PRELIMINARY WATER QUALITY MANAGEMENT PLAN

Vesting Tentative Parcel Map No. 2022-116

Project Address:
Southeast of Camino De Los Mares and Calle Agua
City of San Clemente, CA

Prepared For:
Saddleback Memorial Medical Care
24451 Health Center Drive
Laguna Hills, CA 92653
(949) 452-3627

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

WQMP Preparation/Revision Date:
June 21, 2022
(Rev. September 2, 2022)

W.O. 4479-1

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City of San Clemente, California

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Project Name:

"VESTING TENTATIVE PARCEL MAP NO. 2022-116"

Prepared for:

Saddleback Memorial Medical Care

24451 Health Center Drive

Laguna Hills, CA 92653

(949) 452-3627

Prepared by:

Hunsaker and Associates Irvine, Inc.

Engineer: Phil Dowty

Registration No.

3 Hughes

Irvine, CA 92618

(949) 583-1010

Engineer's Seal

Prepared on:

June 21, 2022

(Rev. September 2, 2022)

Project Owner's Certification			
Permit/Application No.	TBD	Grading Permit No.	N/A
Tract/Parcel Map No.	VTTM 2022-116	Building Permit No.	N/A
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)			APN 675-072-19

This Water Quality Management Plan (WQMP) has been prepared for Saddleback Memorial Medical Care by Hunsaker & Associates Irvine, Inc. The WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the San Diego Region (South Orange County). 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			
Company	Saddleback Memorial Medical Care		
Address	24451 Health Center Drive Laguna Hills, CA 92653		
Email			
Telephone #	(949) 452-3627		
Signature		Date	

Preparer (Engineer):			
Title	Phil Dowty	PE Registration #	
Company	Hunsaker and Associates Irvine, Inc.		
Address	3 Hughes, Irvine, CA 92618		
Email	pdowty@hunsaker.com		
Telephone #	(949) 583-1010		
I hereby certify that this Water Quality Management Plan is in compliance with, and meets the requirements set forth in, Order No. R9-2015-0001/NPDES No. CAS010266, of the San Diego Regional Water Quality Control Board.			
Preparer Signature		Date	
Place Stamp Here			

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Section 1 Discretionary Permit(s) and Water Quality Conditions

Project Infomation			
Permit/Application No.	TBD	Site Address or Tract/Parcel Map No.	654 Camino De Los Mares, San Clemente, California (existing) VTTM 2022-116
Additional Information/ Comments:	This Preliminary WQMP is being submitted as part of the entitlement process for proposed VTTM 2022-116.		
Water Quality Conditions			
Water Quality Conditions from prior approvals or applicable watershed-based plans	This WQMP has been prepared pursuant to the requirements of the County of Orange MS4 Permit (Order No. R9-2015-0001/NPDES No. CAS0108740, of the San Diego Regional Water Quality Control Board) and the City of San Clemente Municipal Code (Chapter 13.40.060) and the Local Implementation Plan (LIP) for Jurisdictional Runoff Management Program. Site-specific conditions of approval will be provided as an attachment to this WQMP (Attachment C) once available from the City of San Clemente. The project is located within the San Clemente Coastal Streams Watershed (Prima Deshecha Cañada) and the South Orange County Water Quality Improvement Plan. Current conditions to meet the receiving water's water quality objectives include requirements for the preparation of a WQMP and BMPs to address potential storm water pollutants present in runoff. There is currently an established TMDL for one of the project's receiving waters at the Pacific Ocean (San Clemente HA) for Indicator Bacteria.		

Section 2 Project Description

2.1 General Description

<table>
<tr><th colspan="3">Description of Proposed Project</th></tr>
<tr><td>Site Location</td><td colspan="2">The project site is located approximately 0.15 miles southeast of the intersection of Camino De Los Mares and Calle Agua, in the City of San Clemente. Current address and APNs of the project site are as follows:
654 Camino De Los Mares, San Clemente, California
APN 675-072-19</td></tr>
<tr><td>Project Area (ft^2):
288,803 ft^2 (6.63 acres)</td><td>Number of Dwelling Units: 250</td><td>SIC Code: 8361 (Senior Housing) & 8011 (Medical Offices)</td></tr>
<tr><td>Narrative Project Description:</td><td colspan="2">The proposed Project, “Vesting Tentative Parcel Map 2022-116”, consists of a 6.63 acre irregularly-shaped parcel of existing land that will be re-developed to accommodate senior residential use (two apartment buildings), a medical office building and related improvements, including project drive aisles and parking spaces, storm drain system, curbs, sidewalks, gutters, common landscaping areas, wet and dry utilities, and related improvements. Entrance to the project site will be provided from Camino De Los Mares to the north, at the project’s northeastern and northwestern corners.

In addition to onsite improvements, the project also proposes approximately 0.038 acres (1,673 $ft^{2)}$ of median improvements to Camino De Los Mares and approximately 0.001 acres (25 ft^2) of sidewalk improvements at the project’s western entrance.

A summary of the project site and uses is as follows:

Table 2-1 – Land Use Summary
<table><tr><th>Parcel No.</th><th>Description</th><th>Acreage</th></tr><tr><td>Parcel 1</td><td>Senior Housing</td><td>6.16</td></tr><tr><td>Parcel 2</td><td>Medical Office</td><td>0.47</td></tr><tr><td>Total</td><td>--</td><td>6.63</td></tr></table>
The proposed residential element of the project will consist of two (2), three and 4 story buildings located in the central and western portions of the project site. The facility will be equipped with a leasing office, common courtyards, an outdoor swimming pool/spa, barbecue area and other amenities typical of apartments.

Residential units will range from studios to two (2) bedroom units and 540 ft^2 to 1,120 ft^2 of living area. Unit plan summary for the proposed units is as follows:

Table 2-2 – Residential Unit Summary
<table><tr><th>Unit Type</th><th>Living Area (sf.)</th><th>Bed</th><th>Units</th></tr><tr><td>S1</td><td>540</td><td>Studio</td><td>61</td></tr><tr><td>A1</td><td>650</td><td rowspan="4">1</td><td>5</td></tr><tr><td>A2</td><td>700</td><td>79</td></tr><tr><td>A3</td><td>740</td><td>23</td></tr><tr><td>A4</td><td>897</td><td>14</td></tr><tr><td>B1</td><td>985</td><td>2</td><td>9</td></tr></table></td></tr>
</table>

B2	995	2	14
B3	1,060	2	5
B4I	1,120	2	40
Total	--	--	250

The proposed medical office building will be located in the northeastern portion of the project site, consist of two (2) stories and accommodate 7,500 ft^2 of office space.

Designated parking will consist of 249 covered resident spaces (carport), 2 apartment manager spaces, 23 guest spaces (uncovered) and 38 medical office spaces (uncovered). Total parking provided is 312 spaces. Project parking shall be consistent with the City of San Clemente parking requirements.

Proposed landscaping and pervious areas will consist of open space common areas located in designated areas throughout the site, pool, spa and fountain areas, as well as existing slopes to the south. These common areas shall be considered private, to be maintained by the facilities management. Total onsite pervious area is approximately 1.465 acres, or 22.1% of the overall project site.

Paved areas and other impervious portions of the project site include the project's drive aisles and parking spaces, curb, sidewalk, walkway and gutter improvements, the footprint of each building and other paved surfaces. Total impervious area is approximately 5.165 acres, or 77.9% of the overall project site.

Proposed community facilities include lounging areas located throughout the site and a pool/spa facility located southeast of Building 1.

No delivery or storage areas are proposed for the project.

Activities similar to those of residential developments can be anticipated for the project. These are anticipated to include day to day activities such as recreation, walking, commuting and other activities typical of residential developments.

Typical residential and office related trash is anticipated to be produced daily from the project. Three (3) designated trash enclosure are provided (western, southwestern and southeastern) for residential and office use. The enclosures shall be walled, covered, designed with a sump condition and precluded from rain and storm water run-on. All wastes will be picked up for disposal on a weekly basis by the local contracting waste hauler.

All improvements are shown in the WQMP Site Plan in Attachment D.

Project Area	Pervious		Impervious	
	Area (acres or sq ft)	Percentage	Area (acres or sq ft)	Percentage
Pre-Project Conditions	1.479	22.3%	5.151	77.7%
Post-Project Conditions	1.465	22.1%	5.165	77.9%

2.2 Post Development Drainage Characteristics

In the post-development condition, runoff from project's residential development areas, designated as the project's western area, central area and eastern area, will be conveyed as sheet flow, gutter flow and area drain flow to project catch basins and the project's storm drain system.

Runoff from the western area is conveyed southerly along the project's western limits prior to discharging to an existing storm drain line and conveyed southwesterly under Interstate 5 to an existing wetland and natural drainage area and then southeasterly through an existing golf course, prior to discharging to Prima Deshecha Cañada and the Pacific Ocean to the south.

Runoff from the central area is conveyed easterly in the project's storm drain prior to discharging to an existing storm drain line to southeast. Runoff is then conveyed easterly and then southerly under Interstate 5 and discharged to the existing natural drainage area as runoff from DMA 1.

Runoff from the eastern area is conveyed easterly through the adjacent property to an existing storm drain line that conveys flows southerly, under Interstate 5, to the existing natural drainage area (same storm drain line that the central project area discharges to).

To satisfy the project's requirement for Low Impact Development (LID) BMPs, hydromodification impacts and to address the project's storm water pollutants of concerns, the project has been divided into 5 Drainage Management Areas (DMAs) as follows:

DMA 1 (1.674 acres) – Consists of the western and northern project development area. Runoff is conveyed southwesterly to an infiltration well located at the western portion of the project site.

DMA 2 (4.463 acres) – Consists of the central and southern portion of the project site. Runoff is conveyed southwesterly to an infiltration well for retention.

DMA 3 (0.019 acres) – Consists of existing landscaping, sidewalk and portion of the project's southern entrance that drain away from the project site to the existing gutter in Camino De Los Mares. Runoff from this area is not hydrologically connected to the project's onsite DMAs. No improvements are proposed for this area and will remain as existing. No treatment is proposed for this area.

DMA 4 (0.448 acres) – Consists of existing slopes and temporary disturbed areas (designated as 4-1 and 4-2) at the project's southwestern limits required for remedial grading that will be returned to natural state. No treatment is proposed.

DMA 5 (0.064 acres) – Consists of parkway and median improvements to Camion De Los Mares. Runoff from this area is discharged to Camino De Los Mares is not hydrologically connected to the project's onsite DMAs. Improvements are as follows:

- DMA 5-1 (0.002 acres) – Replace existing pavement with extended paved median. No BMPs proposed.
- DMA 5-2 (0.035 acres) – Replace existing paved median and turn lane with landscaped median. Area is considered self-retaining as it consist almost entirely of depressed landscaping areas.
- DMA 5-3 (0.027 acres) – Addition of 2' sidewalk width and extend sidewalk to reconfigure project's southern entrance. Runoff will be addressed via hydrologic source control BMP (HSC-3 Street Trees) designed to maximum extent practicable (MEP) standards per USEPA's Green Streets Manual.

2.3 Property Ownership/Management

The property owner and developer, Saddleback Memorial Medical Care, shall assume all BMP maintenance and inspection responsibilities for the project. Thereafter, the owner shall remain the mechanism responsible for ensuring long-term funding, inspection and maintenance for all onsite BMPs, as prescribed in this WQMP.

Section 3 Site & Watershed Characterization

3.1 Site Conditions

3.1.1 Existing Site Conditions

The pre-project site's land use is hospital services, with City zoning and General Plan land use designated as RMF (Regional Medical Facilities). The pre-project address is 654 Camino De Los Mares and bound to the north by Camino De Los Mares and medical office use beyond; to the east by existing apartments San Clemente Villas) and commercial offices beyond; to the south by Interstate 5 Freeway and open space beyond; and to the west by a commercial shopping center (Ocean View Plaza) and Camino De Los Mares beyond.

Existing onsite improvements consist of a centrally located, generally single-story hospital facility and detached building on the eastern side of the facility that were vacated since 2016. The buildings are surrounded by areas of asphalt-paved parking and concrete-covered truck loading bays.

Overall, surface relief across pad is gently sloping from northwest to southeast, between approximate elevations ranging from +230 feet above mean sea level (msl) to +218 msl.

Currently, there are three storm drain lines that service the project site. Runoff from the western project site is conveyed along the existing western drive aisle southerly to an existing inlet located at the southwestern portion of the site. Runoff is discharged to the existing storm drain line servicing Ocean View Plaza and conveyed southerly under Interstate 5 to an existing wetland and natural drainage area and then southeasterly through an existing golf course, prior to discharging to Prima Deshecha Canada and the Pacific Ocean to the south.

Runoff from the central and eastern project areas are serviced by existing two (2) storm drain lines onsite located in the southeastern and the eastern portions of the site that convey flows to an existing storm drain line located east of the project site, within the existing apartment site. Runoff is then conveyed easterly and then southerly under Interstate 5, prior to discharging to an existing natural drainage and wetland and then southeasterly through an existing golf course, prior to discharging to Prima Deshecha Cañada and the Pacific Ocean to the south.

The project does not receive run-on from offsite areas. See "Receiving Waters Exhibit" for the project in Attachment D.

The project site does not contain any environmentally sensitive areas (ESAs), as defined in the Basin Plan and the County of Orange Drainage Area Management Plan (DAMP). Although the site does not discharge directly to areas defined as ESAs or Areas of Special Biological Significance (ASBS), the site is tributary to impaired water bodies, which are designated as ESAs under DAMP guidelines.

Table 3-1 – Existing Land Uses

Land Use Description	(1) Sub-Area (acres)	(2) Impervious Area (acres)	(3) Pervious Area (acres) [(1)-(2)]	(4) Imperviousness of Sub-Area (%) [(2)/(1)]	(5) Imperviousness of Total (%) [(2)/(6)]
Parcel 1 Senior Housing	6.16	4.808	1.352	78.1	72.5
Parcel 2 Medical Offices	0.47	0.343	0.127	73.0	5.2
Total	(6) 6.63	5.151	1.479	--	77.6

3.1.2 Infiltration-Related Characteristics

3.1.2.1 Hydrogeologic Conditions

Per the preliminary geotechnical investigation (Leighton 2022) to a maximum explored depth of 56.5 feet below existing grade. The site is not located within an area known for hydrogeologic groundwater concerns.

3.1.2.2 Soil and Geologic Infiltration Characteristics

The subject site is located within the coastal foothill belt of the Peninsular Ranges geomorphic province of California. The province supports a long and active geologic history of deep marine sedimentation, uplift, fluvial and marine erosion, and deposition. More locally, the site lies southwestern of the Santa Ana Mountains. The Peninsular Ranges province extends far beyond the site area, approximately 900 miles southward from the Los Angeles basin to the tip of Baja California (Yerkes, et al., 1965) and is characterized by elongated, northwest trending, mountain ridges separated by straight-sided, sediment-floored valleys. However, the most dominant structural features of the province are the northwest trending fault zones, most of which either die out, merge with, or are terminated by the steep reverse faults at the southern margin of the Transverse Ranges province to the north. These fault zones separate large elongated blocks, each standing at different structural elevations. Within this framework, the Santa Ana Mountains are a large flexure, which has been uplifted on the eastern side along the Whittier- Elsinore Fault Zone, producing a tilted, irregular, and complex highland that slopes westward toward the sea.

The subject site is underlain by undocumented artificial fill encountered at explored locations from 6 to 45 feet in thickness. Review of earlier topography maps suggest fill may be on the order of up to 70 feet thick placed to infill canyons that transected the site prior to construction of the hospital. The fill is underlain by Quaternary age non-marine and marine deposits comprised of silty clay and clay with silt, and sand with gravel, respectively, which is underlain in turn by bedrock assigned to the Miocene to Pliocene Capistrano Formation (Tc) composed of silty claystone and clayey siltstone.

Based on the County of Orange Technical Guidance Document for Preparation of WQMPs and NRCS Web Soil Survey, onsite soils consist primarily of Alo clay and Calleguas clay, which are classified as Hydrologic Soil Group "D" soils. However, based on soil borings conducted onsite, there exists a lower layer of Marine Terrace unit comprised of poorly sorted gravelly sand that is conducive for infiltration (See Geotechnical Report in Attachment G).

3.1.2.3 Geotechnical Conditions

As previously stated, although the upper soil layers onsite consist of HSG Type D soils, geotechnical borings encountered a layer of gravelly sand between 29' and 31' below existing grade that is conducive for infiltration.

3.1.2.4 Summary of Infiltration Opportunities and Constraints of Existing Site

Per the TGD Figure 10.9 – "Infiltration Constraints for San Clemente Creek Watershed", the project resides in an area with one constraint for infiltration (Type D soils). However, geotechnical borings discovered a lower layer consisting of gravelly sand that is conducive for infiltration in the southern portion of the project site.

3.2 Proposed Site Development Activities

The project consists of the development of 250 apartment units, a medical office building and related improvements, including drive aisles, parking areas, wet and dry utilities, private storm drain improvements, common landscaping and open space areas, a pool/recreation center and other improvements to support residential and office uses.

3.2.1 Overview of Site Development Activities

The proposed project would change the project site from hospital use to typical residential use and medical office use (commercial) consisting primarily of residential activities, such as commuting, exercising, walking and other activities typical of residential developments; as well as office use, such as commuting. These uses, as well as proposed project infrastructure would connect onsite activities with existing developments located adjacent to the project.

3.2.2 Project Attributes Influencing Stormwater Management

Typical residential and office uses and activities are anticipated to produce wastes on a daily basis from each of the project's land use areas. These materials include household wastes such as food wastes, recyclable materials (plastics, glass, etc.), typical medical office related wastes such as paper and other recyclable materials (plastics, glass, etc.) and landscaping materials from common areas. Non-recyclable and recyclable wastes will be stored within the private areas of each residence or office and brought to one of three trash enclosure areas located onsite (western, southwestern and southeastern) for disposal. The enclosures shall be picked up for disposal on a weekly basis (at minimum) by the contracting waste hauler.

Medical wastes generated from the medical office building shall be disposed by the contracting disposal firm for each office.

Other attributes that are anticipated to impact runoff include wastes generated from typical vehicle use (oil, coolant, etc.) as well as landscaping maintenance activities. These will be minimized via non-structural best management practices through homeowner education as well as restrictions on vehicle maintenance/repair activities onsite.

Aside from apartment/office uses and supporting infrastructure facilities, no other facilities are proposed for the project.

As previously discussed in Section 3.1.1, the site does not receive run-on from offsite areas.

The project site does not contain any environmentally sensitive areas (ESAs) to preserve. Proposed land use for the project is as follows:

Table 3-2 – Proposed Land Uses

Land Use Description		Area (acres)	Impervious Area (acres)	Pervious Area (acres)	Total Imperviousness (%)
Parcel 1	*Building/Structure Footprint, Drive Aisle/Parking, Walkways*	4.742	4.742	0	71.5
	Pool/Spa, Water Feature	0.063	0.063	0	0.01
	Common Landscaping	0.907	0	0.907	0
	Unimproved Slopes	0.448	0	0.448	0
Parcel 2	*Building/Structure Footprint, Drive Aisle/Parking, Walkways*	0.360	0.360	0	5.4
	Common Landscaping	0.110	0	0.110	0
Total		6.63	5.165	1.465	77.9

3.2.3 Effects on Infiltration and Harvest and Use Feasibility

The proposed project will employ infiltration BMPs to address runoff from the project's development areas. Infiltration will increase from pre-project conditions.

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

The project does not propose the use of harvesting BMPs, as the project will employ infiltration BMPs to satisfy the project's LID BMP requirements.

3.3 Receiving Waterbodies

The following table provides descriptions of the project's receiving waters and their impairment status. Refer to WQMP Section 2.2 for onsite drainage and connection to offsite/surrounding drainage.

Table 3-3 – Watershed Description	
Receiving Waters	Unnamed Drainage, Prima Deshecha Cañada, Pacific Ocean
303(d) Listed Impairments	Unnamed Drainage - None Prima Deshecha Cañada – Cadmium, Indicator Bacteria, Malathion, Nitrogen, Phosphorus, Selenium, Turbidity Pacific Ocean (San Clemente HA) - None
Applicable TMDLs	Unnamed Drainage - None Prima Deshecha Cañada – None Pacific Shoreline (San Clemente HA) – Indicator Bacteria

3.4 Stormwater Pollutants or Conditions of Concern

Table 2-4, Anticipated and Potential Pollutants Generated by Land Use Type, from the Technical Guidance Document (September 2017) lists the following Pollutants of Concern (POC's) associated with the proposed development:

Table 3-4 – Pollutants or Conditions of Concern				
Pollutant	Expected from Proposed Land Uses/Activities (Yes or No)	Receiving Waterbody Impaired (Yes or No)	Priority Pollutant from WQIP or other Water Quality Condition? (Yes or No)	Pollutant of Concern (Primary, Other, or No)
Suspended-Solids	Yes	No	No	Other
Nutrients	Yes	No	No	Other
Heavy Metals	Yes	Yes	No	Primary
Bacteria/Virus/Pathogens	Yes	Yes	Yes	Primary
Pesticides	Yes	Yes	No	Primary
Oil and Grease	Yes	No	No	Other

Table 3-4 – Pollutants or Conditions of Concern				
Pollutant	Expected from Proposed Land Uses/Activities (Yes or No)	Receiving Waterbody Impaired (Yes or No)	Priority Pollutant from WQIP or other Water Quality Condition? (Yes or No)	Pollutant of Concern (Primary, Other, or No)
Toxic Organic Compounds	Yes	No	No	Other
Trash and Debris	Yes	No	Yes	Primary
Dry Weather Runoff	Yes	No	Yes	Primary

3.5 Hydrologic Conditions of Concern

The purpose of this section is to identify any hydrologic conditions of concern (HCOC) with respect to downstream flooding, erosion potential of natural channels downstream, impacts of increased flows on natural habitat, etc. that may occur as the result of project implementation. As specified in Section 2.3.5 of the 2017 TGD, projects must identify and mitigate any HCOCs. A HCOC is a combination of upland hydrologic conditions and stream biological and physical conditions that presents a condition of concern for physical and/or biological degradation of streams.

Does a hydrologic condition of concern exist for this project?

☐ No – An HCOC does not exist for this receiving water because:

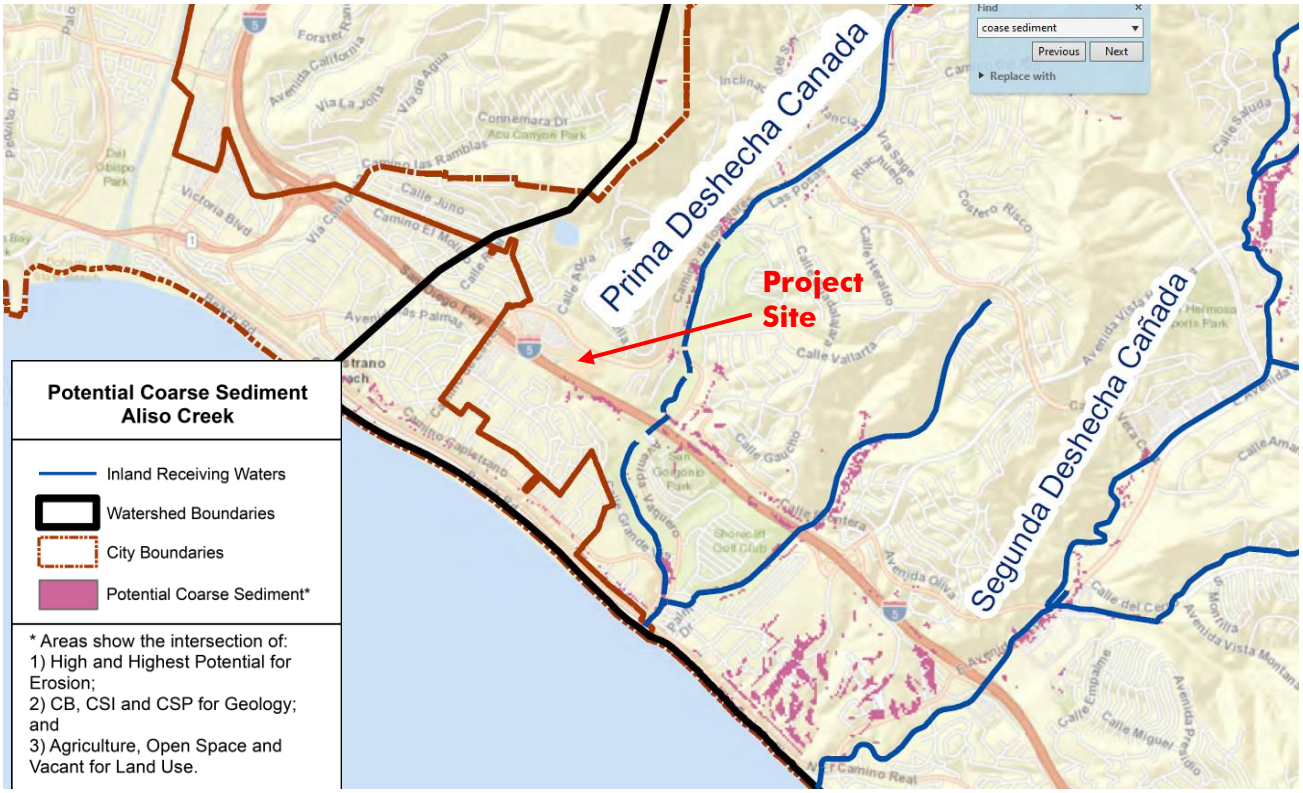
- ☐ Project discharges directly to a protected conveyance (bed and bank are concrete lined the entire way from the point(s) of discharge to a receiving lake, reservoir, embayment, or the Ocean
- ☐ Project discharges directly to storm drains which discharge directly to a reservoir, lake, embayment, ocean or protected conveyance (as described above)
- ☐ The project discharges to an area identified in the WMAA as exempt from hydromodification concerns

☒ Yes – An HCOC does exist for this receiving water because none of the above are applicable.

Per Figure F-10 of the South Orange County Hydromodification Plan (and Appendix N.7 of the TGD), the project discharges to non-engineered channels downstream that are susceptible to HCOC impacts.

3.6 Critical Coarse Sediment Yield Areas

The project site is shown in Appendix N.8 of the Water Quality Improvement Plan for South Orange County Watershed Management as not residing within a potential coarse sediment yield area.



Source: Appendix N.8, Potential Coarse Sediment for San Clemente Coastal Streams (SOC TGD, September 28, 2018

Section 4 Site Plan and Drainage Plan

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

4.1 Drainage Management Area Delineation

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

The limits of the project's DMAs are provided in the WQMP Site Plan located in Attachment D. The DMAs for the project were selected based on the site layout and suitable areas for BMP location.

4.2 Overall Site Design BMPs

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

Minimize Impervious Area – The project will decrease impervious surfaces as compared to pre-project conditions. Additionally, the project will also include infiltration BMPs for additional runoff retention when compared to pre-project conditions.

Maximize Natural Infiltration Capacity – Project will employ infiltration BMPs in DMAs 1 and 2 to retain the design capture volume for each DMA.

Preserve Existing Drainage Patterns and Time of Concentration – In the proposed condition, runoff from the site will be conveyed similar to pre-project conditions, with hydromodification controls employed to retain the site's pre-development runoff flow rates and volumes.

Disconnect Impervious Areas – Landscaping will be provided adjacent to common pavement areas and within project's drive and parking aisles to break up the project's impervious areas.

Protect Existing Vegetation and Sensitive Areas – There are no sensitive onsite areas to preserve. Existing vegetation and slope located in the southern portion of the project limits will remain as existing (unimproved). Areas to be disturbed by construction will be paved or landscaped with native and/or drought tolerant plant species with a deep root system.

Revegetate Disturbed Areas – Native and/or drought tolerant landscaping will be incorporated into site design, consistent with City guidelines, in proposed landscaping areas.

Soil Stockpiling and Site Generated Organics – Due to the project's previous land use as a hospital, there are no natural areas or natural materials from the pre-project condition to preserve.

Firescaping – Project landscaping will be selected based on each area's fire zone risk, including requirements for buffers/fuel modification, as applicable.

Water Efficient Landscaping – Landscaping will be designed to consist of native species or drought tolerant, water conserving landscaping. Additionally, irrigation system will be designed, constructed and adjusted to eliminate overspray to hardscape areas, with timing and cycle lengths adjusted in accordance with water demands, given time of year, weather, day or nighttime temperatures based on system specifications and local climate patterns.

Slopes and Channel Buffers – The project's existing slope to the south shall be inspected for adequate vegetation cover, vegetation health and signs of erosion. Dead or dying vegetation shall be replaced as needed. Signs of erosion and concentrated flow areas shall be noted and repaired as needed. Any existing drains shall be inspected and maintained as needed.

4.3 DMA Characteristics and Site Design BMPs

The project's DMA characteristics and Site Design BMPs are provided in the following sections.

4.3.1 DMA 1

DMA Location:	Western project area
Total Area (AC):	1.674
Impervious Area (AC):	1.430
Pervious Area (AC):	0.244
DMA Outlet Location (or self-retaining):	Southwestern project site to existing storm drain
Maximize Retention?:	Yes. DCV retained via drywell
Land Use & Pollutant Generation Activities:	Residential – Trash and debris from household uses, landscaping related materials Drive aisles & parking areas – Vehicle related fluids from daily vehicle use Commercial – Trash and debris from office uses, landscaping materials
Site Design BMPs Summary:	Applicable site design BMPs include: minimize impervious area, preserve pre-project drainage patterns and time of concentration, disconnect impervious surface, revegetate disturbed areas, firescaping and water efficient landscaping.
Infiltration Feasibility Category:	Full Infiltration
Potential Harvest Demand:	Not applicable. project will retain DCV via infiltration BMP
Harvest and Use Requirement:	Not required

4.3.2 DMA 2

DMA Location:	Central and Eastern project area
Total Area (AC):	4.463
Impervious Area (AC):	3.696
Pervious Area (AC):	0.767
DMA Outlet Location (or self-retaining):	Southeastern project site to existing storm drain
Maximize Retention?:	Yes. DCV retained via drywell
Land Use & Pollutant Generation Activities:	Residential – Trash and debris from household uses, landscaping related materials Drive aisles & parking areas – Vehicle related fluids from daily vehicle use Commercial – Trash and debris from office uses, landscaping materials
Site Design BMPs Summary:	Applicable site design BMPs include: minimize impervious area, preserve pre-project drainage patterns and time of

	concentration, disconnect impervious surface, revegetate disturbed areas, firescaping and water efficient landscaping.
Infiltration Feasibility Category:	Full Infiltration
Potential Harvest Demand:	Not applicable. project will retain DCV via infiltration BMP
Harvest and Use Requirement:	Not required

4.3.3 DMA 3

DMA Location:	Existing landscaping, sidewalk, entrance gutter at project's southern entrance. Will remain as existing with no improvements proposed.
Total Area (AC):	0.019
Impervious Area (AC):	0.003
Pervious Area (AC):	0.063
DMA Outlet Location (or self-retaining):	Camino De Los Mares gutter
Maximize Retention?:	No
Land Use & Pollutant Generation Activities:	Landscaping and street access - Vehicle related fluids from daily vehicle use.
Site Design BMPs Summary:	None
Infiltration Feasibility Category:	Not applicable
Potential Harvest Demand:	Not applicable
Harvest and Use Requirement:	Not required

4.3.4 DMA 4 (4-1 & 4-2)

DMA Location:	Existing slopes and temporary disturbed areas (remedial grading) at project's southwestern limits that will be revegetated to natural conditions.
Total Area (AC):	0.448
Impervious Area (AC):	0
Pervious Area (AC):	0.448
DMA Outlet Location (or self-retaining):	Self-retaining
Maximize Retention?:	Yes
Land Use & Pollutant Generation Activities:	Natural landscaping. No pollutant generation anticipated.
Site Design BMPs Summary:	HSC-6 Self-Retaining Area
Infiltration Feasibility Category:	Not applicable
Potential Harvest Demand:	Not applicable
Harvest and Use Requirement:	Not required

4.3.5 DMA 5 (Camino De Los Mares Parkway and Median Improvements)

DMA 5-1

DMA Location:	Northern Camino de Los Mares median extension at project's northern access.
Total Area (AC):	0.002
Impervious Area (AC):	0.002
Pervious Area (AC):	0.000
DMA Outlet Location (or self-retaining):	Camino De Los Mares gutter
Maximize Retention?:	No
Land Use & Pollutant Generation Activities:	Street use – Aerially deposited vehicle related pollutants.
Site Design BMPs Summary:	None
Infiltration Feasibility Category:	Not applicable
Potential Harvest Demand:	Not applicable
Harvest and Use Requirement:	Not required

DMA 5-2

DMA Location:	Southern Camino de Los Mares median extension at project's northern access.
Total Area (AC):	0.035
Impervious Area (AC):	0.003
Pervious Area (AC):	0.032
DMA Outlet Location (or self-retaining):	Self-retaining
Maximize Retention?:	Yes
Land Use & Pollutant Generation Activities:	Median landscaping – Aerially deposited vehicle related pollutants and potential fertilizer or pesticide use.
Site Design BMPs Summary:	None
Infiltration Feasibility Category:	Not applicable
Potential Harvest Demand:	Not applicable
Harvest and Use Requirement:	Not required

DMA 5-3

DMA Location:	Project limits along Camino de Los Mares parkway
Total Area (AC):	0.027
Impervious Area (AC):	0.027
Pervious Area (AC):	0.0
DMA Outlet Location (or self-retaining):	Camino De Los Mares street gutter
Maximize Retention?:	No
Land Use & Pollutant Generation Activities:	Walkway – General litter, aerially deposited vehicle related pollutants.
Site Design BMPs Summary:	HSC-3 Street Trees to USEPA Green Street Standards
Infiltration Feasibility Category:	Not applicable
Potential Harvest Demand:	Not applicable
Harvest and Use Requirement:	Not required

4.3.6 DMA Summary

Summary of the project's DMA is provided in the following table:

Table 4-1 – Drainage Management Areas

DMA (Number/ Description)	Total Area (acres)	Imp. (%)	Infiltration Feasibility Category (Full, Partial, or No Infiltration)	Hydrologic Source Controls Used	C-value	D_{85} (in)	DCV_{Simple} (ft^3)
1	1.674	0.854	Full Infiltration	None	0.791	0.80	3843.7
2	4.463	0.828	Full Infiltration	None	0.771	0.80	9994.0
3	0.019	0.158	No infiltration	None	0.268	0.80	14.8
4-1	0.353	0.000	Full Infiltration (Natural Landscape)	HSC-6 Self-Retaining	0.150	0.80	153.8
4-2	0.095	0.000	Full Infiltration (Natural Landscape)	HSC-6 Self-Retaining	0.150	0.80	41.4
5-1	0.002	1.000	No Infiltration	None	0.900	0.80	5.2
5-2	0.035	0.086	Full Infiltration	HSC-6 Self-Retaining via HSC-2 Impervious Area Dispersion	0.214	0.80	21.8
5-3	0.027	1.000	No Infiltration	HSC-3 Street Trees	0.900	0.80	70.6
Total[1]	*6.668*	--	--	--	--	--	--

[1] *DMA acreage is dependent on hydrologic boundaries and not on property limits.*

4.4 Source Control BMPs

In accordance with the County DAMP and City of San Clemente Local Implementation Plan (LIP), both structural and non-structural source control BMPs are required for all priority projects unless deemed not applicable based on project characteristics. The following tables summarize the source control BMPs (Non-Structural and Structural) specified in the County DAMP and City's LIP.

