography, subsurface stratification, rainfall, irrigation, and other factors that may not have been evident at the time of our subsurface exploration.

3.0 REGIONAL FAULTING AND SEISMICITY

The portion of Southern California that includes the subject property is considered to be seismically active. Due to the proximity of the property area to several nearby active faults, strong ground shaking could occur at the property as a result of an earthquake on any one of the faults. Our review indicates that there are no known active faults crossing the property and the property is not located within an Alquist-Priolo Earthquake Fault Zone as defined by the State of California (Hart and Bryant, 1997, CDMG, 2000).

Rigid pavement sections were evaluated in general accordance with ACI 330R-08, based on an average daily truck traffic value of 10.

TABLE 3
Preliminary Pavement Design Recommendations

Traffic Index (TI)	Pavement Surface	Aggregate Base Material [1]
4.5 – Parking Stalls	3.0-inches Asphalt Concrete	5.0-inches
5.5 – Drive Areas	4.0-inches Asphalt Concrete	6.0-inches
Entrance/Exit Lane Areas	6.0-inches Portland Cement Concrete [2]	4.0-inches (optional)

(1) Reinforcement and control joints placed in accordance with the structural engineer's requirements

The recommended rigid pavement section provided above is intended as a minimum guideline. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. If the ADT (average daily traffic) or ADTT (average daily truck traffic) increases beyond that intended, as reflected by the assumed traffic index used for design, increased maintenance and repair could be required for the pavement section. Final pavement design should be verified by testing of soils exposed at subgrade after grading has been completed. Thicker pavement sections could result if R-Value testing indicates lower values.

9.0 DEVELOPMENT RECOMMENDATIONS

9.1 Landscape Maintenance and Planting

Water is known to decrease the physical strength of earth materials, significantly reducing stability by high moisture conditions. Surface drainage away from foundations and graded slopes should be maintained. Only the volume and frequency of irrigation necessary to sustain plant life should be applied.

Consideration should be given to selecting lightweight, deep-rooted types of landscape vegetation which require low irrigation that are capable of surviving the local climate. From a soils engineering viewpoint, "leaching" of the onsite soils is not recommended for establishing landscaping. If landscape soils are processed for the addition of amendments, the processed soils should be re-compacted to at least 90 percent relative compaction (based on ASTM D1557).

9.2 Site Drainage

Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled over slopes or the subject property. Runoff should be channeled away from slopes and structures and should not be allowed to pond and/or seep uncontrolled into the ground. Pad drainage should be directed toward an acceptable outlet. Although not required, roof gutters and down spouts may be considered to control roof drainage, discharging a minimum of 10 feet from proposed structures, or into a subsurface drainage system. Consideration should be given to eliminating open-bottom planters directly adjacent to proposed structures for a minimum distance of 10 feet. As an alternative, closed-bottom type planters could be utilized, with a properly designed drain outlet placed in the bottom of the planter.

9.3 Site Runoff Considerations - Stormwater Disposal Systems

It is EEI understanding that the Client is considering that runoff generated from the facility be disposed of in engineered subsurface features onsite.

9.3.1 Percolation Testing

Following the drilling of exploratory borings B-6 and B-7, a 3-inch diameter perforated polyvinyl chloride (PVC) pipe was placed in the hole and gravel was placed around the pipe. The test holes were presoaked in general accordance with County of Orange DEH Guidelines. During the presoaking process, it was observed that less than 30 minutes was required for a minimum 12-inch high column of water to seep away. Consequently, the borings were allowed to presoak and the test in the boring was run at approximate 10 minute intervals for a period of approximately two hours, when the highest and lowest readings from three consecutive readings were noted to be within 10 percent of each other. The reading obtained from the final 10 minute interval was then used to calculate the pre-adjusted percolation rate for each test hole. Upon conclusion of testing, the perforated pipe was removed from the test holes and the test excavations were backfilled.

We note that a soil profile's percolation rate is not the same as its infiltration rate. Therefore, the measured/calculated percolation rate was converted to an estimated infiltration rate. Therefore, the measured/calculated field percolation rate was converted to an estimated infiltration rate utilizing a reduction factor known as the Porchet method. **Table 4** presents the measured percolation rate and corresponding infiltration rate calculated for the test hole.

TABLE 4
Summary of Percolation Testing

Location	Depth (ft)	Pre-Adjusted Percolation Rate (in/hr)	Infiltration Rate (in/hr)
B-6	~13	288.0	55.38
B-7	~12	151.2	27.10

9.3.2 Summary of Findings

Based on the results of our field percolation testing, it appears that the percolation/infiltration rates presented herein are conducive to direct infiltration of surface stormwater for the preliminary design of subsurface storm water retention/disposal devices at the specific locations and approximate depths at the subject property as listed in **Table 4**.