The following tables show source control BMPs (routine non-structural and routine structural) included in this project and those that were not included.

Table 4-2 – Non-Structural Source Control BMPs

Identifier	Name	Check One		Reason Source Control is Not Applicable
		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)	☐	☒	Proposed facility will not generate waste subject to Title 22 CCR compliance.
N6	Local Industrial Permit Compliance	☐	☒	Not applicable to residential.
N7	Spill Contingency Plan	☐	☒	Proposed facility will not generate waste or store materials subject to the requirements of Chapter 6.95 of the CA Health and Safety Code.
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tanks proposed for the project.
N9	Hazardous Materials Disclosure Compliance	☐	☒	Proposed facility will not store or generate hazardous materials subject to agency requirements.
N10	Uniform Fire Code Implementation	☐	☒	Proposed facility does not propose to store toxic or highly toxic compressed gases.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	Not applicable for residential.
N13	Housekeeping of Loading Docks	☐	☒	No loading docks proposed for project.

Table 4-2 – Non-Structural Source Control BMPs				
Identifier	Name	Check One		Reason Source Control is Not Applicable
		Included	Not Applicable	
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	Project is for residential and office uses.

N1 – Education for Property Owners, Tenants and Occupants

Educational materials will be provided to lessees at lease signing by the owner/developer and periodically thereafter by the site management to inform residents and office lessees of their actions and the potential impacts to downstream water quality. Materials include those described in Section VII of this WQMP and any updates to educational materials.

N2 – Activity Restrictions

Activity restrictions to minimize potential impacts to water quality and with the purpose of protecting water quality will be prescribed via lease restrictions for both the apartment site and medical office site, or other equally effective measure.

N3 – Common Area Landscape Management

Management programs will be designed and established by the owner. Upon project completion, the owner's site management staff, through its contractor, will maintain all common areas within the project site. These programs will include how to mitigate the potential dangers of fertilizer and pesticide usage. Ongoing maintenance will be consistent with the City's Landscape Water Use Standards.

N4 – BMP Maintenance

The Owner shall be responsible for implementation of each applicable non-structural, structural and LID BMPs as well as scheduling inspection and maintenance cleaning of all applicable structural BMP facilities. The Owner shall be responsible for inspection and maintenance activities in landscape areas (see WQMP Site Plan).

N11 – Common Area Litter Control

Weekly trash pickup and as necessary within all project areas and common landscape areas. Daily inspection of trash receptacles to ensure that lids are closed and pick up any excess trash on the ground, noting trash disposal violations by residents and lessees, and reporting the violations to site management for investigation.

N14 – Common Area Catch Basin Inspection

100% of all privately-maintained drainage facilities shall be inspected each year and, if necessary, cleaned and maintained prior to the storm season, no later than October 1st of each year. Drainage facilities include catch basins and inlets, detention vaults, storm drain lines, slope drains and the project's LID BMPs.

N15 – Street Sweeping Private Streets and Parking Lots

Per the TGD, private streets shall be swept at a minimum prior to the storm season, in early fall or late summer, and as needed.

Table 4-3 – Structural Source Control BMPs				
Identifier	Name	Check One		Reason Source Control is Not Applicable
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outdoor storage areas proposed for facility.
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	☐	☒	No slopes onsite.
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☒	☐	
S6	Dock areas	☐	☒	No dock areas proposed for facility.
S7	Maintenance bays	☐	☒	No maintenance bays proposed for facility.
S8	Vehicle wash areas	☐	☒	No vehicle washing onsite for proposed facility.
S9	Outdoor processing areas	☐	☒	No outdoor processing of good required for facility.
S10	Equipment wash areas	☐	☒	No wash areas for site.
S11	Fueling areas	☐	☒	No fueling areas in project scope.
S12	Hillside landscaping	☐	☒	Project is not hillside development.
S13	Wash water control for food preparation areas	☐	☒	No food service facilities onsite.
S14	Community car wash racks	☐	☒	None proposed.

S1 – Provide Storm Drain System Stenciling and Signage (CASQA SD-13)

Storm drain stenciling with a brief message or graphical icons with symbols, prohibiting the dumping of improper materials into the storm drain system shall be placed in highly visible areas adjacent to all storm drain inlets. The BMP is designed to alert, educate and discourage the public of the destination of pollutants discharged into storm drain systems. Legibility of stencils and signs shall be maintained.

S3 – Trash Storage Area Design (CASQA SD-32)

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

S4 – Efficient Irrigation System & Landscape Design (CASQA SD-10 & SD-12)

Landscaping will be designed to consist of native species or drought tolerant, water conserving landscaping. Irrigation system will be designed, constructed and adjusted to eliminate overspray to hardscape areas, with timing and cycle lengths adjusted in accordance with water demands, given time of year, weather, day or night time temperatures based on system specifications and local climate patterns.

Section 5 Low Impact Development BMPs

Per the South County Model WQMP, Low Impact Development (LID) BMPs must be incorporated into design features and source controls to reduce project related storm water pollutants. The incorporation of LID BMPs into project design requires evaluation of LID measures primarily for full retention, partial retention and lastly, biotreatment.

5.1 LID BMPs

Proposed LID BMPs per DMA is as follows:

DMAs 1 and 2 – infiltration via subsurface detention facilities that discharge to infiltration wells. Although current soils maps show that underlying soils consist primarily of HSG Type D soils with very limited infiltration, onsite geotechnical investigation has determined that a gravel layer that is conducive for infiltration exists in the southern limits of the project site. Therefore, the project is able to infiltrate in DMAs 1 and 2.

DMA 3 – consists of existing landscape and a portion of the project's southern entrance that is not hydrologically connected with the onsite project areas. This DMA will not be improved and remain in existing condition. No LID BMP proposed.

DMA 4 – consists of existing slopes and temporary disturbed areas (designated as 4-1 and 4-2) at the project's southwestern limits required for remedial grading. This DMA will remain as natural or be returned to natural condition and anticipated to not generate runoff volumes or pollutant loads higher than natural conditions, qualifying it as a self-retaining area (HSC-6).

DMA 5 – consists of parkway and median improvements to Camion De Los Mares. Improvements are as follows:

- DMA 5-1 – Remove existing asphalt pavement and extend paved median to prevent turning left out of the project's northern entrance. No BMPs proposed;
- DMA 5-2 – Replace existing paved median and turn lane with landscaped median. Area is considered self-retaining (HSC-6) as it consist almost entirely of depressed landscaping areas and employs HSC-2 (impervious area dispersion) to meet HSC-6 qualifications[1]; and
- DMA 5-3 – Addition of 2' sidewalk width and extend sidewalk to reconfigure project's southern entrance. Runoff will be addressed via hydrologic source control BMP (HSC-3 Street Trees) designed to maximum extent practicable (MEP) standards per USEPA's Green Streets Manual. Additionally, parkway inlet drains will be installed each new street tree proposed to covey some runoff into each tree well for retention.

5.1.1 Hydrologic Source Controls

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

Trees will be planted within common landscape areas within the project to provide canopy interception of rain, thereby reducing the site's runoff during rain event. However, the reduction benefits from these measures within the project's onsite will not be determined as the project is in the conceptual phase. Proposed infiltration and biotreatment BMPs will be designed to address the project's full DCV for the project's onsite areas.

[1] Per TGD HSC-6 Fact sheet, DMAs with impervious surface where the full effects of impervious surface are mitigated by HSC's.

Project DMAs specifically utilizing HSC BMPs to address runoff are as follows:

Table 5-1 – HSC BMP Design Summary						
DMA	BMP	DCV (ft^3)	HSC System	D_{HSC}	% Capture	DCV_{REM} (cu-ft)
4-1[1]	HSC-6 Self-Retaining	153.8	N/A – natural condition	1.0″	80	0
4-2[1]	HSC-6 Self-Retaining	41.4	N/A – natural condition	1.0″	80	0
5-2[2]	HSC-6 Self-Retaining	21.8	HSC-2 Impervious Area Dispersion with 0.032 acres of pervious area to 0.003 acres of impervious	1.0″	80	0
5-3	HSC-3 Street Trees	70.6	Four (4) Street Trees with parkway inlets for incidental infiltration per USEPA Green Streets Standards (MEP)	0.05″	8	70.6 – 4.4 = **66.2**[3]

[1] Per TGD HSC-6 Fact sheet, DMAs without impervious surface where the condition of the pervious surface does not generate elevated runoff volumes or pollutant loads from natural condition are considered self-retaining.
[2] Per TGD HSC-6 Fact sheet, DMAs with impervious surface where the full effects of impervious surface are mitigated by HSC's are considered self-retaining.
[3] Since sidewalk improvements in DMA 5-3 located in parkway flows away from project site to existing sidewalk and gutter, it was not feasible to convey runoff to onsite LID BMPs or employ BMPs downstream of DMA 5-3. Therefore, per EPA Green Street Standards, Street Trees have been employed to the maximum extent practicable (MEP).

5.1.2 Structural LID BMP for DMA 1 through DMA 2

Infiltration BMPs are considered the first choice in a project's BMP selection hierarchy as it serves to retain runoff within a project site, thereby mimicking natural conditions. The project will employ the use of infiltration well BMPs for DMAs 1 and 2, where infiltration of runoff is feasible. The DCV for each DMA will be conveyed to a detention facility prior to discharging through a runoff pre-treatment device and then a drywell (Maxwell Plus system).

In the event that future geotechnical investigation or new data determines that infiltration would pose a significant threat to the structural integrity of onsite or downstream/offsite improvements, the proposed infiltration BMPs would be replaced with other LID BMPs (e.g. biotreatment) per approval from the City.

Infiltration wells are classified as Class V Underground Injection wells and fall under the California Wells Standards and the Orange County Well Ordinance. The project proponent will receive all required approvals from the County of Orange and register with the EPA's Pacific Southwest Region prior to and after well operation.

5.2 Summary of LID BMPs

Summary of the selected LID BMP is provided in the following table:

Table 5-2 – Infiltration BMP Design Summary								
DMA	BMP	DCV (ft^3)	Infiltration Rate (K_m)	FS	K_{DESIGN}	Drywell Infiltration Surface Depth	$Q_{DRYWELL}$ (cfs)	Draw Down (Hours)
1	INF-4	3843.7	96.0 in/hr	4	24.0 in/hr	10′	0.0698	15.30
2	INF-4	9994.0	152.9 in/hr	4	38.23 in/hr	10′	0.1111	24.98

Section 6 Hydromodification BMPs

6.1 Points of Compliance

The project has two (2) points of compliance. Flows up to the 10-year event will be conveyed to one of two onsite vaults sized to retain the required DCV and detain the hydromodification mitigation volume for each DMA.

Supporting documentation from the project's Hydromodification Analysis is provided in Attachment F.

Table 6-1 – Hydromodification BMP Design Summary				
DMA	BMP	V_{DES} (cu-ft)[7]	Footprint	Depth
1	Vault	5,000	10'x50'	10'
2	Vault	14,080	20'x44' (2 vaults)	8'

6.2 Pre-Development (Natural) Conditions

The pre-project site consists of a hospital facility, supporting structures and surrounding parking and drive aisles.

Table 6-1 – Summary of Existing Conditoins			
DMA[(1)]	Tributary Area (ac)	Imperviousness[(1)]	POC
DMA 1	2.092	0%	1
DMA 2	4.538	0%	2
Total	**6.63**	--	N/A

Notes: (1) Per 2013 RWQCB MS4 Permit, existing condition impervious surfaces are not to be accounted for in existing analysis if they are part of the project's boundary.

6.3 Post-Development Conditions and Hydromodification BMPs

Runoff from the developed project site is intercepted by the onsite storm drain system, conveying flows from developed portions of the project site to two (2) onsite receiving HMP detention facilities.

Table 2 shows a summary of the developed conditions DMAs along with the underground system receiving the runoff prior to discharging to each POC.

Table 6-2 – Summary of Developed Conditions			
DMA	Tributary Area (ac)	Imperviousness	POC
DMA 1	1.674	85.4%	1
DMA 4-1	0.353	0%	
DMA 2	4.462	82.0%	2
DMA 3	0.019	15.8%	
DMA 4-2	0.095	0%	
Total	**6.67**	--	N/A

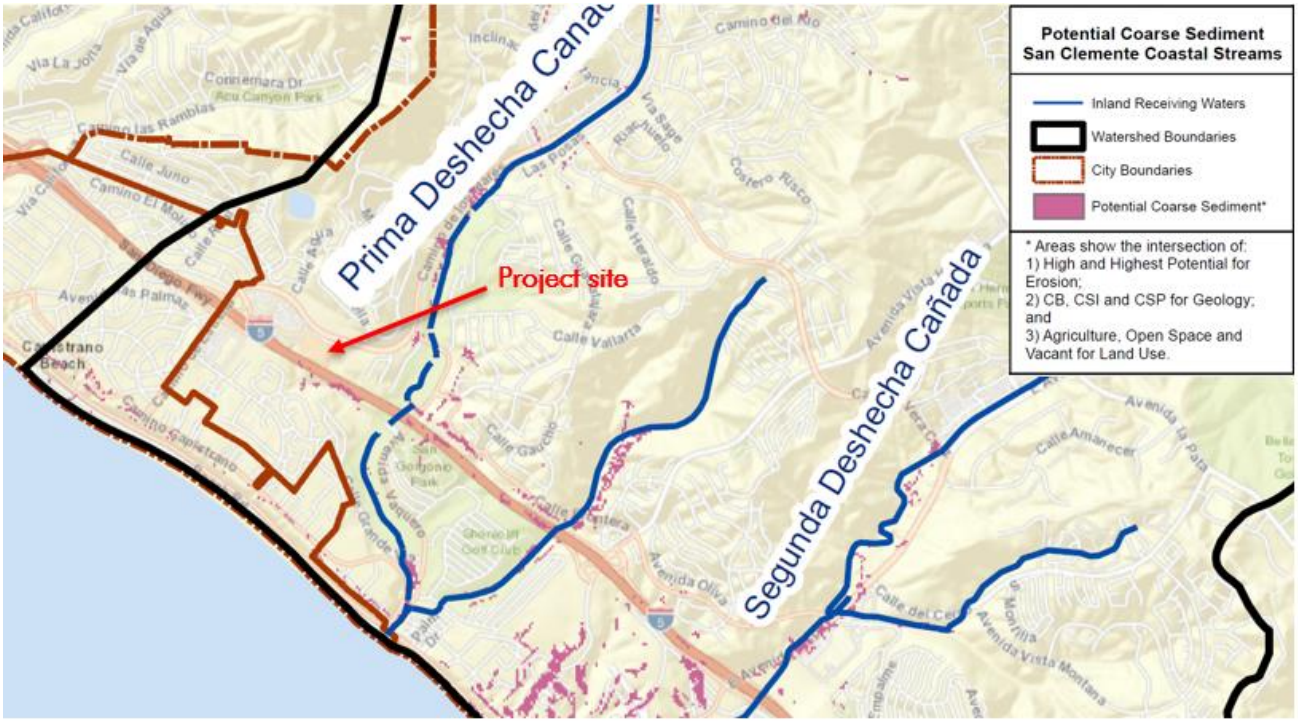
Two (2) underground detention systems are located within the project site and are responsible for handling hydromodification requirements for the project.

Table 6-3 – Hydromodification Control BMPs						
Vault	Tributary Area (ac)	BMP Description				
		Dimension (ft)	Depth to Spillway (ft)[1]	Weir Length (ft)[2]	Total Depth (ft)[3]	Drywell Infiltration (cfs)
UG 1	1.32	1 x 10' x 50' x 8'	9.50	5.0	10.0	0.0698
UG 2	4.587	2 x 20' x 44' x 10'	7.70	10.0	8.0	0.1111

Notes: (1) Depth to ponding beneath outlet structure's main weir.
(2) Overflow length
(3) Total surface depth of BMP from crest to surface invert.

6.4 Measures for Avoidance of Critical Coarse Sediment Yield Areas

Based on existing County maps, project does not reside within a CCSYA.



Source: Figure 9. Potential Coarse Sediment for San Clemente Coastal Streams (TGD Appendix K.1)

6.5 Hydrologic Modeling and Hydromodification Compliance

Based on the project's Hydromodification Analysis from the South Orange County Hydrology Model, provided in Attachment C of this report, with implementation of the project's BMPs, post-development runoff flow rates and durations will not exceed the site's natural conditions (pre-development) by more than 10% of the time, from 10% of the 2-year runoff event up to the 10-year runoff event.

Q_2 to Q_{10} Comparison Table – POC 1

Return Period	Existing Condition (cfs)	Mitigated Condition (cfs)	Reduction, Exist - Mitigated (cfs)
2-year	0.888	0.792	0.096
3-year	1.016	0.886	0.131
4-year	1.110	1.058	0.053
5-year	1.281	1.196	0.084
6-year	1.298	1.228	0.071
7-year	1.313	1.239	0.074
8-year	1.346	1.250	0.096
9-year	1.395	1.256	0.139
10-year	1.430	1.267	0.164

Q_2 to Q_{10} Comparison Table – POC 2

Return Period	Existing Condition (cfs)	Mitigated Condition (cfs)	Reduction, Exist - Mitigated (cfs)
2-year	2.001	1.820	0.180
3-year	2.284	2.075	0.208
4-year	2.432	2.353	0.079
5-year	2.794	2.626	0.169
6-year	2.868	2.671	0.197
7-year	2.896	2.709	0.187
8-year	2.941	2.747	0.194
9-year	3.046	2.768	0.278
10-year	3.144	2.780	0.364

Section 7 Educational Materials Index

The following table provides a list of educational materials to be included in the Final WQMP.

Table 7-1 – Educational 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	☒	Compliance BMPs for Mobile Businesses	☐
Proper Disposal of Household Hazardous Waste	☒	**Other Material**	**Check If Attached**
Recycle at Your Local Used Oil Collection Center (North County)	☐		
Recycle at Your Local Used Oil Collection Center (Central County)	☐		☐
Recycle at Your Local Used Oil Collection Center (South County)	☒		☐
Tips for Maintaining a Septic Tank System	☐		☐
Responsible Pest Control	☒		☐
Sewer Spill	☐		☐
Tips for the Home Improvement Projects	☒		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☒		☐
Tips for Pet Care	☒		☐
Tips for Projects Using Paint	☒		☐

Attachment A Educational Materials

To be provided in the Final WQMP.

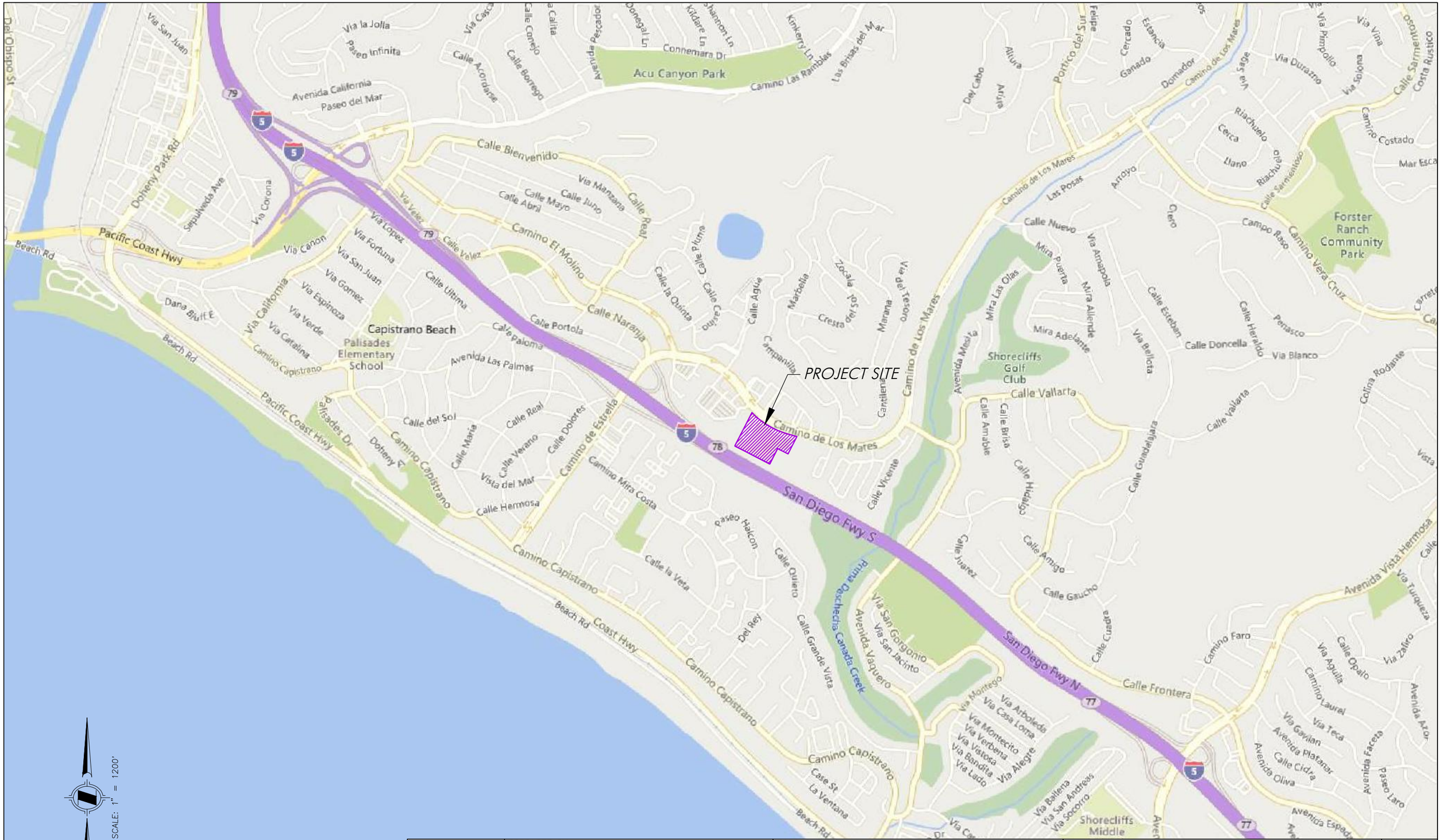
Attachment B Operations and Maintenance Plan

To be provided in the Final WQMP.

Attachment C Conditions of Approval

To be provided in the Final WQMP.

Attachment D Vicinity Map, Site Plan, Receiving Waters Exhibit, Supporting Exhibits



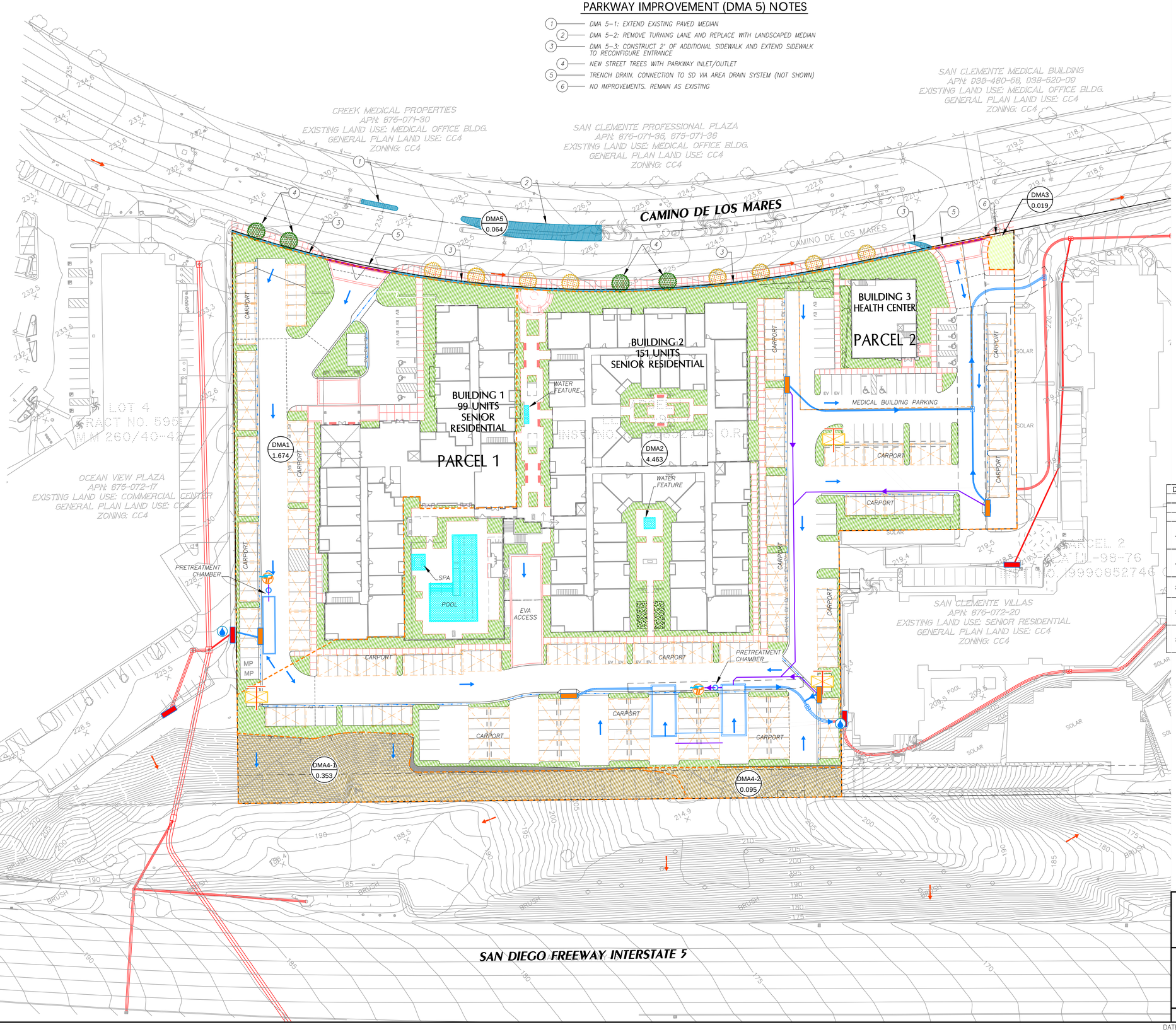
SCALE: 1" = 1200'

DRAWN BY: TIH	PREPARED BY: HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING ■ ENGINEERING ■ SURVEYING Three Hughes, Irvine, CA 92618 ■ PH: (949) 583-1010 ■ FX: (949) 583-0759	PREPARED FOR: SADDLEBACK MEMORIAL MEDICAL CARE 24451 HEALTH CENTER DRIVE LAGUNA HILLS, CA 92653 (949) 452-3627	VESTING TENTATIVE PARCEL MAP NO. 2022-116 SOUTHEAST OF CAMINO DE LOS MARES AND CALLE AGUA SAN CLEMENTE, CALIFORNIA
DATE: 05/19/2022			WQMP VICINITY MAP
W.O.: 4479-1			

DATE: May. 19, 2022 01:40:55 PM FILE: F:\1223\Planning\SY_WQ\PWQMP\Exhibits\WQMP_VIC SC Senior.dwg

PARKWAY IMPROVEMENT (DMA 5) NOTES

1. DMA 5-1: EXTEND EXISTING PAVED MEDIAN
2. DMA 5-2: REMOVE TURNING LANE AND REPLACE WITH LANDSCAPED MEDIAN
3. DMA 5-3: CONSTRUCT 2' OF ADDITIONAL SIDEWALK AND EXTEND SIDEWALK TO RECONFIGURE ENTRANCE
4. NEW STREET TREES WITH PARKWAY INLET/OUTLET
5. TRENCH DRAIN. CONNECTION TO SD VIA AREA DRAIN SYSTEM (NOT SHOWN)
6. NO IMPROVEMENTS. REMAIN AS EXISTING



LEGEND

- TRACT BOUNDARY
- NAP — NOT A PART
- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
- DMA / ACRE — DMA DESIGNATION AND ACREAGE
- POOL, SPA & WATER FEATURE
- SURFACE FLOW (ONSITE)
- SURFACE FLOW (OFFSITE)
- EXISTING DRAINAGE SYSTEM
- PROPOSED STORM DRAIN SYSTEM
- PROPOSED DRAINAGE SYSTEM (WATER QUALITY AND < Q10)
- EXISTING CATCH BASIN
- PROJECT CATCH BASIN WITH BMPS S1 STORM DRAIN SYSTEM STENCIL/SIGNAGE
- DRIVEWAY TRENCH DRAIN
- PROJECT LANDSCAPING AREA WITH BMPS S4 EFFICIENT IRRIGATION SYSTEM AND LANDSCAPE PLANNING
- MEDIAN AND PARKWAY IMPROVEMENT AREAS (DMA 5) (SEE PARKWAY IMPROVEMENT NOTES)
- EXISTING LANDSCAPING TO REMAIN
- NATURAL AREA/AREA RETURNED TO NATURAL (DMA 4)
- EXISTING PARKWAY TREES (FERN PINE) TO REMAIN BMP HSC-3 STREET TREES
- PROPOSED PARKWAY TREES (FERN PINE) BMP HSC-3 STREET TREES
- PROJECT WALKWAYS
- COVERED PARKING (CARPORT)
- S7 DESIGNATED TRASH ENCLOSURE
- LID BMP – INF4 DRYWELL MAXWELL PLUS DRYWELL SYSTEM WITH PRE-TREATMENT CHAMBER
- SUBSURFACE DETENTION FACILITY
- DISCHARGE POINT/POINT OF COMPLIANCE (HYDROMOD)
- STORM OVERFLOW DISCHARGE POINT (EVENTS > Q10)

DMA SUMMARY

DMA	Acres	Pervious Acres	Impervious Ares	Imp. Ratio	C	D (in)	DCV (simple)	LID BMP
1	1.674	0.244	1.430	0.854	0.791	0.8	3843.7	INF-4 Infiltration Well
2	4.463	0.767	3.696	0.828	0.771	0.8	9994.0	INF-4 Infiltration Well
3	0.019	0.016	0.003	0.158	0.268	0.8	14.8	No improvement area
4-1	0.353	0.353	0.000	0.000	0.150	0.8	153.8	HSC-6 Self Retaining Area (Natural/return to natural landscape)
4-2	0.095	0.095	0.000	0.000	0.150	0.8	41.4	HSC-6 Self Retaining Area (Natural/return to natural landscape)
5-1	0.002	0	0.002	1.000	0.900	0.8	5.2	None. Direct replacement of impervious area
5-2	0.035	0.032	0.003	0.086	0.214	0.8	21.8	HSC-6 Self-retaining Area (via HSC-2 Impervious Area Dispersion)
5-3	0.027	0	0.027	1.000	0.900	0.8	70.6	HSC-3 Street Trees per USEPA Green Streets Standards

N

GRAPHIC SCALE
0 20 40 80
(IN FEET)
1 INCH = 40 FT.

PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

APPLICANT:
SADDLEBACK MEMORIAL MEDICAL CARE
24451 HEALTH CENTER DRIVE
LAGUNA HILLS, CA 92653
(949) 452-3627

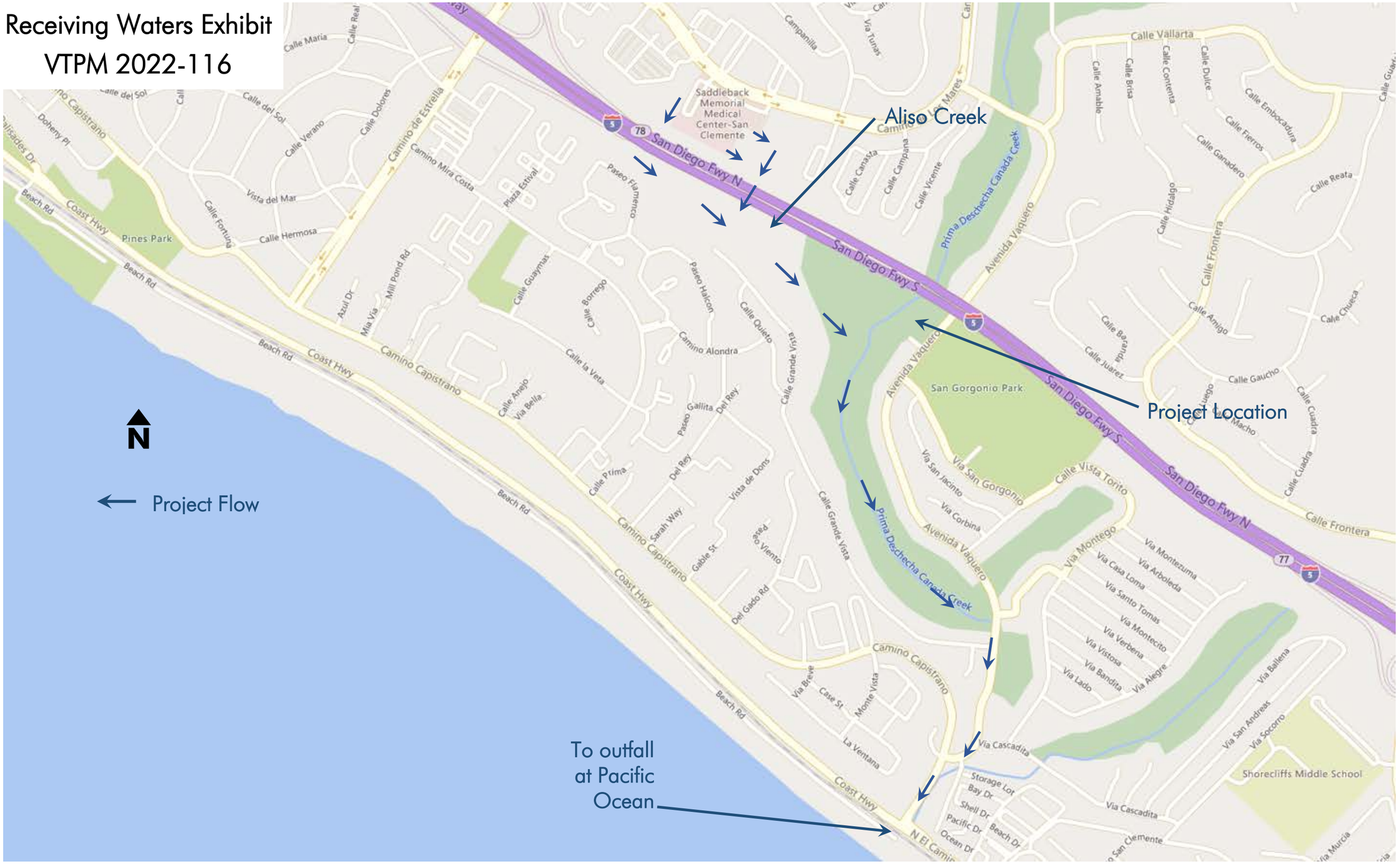
PREPARED BY:
HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

"VESTING TENTATIVE PARCEL MAP NO. 2022-116"
SOUTHEAST OF CAMINO DE LOS MARES &
CALLE AGUA
CITY OF SAN CLEMENTE, COUNTY OF ORANGE, CALIFORNIA

DRAFTED BY:	DATE:	W.O. NO:	SHEET NO:
TIH	08/30/2022	4479-1	1 OF 1

DATE: Aug. 31, 2022 08:31:58 PM FILE: F:\1223\Planning\SY_WQ\PWQMP\Exhibits\WQMP_SP SC Senior.dwg

Receiving Waters Exhibit
VTPM 2022-116



Attachment E BMP Worksheets & Details

Worksheet 1: Infiltration Feasibility Categorization

Categorization of Infiltration Feasibility Condition	*Page 1 of 5*

Part 1: Physical Limitations of Infiltration

Based on the criteria for physical limitations of infiltration described in Section 4.2.2.2, what level of physical feasibility of infiltration is the maximum that the BMP location will support?

	Physical Infiltration Feasibility Category	Mark applicable category	Next step
1	Full Infiltration of the DCV	X	Continue to Part 2
	Biotreatment with Partial Infiltration		Continue to Part 3
	Biotreatment with No Infiltration		Select and Utilize Biotreatment without Infiltration

Provide summary of basis: Project will infiltrate full DCV for each DMA onsite via a drywell system.

Categorization of Infiltration Feasibility Condition		*Page 2 of 5*	
Part 2: Risks Limiting Full Infiltration of the DCV – *Would infiltration of the full DCV introduce risks of undesirable consequences that cannot reasonably be mitigated?*		*Yes*	*No*
2	**Would infiltration of the DCV pose significant risk for groundwater related concerns?** Use criteria described in Section 4.2.2.3 and results from **Worksheet 2** (Appendix C) to describe groundwater-related infiltration feasibility criteria.		X
Provide basis: Infiltration of project runoff would not pose concerns as the project does not reside over plume areas nor has the potential for soluble pollutants that can reach groundwater. Additionally, project is not located within landslide area.			
3	**Would infiltration of the full DCV pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level**? Use criteria described in Section 4.2.2.4.		X
Provide basis: No. Project is not located within any known slide area per TGD maps. Per geotechnical investigation, site can support infiltration.			
4	Would infiltration of the DCV cause an increase in groundwater flow or decrease in surface runoff over predevelopment conditions that would cause **impairment to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?** Use criteria in Section 4.2.2.5		X
Provide basis: Project is located approximately 0.12 miles north from an existing wetland. The project's DCV will receive pre-treatment via settling prior to discharging to a pre-treatment BMP which removes fine sediment, oil, grease, sediment bound pollutants and floatables from runoff prior to discharging to the infiltration. Runoff is then conveyed down to approximately 30' to the infiltration zone, which consists of a sand layer capable of removing remaining pollutants typical of the proposed development. Therefore, infiltration of runoff is not anticipated to impact the downstream wetland.			

Categorization of Infiltration Feasibility Condition		*Page 3 of 5*	
Part 2 (continued): Risks Limiting Full Infiltration of the DCV –*Would infiltration of the full DCV introduce risks of undesirable consequences that cannot reasonably be mitigated?*		***Yes***	***No***
5	Is there substantial evidence that infiltration of the DCV would **result in a significant increase in I&I to the sanitary sewer** that cannot be sufficiently mitigated?		X
Provide basis: Based on TGD, project is not located within area that has potential for I&I.			
6	Would infiltration of the DCV **violate downstream water rights**?		X
Provide basis: No regional recharge areas downstream of project.			
Part 2 Result	If the answer to all questions 2-6 are "No", then the DMA is categorized as "Full Infiltration" for the purposes of LID BMP type selection. Describe finding. At the Preliminary/Conceptual WQMP phase, describe the additional design-phase testing required to confirm this determination and identify contingencies for final design. At the Final Project WQMP phase, identify any required construction-phase testing and identify the design contingencies that should result based on construction-phase testing. If the answer to any of questions 2-6 is "Yes" then the site cannot be categorized as "Full Infiltration". Continue to Part 3: Partial Infiltration Feasibility	All answers are "No". Full infiltration for the project is feasible, as supported by project's geotechnical study.	

Categorization of Infiltration Feasibility Condition		*Page 4 of 5*	
Part 3: Partial Infiltration Feasibility Criteria *–Would infiltration of any appreciable volume of stormwater result in risks of undesirable consequences that cannot reasonably be mitigated?*		*Yes*	*No*
8	**Would use of biotreatment BMPs with partial infiltration pose significant risk for groundwater related concerns?** Refer to criteria in Section 4.2.2.3 and Worksheet 1 (Appendix C) for guidance on groundwater-related infiltration feasibility criteria.		X
Provide basis: No existing groundwater plumes onsite.			
9	**Would the use of biotreatment BMPs with partial infiltration pose elevated risks of geotechnical hazards that cannot be mitigated to an acceptable level**? Refer to Section 4.2.2.4.	X	
Provide basis: Project has steep slopes with clay soils and in the post-development condition would require the use of large retaining walls. See geotechnical report for project site.			
10	**Would the use of biotreatment BMPs with partial infiltration elevate risks or introduced conflicts related to groundwater balance, inflow and infiltration, or water rights?** Refer to Section 4.2.2.5. Note: this is uncommon and must be supported by site-specific analysis if it is used as a basis to reject biotreatment with partial infiltration.		X
Provide basis: Partial infiltration would not pose any downstream issues.			
Categorization of Infiltration Feasibility Condition		*Page 5 of 5*	
Part 3 Result	If the answer to all questions 8-10 are "No", then the DMA is categorized as "Biotreatment with Partial Infiltration" for the purposes of LID BMP type selection. If the answer to any of questions 8-10 is "Yes" then the site is categorized as "Biotreatment with No Infiltration" for the purposes of LID BMP type selection.	Item 9 is Yes	

Worksheet 2: Summary of Groundwater-related Feasibility Criteria

1	Is project large or small? (as defined by Table C-2) circle one	**Large**	Small	
2	What is the tributary area to the BMP?	A	1.674 (DMA1) 4.463 (DMA2)	acres
3	What type of BMP is proposed?	2 Drywell systems		
4	What is the infiltrating surface area of the proposed BMP?	A_{BMP}	125.60 per well	sq-ft
5	What land use activities are present in the tributary area (list all) Residential – Trash and debris from household uses, landscaping related materials. Drive aisles & parking areas – Vehicle related fluids from daily vehicle use. Commercial – Trash and debris from office uses, landscaping materials.			
6	What land use-based risk category is applicable?	L	**M**	H
7	If M or H, what pretreatment and source isolation BMPs have been considered and are proposed (describe all): Project will employ Maxwell Plus Drywell system, which includes a pre-treatment settling chamber to remove solids, sediment, oil and grease and floatables from runoff prior to drywell chamber.			
8	What minimum separation to mounded seasonally high groundwater applies to the proposed BMP? See Appendix C.2 (circle one)	5 ft	**10 ft**	
9	Provide rationale for selection of applicable minimum separation to seasonally high mounded groundwater: Per TGD Fact Sheet for BMP INF-4, minimum separation for drywell is 10 feet. See Geotechnical Response dated 8/31/2022 by Leighton and Associates.			
10	What is the separation from the infiltrating surface to seasonally high groundwater? Per CA DNR data, no groundwater within project vicinity. Onsite borings only encountered some perched groundwater.	**>10**	ft	
11	What is the separation from the infiltrating surface to mounded seasonally high groundwater? Per CA Department of Natural Resources data, no groundwater within project vicinity. Onsite borings only encountered some perched groundwater.	**>10**	ft	
12	Describe assumptions and methods used for mounding analysis: Based on available information from Department of Natural Resources and onsite geotechnical investigation.			
13	Is the site within a plume protection boundary?	Y	**N**	N/A
14	Is the site within a selenium source area or other natural plume area?	Y	**N**	N/A
15	Is the site within 250 feet of a contaminated site?	Y	**N**	N/A

Worksheet 2: Summary of Groundwater-related Feasibility Criteria

16	If site-specific study has been prepared, provide citation and briefly summarize relevant findings: Geotechnical investigation for project supports use of infiltration BMPs onsite without any geotechnical issues, conflicts with water rights.	
17	Is the site within 100 feet of a water supply well, spring, or septic system?	Y N N/A
18	Is infiltration feasible on the site relative to groundwater-related criteria?	Y N
Provide rationale for feasibility determination: Based onsite geotechnical investigation, boring logs, infiltration testing conducted and available information from the DNR and TGD, infiltration is supported.		

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

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.0
B	Design	Tributary area size	0.25	3	0.75
		Level of pretreatment/ expected sediment loads	0.25	1	0.25
		Redundancy/contingency plan	0.25	3	0.75
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			2.0

Combined Safety Factor, $S_{Total} = S_A \times S_B$	2.0 minimum; project will use FS of 4
Observed Infiltration Rate, inch/hr, K_{obs} (corrected for test-specific bias)	DMA1 = 96.0 in/hr DMA2 = 152.9 in/hr
Design Infiltration Rate, in/hr, $K_{design} = K_{obs} / S_{Total}$	DMA1 = 24.0 in/hr DMA2 = 38.23 in/hr

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Testing conducted at infiltration BMP located from depth between 29' to 40' below finished elevation. Tests conducted in accordance to SOC TGD Appendix D for infiltration testing protocol. See project geotechnical report.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

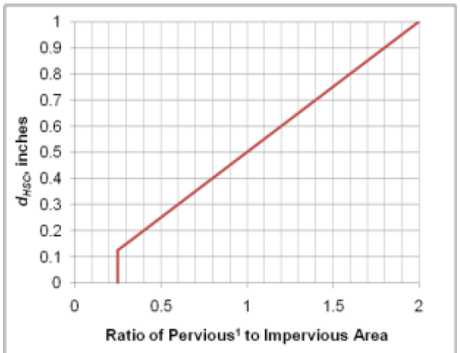
Worksheet 4: Hydrologic Source Control Calculation Form

		Drainage area ID	DMA 5-2	
		Total drainage area	0.035	acres
		Total drainage area Impervious Area (IA_{total})	0.003	acres
HSC ID	HSC Type/ Description/ Reference BMP Fact Sheet	Effect of individual HSC_i per criteria in **relevant fact sheet (Appendix G.1)** (d_{HSCi})[1]	Impervious Area Tributary to HSC_i (IA_i)	$d_i \times IA_i$
HSC-6	Qualifies as self-retaining based on HSC-2 (Impervious Area Dispersion) design criteria with 0.032 acres of pervious median area to 0.003 acres of impervious curb area.	Perv/Imp = 10.6:1 d_{HSC} = 1.0″	0.003	0.003
		Box 1:	$\sum d_i \times IA_i =$	0.003
		Box 2:	$IA_{total} =$	0.003
		[Box 1]/[Box 2]:	$d_{HSC\ total} =$	1.0″
			Percent Capture Provided by HSCs (Table E-2)	80%

1 – None of the values in this column may be larger than the design storm depth for the project

Calculating HSC Retention Volume

- The retention volume provided by downspout dispersion is a function of the ratio of impervious to pervious area and the condition of soils in the pervious area.
- Determine flow patterns in pervious area and estimate footprint of pervious area receiving dispersed flow. Calculate the ratio of pervious to impervious area.
- Look up the storm retention depth, dHSC from the chart below.
- The max dHSC is equal to the design capture storm depth for the project site.



[1] Pervious area used in calculation should only include the pervious area receiving flow, not pervious area receiving only direct rainfall or upslope pervious drainage.

Chart extends to 0.25, but designs should not go below a minimum value of 0.5 (2 parts impervious to 1 part pervious).

Worksheet 4: Hydrologic Source Control Calculation Form

		Drainage area ID	DMA 5-3	
		Total drainage area	0.027	acres
		Total drainage area Impervious Area (IA_{total})	0.027	acres
HSC ID	HSC Type/ Description/ Reference BMP Fact Sheet	Effect of individual HSC_i per criteria in **relevant fact sheet (Appendix G.1)** (d_{HSCi})[1]	Impervious Area Tributary to HSC_i (IA_i)	$d_i \times IA_i$
HSC-3	Street Trees, perennial cover over 0.014 acres of impervious area (assume 14' canopy cover per tree)	0.05"	0.027	0.00135
		Box 1:	$\sum d_i \times IA_i =$	0.00135
		Box 2:	$IA_{total} =$	0.027
		[Box 1]/[Box 2]:	$d_{HSC\ total} =$	0.05"
			Percent Capture Provided by HSCs (Table E-2)	8%

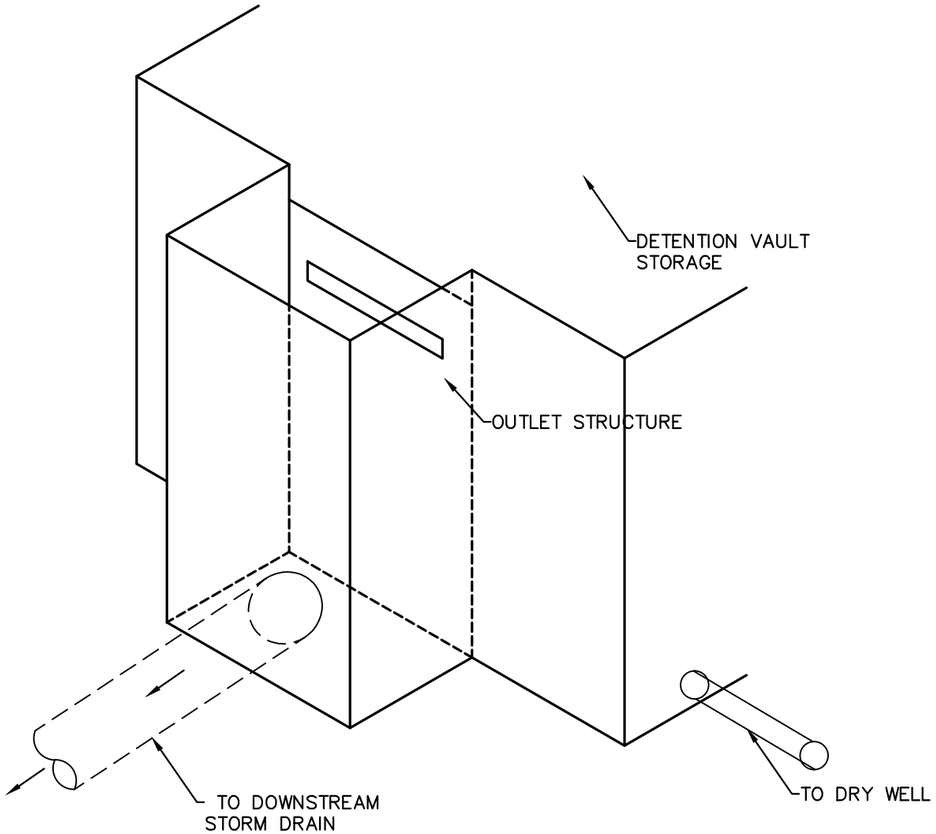
Table E-2: Fraction of Average Long Term Runoff Reduced (Capture Efficiency) by HSCs

Combined HSC Adjustment to Design Capture Storm Depth (d_{hsc})	Capture Efficiency Achieved Lowland Regions (<1,000 ft)	Capture Efficiency Achieved Mountainous Regions (>1,000 ft)
<0.05	0	0%
0.05"	8%	7%
0.1"	20%	16%
0.2"	37%	31%
0.3"	48%	42%
0.4"	57%	50%
0.5"	64%	57%
0.6"	70%	63%
0.7"	75%	68%
0.8"	80%	72%
0.9"	80%	76%
1.0"	80%	80%

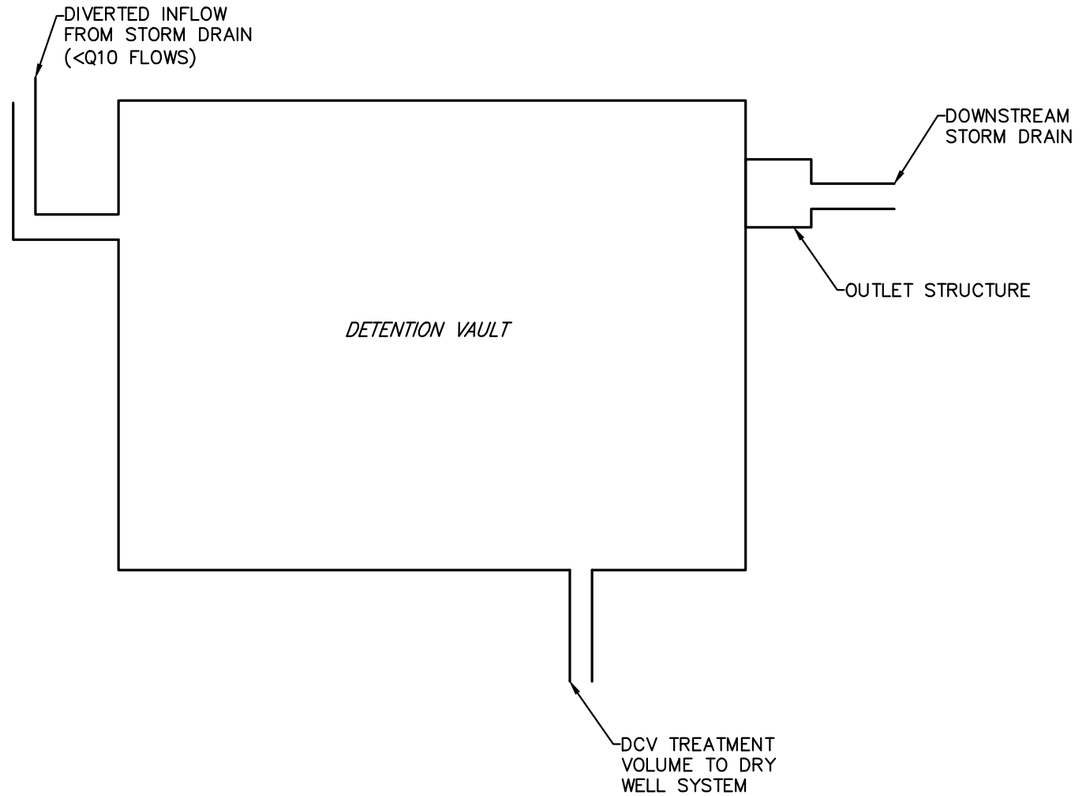
Worksheet 5: Simple Design Capture Volume Sizing Method for Full Infiltration BMPs – DMA 1 & 2

Part 1: Calculate the DCV				
1	Enter design capture storm depth, *d* (inches)	d=	See following table	inches
2a	Enter the combined effect of provided HSCs, d_{HSC} (inches) (based on Worksheet 4) including any other upstream BMPs	d_{HSC}=		inches
2b	Calculate the remainder of the design capture storm depth, $d_{remainder} = d - d_{HSC}$	$d_{remainder}$=		inches
3a	Enter DMA area tributary to BMP(s), *A* (acres) excluding any self-retaining areas	A=		acres
3b	Enter DMA Imperviousness, imp (unitless) after removal of self-retaining areas	imp=		
3c	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=		
3d	Calculate runoff volume, *DCV = (C x $d_{remainder}$ x A x 43560 x (1/12)) (See Section E.2.2)*	DCV=		cu-ft
Part 2: Design BMP and Calculate Effective Storage Depth and Footprint				
4	Enter total effective storage depth (sum of values below)	$D_{total\_effective}$	See following table	inches
4a	Ponding storage depth	D_{pond}		inches
4b	Media effective storage depth (depth * 0.2)	$D_{media\_effective}$		inches
4c	Gravel effective storage (depth * 0.4)	$D_{gravel\_effective}$		inches
5	Determine required effective footprint: A_{BMP} = DCV /(D_{Total} *12 inches/ft) If sides are sloped, measure A_{BMP} at the mid-ponding depth of the BMP.	A_{BMP}=		sq-ft
Part 3: Check Drawdown Time				
6a	Calculate design infiltration rate, $K_{design} = K_{observed} / S_{total}$ (See Worksheet 3 and Appendix D)	K_{design}=	See following table	in/hr
6b	Calculate drawdown time ($D_{total\_effective} / K_{design}$) (must be less than or equal to 48 hours).	$T_{drawdown}$=		hours
6c	If using Method 2 for drawdown (Section E.2.5) which accounts for sidewall infiltration, insert result and attach relevant calculations below.	$T_{drawdown}$=		hours
Part 4: *Check Minimum Infiltrating Surface Area for Premature Clogging*				
7a	Calculate BMP infiltrating surface area as percent of tributary impervious area ($A_{infiltrating}$/(A * imp * 43560 sq-ft/ac)		Drywells are flow based design. FS increased to account for premature clogging issues	%
7b	Calculate minimum infiltrating surface area required for BMP to avoid premature clogging (Section E.4.1)			%

DMA	ACRES	IMP	C	DEPTH (in)	DCV (cu-ft)	K_M (in/hr)	FS	K_D (in/hr)	FPS	Surface Area per foot 4'	Total SA 4' (10' depth)	Drywell Q cfs (4')	DD per drywell (hrs)
1	1.674	0.854	0.791	0.8	3843.7	96.0	4.0	24.00	0.00056	12.56	15.70	125.60	0.0698
2	4.463	0.828	0.771	0.8	9994.0	152.9	4.0	38.23	0.00088	12.56	15.70	125.60	0.1111



BASIN OUTLET SCHEMATIC
(N.T.S.)



VAULT SYSTEM PLAN VIEW
(N.T.S.)

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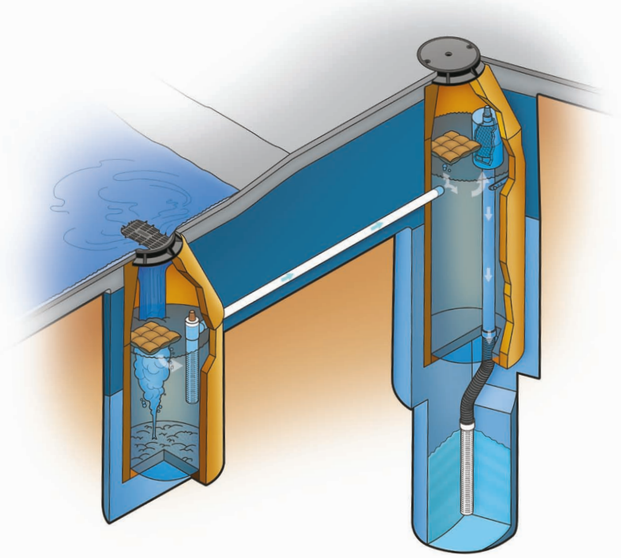
1/12

MaxWell® Plus DRAINAGE SYSTEM

Product Information and Design Features

TORRENT RESOURCES

The ***MaxWell® Plus,*** as manufactured and installed exclusively by Torrent Resources Incorporated, is the industry standard for draining large paved surfaces, nuisance water and other demanding applications. This patented system incorporates state-of-the-art pre-treatment technology.



THE ULTIMATE IN DESIGN

Since 1974, nearly 65,000 MaxWell® Systems have proven their value as a cost-effective solution in a wide variety of drainage applications. They are accepted by state and municipal agencies and are a standard detail in numerous drainage manuals. Many municipalities have recognized the inherent benefits of the MaxWell Plus and now require it for drainage of all paved surfaces.

SUPERIOR PRE-TREATMENT

Industry research, together with Torrent Resources' own experience, have shown that initial storm drainage flows have the greatest impact on system performance. This "first flush" occurs during the first few minutes of runoff, and carries the majority of sediment and debris. Larger paved surfaces or connecting pipes from catch basins, underground storage, etc. can also generate high peak flows which may strain system function. In addition, nuisance water flows require controlled processing separate from normal storm runoff demands.

Manufactured and Installed Exclusively by Torrent Resources Incorporated
Please see reverse side for additional information
U.S. Patent No. 4,923,330

In the ***MaxWell® Plus,*** preliminary treatment is provided through collection and separation in deep large-volume settling chambers. The standard MaxWell Plus System has over 2,500 gallons of capacity to contain sediment and debris carried by incoming water. Floating trash, paper, pavement oil, etc. are effectively stopped by the **PureFlo®** Debris Shields in each chamber. These shielding devices are equipped with an effective screen to filter suspended material and are vented to prevent siphoning of floating surface debris as the system drains.

EFFECTIVE PROCESSING

Incoming water from the surface grated inlets or connecting pipes is received in the Primary Settling Chamber where silt and other heavy particles settle to the bottom. A PureFlo Debris Shield ensures containment by trapping floating debris and pavement oil. The pre-treated flow is then regulated to a design rate of up to 0.25cfs and directed to a Secondary Settling Chamber. The settling and containment process is repeated, thereby effectively achieving controlled, uniform treatment. The system is drained as water rises under the PureFlo Debris Shield and spills into the top of the overflow pipe. The drainage assembly returns the cleaned water into the surrounding soil through the **FloFast®** Drainage Screen.

ABSORBENT TECHNOLOGY

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

SECURITY FEATURES

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

THE MAXWELL FIVE-YEAR WARRANTY

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

MAXWELL® PLUS DRAINAGE SYSTEM DETAIL AND SPECIFICATIONS

CALCULATING MAXWELL PLUS REQUIREMENTS:

The type of property, soil permeability, rainfall intensity and local drainage ordinances determine the number and design of MaxWell Systems. For general applications draining retained stormwater, use one standard ***MaxWell® Plus*** per the instructions below for up to 5 acres of landscaped contributory area, and up to 2 acres of paved surface. To drain nuisance water flows in storm runoff systems, add a remote inlet to the system. For smaller drainage needs, refer to our ***MaxWell® IV.*** For industrial drainage, our ***Envibro® System*** may be recommended. For additional considerations, please refer to **"Design Suggestions For Retention And Drainage Systems"** or consult our Design Staff.

COMPLETING THE MAXWELL PLUS DRAWING

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

' PRIMARY SETTLING CHAMBER DEPTH

The overall depth of the Primary Settling Chamber is determined by the amount of surface area being drained. Use a standard depth of **15 feet** for the initial acre of contributory drainage area, **plus 2 feet** for each additional acre, up to the design limits of the property type noted in "Calculating MaxWell Plus Requirements" noted above. Other conditions that would require increased chamber depths are property usage, maintenance scheduling, and severe or unusual service conditions. Connecting pipe depth may dictate deeper chambers so as to maintain the effectiveness of the settling process. Maximum chamber depth is 25 feet.
A pump and lift station is recommended for systems with deeper requirements.

' ESTIMATED TOTAL DEPTH

The Estimated Total Depth is the approximate total system depth required to achieve 10 continuous feet of penetration into permeable soils, based upon known soil information. Torrent utilizes specialized **"crowd"** equipped rigs to get through the difficult cemented soil and to reach clean drainage soils at depths up to **180 feet.** An extensive drilling log database is available to use as a reference.

' SETTLING CHAMBER DEPTH

On MaxWell Plus Systems of over 30 feet overall depth and up to 0.25cfs design rate, the standard Settling Chamber Depth is **18 feet.** Maximum chamber depth is 25 feet.

' OVERFLOW HEIGHT

The Overflow Height and Secondary Settling Chamber Depth determine the effectiveness of the settling process. The higher the overflow pipe, the deeper the chamber, the greater the settling capacity. An overflow height of **13 feet** is used with the standard settling chamber depth of **18 feet.**

"Ø DRAINAGE PIPE

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

"Ø BOLTED RING & GRATE/COVER

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

' INLET PIPE INVERT

Pipes up to 12" in diameter from catch basins, underground storage, etc. may be connected into the primary settling chamber. Larger pipe diameters dictate the use of manhole material for the primary setting chamber with 48" grates on the cone.Inverts deeper than 5 feet will require additional depth in both system settling chambers to maintain respective effective settling capacities.

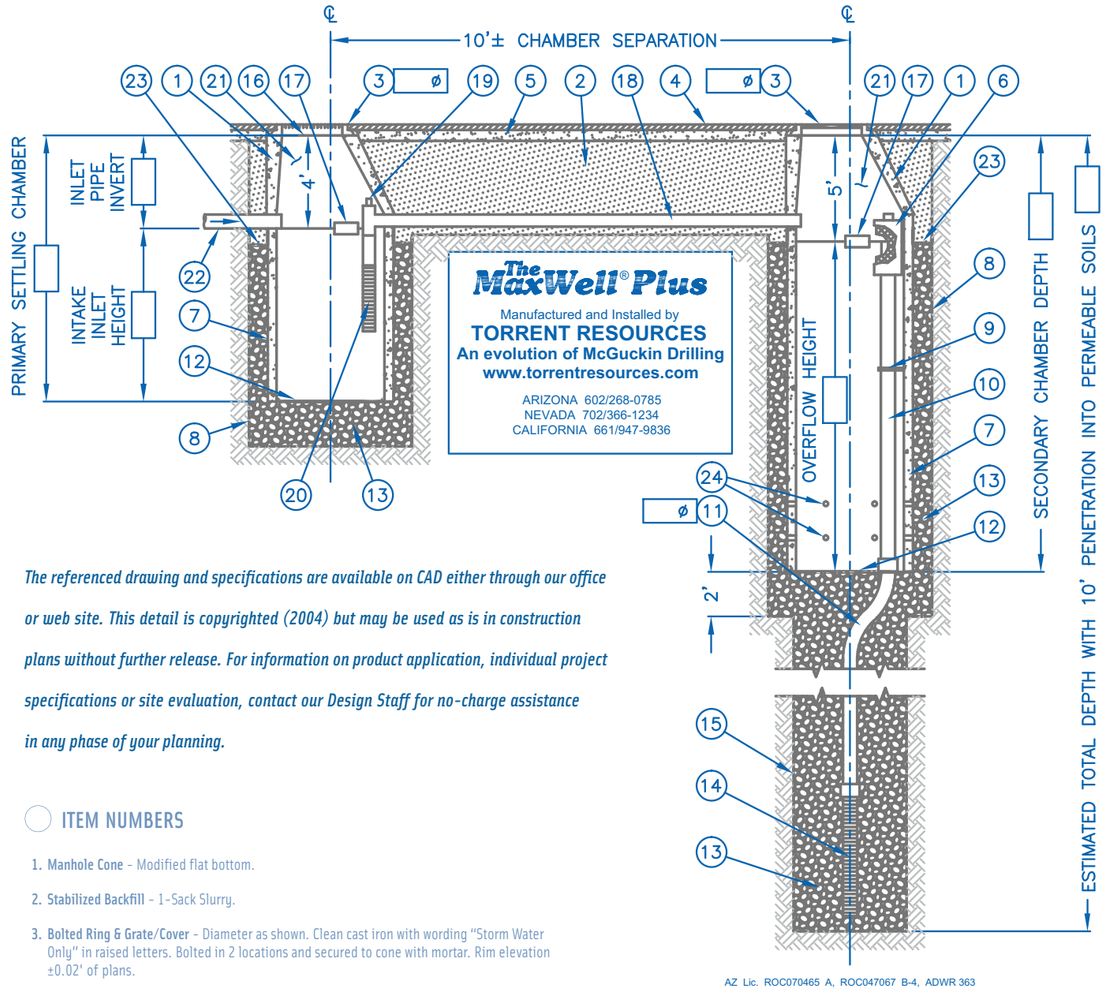
' INTAKE INLET HEIGHT

The Intake Inlet Height determines the effectiveness of the settling process in the Primary Settling Chamber. A minimum inlet height of **11 feet** is used with the standard primary settling chamber depth of 15 feet. Greater inlet heights would be required with increased system demands as noted in Primary Settling Chamber Depth. Freeboard Depth Varies with inlet pipe elevation. Increase primary/secondary settling chamber depths as needed to maintain all inlet pipe elevations above connector pipe overflow.

' CHAMBER SEPARATION

The standard separation between chambers is **10 feet** from center to center.
Soil conditions and deeper inverts may dictate required variations in chamber separation.