9.3.3 Structural Setback from Retention Devices

It is recommended that retention/disposal devices be situated at least three times their depth, or a minimum of 15 feet (whichever is greater), from the outside bottom edge of structural foundations. Structural foundations include (but are not limited to) buildings, loading docks, retaining walls, and screen walls.

All stormwater disposal systems, including pervious pavement areas should be checked and maintained on regular intervals. Stormwater devices including bioswales that are located closer than 10 feet from any foundations/footings should be lined with an impermeable membrane to reduce the potential for saturation of foundation soils (also refer to **Section 7.6**).

9.4 Additional Site Improvements

Recommendations for additional grading, exterior concrete flatwork design and construction can be provided upon request.

If in the future, additional property improvements were planned for the site, recommendations concerning the design and construction of improvements would be provided upon request.

9.5 Trenching

All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with OSHA guidelines and local safety codes. Temporary excavations over 4 feet in height should be evaluated by the project engineer, and could require shoring, sloping, or a combination thereof. Temporary excavations within the onsite materials should be stable at 1.5:1 inclinations for cuts less than 20 feet in height.

Footing trench excavations for structures and walls should be observed and approved by a representative of the project soils engineer prior to placing reinforcement. Footing trench spoil and excess soils generated from utility trench excavations should be compacted to a minimum relative compaction of 90 percent (based on ASTM D1557) if not removed from the subject property. All excavations should conform to OSHA and local safety codes.

9.6 Utility Backfill

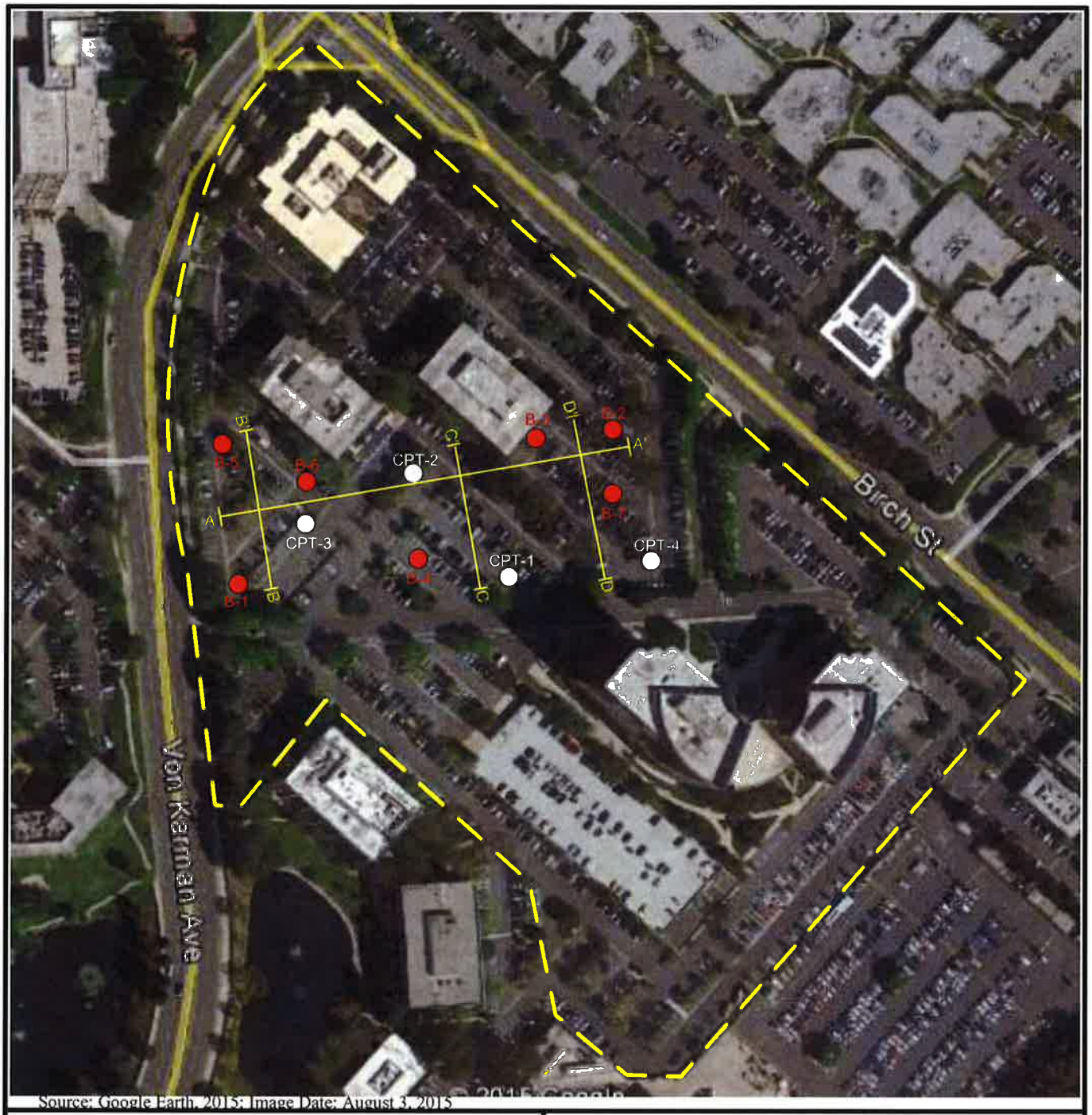
Fill around the pipe should be placed in accordance with details shown on the drawings, and should be placed in layers not to exceed 8-inches loose (unless otherwise approved by the Geotechnical Engineer) and compacted to at least 90 percent of the maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor).