The MaxWell® Plus Drainage System Detail And Specifications



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

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

ITEM NUMBERS

1. **Manhole Cone** - Modified flat bottom.
2. **Stabilized Backfill** - 1-Sack Slurry.
3. **Bolted Ring & Grate/Cover** - Diameter as shown. Clean cast iron with wording "Storm Water Only" in raised letters. Bolted in 2 locations and secured to cone with mortar. Rim elevation ±0.02' of plans.
4. **Graded Basin or Paving** (by Others).
5. **Compacted Base Material** (by Others).
6. **PureFlo® Debris Shield** - Rolled 16 Ga. steel X 24" length with vented anti-siphon and internal .265" Max. SWO flattened expanded steel screen X 12" length. **Fusion bonded epoxy coated.**
7. **Pre-cast Liner** - 4000 PSI concrete 48" ID. X 54" OD. **Center in hole** and align sections to **maximize bearing surface.**
8. **Min. 6' Ø Drilled Shaft.**
9. **Support Bracket** - Formed 12 Ga. steel. **Fusion bonded epoxy coated.**
10. **Overflow Pipe** - Sch. 40 PVC mated to drainage pipe at base seal.
11. **Drainage Pipe** - ADS highway grade with TRI-A coupler. **Suspend pipe** during backfill operations to prevent buckling or breakage. Diameter as noted.
12. **Base Seal** - Geotextile or concrete slurry.
13. **Rock** - Washed, sized between 3/8" and 1-1/2" to **best complement soil conditions.**
14. **FloFast® Drainage Screen** - Sch. 40 PVC 0.120" slotted well screen with 32 slots per row/ft. Diameter varies 120" overall length with TRI-B coupler.
15. **Min. 4' Ø Shaft** - Drilled to **maintain permeability** of drainage soils.
16. **Fabric Seal** - U.V. Resistant Geotextile - **To be removed by customer** at project completion.
17. **Absorbent** – Hydrophobic Petrochemical Sponge. Min 128 oz. capacity.
18. **Connector Pipe** – 4" Ø Sch. 40 PVC.
19. **Anti-Siphon Vent** with flow regulator.
20. **Intake Screen** – Sch. 40 PVC 0.120" modified slotted well screen with 32 slots per row/ft. 48" overall length with TRI-C end cap.
21. **Freeboard Depth Varies** with inlet pipe elevation. Increase primary/secondary settling chamber depths as needed to maintain all inlet pipe elevations above connector pipe overflow.
22. **Optional Inlet Pipe** (by Others).
23. **Moisture Membrane** – 6 mil. Plastic. Place securely against eccentric cone and hole sidewall. Used in lieu of slurry in landscaped areas.
24. **Eight** – (8) **perforations per foot,** 2 row minimum.

Attachment F Hydromodification and Critical Coarse Sediment Analysis

TECHNICAL MEMORANDUM:

SWMM Modeling for Hydromodification Compliance of:

San Clemente Senior Housing & Health Center

Prepared For:

Saddleback Memorial Care

July, 2022 – REVISED September, 2022

Prepared by:

Luis Parra, PhD, CPSWQ, ToR, D.WRE.
R.C.E. 66377

REC Consultants
2442 Second Avenue
San Diego, CA 92101
Telephone: (619) 232-9200

TECHNICAL MEMORANDUM

TO: Saddleback Memorial Health Care

FROM: Luis Parra, PhD, PE, CPSWQ, ToR, D.WRE, CFM.
David Edwards, MS, PE, CFM.

DATE: July 6, 2022, Revised September 1, 2022

RE: Summary of SWMM Modeling for Hydromodification Compliance for San Clemente Senior Housing & Health Center, San Clemente, CA.

INTRODUCTION

This memorandum summarizes the approach used to model the proposed residential/medical development site in the City of San Clemente using the Environmental Protection Agency (EPA) Storm Water Management Model 5.0 (SWMM). SWMM models were prepared for pre and post-developed conditions at the site in order to determine if the proposed underground detention facilities have sufficient volume to meet Order R9-2015-0001. This order states that South Orange County should be under the California Regional Water Quality Control Board San Diego Region (SDRWQCB) Permit requirements (Order R9-2013-001), as explained in the South Orange County Hydromodification Management Plan (HMP), dated April, 2015, prepared for the southern portion of Orange County.

SWMM MODEL DEVELOPMENT

The San Clemente Senior Housing & Health Center project proposes a senior care residential development on the current hospital site. Two (2) SWMM models were prepared for this study: the first for the pre-developed and the second for the post-developed conditions. The project site drains to two (2) Points of Compliance (POC); POC-1 which is an existing storm drain located to the southwest of the project site and POC-2 which is also an existing storm drain system located to the eastern boundary of the project site. Both storm drain systems convey flow in a westerly direction beneath the adjacent 405 Freeway, discharging to a natural stream at two (2) separate locations.

The SWMM model was used since we have found it to be more comparable to the Orange County area watersheds than the alternative South Orange County Hydrology Model (SOHM) and also because it is a non-proprietary model approved by the HMP document. For both SWMM models, flow duration curves were prepared to determine if the proposed HMP facilities are sufficient to meet the current HMP requirements.

The inputs required to develop SWMM models include rainfall, watershed characteristics and BMP configurations. The Laguna Beach gauge from the SOCHM model was extracted and used for this study, since it is the most representative of the project site precipitation due to elevation and proximity to the project site.

Per the California Irrigation Management Information System “Reference Evaporation Zones” (CIMIS ETo Zone Map), the project site is located within the Zone 4 Evapotranspiration Area. Thus, evapotranspiration values for the site were modeled using Zone 4 average monthly values from Table

G.1-1 from the County of San Diego 2020 BMP Design Manual as this include the location of the site. The site was modeled with Type D hydrologic soil as this is the existing soils determined from the NRCS Soil Survey. Soils have been assumed to be compact in the existing condition to represent the current mass graded condition of the site. The post developed conditions were modeled also as fully compacted. Other SWMM inputs for the subareas are discussed in the appendices to this document, where the selection of the parameters is explained in detail.

HMP MODELING

EXISTING CONDITIONS

The runoff from the existing hospital site and associated hardscape parking areas discharge to two (2) Points of Compliance located to the northwest and southwest of the project site to two (2) separate storm drain systems. Table 1 below provides a summary of the existing conditions DMAs.

TABLE 1 – SUMMARY OF EXISTING CONDITIONS

DMA	Tributary Area, A (Ac)	Impervious Percentage, Ip[(1)]	POC
DMA-1	2.092	0%	1
DMA-2	4.538	0%	2
TOTAL	**6.63**	--	n/a

Notes: (1) – Per the 2013 RWQCB permit, existing condition impervious surfaces are not to be accounted for in existing conditions analysis if they are part of property boundary. Therefore, both DMAs were modeled as 0% impervious.

DEVELOPED CONDITIONS

Runoff from the developed project site drains to two (2) separate underground detention facilities located at the existing discharge locations from the project site. Flows are intercepted by a series of curb inlets which then convey runoff flows via a proposed storm drain to the aforementioned detention vaults. Peak flows beyond the HMP threshold (i.e. flows greater than the 10-year event) bypass the proposed vault systems and discharge directly to the receiving storm drain outlet location. Table 2 on the following page provides a summary of the developed conditions DMAs.

Runoff tributary to the aforementioned underground vaults are primarily drained via a proposed dry well system or a riser outlet structure. The first riser structure outlet is located at an elevation such that the water quality treatment volume (Design Capture Volume – DCV) is fully contained within the vault and can only exit the vault via dry well infiltration. Flows in excess of the DCV can outlet via the riser structure within the vault systems. A riser spillway structure with orifices and slots (see dimensions in Table 4) will be located at the downstream end of the vaults to control the flows. The riser structures will act as a spillway such that peak flows can be safely discharged to the receiving storm drain system.

It is assumed all storm water quality requirements for the project will be met by the onsite water quality BMPs. However, detailed water quality requirements are not discussed within this technical memo. For further information in regards to storm water quality requirements for the project, please refer to the site specific Water Quality Management Plan (WQMP).

TABLE 2 – SUMMARY OF DEVELOPED CONDITIONS

DMA	Tributary Area, A (Ac)	Impervious Percentage, Ip	POC
DMA 1	1.674	85.4%	POC 1
DMA 4-1	0.353	0%	
DMA 2	4.462	82.0%	POC 2
DMA 3	0.019	15.8%	
DMA 4-2	0.095	0%	
TOTAL	**6.67**	--	--

The underground detention vault systems were modeled using the storage unit feature within SWMM. The riser structure with its given outlets was modeled using the outlet feature in SWMM. The storage unit feature can model the vaults volume while the outlet feature models the discharge of the flows via the riser structure. It should be noted that detailed outlet structure location and elevations will be shown on the construction plans based on the recommendations of this study.

DMA's 3 and 4 are self-treating and/or deminimus areas that drain directly to the receiving POC, confluencing with flows from the overall developed site. It should be noted that offsite improvements (DMA's 5-1, 5-2 and 5-3) are part of the EPA green street initiative design for the adjacent Camino De Los Mares and are not required to be analyzed for HMP given the EPA green streets design designation.

BMP MODELING FOR HMP PURPOSES

Two (2) underground detention vault systems will be used for hydromodification conformance for the project site. Tables 3 & 4 illustrate the dimensions required for HMP compliance according to the SWMM model that was undertaken for the project.

TABLE 3 – SUMMARY OF DEVELOPED DUAL PURPOSE DETENTION VAULTS

Vault	Tributary Area (Ac)	DIMENSIONS					
		Vault Dimensions (ft)	Vault Area, (ft^2)	Depth to spillway (ft)(1)	Weir Length(2) (ft)	Total Vault Depth(3) (ft)	Drywell Infiltration (cfs)
UG 1	1.32	1 x 10' x 50' x 8'	500	9.50	5.0	10.0	0.0698
UG 1	4.587	2 x 20' x 44' x 10'	1,760	7.70	10.0	8.0	0.1111

Notes: (1): Depth of ponding beneath outlet structure's main weir.
(2): Overflow length.
(3): Total surface depth of BMP from top crest elevation to basin invert.

TABLE 4 – SUMMARY OF RISER DETAILS

Vault	Lower Slot		Main Weir	
	B x h	Elev.(1)	Length(2)	Elev.(1)
UG-1	2.0' x 1"	7.7 ft	5.0'	9.5 ft
UG-2	2.5' x 2"	5.7 ft	10.0'	8.5 ft

(1) Underground vault elevation assumed to be 0.00 ft elevation.

DETERMINATION OF MANNINGS N=0.05

The n = 0.05 has already been approved in many studies prepared by multiple San Diego consulting firms, among them REC, TRWE, Excel and others. Per the regional board approved study undertaken in the TRWE N-Perv paper (an excerpt of which is provided in Attachment 7 of this report) establishes an n value as low as 0.017 to 0.038 for smooth, moderate, rough and gravel soil depending on the intensity of rain, 0.04 to 0.055 for pasture, and average grasses, with values as high as 0.08 to 0.12 for dense shrub and bushes. Values of n for heavy rain are not considered (I > 1.2 in/hr) because those intensities are very rare and if they occur generate peaks larger than Q10.

In this regard, there are 16 potential values of n that can be used in the most common scenarios, depending on the combination of intensity and surface condition (LR = light rain; MR = moderate rain): smooth soil (0.017 LR, 0.021 MR); moderate bare soil (0.025 LR, 0.030 MR); rough soil (0.032 LR, 0.038 MR); gravel soil (0.025 LR; 0.032 MR); average grass (0.04 LR; 0.05 MR); pasture (0.04 LR; 0.055 MR); dense grass (0.06 LR, 0.09 MR); and shrubs an bushes (0.08 LR; 0.12 MR).

An average of those values corresponds to n = 0.047 as an arithmetic mean, with a geometric mean to 0.045. A weighted average of those values (giving soil values a 30% weight and vegetation values a 70% weight) would be 0.051 as arithmetic mean and 0.048 as geometric mean. Therefore, it is the opinion of REC that a conservative weighted average of n = 0.05 properly represents the conditions of the project based on TRWE – Board Approved paper.

FLOW DURATION CURVE COMPARISON

The Flow Duration Curve (FDC) for the site was compared at the POC by exporting the hourly runoff time series results from SWMM to a spreadsheet.

Q_2 and Q_{10} were determined with a partial duration statistical analysis of the runoff time series in an Excel spreadsheet using the Cunnane plotting position method (which is the preferred plotting methodology in the HMP Permit). As the SWMM Model includes a statistical analysis based on the Weibull Plotting Position Method, the Weibull Method was also used within the spreadsheet to ensure that the results were similar to those obtained by the SWMM Model.

The range between 10% of Q_2 and Q_{10} was divided into 100 equal time intervals; the number of hours that each flow rate was exceeded was counted from the hourly series. Additionally, the intermediate peaks with a return period "i" were obtained (Q_i with i=3 to 9). For the purpose of the plot, the values were presented as percentage of time exceeded for each flow rate. FDC comparison at the POCs is illustrated in Figures 1a/2a and 1b/2b in both normal and logarithmic scale.

As can be seen in Figures 1a and 1b, the FDC for the proposed condition with the HMP BMP is within 110% of the curve for the existing condition in both peak flows and durations. The additional runoff volume generated from developing the site will be released to the existing point of discharge at a flow rate below the 10% Q_2 lower threshold for POC-1 and POC-2. Additionally, the project will also not increase peak flow rates between the Q_2 and the Q_{10}, as shown in the peak flow tables in Attachment 1.

SUMMARY

This study has demonstrated that the proposed HMP underground BMPs provided for the San Clemente Senior Housing site are sufficient to meet the current HMP criteria for the Points of Compliance, if the cross-section areas and volumes recommended within this technical memorandum, and the respective orifices and outlet structures are incorporated as specified within the proposed project site.

KEY ASSUMPTIONS

1. Type D Soils are representative of the existing condition site.

ATTACHMENTS

1. Q_2 to Q_{10} Comparison Tables
2. Flow Duration Curve Analysis
3. List of the "n" largest Peaks: Pre-Development and Post-Development Conditions
4. Area Vs Elevation & Discharge Vs Elevation
5. Pre & Post Development Maps, Project Plan and Section Sketches
6. SWMM Input Data in Input Format (Existing and Proposed Models)
7. EPA SWMM Figures and Explanations
8. Soil Maps
9. Summary files from the SWMM Model

REFERENCES

[1] – *"Review and Analysis of San Diego County Hydromodification Management Plan (HMP): Assumptions, Criteria, Methods, & Modeling Tools – Prepared for the Cities of San Marcos, Oceanside & Vista",* May 2012, TRW Engineering.

[2] – *"South Orange County Hydromodification Management Plan (HMP)"* Prepared for South Orange County", April 1, 2015, Prepared by RBF.

[3] - Order R9-2013-001, California Regional Water Quality Control Board San Diego Region (SDRWQCB).

[4] – "*Handbook of Hydrology*", David R. Maidment, Editor in Chief. 1992, McGraw Hill.

[5] – "*County of San Diego BMP Design Manual*", September 2020.

[6] – *"Improving Accuracy in Continuous Hydrologic Modeling: Guidance for Selecting Pervious Overland Flow Manning's n Values in the San Diego Region",* TRWE, 2016.

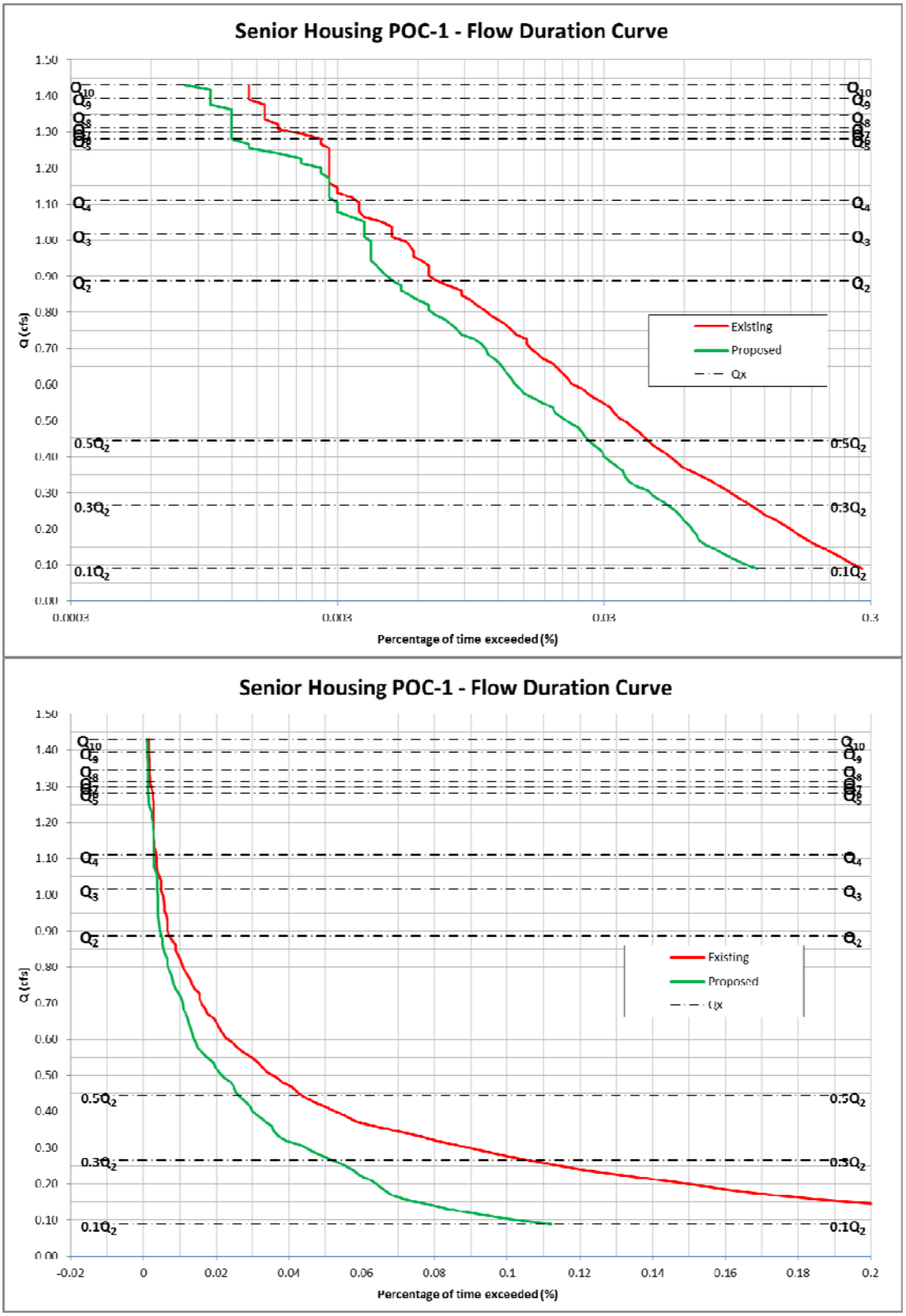


Figure 1a and 1b. Flow Duration Curve Comparison (logarithmic and normal "x" scale)

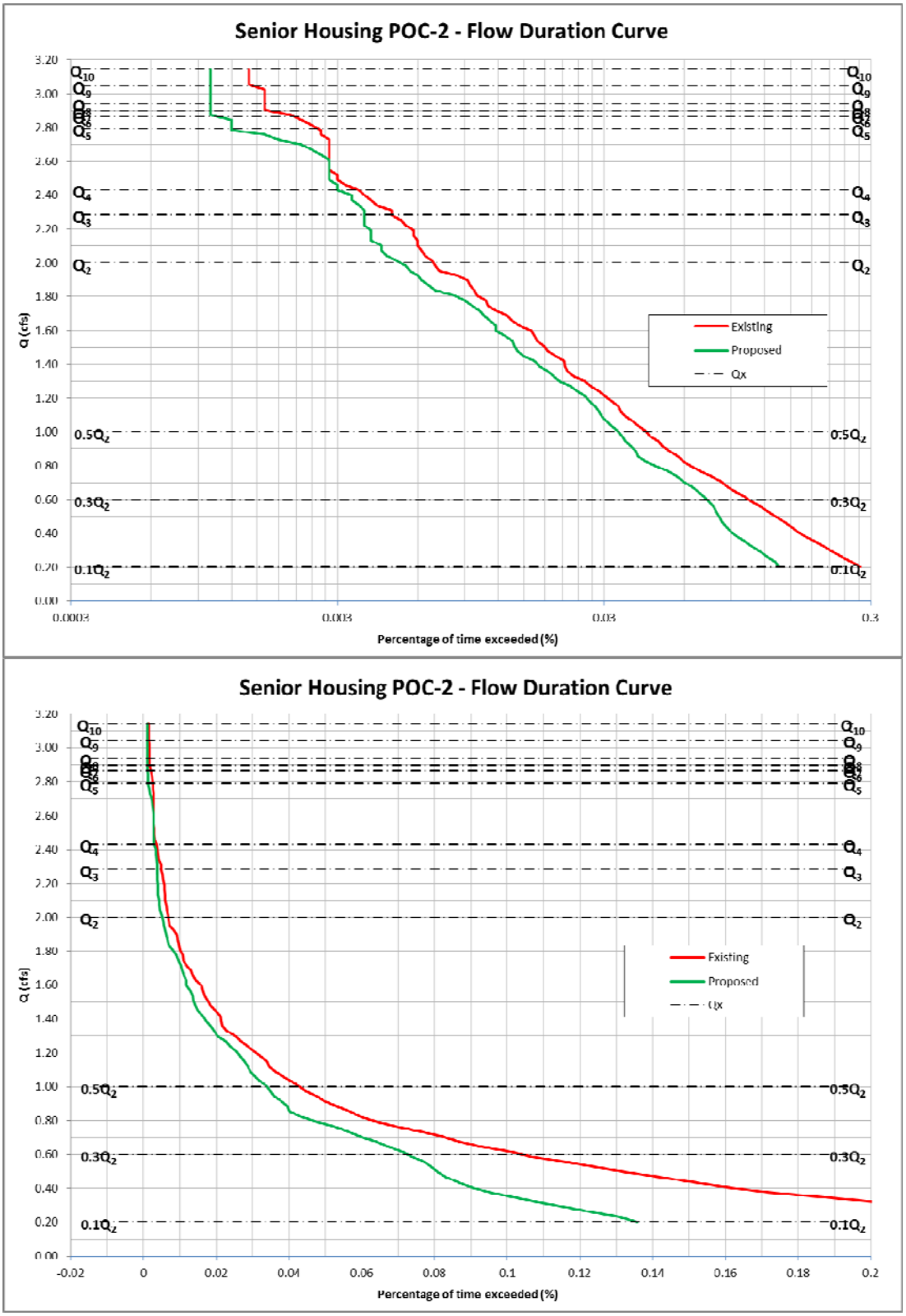


Figure 2a and 2b. Flow Duration Curve Comparison (logarithmic and normal "x" scale)

ATTACHMENT 1

Q_2 to Q_{10} Comparison Table – POC 1

Return Period	Existing Condition (cfs)	Mitigated Condition (cfs)	Reduction, Exist - Mitigated (cfs)
2-year	0.888	0.792	0.096
3-year	1.016	0.886	0.131
4-year	1.110	1.058	0.053
5-year	1.281	1.196	0.084
6-year	1.298	1.228	0.071
7-year	1.313	1.239	0.074
8-year	1.346	1.250	0.096
9-year	1.395	1.256	0.139
10-year	1.430	1.267	0.164

Q_2 to Q_{10} Comparison Table – POC 2

Return Period	Existing Condition (cfs)	Mitigated Condition (cfs)	Reduction, Exist - Mitigated (cfs)
2-year	2.001	1.820	0.180
3-year	2.284	2.075	0.208
4-year	2.432	2.353	0.079
5-year	2.794	2.626	0.169
6-year	2.868	2.671	0.197
7-year	2.896	2.709	0.187
8-year	2.941	2.747	0.194
9-year	3.046	2.768	0.278
10-year	3.144	2.780	0.364

ATTACHMENT 2

FLOW DURATION CURVE ANALYSIS

1) Flow duration curve shall not exceed the existing conditions by more than 10%, neither in peak flow nor duration.

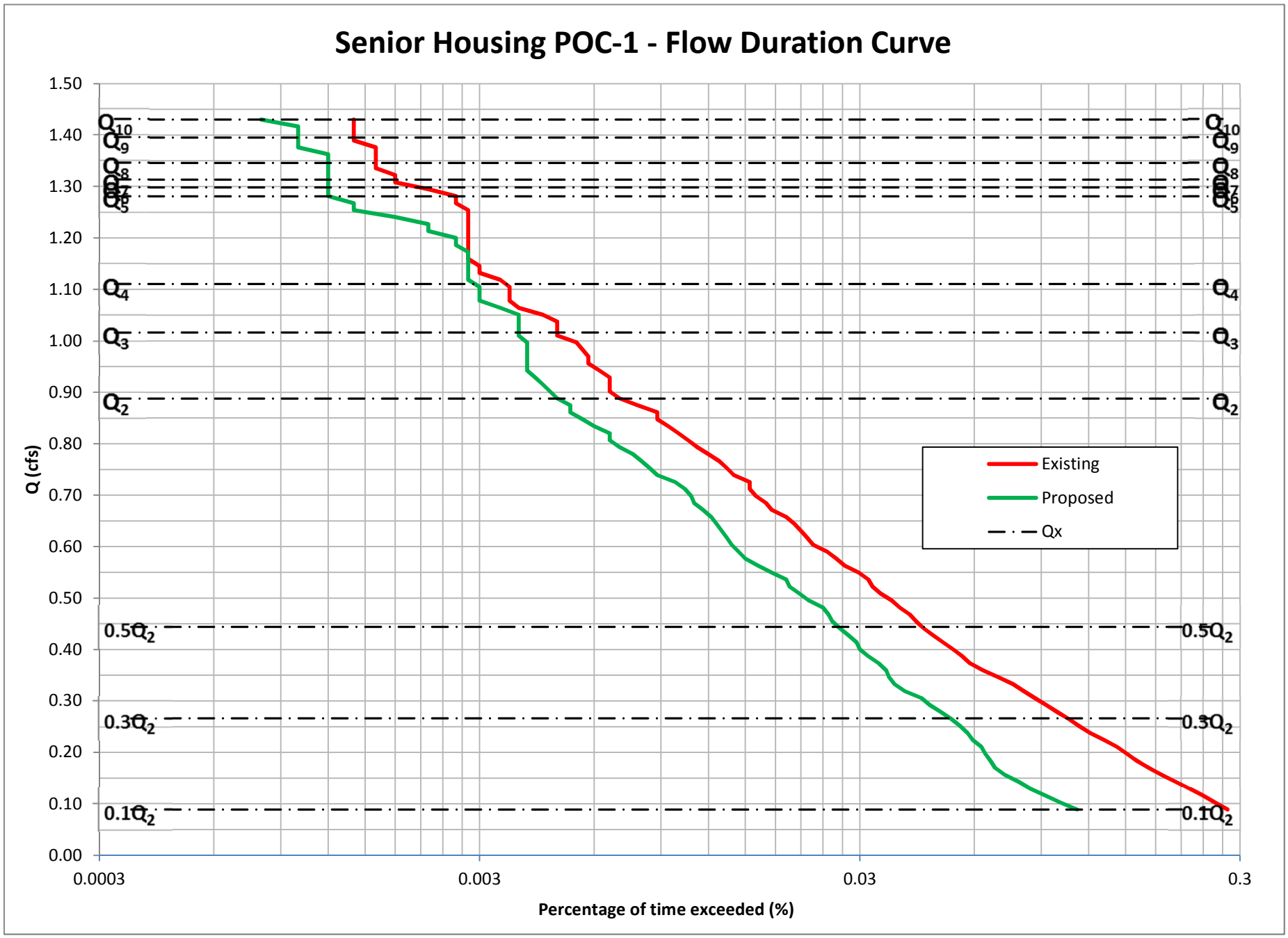
The figures on the following pages illustrate that the flow duration curve in post-development conditions after the proposed BMP is below the existing flow duration curve. The flow duration curve table following the curve shows that if the interval $0.10Q_2 - Q_{10}$ is divided in 100 sub-intervals, then a) the post development divided by pre-development durations are never larger than 110% (the permit allows up to 110%); and b) there are no more than 10 intervals in the range 101%-110% which would imply an excess over 10% of the length of the curve (the permit allows less than 10% of excesses measured as 101-110%).

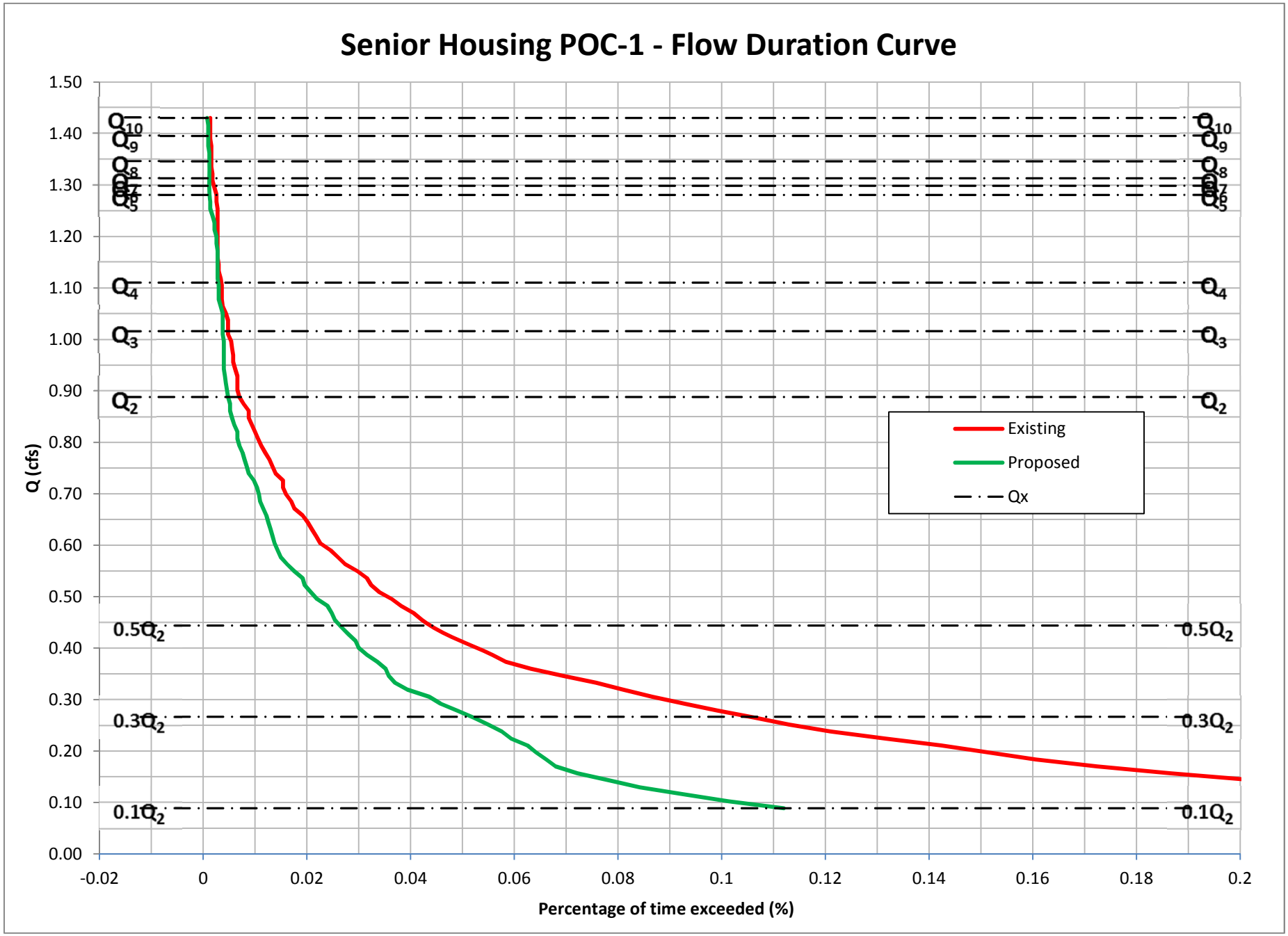
Consequently, the design passes the hydromodification test.

It is important to note that the flow duration curve can be expressed in the "x" axis as percentage of time, hours per year, total number of hours, or any other similar time variable. As those variables only differ by a multiplying constant, their plot in logarithmic scale is going to look exactly the same, and compliance can be observed regardless of the variable selected. However, in order to satisfy the City of San Clemente HMP example, % of time exceeded is the variable of choice in the flow duration curve. The selection of a logarithmic scale in lieu of the normal scale is preferred, as differences between the pre-development and post-development curves can be seen more clearly in the entire range of analysis. Both graphics are presented just to prove the difference.

In terms of the "y" axis, the peak flow value is the variable of choice. As an additional analysis performed by REC, not only the range of analysis is clearly depicted (10% of Q_2 to Q_{10}) but also all intermediate flows are shown (Q_2, Q_3, Q_4, Q_5, Q_6, Q_7, Q_8 and Q_9) in order to demonstrate compliance at any range $Q_x - Q_{x+1}$. It must be pointed out that one of the limitations of both the SWMM and SDHM models is that the intermediate analysis is not performed (to obtain Q_i from i = 2 to 10). REC performed the analysis using the Cunnane Plotting position Method (the preferred method in the HMP permit) from the "n" largest independent peak flows obtained from the continuous time series.

The largest "n" peak flows are attached in this appendix, as well as the values of Q_i with a return period "i", from i=2 to 10. The Q_i values are also added into the flow-duration plot.


Senior Housing POC-1 - Flow Duration Curve
Q (cfs)
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Q_{10}
Q_9
Q_8
Q_7
Q_6
Q_5
Q_4
Q_3
Q_2
$0.5Q_2$
$0.3Q_2$
$0.1Q_2$
Existing
Proposed
Qx
0.0003
0.003
0.03
0.3
Percentage of time exceeded (%)


Senior Housing POC-1 - Flow Duration Curve
Q (cfs)
Percentage of time exceeded (%)
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.02
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
Q10
Q9
Q8
Q7
Q6
Q5
Q4
Q3
Q2
0.5Q2
0.3Q2
0.1Q2
Existing
Proposed
Qx

Flow Duration Curve Data for Senior Housing POC-1, City of San Clemente CA

Q2 =	0.89	cfs	Fraction	10 %
Q10 =	1.43	cfs		
Step =	0.0136	cfs		
Count =	499995	hours		
	57.04	years		

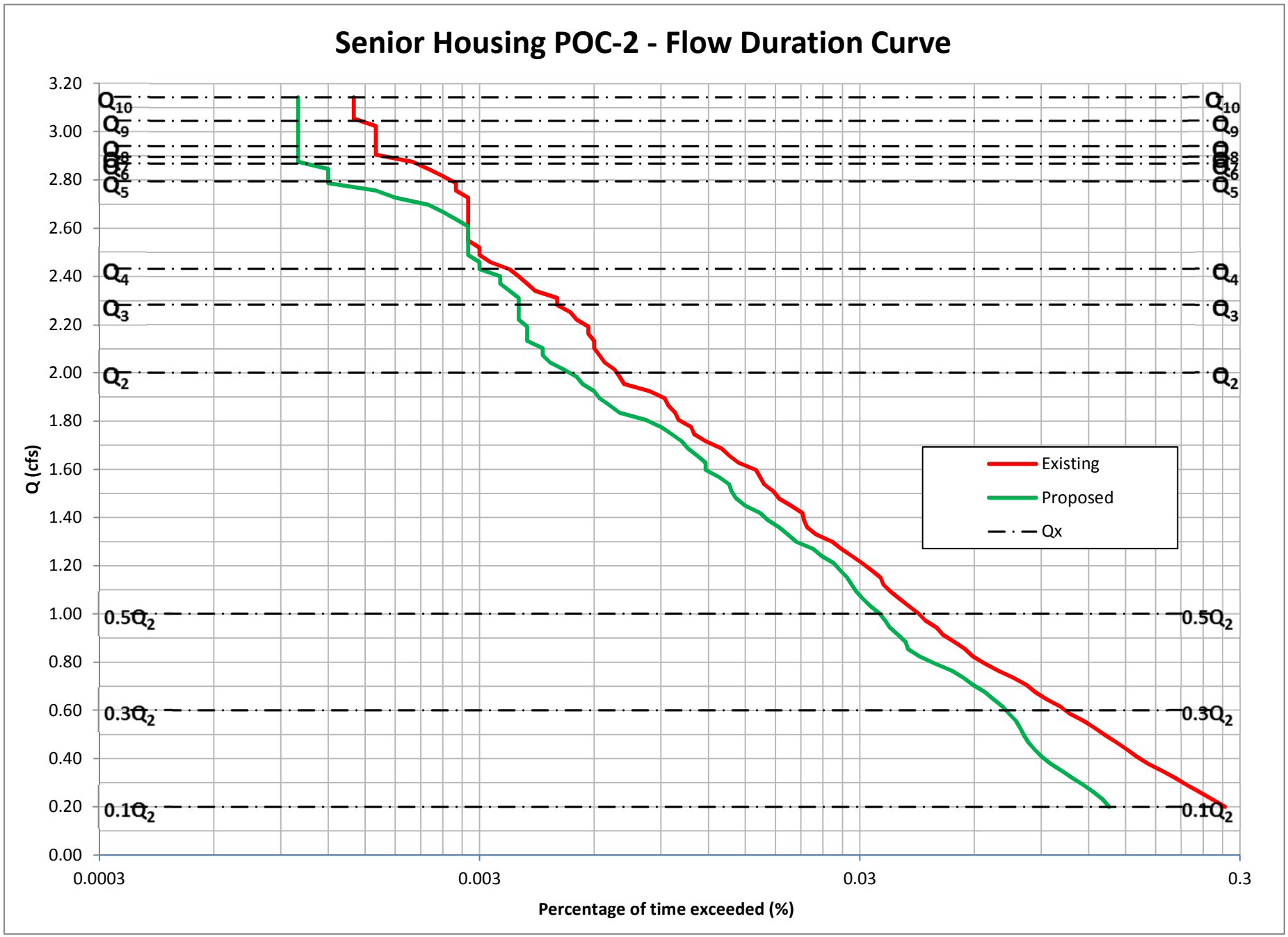
	Existing Condition			Detention Optimized			Pass or
Interval	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	Fail?
1	0.089	1391	2.78E-01	560	1.12E-01	40%	Pass
2	0.102	1287	2.57E-01	507	1.01E-01	39%	Pass
3	0.116	1197	2.39E-01	463	9.26E-02	39%	Pass
4	0.129	1099	2.20E-01	421	8.42E-02	38%	Pass
5	0.143	1016	2.03E-01	392	7.84E-02	39%	Pass
6	0.157	933	1.87E-01	361	7.22E-02	39%	Pass
7	0.170	862	1.72E-01	340	6.80E-02	39%	Pass
8	0.184	803	1.61E-01	331	6.62E-02	41%	Pass
9	0.197	757	1.51E-01	321	6.42E-02	42%	Pass
10	0.211	712	1.42E-01	313	6.26E-02	44%	Pass
11	0.224	658	1.32E-01	297	5.94E-02	45%	Pass
12	0.238	605	1.21E-01	288	5.76E-02	48%	Pass
13	0.251	565	1.13E-01	275	5.50E-02	49%	Pass
14	0.265	532	1.06E-01	261	5.22E-02	49%	Pass
15	0.279	496	9.92E-02	245	4.90E-02	49%	Pass
16	0.292	464	9.28E-02	229	4.58E-02	49%	Pass
17	0.306	433	8.66E-02	218	4.36E-02	50%	Pass
18	0.319	405	8.10E-02	197	3.94E-02	49%	Pass
19	0.333	379	7.58E-02	185	3.70E-02	49%	Pass
20	0.346	347	6.94E-02	179	3.58E-02	52%	Pass
21	0.360	316	6.32E-02	176	3.52E-02	56%	Pass
22	0.373	292	5.84E-02	168	3.36E-02	58%	Pass
23	0.387	279	5.58E-02	158	3.16E-02	57%	Pass
24	0.400	264	5.28E-02	150	3.00E-02	57%	Pass
25	0.414	248	4.96E-02	147	2.94E-02	59%	Pass
26	0.428	234	4.68E-02	140	2.80E-02	60%	Pass
27	0.441	221	4.42E-02	133	2.66E-02	60%	Pass
28	0.455	211	4.22E-02	127	2.54E-02	60%	Pass
29	0.468	203	4.06E-02	124	2.48E-02	61%	Pass
30	0.482	191	3.82E-02	120	2.40E-02	63%	Pass
31	0.495	182	3.64E-02	110	2.20E-02	60%	Pass
32	0.509	170	3.40E-02	104	2.08E-02	61%	Pass
33	0.522	162	3.24E-02	98	1.96E-02	60%	Pass
34	0.536	158	3.16E-02	96	1.92E-02	61%	Pass
35	0.550	149	2.98E-02	88	1.76E-02	59%	Pass
36	0.563	137	2.74E-02	81	1.62E-02	59%	Pass
37	0.577	130	2.60E-02	75	1.50E-02	58%	Pass

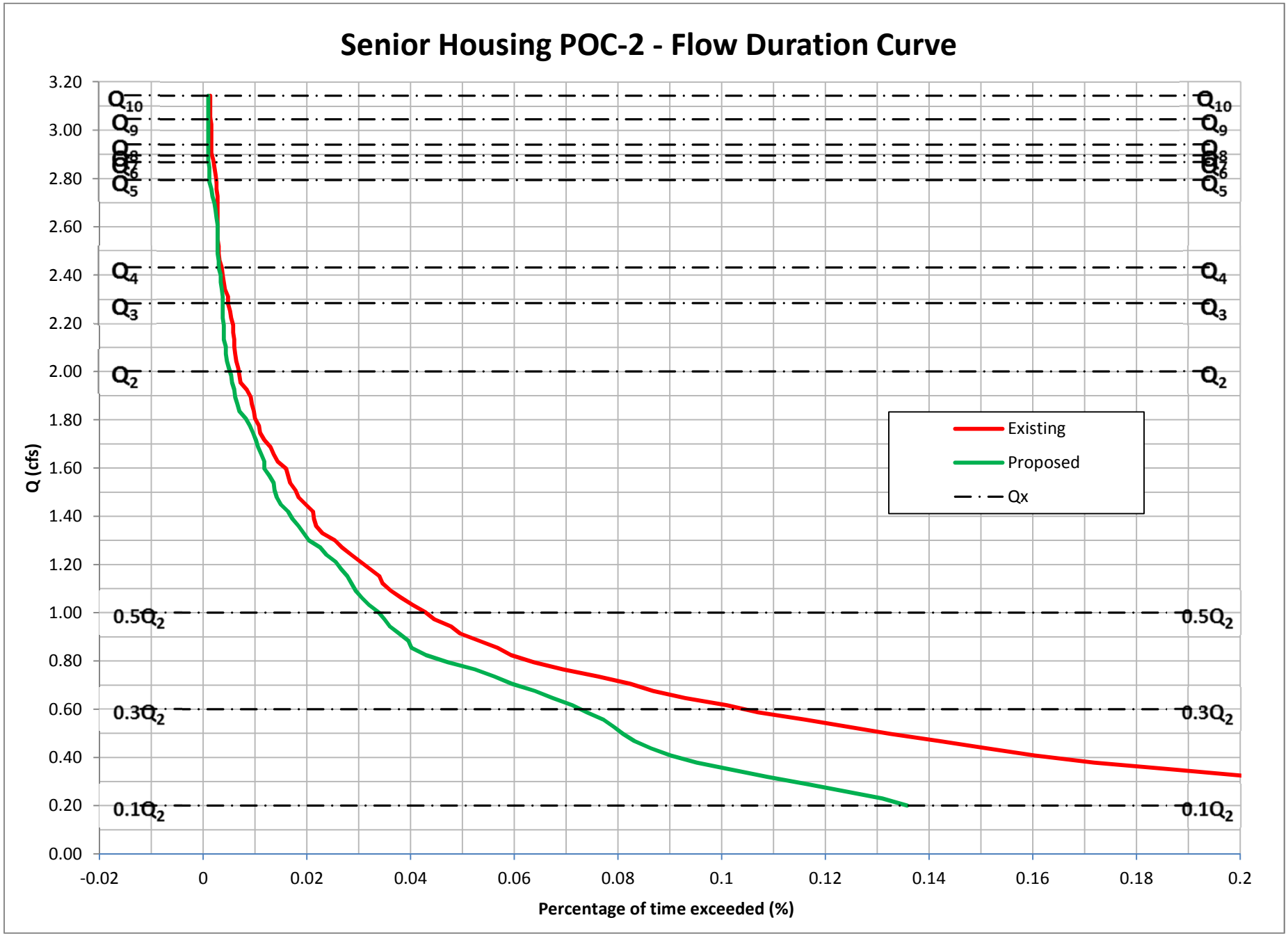
Interval	Existing Condition			Detention Optimized			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
38	0.590	123	2.46E-02	72	1.44E-02	59%	Pass
39	0.604	113	2.26E-02	69	1.38E-02	61%	Pass
40	0.617	109	2.18E-02	67	1.34E-02	61%	Pass
41	0.631	105	2.10E-02	65	1.30E-02	62%	Pass
42	0.644	101	2.02E-02	63	1.26E-02	62%	Pass
43	0.658	96	1.92E-02	61	1.22E-02	64%	Pass
44	0.671	88	1.76E-02	58	1.16E-02	66%	Pass
45	0.685	85	1.70E-02	55	1.10E-02	65%	Pass
46	0.699	80	1.60E-02	54	1.08E-02	68%	Pass
47	0.712	77	1.54E-02	52	1.04E-02	68%	Pass
48	0.726	77	1.54E-02	49	9.80E-03	64%	Pass
49	0.739	70	1.40E-02	44	8.80E-03	63%	Pass
50	0.753	67	1.34E-02	42	8.40E-03	63%	Pass
51	0.766	64	1.28E-02	40	8.00E-03	63%	Pass
52	0.780	60	1.20E-02	38	7.60E-03	63%	Pass
53	0.793	56	1.12E-02	35	7.00E-03	63%	Pass
54	0.807	53	1.06E-02	33	6.60E-03	62%	Pass
55	0.821	50	1.00E-02	33	6.60E-03	66%	Pass
56	0.834	47	9.40E-03	30	6.00E-03	64%	Pass
57	0.848	44	8.80E-03	28	5.60E-03	64%	Pass
58	0.861	44	8.80E-03	26	5.20E-03	59%	Pass
59	0.875	39	7.80E-03	26	5.20E-03	67%	Pass
60	0.888	35	7.00E-03	24	4.80E-03	69%	Pass
61	0.902	33	6.60E-03	23	4.60E-03	70%	Pass
62	0.915	33	6.60E-03	22	4.40E-03	67%	Pass
63	0.929	33	6.60E-03	21	4.20E-03	64%	Pass
64	0.942	31	6.20E-03	20	4.00E-03	65%	Pass
65	0.956	29	5.80E-03	20	4.00E-03	69%	Pass
66	0.970	29	5.80E-03	20	4.00E-03	69%	Pass
67	0.983	28	5.60E-03	20	4.00E-03	71%	Pass
68	0.997	27	5.40E-03	20	4.00E-03	74%	Pass
69	1.010	24	4.80E-03	19	3.80E-03	79%	Pass
70	1.024	24	4.80E-03	19	3.80E-03	79%	Pass
71	1.037	24	4.80E-03	19	3.80E-03	79%	Pass
72	1.051	22	4.40E-03	19	3.80E-03	86%	Pass
73	1.064	19	3.80E-03	17	3.40E-03	89%	Pass
74	1.078	18	3.60E-03	15	3.00E-03	83%	Pass
75	1.092	18	3.60E-03	15	3.00E-03	83%	Pass
76	1.105	18	3.60E-03	15	3.00E-03	83%	Pass
77	1.119	17	3.40E-03	14	2.80E-03	82%	Pass
78	1.132	15	3.00E-03	14	2.80E-03	93%	Pass
79	1.146	15	3.00E-03	14	2.80E-03	93%	Pass
80	1.159	14	2.80E-03	14	2.80E-03	100%	Pass
81	1.173	14	2.80E-03	14	2.80E-03	100%	Pass
82	1.186	14	2.80E-03	13	2.60E-03	93%	Pass

Interval	Existing Condition			Detention Optimized			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
83	1.200	14	2.80E-03	13	2.60E-03	93%	Pass
84	1.213	14	2.80E-03	11	2.20E-03	79%	Pass
85	1.227	14	2.80E-03	11	2.20E-03	79%	Pass
86	1.241	14	2.80E-03	9	1.80E-03	64%	Pass
87	1.254	14	2.80E-03	7	1.40E-03	50%	Pass
88	1.268	13	2.60E-03	7	1.40E-03	54%	Pass
89	1.281	13	2.60E-03	6	1.20E-03	46%	Pass
90	1.295	11	2.20E-03	6	1.20E-03	55%	Pass
91	1.308	9	1.80E-03	6	1.20E-03	67%	Pass
92	1.322	9	1.80E-03	6	1.20E-03	67%	Pass
93	1.335	8	1.60E-03	6	1.20E-03	75%	Pass
94	1.349	8	1.60E-03	6	1.20E-03	75%	Pass
95	1.363	8	1.60E-03	6	1.20E-03	75%	Pass
96	1.376	8	1.60E-03	5	1.00E-03	63%	Pass
97	1.390	7	1.40E-03	5	1.00E-03	71%	Pass
98	1.403	7	1.40E-03	5	1.00E-03	71%	Pass
99	1.417	7	1.40E-03	5	1.00E-03	71%	Pass
100	1.430	7	1.40E-03	4	8.00E-04	57%	Pass

Peak Flows calculated with Cunnane Plotting Position

Return Period (years)	Pre-dev. Q (cfs)	Post-Dev. Q (cfs)	Reduction (cfs)
10	1.430	1.267	0.164
9	1.395	1.256	0.139
8	1.346	1.250	0.096
7	1.313	1.239	0.074
6	1.298	1.228	0.071
5	1.281	1.196	0.084
4	1.110	1.058	0.053
3	1.016	0.886	0.131
2	0.888	0.792	0.096


Senior Housing POC-2 - Flow Duration Curve
3.20
3.00
2.80
2.60
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Q (cfs)
Q_{10}
Q_9
Q_8
Q_7
Q_6
Q_5
Q_4
Q_3
Q_2
$0.5Q_2$
$0.3Q_2$
$0.1Q_2$
Existing
Proposed
Qx
0.0003
0.003
0.03
0.3
Percentage of time exceeded (%)


Senior Housing POC-2 - Flow Duration Curve
Q (cfs)
Percentage of time exceeded (%)
3.20
3.00
2.80
2.60
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-0.02
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
Q10
Q9
Q8
Q7
Q6
Q5
Q4
Q3
Q2
0.5Q2
0.3Q2
0.1Q2
Existing
Proposed
Qx

Flow Duration Curve Data for Senior Housing POC-2, City of San Clemente CA

Q2 =	2.00	cfs	Fraction	10 %
Q10 =	3.14	cfs		
Step =	0.0297	cfs		
Count =	499995	hours		
	57.04	years		

	Existing Condition			Detention Optimized			Pass or
Interval	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	Fail?
1	0.200	1369	2.74E-01	679	1.36E-01	50%	Pass
2	0.230	1272	2.54E-01	655	1.31E-01	51%	Pass
3	0.260	1176	2.35E-01	619	1.24E-01	53%	Pass
4	0.289	1090	2.18E-01	583	1.17E-01	53%	Pass
5	0.319	1015	2.03E-01	544	1.09E-01	54%	Pass
6	0.349	938	1.88E-01	510	1.02E-01	54%	Pass
7	0.378	859	1.72E-01	476	9.52E-02	55%	Pass
8	0.408	802	1.60E-01	451	9.02E-02	56%	Pass
9	0.438	756	1.51E-01	432	8.64E-02	57%	Pass
10	0.468	710	1.42E-01	416	8.32E-02	59%	Pass
11	0.497	663	1.33E-01	405	8.10E-02	61%	Pass
12	0.527	622	1.24E-01	396	7.92E-02	64%	Pass
13	0.557	581	1.16E-01	386	7.72E-02	66%	Pass
14	0.587	535	1.07E-01	370	7.40E-02	69%	Pass
15	0.616	505	1.01E-01	356	7.12E-02	70%	Pass
16	0.646	465	9.30E-02	337	6.74E-02	72%	Pass
17	0.676	434	8.68E-02	320	6.40E-02	74%	Pass
18	0.706	412	8.24E-02	298	5.96E-02	72%	Pass
19	0.735	381	7.62E-02	281	5.62E-02	74%	Pass
20	0.765	347	6.94E-02	262	5.24E-02	76%	Pass
21	0.795	319	6.38E-02	236	4.72E-02	74%	Pass
22	0.824	297	5.94E-02	215	4.30E-02	72%	Pass
23	0.854	284	5.68E-02	201	4.02E-02	71%	Pass
24	0.884	266	5.32E-02	198	3.96E-02	74%	Pass
25	0.914	248	4.96E-02	189	3.78E-02	76%	Pass
26	0.943	239	4.78E-02	180	3.60E-02	75%	Pass
27	0.973	223	4.46E-02	175	3.50E-02	78%	Pass
28	1.003	214	4.28E-02	169	3.38E-02	79%	Pass
29	1.033	202	4.04E-02	160	3.20E-02	79%	Pass
30	1.062	191	3.82E-02	153	3.06E-02	80%	Pass
31	1.092	181	3.62E-02	147	2.94E-02	81%	Pass
32	1.122	173	3.46E-02	143	2.86E-02	83%	Pass
33	1.152	170	3.40E-02	139	2.78E-02	82%	Pass
34	1.181	161	3.22E-02	133	2.66E-02	83%	Pass
35	1.211	152	3.04E-02	128	2.56E-02	84%	Pass
36	1.241	143	2.86E-02	119	2.38E-02	83%	Pass
37	1.270	134	2.68E-02	113	2.26E-02	84%	Pass

Interval	Existing Condition			Detention Optimized			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
38	1.300	127	2.54E-02	102	2.04E-02	80%	Pass
39	1.330	115	2.30E-02	97	1.94E-02	84%	Pass
40	1.360	109	2.18E-02	92	1.84E-02	84%	Pass
41	1.389	107	2.14E-02	86	1.72E-02	80%	Pass
42	1.419	106	2.12E-02	82	1.64E-02	77%	Pass
43	1.449	99	1.98E-02	75	1.50E-02	76%	Pass
44	1.479	92	1.84E-02	71	1.42E-02	77%	Pass
45	1.508	89	1.78E-02	69	1.38E-02	78%	Pass
46	1.538	84	1.68E-02	68	1.36E-02	81%	Pass
47	1.568	82	1.64E-02	64	1.28E-02	78%	Pass
48	1.597	80	1.60E-02	59	1.18E-02	74%	Pass
49	1.627	72	1.44E-02	59	1.18E-02	82%	Pass
50	1.657	68	1.36E-02	56	1.12E-02	82%	Pass
51	1.687	65	1.30E-02	53	1.06E-02	82%	Pass
52	1.716	59	1.18E-02	51	1.02E-02	86%	Pass
53	1.746	55	1.10E-02	48	9.60E-03	87%	Pass
54	1.776	54	1.08E-02	45	9.00E-03	83%	Pass
55	1.806	50	1.00E-02	41	8.20E-03	82%	Pass
56	1.835	49	9.80E-03	35	7.00E-03	71%	Pass
57	1.865	47	9.40E-03	33	6.60E-03	70%	Pass
58	1.895	46	9.20E-03	31	6.20E-03	67%	Pass
59	1.925	42	8.40E-03	30	6.00E-03	71%	Pass
60	1.954	36	7.20E-03	28	5.60E-03	78%	Pass
61	1.984	35	7.00E-03	27	5.40E-03	77%	Pass
62	2.014	34	6.80E-03	25	5.00E-03	74%	Pass
63	2.043	32	6.40E-03	23	4.60E-03	72%	Pass
64	2.073	31	6.20E-03	22	4.40E-03	71%	Pass
65	2.103	30	6.00E-03	22	4.40E-03	73%	Pass
66	2.133	30	6.00E-03	20	4.00E-03	67%	Pass
67	2.162	29	5.80E-03	20	4.00E-03	69%	Pass
68	2.192	29	5.80E-03	20	4.00E-03	69%	Pass
69	2.222	27	5.40E-03	19	3.80E-03	70%	Pass
70	2.252	26	5.20E-03	19	3.80E-03	73%	Pass
71	2.281	24	4.80E-03	19	3.80E-03	79%	Pass
72	2.311	24	4.80E-03	19	3.80E-03	79%	Pass
73	2.341	21	4.20E-03	18	3.60E-03	86%	Pass
74	2.371	20	4.00E-03	17	3.40E-03	85%	Pass
75	2.400	19	3.80E-03	17	3.40E-03	89%	Pass
76	2.430	18	3.60E-03	15	3.00E-03	83%	Pass
77	2.460	16	3.20E-03	15	3.00E-03	94%	Pass
78	2.489	15	3.00E-03	14	2.80E-03	93%	Pass
79	2.519	15	3.00E-03	14	2.80E-03	93%	Pass
80	2.549	14	2.80E-03	14	2.80E-03	100%	Pass
81	2.579	14	2.80E-03	14	2.80E-03	100%	Pass
82	2.608	14	2.80E-03	14	2.80E-03	100%	Pass

Interval	Existing Condition			Detention Optimized			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
83	2.638	14	2.80E-03	13	2.60E-03	93%	Pass
84	2.668	14	2.80E-03	12	2.40E-03	86%	Pass
85	2.698	14	2.80E-03	11	2.20E-03	79%	Pass
86	2.727	14	2.80E-03	9	1.80E-03	64%	Pass
87	2.757	13	2.60E-03	8	1.60E-03	62%	Pass
88	2.787	13	2.60E-03	6	1.20E-03	46%	Pass
89	2.817	12	2.40E-03	6	1.20E-03	50%	Pass
90	2.846	11	2.20E-03	6	1.20E-03	55%	Pass
91	2.876	10	2.00E-03	5	1.00E-03	50%	Pass
92	2.906	8	1.60E-03	5	1.00E-03	63%	Pass
93	2.935	8	1.60E-03	5	1.00E-03	63%	Pass
94	2.965	8	1.60E-03	5	1.00E-03	63%	Pass
95	2.995	8	1.60E-03	5	1.00E-03	63%	Pass
96	3.025	8	1.60E-03	5	1.00E-03	63%	Pass
97	3.054	7	1.40E-03	5	1.00E-03	71%	Pass
98	3.084	7	1.40E-03	5	1.00E-03	71%	Pass
99	3.114	7	1.40E-03	5	1.00E-03	71%	Pass
100	3.144	7	1.40E-03	5	1.00E-03	71%	Pass

Peak Flows calculated with Cunnane Plotting Position

Return Period (years)	Pre-dev. Q (cfs)	Post-Dev. Q (cfs)	Reduction (cfs)
10	3.144	2.780	0.364
9	3.046	2.768	0.278
8	2.941	2.747	0.194
7	2.896	2.709	0.187
6	2.868	2.671	0.197
5	2.794	2.626	0.169
4	2.432	2.353	0.079
3	2.284	2.075	0.208
2	2.001	1.820	0.180

ATTACHMENT 3

List of the "n" Largest Peaks: Pre & Post-Developed Conditions

Basic Probabilistic Equation:

R = 1/P R: Return period (years).

P: Probability of a flow to be equaled or exceeded any given year (dimensionless).

Cunnane Equation:

$$P = \frac{i-0.4}{n+0.2}$$

Weibull Equation:

$$P = \frac{i}{n+1}$$

i: Position of the peak whose probability is desired (sorted from large to small).

n: Number of years analyzed.

Explanation of Variables for the Tables in this Attachment

Peak: Refers to the peak flow at the date given, taken from the continuous simulation hourly results of the n year analyzed.

Posit: If all peaks are sorted from large to small, the position of the peak in a sorting analysis is included under the variable Posit.

Date: Date of the occurrence of the peak at the outlet from the continuous simulation

Note: All peaks are not annual maxima; instead they are defined as event maxima, with a threshold to separate peaks of at least 12 hours. In other words, any peak P in a time series is defined as a value where dP/dt = 0, and the peak is the largest value in 25 hours (12 hours before, the hour of occurrence and 12 hours after the occurrence, so it is in essence a daily peak).

List of Peak events and Determination of Q2 and Q10 (Pre-Development)
Senior Housing - POC-1

T (Year)	Cunnane (cfs)	Weibull (cfs)
10	**1.43**	**1.46**
9	**1.40**	**1.41**
8	**1.35**	**1.36**
7	**1.31**	**1.32**
6	**1.30**	**1.30**
5	**1.28**	**1.29**
4	**1.11**	**1.11**
3	**1.02**	**1.02**
2	**0.89**	**0.89**

Note:
Cunnane is the preferred method by the HMP permit.

Peaks (cfs)	Date	Posit	Period of Return (Years)	
			Weibull	Cunnane
0.707	2/12/1980	58	1.02	1.01
0.712	2/3/1958	57	1.04	1.03
0.728	2/9/1963	56	1.05	1.05
0.728	1/16/1993	55	1.07	1.07
0.729	1/20/1962	54	1.09	1.09
0.732	2/21/2005	53	1.11	1.11
0.739	3/8/1975	52	1.13	1.13
0.74	1/11/2001	51	1.16	1.15
0.742	2/27/1991	50	1.18	1.17
0.743	1/12/1960	49	1.20	1.20
0.754	12/31/2004	48	1.23	1.22
0.755	10/20/2004	47	1.26	1.25
0.766	1/9/2005	46	1.28	1.28
0.768	2/19/1958	45	1.31	1.30
0.778	3/8/1974	44	1.34	1.33
0.782	2/1/1960	43	1.37	1.37
0.812	9/5/1978	42	1.40	1.40
0.82	2/26/1983	41	1.44	1.43
0.824	3/16/1958	40	1.48	1.47
0.832	10/27/2004	39	1.51	1.51
0.834	10/30/1975	38	1.55	1.55
0.836	2/14/1980	37	1.59	1.59
0.844	4/28/2005	36	1.64	1.63
0.863	2/21/1980	35	1.69	1.68
0.871	3/1/1981	34	1.74	1.73
0.876	1/10/1995	33	1.79	1.79
0.879	1/18/1973	32	1.84	1.84
0.883	1/16/1952	31	1.90	1.90
0.886	1/3/2006	30	1.97	1.97
0.89	1/16/1973	29	2.03	2.03
0.898	3/22/1958	28	2.11	2.11
0.942	1/16/1978	27	2.19	2.19
0.946	1/2/2006	26	2.27	2.27
0.948	11/20/1963	25	2.36	2.37
0.954	2/15/1992	24	2.46	2.47
0.984	10/11/1957	23	2.57	2.58
0.999	11/6/1960	22	2.68	2.69
1.002	2/27/1983	21	2.81	2.83
1.01	4/27/1960	20	2.95	2.97
1.042	10/26/2004	19	3.11	3.13
1.055	3/25/1998	18	3.28	3.31
1.057	11/11/1978	17	3.47	3.51
1.07	3/15/2003	16	3.69	3.73
1.11	2/14/1998	15	3.93	3.99
1.12	2/6/1969	14	4.21	4.28
1.124	12/10/1965	13	4.54	4.62
1.288	1/25/1997	12	4.92	5.02
1.294	12/4/1974	11	5.36	5.49
1.299	2/12/1992	10	5.90	6.06
1.308	1/6/1959	9	6.56	6.77
1.328	2/7/1998	8	7.38	7.66
1.389	3/1/1983	7	8.43	8.82
1.444	11/14/1972	6	9.83	10.39
1.582	12/16/2002	5	11.80	12.65
1.595	3/3/1981	4	14.75	16.17
2.08	3/20/1992	3	19.67	22.38
2.103	4/21/1988	2	29.50	36.38
2.558	12/6/1997	1	59.00	97.00

List of Peak events and Determination of Q2 and Q10 (Post-Development)
Senior Housing - POC-1

T (Year)	Cunnane (cfs)	Weibull (cfs)
10	**1.27**	**1.28**
9	**1.26**	**1.26**
8	**1.25**	**1.25**
7	**1.24**	**1.24**
6	**1.23**	**1.23**
5	**1.20**	**1.20**
4	**1.06**	**1.06**
3	**0.89**	**0.89**
2	**0.79**	**0.79**

Note:
Cunnane is the preferred method by the HMP permit.

Peaks (cfs)	Date	Posit	Period of Return (Years) Weibull	Cunnane
0.552	2/19/2005	58	1.02	1.01
0.555	10/26/2004	57	1.04	1.03
0.557	12/24/1994	56	1.05	1.05
0.557	2/23/1998	55	1.07	1.07
0.565	2/10/1978	54	1.09	1.09
0.568	1/11/2005	53	1.11	1.11
0.582	11/22/1965	52	1.13	1.13
0.584	2/3/1998	51	1.16	1.15
0.587	4/28/2005	50	1.18	1.17
0.6	2/7/1993	49	1.20	1.20
0.611	1/9/2005	48	1.23	1.22
0.618	12/3/1966	47	1.26	1.25
0.63	1/26/1956	46	1.28	1.28
0.631	11/6/1960	45	1.31	1.30
0.632	3/5/1995	44	1.34	1.33
0.646	2/13/1954	43	1.37	1.37
0.651	2/21/2005	42	1.40	1.40
0.661	11/7/1966	41	1.44	1.43
0.672	1/12/1997	40	1.48	1.47
0.677	12/7/1992	39	1.51	1.51
0.686	4/14/2003	38	1.55	1.55
0.703	1/11/2001	37	1.59	1.59
0.741	2/9/1963	36	1.64	1.63
0.753	1/16/1993	35	1.69	1.68
0.771	3/16/1958	34	1.74	1.73
0.772	2/1/1960	33	1.79	1.79
0.782	2/26/1983	32	1.84	1.84
0.787	1/9/1980	31	1.90	1.90
0.788	2/12/1980	30	1.97	1.97
0.797	2/27/1991	29	2.03	2.03
0.798	2/19/1958	28	2.11	2.11
0.827	1/20/1962	27	2.19	2.19
0.83	1/10/1995	26	2.27	2.27
0.831	3/8/1974	25	2.36	2.37
0.844	2/14/1980	24	2.46	2.47
0.85	1/16/1973	23	2.57	2.58
0.863	1/2/2006	22	2.68	2.69
0.877	9/5/1978	21	2.81	2.83
0.879	1/16/1978	20	2.95	2.97
0.913	4/27/1960	19	3.11	3.13
0.933	11/20/1963	18	3.28	3.31
1.009	3/25/1998	17	3.47	3.51
1.051	2/6/1969	16	3.69	3.73
1.057	12/10/1965	15	3.93	3.99
1.072	3/15/2003	14	4.21	4.28
1.073	2/14/1998	13	4.54	4.62
1.202	1/25/1997	12	4.92	5.02
1.209	2/12/1992	11	5.36	5.49
1.23	2/7/1998	10	5.90	6.06
1.236	3/3/1981	9	6.56	6.77
1.248	3/1/1983	8	7.38	7.66
1.254	11/14/1972	7	8.43	8.82
1.271	12/4/1974	6	9.83	10.39
1.376	1/6/1959	5	11.80	12.65
1.422	4/21/1988	4	14.75	16.17
1.747	12/16/2002	3	19.67	22.38
2.177	3/20/1992	2	29.50	36.38
2.559	12/6/1997	1	59.00	97.00

List of Peak events and Determination of Q2 and Q10 (Pre-Development)
Senior Housing - POC-2

T (Year)	Cunnane (cfs)	Weibull (cfs)
10	**3.14**	**3.21**
9	**3.05**	**3.09**
8	**2.94**	**2.98**
7	**2.90**	**2.90**
6	**2.87**	**2.88**
5	**2.79**	**2.81**
4	**2.43**	**2.44**
3	**2.28**	**2.29**
2	**2.00**	**2.00**

Note:
Cunnane is the preferred method by the HMP permit.