The Geotechnical Engineer should approve all backfill material. Select material should be used when called for on the drawings, or when recommended by the Geotechnical Engineer. Care should be taken during backfill and compaction operations to maintain alignment and prevent damage to the joints. The backfill should be kept free from stones, chunks of highly plastic clay, or other objectionable material. Backfill soils should be non-expansive, non-corrosive, and compatible with native earth materials. Backfill materials and testing should be in accordance with the CBC 2013 and City specifications.

All pipe backfill areas should be graded and maintained in such a condition that erosion or saturation will not damage the pipe bed or backfill. Flooding trench backfill is not recommended. Heavy equipment should not be operated over any pipe until it has been properly backfilled with a minimum 2 to 3 feet of cover. The utility trench should be systematically backfilled to allow maximum time for natural settlement. Backfill should not occur over porous, wet, or spongy subgrade surfaces. Should these conditions exist, the areas should be removed, replaced and recompacted.

10.0 PLAN REVIEW

Once the detailed and approved site and grading plans are available, they should be submitted to this office for review and comment, to reduce the potential for discrepancies between plans and recommendations presented herein. If conditions were found to differ substantially from those stated, appropriate recommendations would be provided. Additional field studies may be warranted once the final conceptual plans are produced.



Source: Google Earth, 2015; Image Date: August 3, 2015

LEGEND

B-7 — Approximate Boring Locations

CPT-4 — Approximate CPT Locations

D D' — Approximate Cross-Section Locations

Scale: 1" = 200'