Peaks (cfs)	Date	Posit	Period of Return (Years)	
			Weibull	Cunnane
1.614	12/1/1952	58	1.02	1.01
1.614	1/11/2001	57	1.04	1.03
1.614	2/21/2005	56	1.05	1.05
1.623	1/16/1993	55	1.07	1.07
1.625	12/24/1994	54	1.09	1.09
1.628	1/20/1962	53	1.11	1.11
1.629	2/27/1991	52	1.13	1.13
1.653	2/3/1958	51	1.16	1.15
1.671	1/12/1960	50	1.18	1.17
1.675	3/8/1975	49	1.20	1.20
1.706	2/19/1958	48	1.23	1.22
1.714	12/31/2004	47	1.26	1.25
1.715	10/20/2004	46	1.28	1.28
1.719	2/1/1960	45	1.31	1.30
1.734	1/9/2005	44	1.34	1.33
1.743	3/8/1974	43	1.37	1.37
1.782	9/5/1978	42	1.40	1.40
1.788	2/26/1983	41	1.44	1.43
1.792	3/16/1958	40	1.48	1.47
1.859	2/14/1980	39	1.51	1.51
1.873	10/27/2004	38	1.55	1.55
1.9	4/28/2005	37	1.59	1.59
1.923	2/21/1980	36	1.64	1.63
1.931	10/30/1975	35	1.69	1.68
1.939	3/1/1981	34	1.74	1.73
1.948	1/18/1973	33	1.79	1.79
1.948	1/10/1995	32	1.84	1.84
1.963	1/16/1973	31	1.90	1.90
1.985	3/22/1958	30	1.97	1.97
2.017	1/16/1952	29	2.03	2.03
2.039	1/3/2006	28	2.11	2.11
2.066	1/16/1978	27	2.19	2.19
2.085	11/20/1963	26	2.27	2.27
2.146	1/2/2006	25	2.36	2.37
2.155	2/15/1992	24	2.46	2.47
2.202	11/6/1960	23	2.57	2.58
2.234	4/27/1960	22	2.68	2.69
2.258	10/11/1957	21	2.81	2.83
2.274	2/27/1983	20	2.95	2.97
2.324	10/26/2004	19	3.11	3.13
2.331	3/25/1998	18	3.28	3.31
2.351	3/15/2003	17	3.47	3.51
2.419	11/11/1978	16	3.69	3.73
2.431	2/14/1998	15	3.93	3.99
2.449	2/6/1969	14	4.21	4.28
2.469	12/10/1965	13	4.54	4.62
2.809	1/25/1997	12	4.92	5.02
2.836	2/12/1992	11	5.36	5.49
2.872	12/4/1974	10	5.90	6.06
2.893	2/7/1998	9	6.56	6.77
2.904	1/6/1959	8	7.38	7.66
3.028	3/1/1983	7	8.43	8.82
3.182	11/14/1972	6	9.83	10.39
3.501	12/16/2002	5	11.80	12.65
3.591	3/3/1981	4	14.75	16.17
4.584	3/20/1992	3	19.67	22.38
4.692	4/21/1988	2	29.50	36.38
5.594	12/6/1997	1	59.00	97.00

List of Peak events and Determination of Q2 and Q10 (Post-Development)
Senior Housing - POC-2

T (Year)	Cunnane (cfs)	Weibull (cfs)
10	**2.78**	**2.79**
9	**2.77**	**2.77**
8	**2.75**	**2.76**
7	**2.71**	**2.72**
6	**2.67**	**2.68**
5	**2.63**	**2.64**
4	**2.35**	**2.36**
3	**2.08**	**2.08**
2	**1.82**	**1.82**

Note:
Cunnane is the preferred method by the HMP permit.

Peaks (cfs)	Date	Posit	Period of Return (Years) Weibull	Cunnane
1.391	2/10/1978	58	1.02	1.01
1.418	2/10/1963	57	1.04	1.03
1.42	1/9/2005	56	1.05	1.05
1.422	2/7/1993	55	1.07	1.07
1.422	4/28/2005	54	1.09	1.09
1.433	11/6/1960	53	1.11	1.11
1.448	12/3/1966	52	1.13	1.13
1.471	2/13/2003	51	1.16	1.15
1.478	1/26/1956	50	1.18	1.17
1.481	3/5/1995	49	1.20	1.20
1.498	2/17/1980	48	1.23	1.22
1.56	11/7/1966	47	1.26	1.25
1.566	2/13/1954	46	1.28	1.28
1.576	12/24/1994	45	1.31	1.30
1.582	12/7/1992	44	1.34	1.33
1.586	1/12/1997	43	1.37	1.37
1.63	2/21/2005	42	1.40	1.40
1.638	3/3/1980	41	1.44	1.43
1.642	1/11/2001	40	1.48	1.47
1.659	2/21/1980	39	1.51	1.51
1.662	4/14/2003	38	1.55	1.55
1.697	1/16/1993	37	1.59	1.59
1.729	2/9/1963	36	1.64	1.63
1.774	10/27/2004	35	1.69	1.68
1.78	2/1/1960	34	1.74	1.73
1.785	2/12/1980	33	1.79	1.79
1.786	1/9/1980	32	1.84	1.84
1.813	2/26/1983	31	1.90	1.90
1.817	2/19/1958	30	1.97	1.97
1.824	3/16/1958	29	2.03	2.03
1.855	2/27/1991	28	2.11	2.11
1.877	3/8/1974	27	2.19	2.19
1.894	1/20/1962	26	2.27	2.27
1.929	2/14/1980	25	2.36	2.37
1.94	1/10/1995	24	2.46	2.47
1.969	1/16/1973	23	2.57	2.58
1.994	1/16/1978	22	2.68	2.69
2.031	9/5/1978	21	2.81	2.83
2.068	4/27/1960	20	2.95	2.97
2.107	11/20/1963	19	3.11	3.13
2.143	1/2/2006	18	3.28	3.31
2.205	3/25/1998	17	3.47	3.51
2.335	12/10/1965	16	3.69	3.73
2.35	2/6/1969	15	3.93	3.99
2.406	2/14/1998	14	4.21	4.28
2.417	3/15/2003	13	4.54	4.62
2.635	11/14/1972	12	4.92	5.02
2.649	1/25/1997	11	5.36	5.49
2.674	4/21/1988	10	5.90	6.06
2.698	2/12/1992	9	6.56	6.77
2.739	2/7/1998	8	7.38	7.66
2.766	3/1/1983	7	8.43	8.82
2.784	12/4/1974	6	9.83	10.39
2.864	1/6/1959	5	11.80	12.65
3.816	12/16/2002	4	14.75	16.17
3.95	3/3/1981	3	19.67	22.38
5.076	3/20/1992	2	29.50	36.38
5.935	12/6/1997	1	59.00	97.00

ATTACHMENT 4

AREA VS ELEVATION

Volume provided on the underground vaults is accounted for in the storage module within SWMM. As the concrete vaults are a constant area, the stage storage relationship remains constant with depth. Please refer to SWMM model inputs in Attachment 7.

DISCHARGE VS ELEVATION

The orifice has been selected to maximize its size while still restricting flows to conform to the required 10% of the Q_2 event flow as mandated in the Final Hydromodification Management Plan by Brown & Caldwell, dated March 2011. While REC acknowledges that the orifice/s is/are small, to increase the size of the outlet would impact the basin's ability to restrict flows beneath the HMP thresholds, thus preventing the BMP from conformance with HMP requirements.

In order to further reduce the risk of blockage of the orifices, regular maintenance of the riser spillway and orifices must be performed to ensure potential blockages are minimized. A detail of the orifice and riser structure is provided in Attachment 5 of this memorandum.

A stage-discharge relationship is provided on the following pages for the surface outlet structure.

DISCHARGE EQUATIONS

1) Weir:

$$Q_W = C_W \cdot L \cdot H^{3/2} \quad (1)$$

2) Slot:

As an orifice: $$Q_s = B_s \cdot h_s \cdot c_g \cdot \sqrt{2g\left(H - \frac{h_s}{2}\right)} \quad (2.a)$$

As a weir: $$Q_s = C_W \cdot B_s \cdot H^{3/2} \quad (2.b)$$

For H > h_s slot works as weir until orifice equation provides a smaller discharge. The elevation such that equation (2.a) = equation (2.b) is the elevation at which the behavior changes from weir to orifice.

3) Vertical Orifices

As an orifice: $$Q_o = 0.25 \cdot \pi D^2 \cdot c_g \cdot \sqrt{2g\left(H - \frac{D}{2}\right)} \quad (3.a)$$

As a weir: Critical depth and geometric family of circular sector must be solved to determined Q as a function of H:

$$\frac{Q_O^2}{g} = \frac{A_{cr}^3}{T_{cr}}; \quad H = y_{cr} + \frac{A_{cr}}{2 \cdot T_{cr}}; \; T_{cr} = 2\sqrt{y_{cr}(D - y_{cr})}\,; \quad A_{cr} = \frac{D^2}{8}[\alpha_{cr} - sin(\alpha_{cr})]\,;$$

$$y_{cr} = \frac{D}{2}[1 - sin(0.5 \cdot \alpha_{cr})] \quad \text{(3.b.1, 3.b.2, 3.b.3, 3.b.4 and 3.b.5)}$$

There is a value of H (approximately H = 110% D) from which orifices no longer work as weirs as critical depth is not possible at the entrance of the orifice. This value of H is obtained equaling the discharge using critical equations and equations (3.b).

A mathematical model is prepared with the previous equations depending on the type of discharge.

The following are the variables used above:

Q_W, Q_s, Q_O = Discharge of weir, slot or orifice (cfs)

C_W, c_g : Coefficients of discharge of weir (typically 3.1) and orifice (0.61 to 0.62)

L, B_s, D, h_s : Length of weir, width of slot, diameter of orifice and height of slot, respectively; (ft)

H: Level of water in the pond over the invert of slot, weir or orifice (ft)

A_{cr}, T_{cr}, y_{cr}, α_{cr}: Critical variables for circular sector: area (sq-ft), top width (ft), critical depth (ft), and angle to the center, respectively.

Outlet structure for Discharge of Underground System 1

Note: 0' elevation = 7.7 feet

Discharge vs Elevation Table

Low orifice	1.000	"	Lower slot			Lower Weir		
Number of orif:	0		Number of slots:	1		Number of weirs:	1	
Cg-low:	0.61		Invert:	0.00	ft	Invert:	1.80	
			B	2.000	ft	B:	5.00	
Middle orifice	1.000	"	h_{slot}	0.083	ft			
Number of orif:	0							
Cg-middle:	0.61		Upper slot			Emergency weir		
invert elev:	0.000	ft	Number of slots:	0		Invert:	0.000	ft
			Invert:	0.000	ft	W:	0.00	ft
			B:	0.00	ft			
			h_{slot}	0.000	ft			

Drw Well	0.0698	cfs

h* (ft)	H/D-low -	H/D-mid -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qslot-low (cfs)	Qslot-upp (cfs)	Qweir (cfs)	Qemerg (cfs)	Qtot (cfs)	Qtotal(inf) (cfs)
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0698
0.100	1.200	1.200	0.000	0.000	0.000	0.000	0.000	0.000	0.196	0.000	0.000	0.000	0.196	0.2659
0.200	2.400	2.400	0.000	0.000	0.000	0.000	0.000	0.000	0.324	0.000	0.000	0.000	0.324	0.3933
0.300	3.600	3.600	0.000	0.000	0.000	0.000	0.000	0.000	0.413	0.000	0.000	0.000	0.413	0.4830
0.400	4.800	4.800	0.000	0.000	0.000	0.000	0.000	0.000	0.487	0.000	0.000	0.000	0.487	0.5563
0.500	6.000	6.000	0.000	0.000	0.000	0.000	0.000	0.000	0.550	0.000	0.000	0.000	0.550	0.6200
0.600	7.200	7.200	0.000	0.000	0.000	0.000	0.000	0.000	0.607	0.000	0.000	0.000	0.607	0.6771
0.700	8.400	8.400	0.000	0.000	0.000	0.000	0.000	0.000	0.659	0.000	0.000	0.000	0.659	0.7292
0.800	9.600	9.600	0.000	0.000	0.000	0.000	0.000	0.000	0.708	0.000	0.000	0.000	0.708	0.7775
0.900	10.800	10.800	0.000	0.000	0.000	0.000	0.000	0.000	0.753	0.000	0.000	0.000	0.753	0.8227
1.000	12.000	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.796	0.000	0.000	0.000	0.796	0.8654
1.100	13.200	13.200	0.000	0.000	0.000	0.000	0.000	0.000	0.836	0.000	0.000	0.000	0.836	0.9058
1.200	14.400	14.400	0.000	0.000	0.000	0.000	0.000	0.000	0.875	0.000	0.000	0.000	0.875	0.9444
1.300	15.600	15.600	0.000	0.000	0.000	0.000	0.000	0.000	0.912	0.000	0.000	0.000	0.912	0.9814
1.400	16.800	16.800	0.000	0.000	0.000	0.000	0.000	0.000	0.947	0.000	0.000	0.000	0.947	1.0169
1.500	18.000	18.000	0.000	0.000	0.000	0.000	0.000	0.000	0.981	0.000	0.000	0.000	0.981	1.0512
1.600	19.200	19.200	0.000	0.000	0.000	0.000	0.000	0.000	1.014	0.000	0.000	0.000	1.014	1.0843
1.700	20.400	20.400	0.000	0.000	0.000	0.000	0.000	0.000	1.046	0.000	0.000	0.000	1.046	1.1163
1.800	21.600	21.600	0.000	0.000	0.000	0.000	0.000	0.000	1.078	0.000	0.000	0.000	1.078	1.1474
1.900	22.800	22.800	0.000	0.000	0.000	0.000	0.000	0.000	1.108	0.000	0.483	0.000	1.591	1.6604
2.000	24.000	24.000	0.000	0.000	0.000	0.000	0.000	0.000	1.137	0.000	1.376	0.000	2.513	2.5830
2.100	25.200	25.200	0.000	0.000	0.000	0.000	0.000	0.000	1.166	0.000	2.534	0.000	3.700	3.7699
2.200	26.400	26.400	0.000	0.000	0.000	0.000	0.000	0.000	1.194	0.000	3.907	0.000	5.100	5.1702
2.300	27.600	27.600	0.000	0.000	0.000	0.000	0.000	0.000	1.221	0.000	5.464	0.000	6.685	6.7547

Outlet structure for Discharge of Underground System 2

Note: 0' elevation = 5.7 feet

Discharge vs Elevation Table

Low orifice	1.000 "	Lower slot		Lower Weir		Drw Well	0.1111	cfs
Number of orif:	0	Number of slots:	1	Number of weirs:	1			
Cg-low:	0.61	Invert:	0.00 ft	Invert:	2.00			
		B	2.500 ft	B:	10.00			
Middle orifice	1.000 "	h_{slot}	0.167 ft					
Number of orif:	0							
Cg-middle:	0.61	Upper slot		Emergency weir				
invert elev:	6.417 ft	Number of slots:	1	Invert:	0.000 ft			
		Invert:	0.000 ft	W:	0.00 ft			
		B:	0.00 ft					
		h_{slot}	0.000 ft					

h* (ft)	H/D-low -	H/D-mid -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qslot-low (cfs)	Qslot-upp (cfs)	Qweir (cfs)	Qemerg (cfs)	Qtot (cfs)	Qtotal(inf) (cfs)
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.111
0.100	1.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.245	0.000	0.000	0.000	0.245	0.356
0.200	2.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.693	0.000	0.000	0.000	0.693	0.804
0.300	3.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.949	0.000	0.000	0.000	0.949	1.061
0.400	4.800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.148	0.000	0.000	0.000	1.148	1.259
0.500	6.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.317	0.000	0.000	0.000	1.317	1.428
0.600	7.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.466	0.000	0.000	0.000	1.466	1.577
0.700	8.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.602	0.000	0.000	0.000	1.602	1.713
0.800	9.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.727	0.000	0.000	0.000	1.727	1.838
0.900	10.800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.843	0.000	0.000	0.000	1.843	1.954
1.000	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.953	0.000	0.000	0.000	1.953	2.064
1.100	13.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.057	0.000	0.000	0.000	2.057	2.168
1.200	14.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.155	0.000	0.000	0.000	2.155	2.266
1.300	15.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.250	0.000	0.000	0.000	2.250	2.361
1.400	16.800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.340	0.000	0.000	0.000	2.340	2.452
1.500	18.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.428	0.000	0.000	0.000	2.428	2.539
1.600	19.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.512	0.000	0.000	0.000	2.512	2.623
1.700	20.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.593	0.000	0.000	0.000	2.593	2.705
1.800	21.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.672	0.000	0.000	0.000	2.672	2.784
1.900	22.800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.749	0.000	0.000	0.000	2.749	2.860
2.000	24.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.824	0.000	0.000	0.000	2.824	2.935
2.100	25.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.897	0.000	0.980	0.000	3.877	3.988
2.200	26.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.967	0.000	2.773	0.000	5.740	5.851
2.300	27.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.037	0.000	5.094	0.000	8.130	8.241

ATTACHMENT 5

Pre & Post-Developed Maps, Project Plan and Detention

Section Sketches

LEGEND

- PROJECT LIMITS (6.63 ACRES)
- DRAINAGE MANAGEMENT AREA (DMA) LIMITS
- EXISTING LANDSCAPING AREA
- DMA 2 / 4.538 — DMA DESIGNATION AND ACREAGE

SITE SUMMARY

	AC	PERVIOUSNESS (AC)	IMPERVIOUSNESS (AC)
DMA1	2.092	0.842	1.250
DMA2	4.538	0.637	3.901
TOTAL	6.630	1.479	5.151

SCALE: 1" = 80'

DRAWN BY: TIH

DATE: 08/31/2022

W.O.: 4479-1

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

PREPARED FOR:
SADDLEBACK MEMORIAL MEDICAL CARE
24451 HEALTH CENTER DRIVE
LAGUNA HILLS, CA 92653
(949) 452-3627

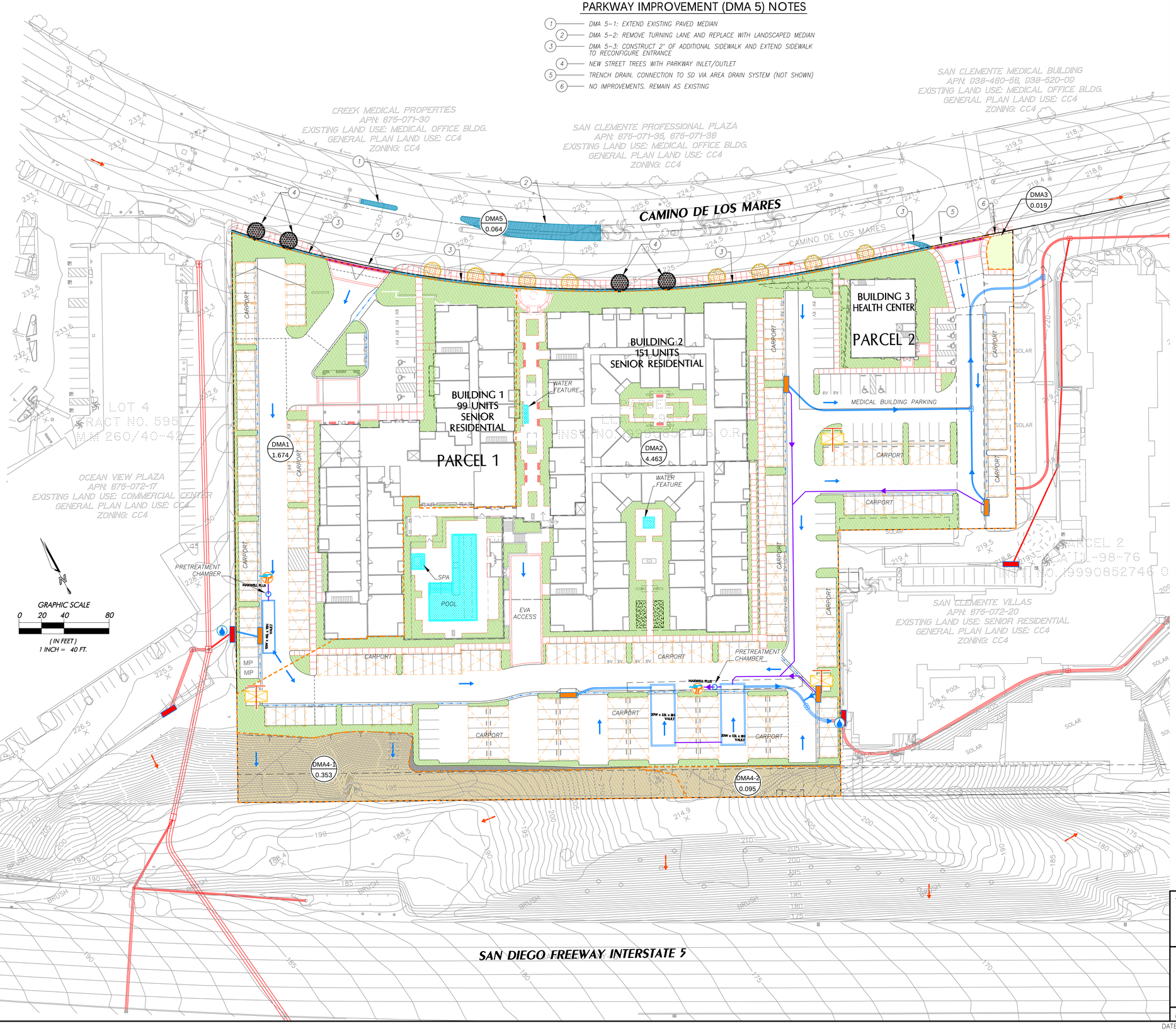
VESTING TENTATIVE PARCEL MAP NO. 2022-116
SOUTHEAST OF CAMINO DE LOS MARES
AND CALLE AGUA
SAN CLEMENTE, CALIFORNIA

EXISTING CONDITION PERVIOUSNESS EXHIBIT

DATE: Aug. 31, 2022 11:07:27 AM FILE: F:\1223\Planning\SY_WQ\PWQMP\Exhibits\WQMP_Pervious Exhibit.dwg

PARKWAY IMPROVEMENT (DMA 5) NOTES

1. DMA 5-1: EXTEND EXISTING PAVED MEDIAN
2. DMA 5-2: REMOVE TURNING LANE AND REPLACE WITH LANDSCAPED MEDIAN
3. DMA 5-3: CONSTRUCT 2' OF ADDITIONAL SIDEWALK AND EXTEND SIDEWALK TO RECONFIGURE ENTRANCE
4. NEW STREET TREES WITH PARKWAY INLET/OUTLET
5. TRENCH DRAIN. CONNECTION TO SD VIA AREA DRAIN SYSTEM (NOT SHOWN)
6. NO IMPROVEMENTS. REMAIN AS EXISTING



LEGEND

- TRACT BOUNDARY
- NAP — NOT A PART
- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
- DMA / ACRE — DMA DESIGNATION AND ACREAGE
- POOL, SPA & WATER FEATURE
- SURFACE FLOW (ONSITE)
- SURFACE FLOW (OFFSITE)
- EXISTING DRAINAGE SYSTEM
- PROPOSED STORM DRAIN SYSTEM
- PROPOSED DRAINAGE SYSTEM (WATER QUALITY AND < Q10)
- EXISTING CATCH BASIN
- PROJECT CATCH BASIN WITH BMPS
  S1 STORM DRAIN SYSTEM STENCIL/SIGNAGE
- DRIVEWAY TRENCH DRAIN
- PROJECT LANDSCAPING AREA WITH BMPS
  S4 EFFICIENT IRRIGATION SYSTEM AND LANDSCAPE PLANNING
- MEDIAN AND PARKWAY IMPROVEMENT AREAS (DMA 5)
  (SEE PARKWAY IMPROVEMENT NOTES)
- EXISTING LANDSCAPING TO REMAIN
- NATURAL AREA/AREA RETURNED TO NATURAL (DMA 4)
- EXISTING PARKWAY TREES (FERN PINE) TO REMAIN
  BMP HSC-3 STREET TREES
- PROPOSED PARKWAY TREES (FERN PINE)
  BMP HSC-3 STREET TREES
- PROJECT WALKWAYS
- COVERED PARKING (CARPORT)
- S7 DESIGNATED TRASH ENCLOSURE
- LID BMP – INF4 DRYWELL
  MAXWELL PLUS DRYWELL SYSTEM WITH PRE-TREATMENT CHAMBER
- SUBSURFACE DETENTION FACILITY
- DISCHARGE POINT/POINT OF COMPLIANCE (HYDROMOD)
- STORM OVERFLOW DISCHARGE POINT (EVENTS > Q10)

DMA SUMMARY

DMA	Acres	Pervious Acres	Imp. Ratio	C	D (in)	DCV (simple)	LID BMP
1	1.674	0.244	0.854	0.791	0.8	3843.7	INF-5 Infiltration Well
2	4.463	0.767	0.828	0.771	0.8	9994.0	INF-5 Infiltration Well
3	0.019	0.016	0.158	0.268	0.8	14.8	No improvement area
4-1	0.353	0.353	0.000	0.150	0.8	153.8	Natural/return to natural landscape
4-2	0.095	0.095	0.000	0.150	0.8	41.4	Natural/return to natural landscape
5-1	0.002	0	1.000	0.900	0.8	5.2	None. Direct replacement of impervious area
5-2	0.035	0.032	0.086	0.214	0.8	21.8	HSC-6 Self-retaining Area
5-3	0.027	0	1.000	0.900	0.8	70.6	HSC-3 Street Trees

PRELIMINARY
WATER QUALITY MANAGEMENT PLAN (WQMP)

APPLICANT:
SADDLEBACK MEMORIAL MEDICAL CARE
24451 HEALTH CENTER DRIVE
LAGUNA HILLS, CA 92653
(949) 452-3627

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

"VESTING TENTATIVE PARCEL MAP NO. 2022-116"
SOUTHEAST OF CAMINO DE LOS MARES &
CALLE AGUA
CITY OF SAN CLEMENTE, COUNTY OF ORANGE, CALIFORNIA

DRAFTED BY: TIH | DATE: 08/30/2022 | W.O. NO: 4479-1 | SHEET NO: 1 OF 1

DATE: Aug. 30, 2022 02:55:59 PM FILE: F:\1223\Planning\SY_WQ\PWQMP\Exhibits\WQMP_SP SC Senior.dwg

ATTACHMENT 6

SWMM Input Data in Input Format (Existing & Proposed Models)

PRE_DEV

```
[TITLE]

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           12/01/1948
START_TIME           00:00:00
REPORT_START_DATE    12/01/1948
REPORT_START_TIME    00:00:00
END_DATE             12/01/2006
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      0.06   0.08   0.11   0.16   0.18   0.21   0.21   0.20   0.16   0.12   0.08   0.06
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
LAGUNA           INTENSITY 1:00   1.0    TIMESERIES Laguna

[SUBCATCHMENTS]
;;                                                 Total    Pcnt.             Pcnt.    Curb
Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length
Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- -
-------
DMA-2            LAGUNA           POC-2            4.538    0        391      1        0
DMA-1            LAGUNA           POC-1            2.092    0        153      1        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-2            0.012      0.05       0.05       0.10       25         OUTLET
DMA-1            0.012      0.05       0.05       0.10       25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
DMA-2            9.0        0.01875    0.33
DMA-1            9          0.01875    0.33

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
POC-1            0          FREE                        NO
POC-2            0          FREE                        NO
```

```
[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Laguna           FILE "Laguna.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 2988.241 6077.246 3859.971 6869.504
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            3034.142           6331.570
POC-2            3810.987           6346.984

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-2            3820.347           6640.618
DMA-1            3027.865           6646.382

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LAGUNA           3495.115           6833.492
```

POST_DEV

```
[TITLE]

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           12/01/1948
START_TIME           00:00:00
REPORT_START_DATE    12/01/1948
REPORT_START_TIME    00:00:00
END_DATE             12/01/2006
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      0.06   0.08   0.11   0.16   0.18   0.21   0.21   0.20   0.16   0.12   0.08   0.06
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
LAGUNA           INTENSITY 1:00   1.0    TIMESERIES Laguna

[SUBCATCHMENTS]
;;                                                 Total    Pcnt.             Pcnt.    Curb
Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length
Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- -
-------
DMA-2            LAGUNA           BASIN_2          4.462    82.8     365      1        0
DMA-1            LAGUNA           BASIN_1          1.674    85.4     133      1        0
DMA-4-1          LAGUNA           POC-1            0.353    0        77       1        0
DMA-3            LAGUNA           POC-2            0.019    15.8     17       1        0
DMA-5            LAGUNA           POC-2            0.064    50       56       1        0
DMA-4-2          LAGUNA           POC-2            0.095    0        83       1        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-2            0.012      0.05       0.05       0.10       25         OUTLET
DMA-1            0.012      0.05       0.05       0.10       25         OUTLET
DMA-4-1          0.012      0.05       0.05       0.10       25         OUTLET
DMA-3            0.012      0.05       0.05       0.10       25         OUTLET
DMA-5            0.012      0.05       0.05       0.10       25         OUTLET
DMA-4-2          0.012      0.05       0.05       0.10       25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
DMA-2            9.0        0.01875    0.33
DMA-1            9          0.01875    0.33
```

POST_DEV

```
DMA-4-1          9          0.01875    0.33
DMA-3            9.0        0.01875    0.33
DMA-5            9.0        0.01875    0.33
DMA-4-2          9.0        0.01875    0.33

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
DRW-WELL-1       0          FREE                        NO
POC-2            0          FREE                        NO
DRY-WELL-2       0          FREE                        NO
POC-1            0          FREE                        NO

[DIVIDERS]
;;               Invert     Diverted         Divider
;;Name           Elev.      Link             Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
DIV-2            0          OUTLET           CUTOFF     0.1111     0          0          0
0
DIV-1            0          OUTLET1          CUTOFF     0.0698     0          0          0
0

[STORAGE]
;;               Invert   Max.     Init.    Storage    Curve                     Ponded   Evap.
;;Name           Elev.    Depth    Depth    Curve      Params                    Area     Frac.
Infiltration Parameters
;;-------------- -------- -------- -------- ---------- -------- -------- -------- -------- ------
-- ------------------------
BASIN_2          0        8        0        TABULAR    BASIN2                    1760     0
BASIN_1          0        10       0        TABULAR    BASIN_1                   500      0

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet
Init.      Max.
;;Name           Node             Node             Length     N          Offset     Offset
Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- --
-------- ----------
DW               DIV-2            DRY-WELL-2       10         0.01       0          0          0
0
OUTLET           DIV-2            POC-2            10         0.01       0          0          0
0
DW1              DIV-1            DRW-WELL-1       10         0.01       0          0          0
0
OUTLET1          DIV-1            POC-1            10         0.01       0          0          0
0

[OUTLETS]
;;               Inlet            Outlet           Outflow    Outlet          Qcoeff/
Flap
;;Name           Node             Node             Height     Type            QTable
Qexpon     Gate
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- --
-------- ----
OUT-2            BASIN_2          DIV-2            0          TABULAR/HEAD    OUT-2
NO
OUT-1            BASIN_1          DIV-1            0          TABULAR/HEAD    OUT1
NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
DW               DUMMY        0                0          0          0          1
OUTLET           DUMMY        0                0          0          0          1
DW1              DUMMY        0                0          0          0          1
OUTLET1          DUMMY        0                0          0          0          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------
```

POST_DEV

```
[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
OUT-2            Rating     0          0.111
OUT-2                       1          0.111
OUT-2                       2          0.111
OUT-2                       3          0.111
OUT-2                       4          0.111
OUT-2                       5          0.111
OUT-2                       5.700      0.111
OUT-2                       5.800      0.356
OUT-2                       5.900      0.804
OUT-2                       6.000      1.061
OUT-2                       6.100      1.259
OUT-2                       6.200      1.428
OUT-2                       6.300      1.577
OUT-2                       6.400      1.713
OUT-2                       6.500      1.838
OUT-2                       6.600      1.954
OUT-2                       6.700      2.064
OUT-2                       6.800      2.168
OUT-2                       6.900      2.266
OUT-2                       7.000      2.361
OUT-2                       7.100      2.452
OUT-2                       7.200      2.539
OUT-2                       7.300      2.623
OUT-2                       7.400      2.705
OUT-2                       7.500      2.784
OUT-2                       7.600      2.860
OUT-2                       7.700      2.935
OUT-2                       7.800      3.988
OUT-2                       7.900      5.851
OUT-2                       8.000      8.241

OUT1             Rating     1          0.0698
OUT1                        2          0.0698
OUT1                        3          0.0698
OUT1                        4          0.0698
OUT1                        5          0.0698
OUT1                        6          0.0698
OUT1                        7          0.0698
OUT1                        7.700      0.0698
OUT1                        7.800      0.2659
OUT1                        7.900      0.3944
OUT1                        8.000      0.4845
OUT1                        8.100      0.5582
OUT1                        8.200      0.6221
OUT1                        8.300      0.6794
OUT1                        8.400      0.7318
OUT1                        8.500      0.7803
OUT1                        8.600      0.8257
OUT1                        8.700      0.8685
OUT1                        8.800      0.9091
OUT1                        8.900      0.9479
OUT1                        9.000      0.9850
OUT1                        9.100      1.0207
OUT1                        9.200      1.0551
OUT1                        9.300      1.0883
OUT1                        9.400      1.1204
OUT1                        9.500      1.1517
OUT1                        9.600      1.6648
OUT1                        9.700      2.5875
OUT1                        9.800      3.7745
OUT1                        9.900      5.1749
OUT1                        10.000     6.7595

BASIN2           Storage    0          1760
BASIN2                      1          1760
BASIN2                      2          1760
BASIN2                      3          1760
```

```
BASIN2                     4          1760
BASIN2                     5          1760
BASIN2                     6          1760
BASIN2                     7          1760
BASIN2                     8          1760

BASIN_1          Storage   0          500
BASIN_1                    1          500
BASIN_1                    2          500
BASIN_1                    3          500
BASIN_1                    4          500
BASIN_1                    5          500
BASIN_1                    6          500
BASIN_1                    7          500
BASIN_1                    8          500
BASIN_1                    9          500
BASIN_1                    10         500

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Laguna           FILE "Laguna.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 2988.241 6077.246 3859.971 6869.504
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DRW-WELL-1       3066.511           6223.675
POC-2            3935.837           6225.216
DRY-WELL-2       3720.047           6317.698
POC-1            3417.941           6274.540
DIV-2            3820.235           6374.728
DIV-1            3277.677           6357.773
BASIN_2          3818.694           6502.661
BASIN_1          3280.760           6488.789

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-2            3820.347           6640.618
DMA-1            3282.301           6646.007
DMA-4-1          3416.399           6445.631
DMA-3            3938.291           6368.831
DMA-5            4039.279           6316.204
DMA-4-2          4066.304           6259.309

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LAGUNA           3495.115           6833.492
```

ATTACHMENT 7

EPA SWMM FIGURES AND EXPLANATIONS

Per the attached, the reader can see the screens associated with the EPA-SWMM Model in both pre-development and post-development conditions. Each portion, i.e., sub-catchments, outfalls, storage units, weir as a discharge, and outfalls (point of compliance), are also shown.

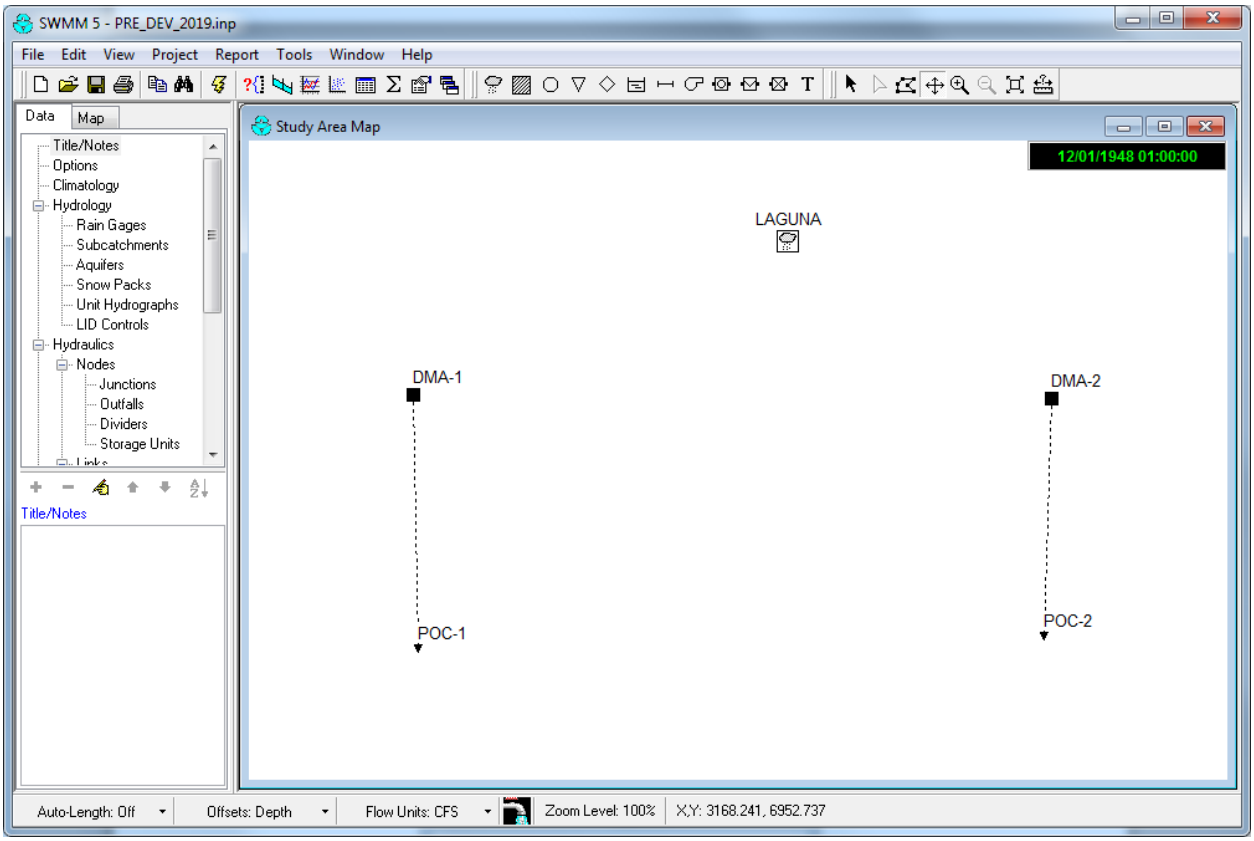
Variables for modeling are associated with typical recommended values by the EPA-SWMM model, typical values found in technical literature (such as Maidment's Handbook of Hydrology). Recommended values for the SWMM model have been attained from Appendix G of the 2020 County of San Diego BMP Design Manual.

Soil characteristics of the existing soils were determined from the NRCS Web Soil Survey (located in Attachment 8 of this report).

A Technical document prepared by Tory R Walker Engineering for the Cities of San Marcos, Oceanside and Vista (Reference [1]) can also be consulted for additional information regarding typical values for SWMM parameters.

Manning's roughness coefficients have been based upon the findings of the "*Improving Accuracy in Continuous Hydrologic Modeling: Guidance for Selecting Pervious Overland Flow Manning's n Values in the San Diego Region*" date 2016 by TRW Engineering (Reference [6]).

PRE-DEVELOPED CONDITION



Outfall POC-1

Property	Value
Name	POC-1
X-Coordinate	3034.142
Y-Coordinate	6331.570
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

Outfall POC-2

Property	Value
Name	POC-2
X-Coordinate	3810.987
Y-Coordinate	6346.984
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

Rain Gage LAGUNA

Property	Value
Name	LAGUNA
X-Coordinate	3495.115
Y-Coordinate	6833.492
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	Laguna
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN

Name of rainfall data file

Subcatchment DMA-1

Property	Value
Name	DMA-1
X-Coordinate	3027.865
Y-Coordinate	6646.382
Description	
Tag	
Rain Gage	LAGUNA
Outlet	POC-1
Area	2.092
Width	153
% Slope	1
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Subcatchment DMA-2

Property	Value
Name	DMA-2
X-Coordinate	3820.347
Y-Coordinate	6640.618
Description	
Tag	
Rain Gage	LAGUNA
Outlet	POC-2
Area	4.538
Width	391
% Slope	1
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Infiltration Editor

Infiltration Method: GREEN_AMPT

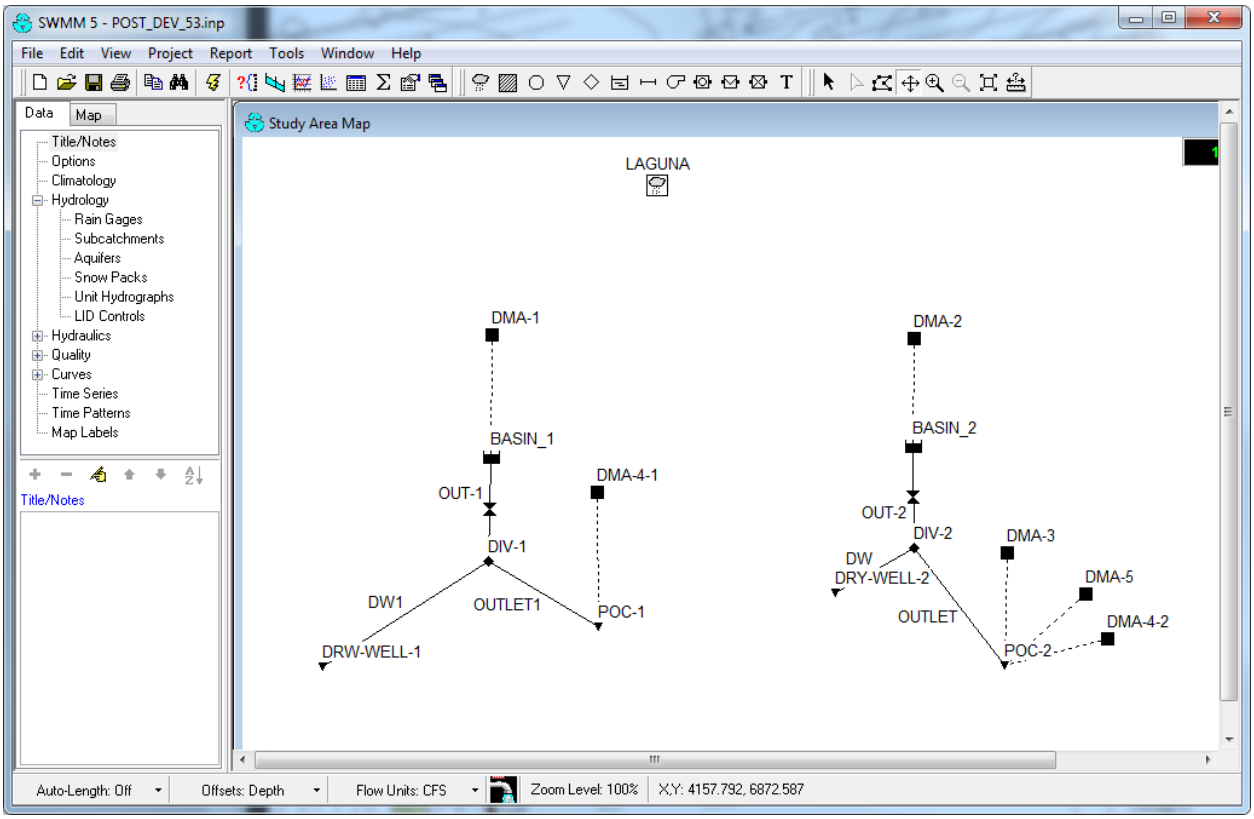
Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

POST-DEVELOPED CONDITION



Rain Gage LAGUNA

Property	Value
Name	LAGUNA
X-Coordinate	3495.115
Y-Coordinate	6833.492
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	Laguna
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN

User-assigned name of rain gage

Outfall POC-1

Property	Value
Name	POC-1
X-Coordinate	3417.941
Y-Coordinate	6274.540
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

User-assigned name of outfall

Outfall POC-2

Property	Value
Name	POC-2
X-Coordinate	3935.837
Y-Coordinate	6225.216
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

User-assigned name of outfall

Subcatchment DMA-1

Property	Value
Name	DMA-1
X-Coordinate	3282.301
Y-Coordinate	6646.007
Description	
Tag	
Rain Gage	LAGUNA
Outlet	BASIN_1
Area	1.674
Width	133
% Slope	1
% Imperv	85.4
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Subcatchment DMA-4-1

Property	Value
Name	DMA-4-1
X-Coordinate	3416.399
Y-Coordinate	6445.631
Description	
Tag	
Rain Gage	LAGUNA
Outlet	POC-1
Area	0.353
Width	77
% Slope	1
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Subcatchment DMA-2

Property	Value
Name	DMA-2
X-Coordinate	3820.347
Y-Coordinate	6640.618
Description	
Tag	
Rain Gage	LAGUNA
Outlet	BASIN_2
Area	4.462
Width	365
% Slope	1
% Imperv	82.8
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment DMA-3

Property	Value
Name	DMA-3
X-Coordinate	3938.291
Y-Coordinate	6368.831
Description	
Tag	
Rain Gage	LAGUNA
Outlet	POC-2
Area	0.019
Width	17
% Slope	1
% Imperv	15.8
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Subcatchment DMA-5

Property	Value
Name	DMA-5
X-Coordinate	4039.279
Y-Coordinate	6316.204
Description	
Tag	
Rain Gage	LAGUNA
Outlet	POC-2
Area	0.064
Width	56
% Slope	1
% Imperv	50
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Subcatchment DMA-4-2

Property	Value
Name	DMA-4-2
X-Coordinate	4066.304
Y-Coordinate	6259.309
Description	
Tag	
Rain Gage	LAGUNA
Outlet	POC-2
Area	0.095
Width	83
% Slope	1
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Divider DIV-1

Property	Value
Name	DIV-1
X-Coordinate	3277.677
Y-Coordinate	6357.773
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Max. Depth	0
Initial Depth	0
Surcharge Depth	0
Ponded Area	0
Diverted Link	OUTLET1
Type	CUTOFF
Cutoff Divider	
Cutoff Flow	0.0698
Tabular Divider	
Curve Name	*
Weir Divider	
Min. Flow	0
Max. Depth	0
Coefficient	0

User-assigned name of divider

Divider DIV-2

Property	Value
Name	DIV-2
X-Coordinate	3820.235
Y-Coordinate	6374.728
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Max. Depth	0
Initial Depth	0
Surcharge Depth	0
Ponded Area	0
Diverted Link	OUTLET
Type	CUTOFF
Cutoff Divider	
Cutoff Flow	0.1111
Tabular Divider	
Curve Name	*
Weir Divider	
Min. Flow	0
Max. Depth	0
Coefficient	0

User-assigned name of divider

EXPLANATION OF SELECTED VARIABLES

Sub-Catchment Areas:

Please refer to the attached diagrams that indicate the DMA sub areas modeled within the project site at both the pre and post developed conditions draining to the POC.

Parameters for the pre- and post-developed models include soil type D as determined from the site specific geotechnical investigation (attached at the end of this appendix). Suction head, conductivity and initial deficit corresponds to average values expected for these soils types, according to Appendix G of the 2020 County of San Diego BMP Design Manual.

For surface runoff infiltration values, REC selected infiltration values per Appendix G of the 2020 County of San Diego BMP Design Manual corresponding to hydrologic soil type.

Selection of a Kinematic Approach: As the continuous model is based on hourly rainfall, and the time of concentration for the pre-development and post-development conditions is significantly smaller than 60 minutes, precise routing of the flows through the impervious surfaces, the underdrain pipe system, and the discharge pipe was considered unnecessary. The truncation error of the precipitation into hourly steps is much more significant than the precise routing in a system where the time of concentration is much smaller than 1 hour.

Detention Basin Data

Storage Unit BASIN_1

Property	Value
Name	BASIN_1
X-Coordinate	3280.760
Y-Coordinate	6488.789
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Max. Depth	10
Initial Depth	0
Ponded Area	500
Evap. Factor	0
Infiltration	NO
Storage Curve	TABULAR
Functional Curve	
Coefficient	1000
Exponent	0
Constant	0
Tabular Curve	
Curve Name	BASIN_1

User-assigned name of storage unit

Outlet OUT-1

Property	Value
Name	OUT-1
Inlet Node	BASIN_1
Outlet Node	DIV-1
Description	
Tag	
Inlet Offset	0
Flap Gate	NO
Rating Curve	TABULAR/HEAD
Functional Curve	
Coefficient	10.0
Exponent	0.5
Tabular Curve	
Curve Name	OUT1

User-assigned name of outlet

Storage Curve Editor

Curve Name: BASIN_1

Description:

	Depth (ft)	Area (ft2)
1	0	500
2	1	500
3	2	500
4	3	500
5	4	500
6	5	500
7	6	500
8	7	500
9	8	500

View... Load... Save... OK Cancel Help

Rating Curve Editor

Curve Name: OUT1

Description:

	Head (ft)	Outflow (CFS)
1	1	0.0698
2	2	0.0698
3	3	0.0698
4	4	0.0698
5	5	0.0698
6	6	0.0698
7	7	0.0698
8	7.700	0.0698
9	7.800	0.2659

View... Load... Save... OK Cancel Help

Storage Unit BASIN_2

Property	Value
Name	BASIN_2
X-Coordinate	3818.694
Y-Coordinate	6502.661
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Max. Depth	8
Initial Depth	0
Ponded Area	1760
Evap. Factor	0
Infiltration	NO
Storage Curve	TABULAR
Functional Curve	
Coefficient	1000
Exponent	0
Constant	0
Tabular Curve	
Curve Name	BASIN2

User-assigned name of storage unit

Outlet OUT-2

Property	Value
Name	OUT-2
Inlet Node	BASIN_2
Outlet Node	DIV-2
Description	
Tag	
Inlet Offset	0
Flap Gate	NO
Rating Curve	TABULAR/HEAD
Functional Curve	
Coefficient	10.0
Exponent	0.5
Tabular Curve	
Curve Name	OUT-2

User-assigned name of outlet

Storage Curve Editor

Curve Name: BASIN2

Description:

	Depth (ft)	Area (ft2)
1	0	1760
2	1	1760
3	2	1760
4	3	1760
5	4	1760
6	5	1760
7	6	1760
8	7	1760
9	8	1760

View... Load... Save... OK Cancel Help

Rating Curve Editor

Curve Name: OUT-2

Description:

	Head (ft)	Outflow (CFS)
1	0	0.111
2	1	0.111
3	2	0.111
4	3	0.111
5	4	0.111
6	5	0.111
7	5.700	0.111
8	5.800	0.356
9	5.900	0.804

View... Load... Save... OK Cancel Help

Overland Flow Manning's Coefficient per TRWE (Reference [6])

appeal of a de facto value, we anticipate that jurisdictions will not be inclined to approve land surfaces other than short prairie grass. Therefore, in order to provide SWMM users with a wider range of land surfaces suitable for local application and to provide Copermittees with confidence in the design parameters, we recommend using the values published by Yen and Chow in Table 3-5 of the EPA SWMM Reference Manual Volume I – Hydrology.

SWMM-Endorsed Values Will Improve Model Quality

In January 2016, the EPA released the SWMM Reference Manual Volume I – Hydrology (SWMM Hydrology Reference Manual). The SWMM Hydrology Reference Manual complements the SWMM 5 User's Manual and SWMM 5 Applications Manual by providing an in-depth description of the program's hydrologic components (EPA 2016). Table 3-5 of the SWMM Hydrology Reference Manual expounds upon SWMM 5 User's Manual Table A.6 by providing Manning's *n* values for additional overland flow surfaces[3]. The values are provided in Table 1:

Table 1: Manning's *n* Values for Overland Flow (EPA, 2016; Yen 2001; Yen and Chow, 1983).

Overland Surface	Light Rain (< 0.8 in/hr)	Moderate Rain (0.8-1.2 in/hr)	Heavy Rain (> 1.2 in/hr)
Smooth asphalt pavement	0.010	0.012	0.015
Smooth impervious surface	0.011	0.013	0.015
Tar and sand pavement	0.012	0.014	0.016
Concrete pavement	0.014	0.017	0.020
Rough impervious surface	0.015	0.019	0.023
Smooth bare packed soil	0.017	0.021	0.025
Moderate bare packed soil	0.025	0.030	0.035
Rough bare packed soil	0.032	0.038	0.045
Gravel soil	0.025	0.032	0.045
Mowed poor grass	0.030	0.038	0.045
Average grass, closely clipped sod	0.040	0.050	0.060
Pasture	0.040	0.055	0.070
Timberland	0.060	0.090	0.120
Dense grass	0.060	0.090	0.120
Shrubs and bushes	0.080	0.120	0.180
Land Use			
Business	0.014	0.022	0.035
Semibusiness	0.022	0.035	0.050
Industrial	0.020	0.035	0.050
Dense residential	0.025	0.040	0.060
Suburban residential	0.030	0.055	0.080
Parks and lawns	0.040	0.075	0.120

For purposes of local hydromodification management BMP design, these Manning's *n* values are an improvement upon the values presented by Engman (1986) in SWMM 5 User's Manual Table A.6. Values from SWMM 5 User's Manual Table A.6, while completely suitable for the intended application to certain agricultural land covers, comes with the disclaimer that the provided Manning's *n* values are valid for shallow-depth overland flow that match the conditions in the experimental plots (Engman,

[3] Further discussion is provided on page 6 under "Discussion of Differences Between Manning's *n* Values"

ATTACHMENT 8

Soils Maps


117° 39' 6" W
117° 38' 51" W
439440
439480
439520
439560
439600
439640
439680
439720
439760
439800
33° 27' 29" N
33° 27' 21" N
3702260
3702220
3702180
3702140
3702100
3702060
De Los Mares
Camino De Los Mares
134
100
134
5
Soil Map may not be valid at this scale.
Map Scale: 1:1,700 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 25 50 100 150
Feet
0 50 100 200 300
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 15, Sep 13, 2021

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

Date(s) aerial images were photographed: Dec 29, 2020—Jan 10, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
100	Alo clay, 9 to 15 percent slopes	D	3.9	58.2%
134	Calleguas clay loam, 50 to 75 percent slopes, eroded	D	2.8	41.8%
Totals for Area of Interest			**6.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ATTACHMENT 9

Summary Files from the SWMM Model

PRE_DEV

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

***************
Analysis Options
***************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Starting Date ............ DEC-01-1948 00:00:00
Ending Date .............. DEC-01-2006 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00


*************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
*************************     ---------       -------
Total Precipitation ......       409.264       740.749
Evaporation Loss .........        17.501        31.675
Infiltration Loss ........       288.507       522.184
Surface Runoff ...........       110.646       200.265
Final Surface Storage ....         0.000         0.000
Continuity Error (%) .....        -1.806


*************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......       110.646        36.056
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........       110.646        36.056
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


**************************
Subcatchment Runoff Summary
**************************

-----------------------------------------------------------------------------------------------------------
                         Total      Total      Total      Total      Total       Total     Peak  Runoff
                        Precip      Runon       Evap      Infil     Runoff      Runoff   Runoff   Coeff
Subcatchment                in         in         in         in         in    10^6 gal      CFS
-----------------------------------------------------------------------------------------------------------
DMA-2                   740.75       0.00      31.64     521.53     201.04       24.77     5.59   0.271
DMA-1                   740.75       0.00      31.75     523.61     198.59       11.28     2.56   0.268


Analysis begun on:  Tue Aug 30 13:57:35 2022
Analysis ended on:  Tue Aug 30 13:58:08 2022
Total elapsed time: 00:00:33
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

***************
Analysis Options
***************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ DEC-01-1948 00:00:00
Ending Date .............. DEC-01-2006 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00
Routing Time Step ........ 60.00 sec


WARNING 04: minimum elevation drop used for Conduit DW

WARNING 04: minimum elevation drop used for Conduit OUTLET

WARNING 04: minimum elevation drop used for Conduit DW1

WARNING 04: minimum elevation drop used for Conduit OUTLET1

*************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
*************************     ---------       -------
Total Precipitation ......       411.548       740.749
Evaporation Loss .........        51.725        93.101
Infiltration Loss ........        63.363       114.048
Surface Runoff ...........       299.778       539.574
Final Surface Storage ....         0.000         0.000
Continuity Error (%) .....        -0.806


*************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......       299.778        97.687
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........       300.748        98.003
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....        -0.324