0 200FT 400FT

N

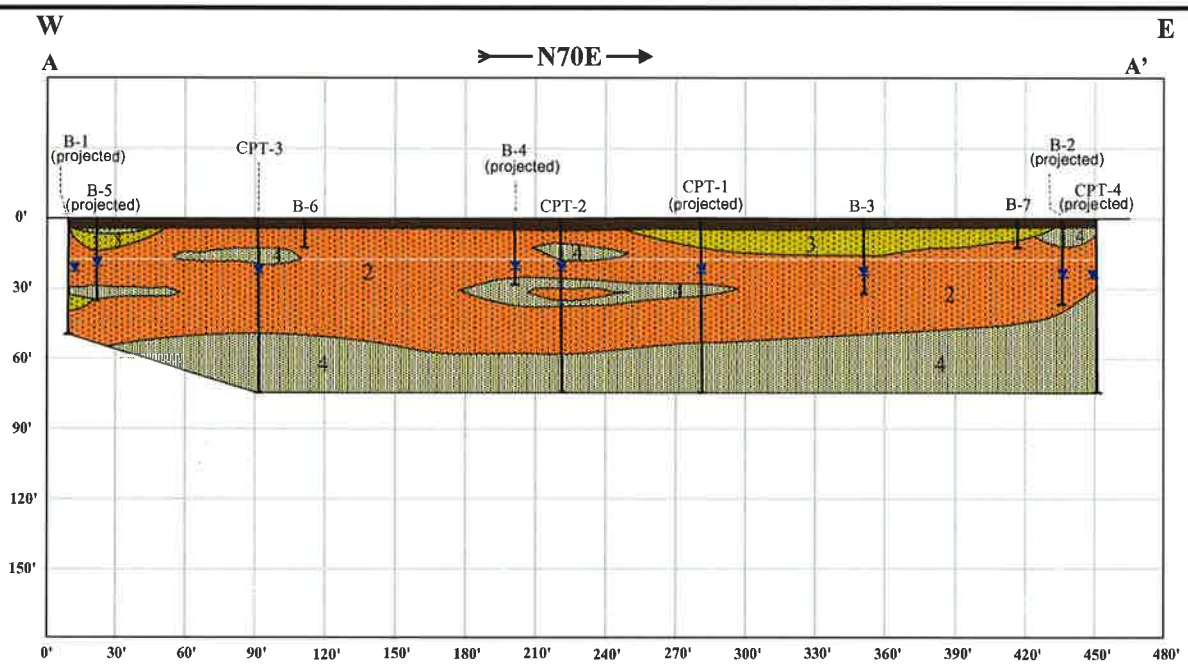
Note: All Locations Are Approximate

BORING LOCATION MAP

Shopoff Land Fund II, LP
The Towers at Koll Center
Newport Beach, California
EEI Project No. SHO – 72189.4
Created July 2015

EEI Geotechnical & Environmental Solutions

FIGURE 3



LEGEND (Detailed description in Section 6.0 of this report)

- Fill: Sands, Silts Clays and Gravels
- Older Alluvial Fan Deposits: SAND, with trace Gravel, Silt or Clay
- Older Alluvial Fan Deposits: SILTY-SAND and SANDY-CLAY
- Older Alluvial Fan Deposits: CLAYS and SILTS
- Groundwater/seepage encountered

SCALE
1" = 60ft

CROSS-SECTION A-A'
Shopoff Land Fund II, LP
The Towers at Koll Center
Newport Beach, California
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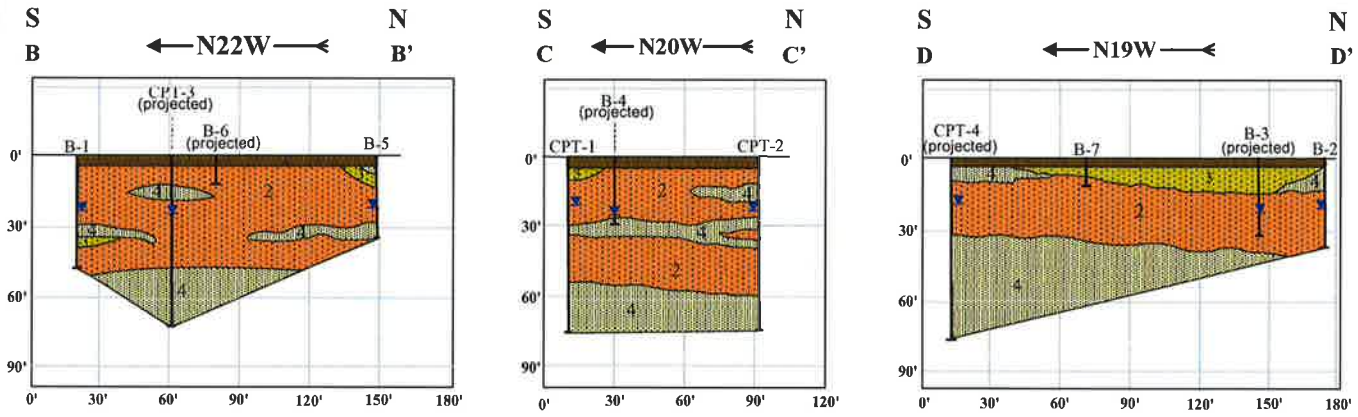
FIGURE 4a



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- Fill: Sands, Silts Clays and Gravels
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- Older Alluvial Fan Deposits: CLAYS and SILTS
- Groundwater/seepage encountered

SCALE
1" = 60ft

CROSS-SECTION B-B'.C-C'.D-D'
Shopoff Land Fund II, LP
The Towers at Koll Center
Newport Beach, California
EEI Project No. SHO-72189.4
Created July 2015

EEI

FIGURE 4b

Appendix F - Educational Materials

- **The Ocean Begins at Your Front Door**
- **Homeowners Guide for Sustainable Water Use**
- **Household Tips**
- **Proper Disposal of Household Hazardous Waste**
- **Recycle at Your Local Used Oil Collection Center (North Orange County)**
- **Responsible Pest Control**
- **Sewer Spill**
- **Tips for the Home Improvement Projects**
- **Tips for Landscaping and Gardening**
- **Tips for Pet Care**
- **Tips for Using Concrete and Mortar**
- **Tips for the Food Service Industry**
- **Proper Maintenance Practices for Your Business**
- **Orange County Watersheds Brochure**
- **Stormwater General Information**
- **How to Protect Your Bay and Ocean**
- **Pollution Reporting**
- **Hazardous Waste and Oil Recycling**
- **Commercial Trash Enclosure**
- **Food and Restaurant Pollution Prevention**
- **Managing Fats, Oils, and Greases**
- **Tips for Projects Using Paint**