*******************************
Highest Flow Instability Indexes
*******************************
```

Link OUT-1 (1)
Link DW1 (1)

****
Routing Time Step Summary
****
Minimum Time Step : 60.00 sec
Average Time Step : 60.00 sec
Maximum Time Step : 60.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-2	740.75	0.00	97.76	86.59	562.25	68.12	5.82	0.759
DMA-1	740.75	0.00	100.35	73.39	572.67	26.03	2.19	0.773
DMA-4-1	740.75	0.00	26.46	508.94	212.31	2.03	0.44	0.287
DMA-3	740.75	0.00	37.01	420.82	292.97	0.15	0.02	0.396
DMA-5	740.75	0.00	63.60	249.13	439.27	0.76	0.08	0.593
DMA-4-2	740.75	0.00	25.18	500.53	224.12	0.58	0.12	0.303

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
DRW-WELL-1	OUTFALL	0.00	0.00	0.00	0 00:00
POC-2	OUTFALL	0.00	0.00	0.00	0 00:00
DRY-WELL-2	OUTFALL	0.00	0.00	0.00	0 00:00
POC-1	OUTFALL	0.00	0.00	0.00	0 00:00
DIV-2	DIVIDER	0.00	0.00	0.00	0 00:00
DIV-1	DIVIDER	0.00	0.00	0.00	0 00:00
BASIN_2	STORAGE	0.08	7.90	7.90	17902 03:33
BASIN_1	STORAGE	0.06	9.66	9.66	17902 04:00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal

DRW-WELL-1	OUTFALL	0.00	0.07	3688	03:45	0.000	22.644
POC-2	OUTFALL	0.23	5.94	17902	03:33	1.493	15.065
DRY-WELL-2	OUTFALL	0.00	0.11	15815	14:45	0.000	54.721
POC-1	OUTFALL	0.44	2.56	17902	04:00	2.035	5.565
DIV-2	DIVIDER	0.00	5.82	17902	03:33	0.000	68.294
DIV-1	DIVIDER	0.00	2.19	17902	04:00	0.000	26.175
BASIN_2	STORAGE	5.82	5.82	17902	04:00	68.122	68.122
BASIN_1	STORAGE	2.19	2.19	17902	04:00	26.031	26.031

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
DIV-2	DIVIDER	508416.02	0.000	0.000
DIV-1	DIVIDER	508416.02	0.000	0.000
BASIN_2	STORAGE	508416.02	7.899	0.101
BASIN_1	STORAGE	508416.02	9.657	0.343

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
BASIN_2	0.132	1	0	13.903	99	17902 03:32	5.82
BASIN_1	0.029	1	0	4.828	97	17902 04:00	2.19

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
DRW-WELL-1	3.08	0.05	0.07	22.644
POC-2	1.06	0.10	5.94	15.065
DRY-WELL-2	4.04	0.10	0.11	54.721
POC-1	0.47	0.09	2.56	5.565
System	2.16	0.34	8.67	97.996

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth

DW	DUMMY	0.11	15815	14:45
OUTLET	DUMMY	5.71	17902	03:33
DW1	DUMMY	0.07	3688	03:45
OUTLET1	DUMMY	2.12	17902	04:00
OUT-2	DUMMY	5.82	17902	03:33
OUT-1	DUMMY	2.19	17902	04:00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
DW	0.01	0.01	0.01	508416.02	0.01
OUTLET	0.01	0.01	0.01	508416.02	0.01
DW1	0.01	0.01	0.01	508416.02	0.01
OUTLET1	0.01	0.01	0.01	508416.02	0.01

Analysis begun on: Wed Aug 31 13:32:27 2022
Analysis ended on: Wed Aug 31 13:33:27 2022
Total elapsed time: 00:01:00

Attachment G Geotechnical Report

Leighton and Associates, Inc.
A Leighton Group Company

August 31, 2022

Project No. 13468.003

Memorial Care Health System
17360 Brookhurst Street
Fountain Valley, California 92708

Attention: Mr. Thomas J. Leary

Subject: **Response to Review Comments**
First City of San Clemente Technical Memorandum
Preliminary Water Quality Management Plan (WQMP)
Saddleback Senior Housing and Health Center Development
654 Camino De Los Mares
San Clemente, California

References: Leighton and Associates, Inc., 2022, *Geologic and Seismic Hazards Review, Proposed San Clemente Senior Housing Project 654 Camino Del Mares City of San Clemente, Orange County, California,* Project No. 13468.002, dated May 19, 2022.

Geosyntec Consultants, 2022, *Technical Memorandum First Review of Preliminary Water Quality Management Plan (WQMP) for Saddleback Senior Housing and Health Care*, prepared by Geosyntec Consultants (acting city reviewer), dated July 26, 2022.

INTRODUCTION

In response to your request and to satisfy the requirements of the reviewer (Geosyntec), Leighton and Associates, Inc. (Leighton) herein submits this letter as our response to the subject first reviewer comments issued by Geosyntec, in their review of the WQMP Plan prepared by Hunsaker and Associates Inc. Geotechnical Review comments with a geotechnical component (Comments 8, 9 and 11) are presented below verbatim followed by our specific response to each. The review letter WQMP Technical Memorandum (TM) is provided in attached Appendix A. A list of pertinent reference cocuments is attached at the end of the text.

RESPONSES TO 1ST SUBMITTAL COMMENTS

Comment ID 8

Based on the information provided in the WQMP, it is not apparent that the potential for groundwater mounding was considered or analyzed. While the geotechnical report documented infiltration rates and soil characteristics at the location of the proposed drywells, a groundwater mounding analysis did not appear to be within the scope of the investigation. Refer to Appendix C.2 and update Worksheet 2 as needed.

Response to Comment ID 8

For clarification, the flow of groundwater through an aquifer is dependent on gravitational forces and aquifer properties, which differs slightly than flow through an unsaturated zone (vadose zone). Flow of water through a vadose zone, in this case via infiltration from above, is dependent upon capillary forces (absorption forces between water and soil matrix), gravity, evapotranspiration, vegetation and hydraulic conductivity of the soil into which the infiltration waters (treated stormwater runoff) is introduced. The flow of infiltration typically occurs as a combined vertical and lateral path of flow, whereas the flow of groundwater within an unconfined aquifer system is generally horizontal (lateral).

Further, the occurrence of groundwater mounding can occur in a vadose zone or subsurface soils possessing a low saturated hydraulic conductivity. The mounding develops as a temporary increase in the surface of the existing groundwater table, where the rate of waters entering a target soil unit is greater than the rate at which water moves laterally within the system. Soils of low permeability (clays, silts) do not dissipate water quickly and can potentially allow mounding to occur at the invert of a drywell.

Groundwater was not encountered within the discrete Marine Terrace Deposits (Qtm) unit encountered beneath the site (soil unit of proposed disposal) during our recent drilling exploration (Leighton, 2022). A map showing locations of recent drilling and planned dry wells is attached as Figure 1, *Geotechnical Map*. The presence of deeper groundwater in the site area is not well constrained, and no deeper exploratory or domestic groundwater wells have been identified on or within the nearby site vicinity. Based on our history of experience in the area, we anticipate the occurrence of groundwater likely exists near sea level beneath the site, confined to fractures and joints within bedrock of the Capistrano Formation. In such case the depth to groundwater would be on the order of 200 feet beneath the ground surface.

The Qtm deposits are composed of a sandy granular lithology of high hydraulic conductivity. Our testing indicates this unit is composed of approximately 4 percent fines, 79 percent sand and 17 percent gravel. Based on the results of our field percolation tests in this unit, we find this deposit will prove to be an excellent transmitter of subsurface waters and useful target for a temporary/seasonal water condition generated by dry-well disposal/infiltration. The basal contact of the Qtm unit is regionally tilted seaward on the order of a few degrees. The nature of the contact is such that a majority of the waters entering the system will migrate southerly away from the source of infiltration towards the Pacific Ocean, within the Qtm unit. Only a minor fraction of the water would be expected to enter the bedrock, at a very slow rate through fractures and joints. The subsurface relationship of the subsurface units and planned improvements is depicted within attached Figure 2, *Cross Section A-A'* in Appendix B.

It is our professional opinion that based on existing evidence and the absence of groundwater residing within the Qtm unit, that the potential for groundwater mounding is negligible, and the introduction of treated stormwater runoff poses no increasing risk that cannot be mitigated to acceptable levels.

Comment No. ID 9

The project proposes the use of two dry-wells to comply with both pollutant control (full infiltration) and hydro-modification flow-duration control requirements. The proposed wells are located adjacent to a significant slope above Interstate 5. Please provide additional documentation that the siting and feasibility criteria associated with Dry Wells has been considered and documented according to the requirements of the TGD (Fact Sheet INF-4) including but not limited to requirements for setbacks, groundwater separation and mounding, and pretreatment.

Response to Comment No. ID 9

The planned depth of infiltration, targeting the Qtm unit, accommodates an invert setback distance of approximately 160 linear feet from the slope face, see Figure 2, Cross Section AA'. No landslides are located nearby and the potential for liquefaction induced settlement to affect the site is anticipated to be low. Groundwater was not encountered during drilling and based on our response above is interpreted at a depth of 200 feet below ground surface.

Comment No. ID 11

The Geotechnical Report included with the WMQP does not appear to consider the potential impact of full infiltration on slope stability (impact of proposed infiltration on adjacent slopes). While slope stability is beyond the scope of this WQMP review, additional analysis and documentation may be needed to support Grading Plan review. Based on the boring logs provided for LP-1 and LP-2 the screened interval for the proposed drywells is at elevations between approximately 177' to 187' (30 to 40' below ground surface). It is noted that this elevation is higher than the adjacent San Diego Freeway (Interstate 5).

Response to Comment No. ID 11

The stability of slopes existing and/or proposed along the southerly site perimeter will be analyzed as part of a pending future scope of work, to address project grading and construction. The occurrence of any subsurface waters including that discharged by the dry well system, will be among a suite of geotechnical parameters including laboratory test results to be incorporated into our analyses of slope stability. Leighton will be determining current factors of safety (FOS) and recommending mitigation measures to achieve a code-based minimum 1.5 FOS static and 1.1 FOS pseudostatic conditions.

The seismic hazards generated by earthquakes in the southern California area can include soil liquefaction and associated surface manifestations, earthquake-induced settlement, lateral displacement, landsliding, seiches, and tsunamis. The potential for seismic hazards at the site will be addressed in the geotechnical report prepared for the site, which will be signed by a licensed California Geotechnical Engineer and Certified Engineering Geologist.

We appreciate the opportunity to be of service. If you have any questions or if we can be of further service, please contact us at your convenience.

Respectfully submitted,

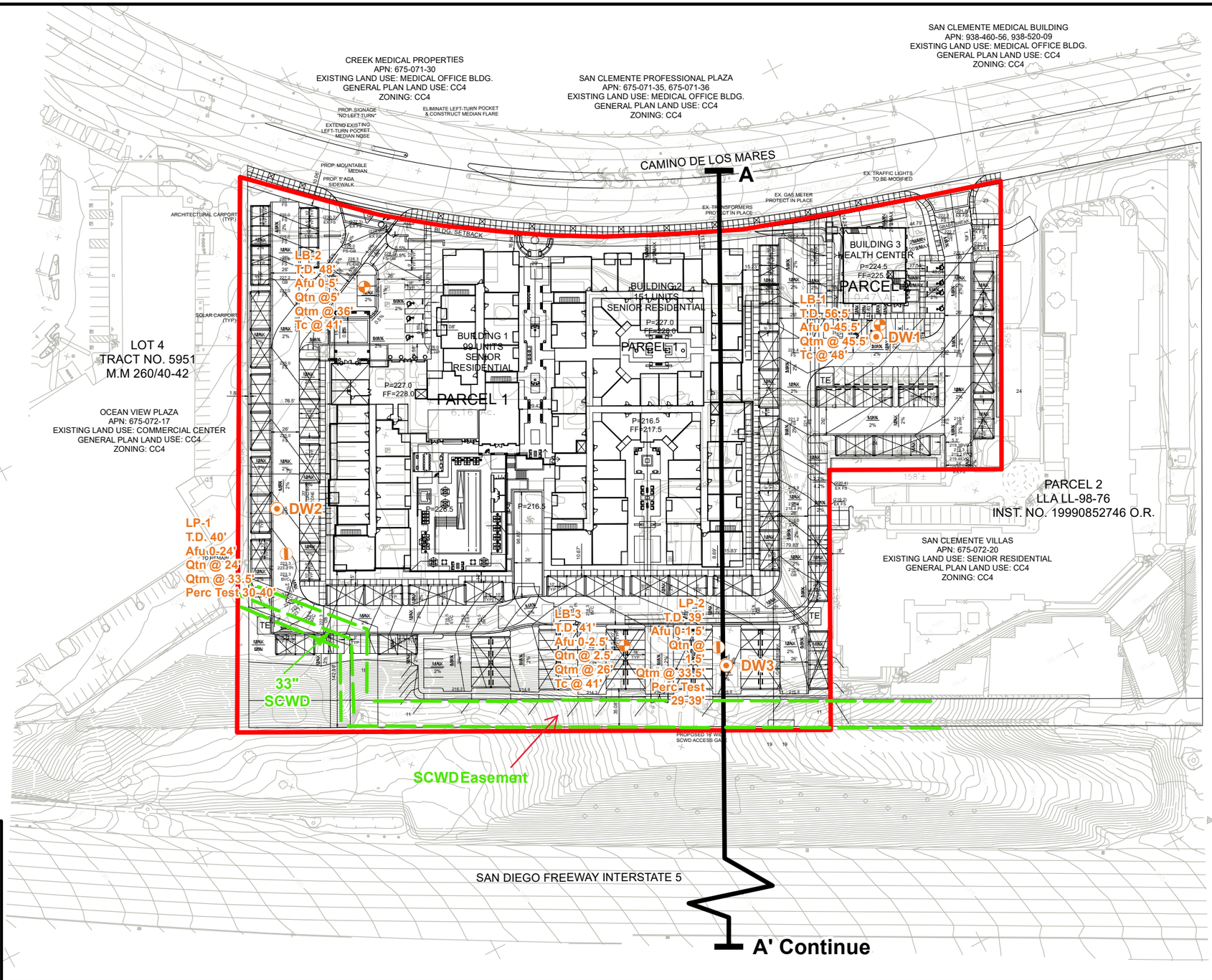
LEIGHTON AND ASSOCIATES, INC.

Joe Roe, PG, CEG 2456
Sr. Principal Geologist

Jeff Hull, PG, CEG 2056
Associate Geologist

JHL/lr

Attachments: Figure 1 – Geotechnical Map
Figure 2 – Geologic Cross Section A-A'
Appendix A – WQMP Technical Memorandum



LEGEND

LB-3 T.D. 41.17' Afu 0-2.5' Qtn @ 2.5' Qtm @ 26' Tc @ 41'	Approximate location of hollow-stem auger boring showing total depth (T.D.), and depth to earth units in feet below existing ground surface.
LP-2 T.D. 39' Afu@0-1.5' Qtn @ 1.5' Qtm @ 33.5' Perc Test 29-39'	Approximate location of percolation test boring showing total depth (T.D.), and depth to earth units in feet below existing ground surface.
DW3	Approximate location of proposed dry well.
Afu	Artificial Fill, Undocumented
Qtn	Quaternary Non-marine Deposits
Qtm	Quaternary Marine Deposits
Tc	Miocene Capistrano Formation
A A'	Location of cross section A-A'. See Figure 2
	Approximate site boundary

N

0 100 200
Feet

Project: 13468.003	Eng/Geol: JLH
Scale:1 " = 100 '	Date: August 2022

Reference: Vesting Tentative Parcel, Map No 2022-116, Saddleback Memorial Medical Center

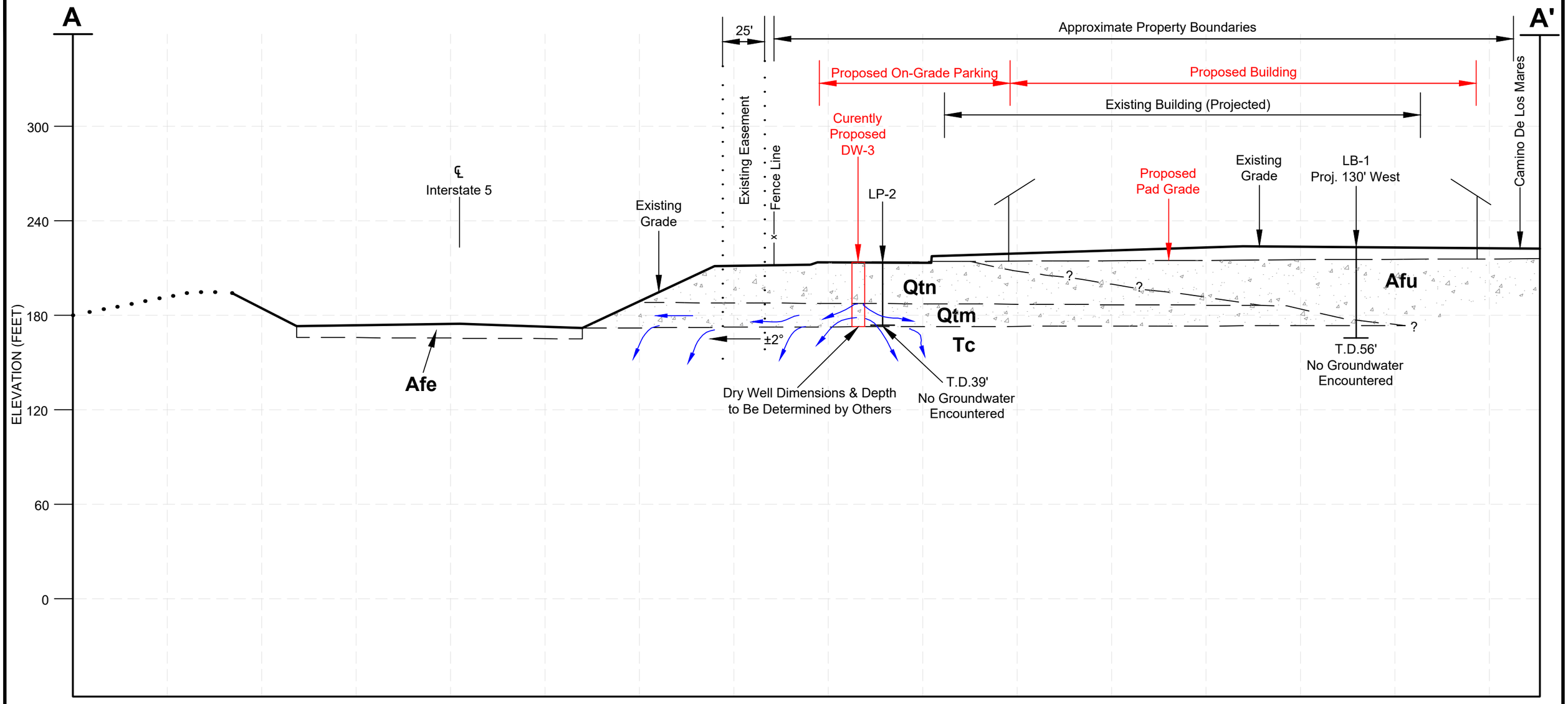
GEOTECHNICAL MAP

San Clemente Senior Center Development Project
Response to WQMP Comments
654 Camino de los Mares, San Clemente, California

FIGURE 1

Leighton

Map Saved as J:\Drafting\13468\003\Maps\13468.003_F01_ELM_2022-08-29.mxd on 8/29/2022 11:52:14 AM Author: KVM (btran)



N25°E

Marine Terrace Sands (Qtm)

Results of sieve analysis from composits samples collected from 29-41 feet indicate 17% gravel 79% sand and 4% fines. Material is characterized as greyish brown, poorly graded sand (SP)g

Arrows indicate pathway of infiltration water into vadose zone

GEOLOGIC CROSS SECTION A-A' San Clemente Senior Center Development Project Response to WQMP Comments 654 Camino de los Mares, San Clemente, California	**FIGURE 2**
	Scale: 1"=60'
	Date: August 2022
Leighton	Proj: 13468.003
	Eng/Geol: JLH

J:\DRAFTING\13468\003\CAD\2022-08-26\13468-003_F02_CS_2022-08-29.DWG (08-29-22 3:45:43PM) Plotted by: btran

APPENDIX A

WQMP Technical Memorandum

Technical Memorandum

Date: July 26, 2022

To: Zachary Ponsen, PE, City of San Clemente

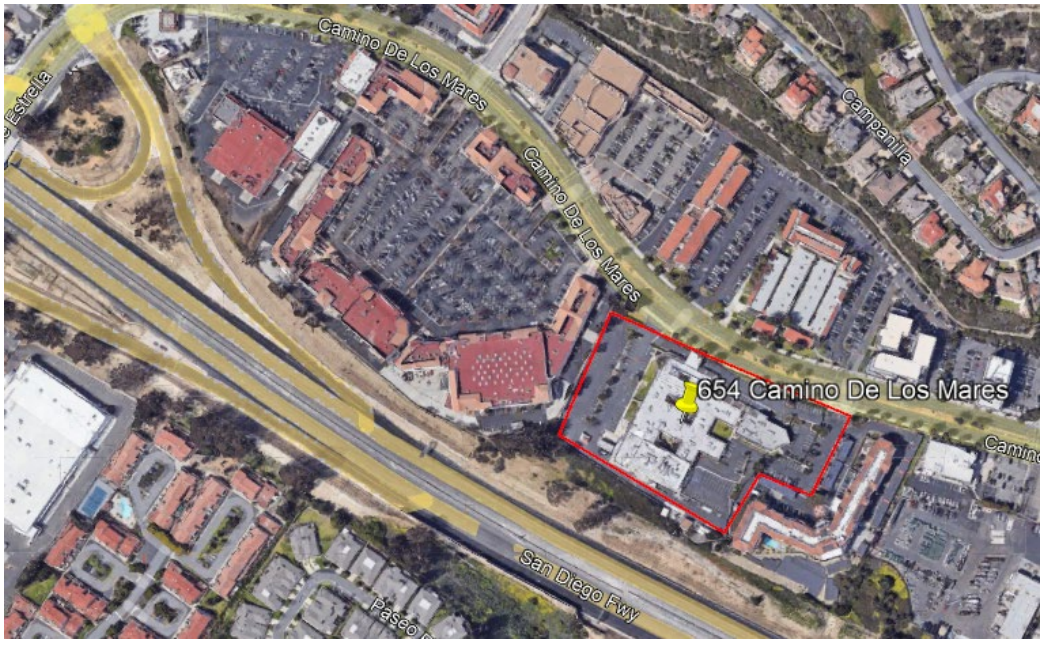
From: Max Dugan, PE (CA), Aaron Poresky, Geosyntec Consultants

Subject: **First review of Preliminary Water Quality Management Plant (WQMP) for Saddleback Senior Housing and Health Center**

Geosyntec Consultants reviewed the first submittal of the Preliminary Water Quality Management Plan (WQMP) prepared for Saddleback Memorial Medical Care by Hunsaker and Associates for a proposed senior living and care center. The project is located in the City of San Clemente on a developed site that is bordered by Camino De Estrella to the north, Camino De Los Mares to the east, and I-5 to the southwest. A supplemental submittal titled *"Technical Memorandum: SWMM Modeling for Hydromodification Compliance of: San Clemente Senior Housing & Health Center"* was also submitted for review along with the WQMP.

The project proposes the redevelopment of an existing 6.63-acre parcel to include two senior living apartment buildings, a medical office building, and related improvements. The project is bordered by Camino De Los Mares to the north and Interstate-5 to the south. The project is not exempt from hydromodification management requirements and proposes the use of dry wells and flow-control vaults for pollutant control and hydromodification compliance.

Geosyntec Consultants reviewed the project for conformance with requirements presented in the South Orange County Technical Guidance Document (Version 1.1), dated December 21, 2018, the South Orange County Model Water Quality Management Plan (Model WQMP), dated September 28, 2017 and the South Orange County Hydromodification Management Plan dated September 28, 2017. Our review comments are summarized in the table below, and a numbered list of comments is provided following the table.



SUBMITTAL TRACKING

Project Name:	Saddleback Senior Housing and Health Center	☒ 1st Submittal, (Reviewed)	7/11/2022, (7/26/2022)
Tracking/Permit Number:	TBD	☐ 2nd Submittal, (Reviewed)	
Submittal Type:	☒ Preliminary WQMP ☐ Final WQMP	☐ 3rd Submittal, (Reviewed)	

REVIEW CHECKLIST

Provided	Adequate	Required South Orange County Storm Water Quality Management Plan Component	Comment Reference
		Title Sheets	
✓	✓	Prepared by a California Registered Civil Engineer	
✓	✓	Project Owner Information & Certification	
		Section 1 - Discretionary Permit(s) and Water Quality Conditions	
✓	×	Project Information	1
✓	✓	List of Previously Approved Water Quality Conditions	
		Section 2 – Project Description	
✓	×	2.1 Description of Proposed Project, Project Area, Pre- And Post-Project Pervious and Impervious Area	2, 3
✓	✓	2.2 Post Development Drainage Characteristics	
✓	✓	2.3 Property Ownership/Management	
		Section 3 – Site & Watershed Characterization	
✓	×	3.1 Site Conditions	2, 6
✓	×	3.2 Proposed Site Development Activities	4
✓	×	3.3 Receiving Waterbodies	6
✓	✓	3.4 Stormwater Pollutants or Conditions of Concern	
✓	✓	3.5 Hydrologic Condition of Concern	
✓	✓	3.6 Critical Course Sediment Yield Areas	
		Section 4 - Site Plan and Drainage Plan	
✓	✓	4.1 Drainage Management Area Delineation	3, 4, 5
		4.2 Overall Site Design BMPs	
✓	✓	Minimize Impervious Area	

Provided	Adequate	Required South Orange County Storm Water Quality Management Plan Component	Comment Reference
✓	✓	Maximize Natural Infiltration Capacity	
✓	✓	Preserve Existing Drainage Patterns and Time of Concentration	
✓	✓	Disconnect Impervious Areas	
✓	✓	Protect Existing Vegetation and Sensitive Areas	
✓	✓	Revegetate Disturbed Areas	
✓	✓	Soil Stockpiling and Site Generated Organics	
✓	✓	Firescaping	
✓	✓	Water Efficient Landscaping	
✓	✓	Slopes and Channel Buffers	
		4.3 DMA Characteristics and Site Design BMPs including DMA Summary Table	
NA	NA	Self-Mitigating DMAs	
✓	×	Self-Retaining DMAs	5
		4.4 Source Control BMPs	
✓	✓	Non-Structural Source Control BMPs	
✓	✓	Structural Source Control BMPs	
✓	✓	Dry Weather Flow Elimination	
		Section 5 - Low Impact Development BMPs	
✓	×	Infiltration Feasibility Category (for each DMA)	6, 7, 8, 11
NA	NA	Harvest and Use Status (for each DMA)	
NA	NA	Description of Space Constraints if any (for each DMA)	
NA	NA	Hydrologic Source Controls (for each DMA)	
✓	×	Structural LID BMPs (for each DMA)	9, 10
✓	✓	LID BMP Sizing-Worksheets and Documentation	
✓	✓	Summary of LID BMPs	
		Section 6 – Hydromodification BMPs (if applicable)	
✓	×	6.1 Points of Compliance	17, 18
✓	×	6.2 Pre-Development (Natural) Conditions	13, 14, 19
✓	×	6.3 Post-Development Conditions and Hydromodification BMPs	13, 15, 16, 19
NA	NA	6.4 Measures for Avoidance of Critical Course Sediment Yield Areas	
✓	×	6.5 Hydrologic Modeling and Hydromodification Compliance	12, 14, 19

Provided	Adequate	Required South Orange County Storm Water Quality Management Plan Component	Comment Reference
		Section 7 - Educational Materials Index	
✓	✓	Checklist of Applicable Educational Materials	
		Site Plan and Drainage Plan Sheet Set (Preliminary and Final WQMPs)	
✓	✓	Project location map showing downstream receiving waters, 303(d) or TMDL water bodies, and hydromodification susceptible water bodies	
✓	×	Existing Site Conditions	18
✓	✓	Proposed Site Conditions including Infiltration Feasibility Findings/Information	
✓	×	Drainage Management Areas, Stormwater Infrastructure, Site Design and Source Control BMPs	5
×	×	Conceptual Design Schematics or Designs for Structural BMPs	20
✓	✓	Description and Conceptual Location of Features to Facilitate O&M	
NA	**NA**	**Site Plan and Drainage Plan Sheet Set Additional Content (Final WQMPs)**	
		Detailed Delineations to Each Proposed Structural BMP	
		DMAs and BMPs overlain on Final Grading Plans	
		Detailed Grading Contours and Elevations for Structural BMPs with Surface Storage	
		BMP Details for all Structural BMPs	
		Specific Models, Dimensions, and Design Characteristics of any Proprietary BMPs	
		Identification of Specific Design Features to Facilitate Inspection and O&M	
		Attachment A: Educational Materials	
✓	✓	Preliminary WQMP: Placeholder only	
		Final WQMP: Attach applicable educational materials from Section 7	
		Attachment B: Operations and Maintenance Plan	
✓	✓	Preliminary WQMP: Placeholder only	
		Final WQMP: Operations and Maintenance Plan	

Notes:

✓ = Provided or Adequate

× = Not Provided or Not Adequate

N/A = Not applicable

Comments Potentially Affecting Other Elements

[This section calls out comments on WQMP elements that may require commensurate changes to other elements of the project design package.]

Addressing the comments below, particularly Comments #2 and #4, may require significant updates to the proposed stormwater management approach and BMPs proposed for the site, significantly altering the plans in this and other submittals including:

- Grading plans
- BMP detail sheets
- Storm drain plans
- Utility plans
- Landscape plans

Comments:

Comment ID	Comment	Reference	Section, Pg.
1	The WQMP cover sheet improperly lists the City of Mission Viejo in the project address. Please correct.	WQMP	Cover
2	The tabulation of impervious area and % impervious included in Table 3-1 of the WQMP appears to incorrectly state the Imperviousness of Parcel 2 (Medical offices) as 33.9%. Please revise/correct as needed.	WQMP	Section 3.1, Pg. 5
3	The total DMA area included DMA summary Table (Table 4-1) is less than the project area stated in the project description. Note that DMAs must be identified for the entire site. Please update the DMA summary and/or delineate additional DMAs as needed.	WQMP	Section 4.1, Pg. 13, and WQMP Exhibit
4	There appear to be a number of offsite improvements associated with the project (e.g., Sidewalk along Camino De Los Mares and Turn Land/Median adjustments). Please document how these activities are either exempt from, or comply with, the LID and hydromodification requirements of the TGD.	WQMP	WQMP Exhibit
5	DMA-3 does not appear to be delineated on the WQMP Exhibit. Please identify the area and document how it is self-retaining.	WQMP	WQMP Exhibit

Comment ID	Comment	Reference	Section, Pg.
6	The project discharges to a wetland area that could potentially be impacted by the proposed drywells. To support the "full infiltration" feasibility condition selected, please document in Worksheet 1 (Part 2, Item 4) how impacts to the downstream wetlands will be avoided or mitigated by the project.	WQMP	Attachment E, Worksheet 1
7	Lines 10 and 11 of Worksheet 2 (Attachment E) are inconsistent with narrative in the WQMP with respect to groundwater separation. Please update as needed.	WQMP	Attachment E, Worksheet 2
8	Based on the information provided in the WQMP, it is not apparent that the potential for groundwater mounding was considered or analyzed. While the geotechnical report documented infiltration rates and soil characteristics at the location of the proposed drywells, a groundwater mounding analysis did not appear to be within the scope of the investigation. Refer to Appendix C.2 and update Worksheet 2 as needed.	WQMP	Attachment E, Worksheet 2
9	The project proposes the use of two dry-wells to comply with both pollutant control (full infiltration) and hydromodification flow-duration control requirements. The proposed wells are located adjacent to a significant slope above Interstate 5. Please provide additional documentation that the siting and feasibility criteria associated with Dry Wells has been considered and documented according to the requirements of the TGD (Fact Sheet INF-4) including but not limited to requirements for setbacks, groundwater separation and mounding, and pretreatment.	WQMP	Various Sections
10	Dry wells are classified as Class V Underground Injection Wells and fall under the California Wells Standards (Bulletin 74-81) and the Orange County Well Ordinance (No. 2607). Please document in the WQMP how the proposed project intends to comply with Local, State, and Federal regulations for dry wells. Refer to Section 2.3.1.2 and Fact Sheet INF-4 of the TGD.	WQMP	Various Sections

Comment ID	Comment	Reference	Section, Pg.
11	The Geotechnical Report included with the WMQP does not appear to consider the potential impact of full infiltration on slope stability (impact of proposed infiltration on adjacent slopes). While slope stability is beyond the scope of this WQMP review, additional analysis and documentation may be needed to support Grading Plan review. Based on the boring logs provided for LP-1 and LP-2 the screened interval for the proposed drywells is at elevations between approximately 177' to 187' (30 to 40' below ground surface). It is noted that this elevation is higher than the adjacent San Diego Freeway (Interstate 5).	Geotech Report	Section 3.3, Appendix A
The following comments apply to the *Technical Memorandum: SWMM Modeling for Hydromodification Compliance of: San Clemente Senior Housing & Health Center*, dated July 2022, prepared by Dr. Luis Parra, PE (REC Consultants), and provided under separate cover. Please include the updated HMP Report and incorporate HMP components where applicable into the next submittal of the WQMP.			
12	Please provide the associated SWMM model files for review and verification with the next submittal of the WQMP. The WQMP Reviewer reserves the right to make additional comments based on content of the provided model.	HMP Report	NA
13	The Hydromodification modeling does not appear to account for the entire site area, refer to comment 3 above. Please update as needed.	HMP Report	HMP Modeling, Pg. 2 and Attachment 5
14	Documentation and description of pre-development SWMM parameters for DMAs is limited to soil type, tributary area, and percent impervious, please provide documentation/support for additional pre-development catchment characteristics.	HMP Report	HMP Modeling, Pg. 2
15	The summation of individual sub-areas (A3, A4, A5, and A6) does not match the provided DMA-1 Area from Table 2	HMP Report	HMP Modeling, Pg. 2 and Attachment 5
16	DMA 3 does not appear to be included in the hydromodification analysis, please document why DMA 3 has not been modeled and/or update the model to include DMA 3.	HMP Report	Various
17	Please clearly identify the Points of Compliance in both the pre-project and post-project exhibits.	HMP Report	Exhibits

Comment ID	Comment	Reference	Section, Pg.
18	It appears that a new storm drain connection is proposed at the northeast corner of the site (connects to existing 18" RCP). Please clarify the direction of flow in the proposed storm drain and discuss potential comingling of offsite flows or discharges of onsite flows at this location. This area is identified as a "Discharge Point/Point of Compliance" on the WQMP Plan included in the WQMP.	WQMP and HMP Report	Attachment 5
19	The Manning's roughness of pervious land used in the SWMM modeling is adjusted from standard guidance (San Diego Model BMP Design Manual, Table G.1-4), please provide supporting technical documentation and justification of the selected values (the included reference is incomplete, and determination/selection of the selected values is not provided).	HMP Report	Attachment 7
20	Neither the HMP report or the WQMP include a schematic or plan for the proposed hydromodification flow control system (detention vaults and controls). Please provide in the next submittal of the WQMP so they can be cross checked against model inputs and narrative.	HMP Report	NA

GEOLOGIC AND SEISMIC HAZARDS REVIEW
PROPOSED SAN CLEMENTE SENIOR HOUSING PROJECT
654 CAMINO DE LOS MARES
CITY OF SAN CLEMENTE, ORANGE COUNTY, CALIFORNIA

Prepared For

MEMORIAL CARE HEALTH SYSTEM
17360 BROOKHURST STREET
FOUNTAIN VALLEY, CALIFORNIA 92708

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13468.002

May 19, 2022

Leighton and Associates, Inc.
A Leighton Group Company

May 19, 2022

Project No. 13468.002

Memorial Care Health System
17360 Brookhurst Street
Fountain Valley, California 92708

Attention: Mr. Thomas J. Leary

Subject: Geologic and Seismic Hazards Review
Proposed San Clemente Senior Housing Project
654 Camino De Los Mares
City of San Clemente, Orange County, California

Leighton and Associates, Inc. (Leighton) is pleased to submit this Geologic and Seismic Hazards Review Report and Infiltration Feasibility Study in support of development of the proposed Senior Housing project located at 654 Camino De Los Mares in the City of San Clemente, California. This desktop study was performed in general accordance with the California Environmental Quality Act (CEQA) guidelines and Environmental Checklist for Geology and Soils.

The project site is not located within a State of California Alquist-Priolo Zone, or Liquefaction Hazard Zone, however, the slope bounding the southern edge of the site is defined as a potential Earthquake-Induced Landslide hazard zone. Based on our review of readily available regional geologic maps and reports, site-specific geotechnical documents, and soil infiltration feasibility study, site geologic units include artificial fill ranging from 6.5 to 45 feet thick as observed in borings and interpreted up to 70 feet thick within the axes of two buried canyons. The fill is underlain by a succession of non-marine "terrestrial" alluvium and marine terrace deposits characterized as silty clay and sand. The terrace units were deposited upon a marine-cut platform of bedrock assigned to the Miocene age Capistrano Formation.

We appreciate the opportunity to be of service to you on this project. If you have any questions or if we can be of further service, please contact us at ***(866) LEIGHTON***; specifically at the phone extensions or e-mails as listed below.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

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1 INTRODUCTION

1.1 Purpose and Scope

The purpose of our work was to evaluate the geologic and seismic hazards and infiltration feasibility conditions associated with the property located at 654 Camino De Los Mares, San Clemente, California (the site). The location and site boundaries are depicted on attached Figure 1, *Site Location Map*. This desktop study was performed in support of the proposed development, per the California Environmental Quality Act (CEQA) guidelines and Environmental Checklist for Geology and Soils.

The scope of this evaluation included the following tasks:

- *Desktop Review and Data Collection* – Reviewed readily available published geology reports and maps, historical aerial photographs and topographic maps, site-specific geotechnical reports obtained from City of San Clemente files, and other literature relevant to the site contained within our in-house library or in the public domain. We evaluated geological hazards and geotechnical issues considered geologically relevant to site development. A list of review documents is provided in the *References* section at end of text

- *Site Reconnaissance and Boring Markout* – Conducted a reconnaissance of the property to observe existing surface conditions and any visual indications of underlying geologic and soil conditions. Marked the locations of planned subsurface exploration (drilling), and notified the DigAlert agency whose members marked the locations of known underground utilities at the surface prior to drilling.

- *Permitting* – Prior to commencement of fieldwork, we applied for and acquired a permit for soil borings through the City of San Clemente.

- *Field Exploration* – We drilled, logged and sampled a total of three (3) 8-inch diameter hollow-stem auger borings (LB-1, LB-2 and LB-3) in accessible areas of the site. Two (2) additional borings (LP-1 and LP-2) were drilled within the areas of potential drywell installation, along the southwestern top of existing slope.

  Both bulk and relatively undisturbed drive samples were obtained from the borings, and transported to our laboratory for geotechnical testing. The

relatively undisturbed samples were collected using a Modified California Ring sampler in accordance with ASTM Test Method D3550. Standard Penetration Tests (SPT) were also performed within the hollow-stem auger borings in accordance with ASTM Test Method D1586. The samplers were driven for a total penetration of 18 inches, unless practical refusal was encountered, using a 140-pound automatic hammer falling freely for 30 inches. The number of blows per 6 inches of penetration was recorded on the boring logs.

The borings were logged in the field by a Certified Engineering Geologist (CEG) from our technical staff. Each soil sample collected was reviewed and described in accordance with the Unified Soil Classification System (USCS). The samples were sealed and packaged for transportation to our laboratory. Upon completion of drilling, Borings LB-1, -2 and -3 were backfilled with a mixture of bentonite grout and a surface patch of concrete. The boring logs are presented in Appendix A, *Exploratory Boring Logs*. Approximate boring locations are shown on Figure 2, *Exploration Location Map.*

- *Percolation Testing* – Upon completion of drilling, percolation test wells LP-1 and LP-2 were constructed by installing 2-inch diameter blank and 0.020-inch slotted PVC casing with an annular space backfill of #3 Monterey Sand. In-situ percolation testing was performed in general accordance with the County of Orange *Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or project WQMP's (December 2013)*. Results of percolation tests are presented in Appendix B, *Infiltration Test Results*. For a discussion of infiltration rates, the reader is referred to Section 2.3, *Infiltration*. Percolation test wells LP-1 and -2 were retained for possible future use and abandonment as part of a continued exploration program for project design. Well protection measures included sealing annular spaces with bentonite and installing a durable traffic box encased in Asphalt Concrete (AC) at the surface. Approximate percolation test well locations are shown on Figure 2. Test well logs are attached in Appendix A, *Exploratory Boring Logs*.

- *Geotechnical Laboratory Testing* – Geotechnical laboratory tests were conducted on select bulk and undisturbed soil samples obtained from borings. The testing program was designed to evaluate geotechnical (physical) characteristics of site soil and bedrock units. Geotechnical test results are presented in Appendix C, *Laboratory Test Results*. The following laboratory tests were performed:

- Expansion Index (ASTM D4829);
- Atterberg Limits (ASTM D 4318);
- Modified Proctor Compaction Test (ASTM D1557);
- Particle Size Analysis (ASTM D 6913); and
- Corrosivity (Soluble Sulfate ASTM C1580, Soluble Chloride ASTM C1411-09, pH ASTM D4972, and Resistivity ASTM G187-12a).

- *Analysis and Report Preparation* – This report documents our geologic and seismic hazards review and results of infiltration testing. A completed *CEQA questionnaire for Section VI - Geology and Soils* has been included in Appendix D.

1.2 Site Description

The subject property is located at 654 Camino De Los Mares in the City of San Clemente, California (site), on a parcel of land identified by the Orange County Assessor's Office with Assessor Parcel Number (APN) 675-072-19. The site location (latitude 33.4570°, longitude -117.6500°) and immediate vicinity are shown on Figure 1, *Site Location Map*.

The project site is roughly rectangular in shape and improved as a relatively level building pad bounded on the southwest by descending slope terrain ranging in ratios from 1.6:1 to 2:1 (h:v). The property encompasses 6.6 acres fronting Camino De Los Mares on the northeast, and bounded by Ocean View Plaza retail development to the northwest, the existing multi-story San Clemente Villas Senior Living development to the southeast, and the northbound lanes of Interstate 5 freeway to the southwest. Surface relief across pad is gently sloping from northwest to southeast, between approximate elevation (El.) +230 feet above mean sea level (msl) to El. +218 msl.

A hospital facility is centrally located on the pad, having been vacated since approximately 2016. The building generally consists of a single-story structure with local single level subterranean basement of smaller footprint. An abutting detached building exists on the eastern side of the structure. The buildings are surrounded by areas of asphalt-paved parking and concrete-covered truck loading bays.

1.3 Proposed Development

Our understanding of the project is based on review of a *San Clemente Senior Housing Entitlement Set* dated March 21, 2022 prepared by TCA Architects. The set of plans indicate the development will consist of two 3- and 4-story structures accommodating a total of 250 senior housing units. Ground floor areas of retail and other uses are planned, along with a central swimming pool and courtyard area. A detached 2-story 7,500 square foot medical office building is planned at the northeast corner of the pad. Parking and vehicular access will be accommodated at grade through use of carport structures, drive aisles, and new asphalt pavement.

Current project plans indicate stormwater runoff will be controlled in part by an on-site system of deep infiltration via drywells (DW), and that use of infiltration BMPs will be dependent upon the feasibility of geologic units to accommodate infiltration. Plans indicate the locations of three (3) potential drywell sites (DW-1, DW-2 and DW-3), see Figure 2.

1.4 Previous Investigations

Prior geotechnical investigation of the Samaritan Medical Center was performed by Woodward Clyde (1995, 1998, 1999). Their evaluation focused on the identification and mitigation of surface distress within an access road along the top-of-slope portion of the southwestern Samaritan Medical Center property. They reported on the character and distribution geologic units underlying the property, which are generally consistent with conditions yielded by our present/subject study.

2 GEOTECHNICAL CONDITIONS

2.1 Regional Geologic Setting

The project site is situated within the coastal foothill belt of the Peninsular Ranges geomorphic province of California. The province supports a long and active geologic history of deep marine sedimentation, uplift, fluvial and marine erosion, and deposition. More locally, the site lies southwestern of the Santa Ana Mountains. The Peninsular Ranges province extends far beyond the site area, approximately 900 miles southward from the Los Angeles basin to the tip of Baja California (Yerkes, et al., 1965) and is characterized by elongated, northwest-trending, mountain ridges separated by straight-sided, sediment-floored valleys. However, the most dominant structural features of the province are the northwest-trending fault zones, most of which either die out, merge with, or are terminated by the steep reverse faults at the southern margin of the Transverse Ranges province to the north. These fault zones separate large elongated blocks, each standing at different structural elevations. Within this framework, the Santa Ana Mountains are a large flexure, which has been uplifted on the eastern side along the Whittier-Elsinore Fault Zone, producing a tilted, irregular, and complex highland that slopes westward toward the sea.

Geological mapping of the area (Bedrossian and Roffers, 2012) indicate the subject site is underlain by Quaternary to Miocene age sedimentary formations with intermittent artificial fill. The regional geology of the site and vicinity is shown on Figure 3, *Regional Geology Map.*

2.2 Local Geology

Our investigation reveals the site is underlain by undocumented artificial fill encountered at explored locations from 6 to 45 feet in thickness. Review of earlier topography maps suggest fill may be on the order of up to 70 feet thick placed to infill canyons that transected the site prior to construction of the hospital. The fill is underlain by Quaternary age non-marine and marine deposits comprised of silty clay and clay with silt, and sand with gravel, respectively, which is underlain in turn by bedrock assigned to the Miocene to Pliocene Capistrano Formation (Tc) composed of silty claystone and clayey siltstone.

2.3 Infiltration

Per discussions with the project civil engineer and in accordance with our authorized scope of work, Leighton performed two field percolation tests (LP-1 and LP-2) within zones approximately 30 to 40 feet bgs. The test wells were constructed in the vicinity of planned dry wells along the southwest site boundary (see Figure 2, *Exploration Location Map*). The test zones penetrated a Marine Terrace unit comprised of poorly sorted gravelly sand with approximately 4 percent fines (Appendix C). Wells were constructed using 2-inch diameter slotted PVC pipe (0.020 in). Annular space around well pipes was infilled with #3 Monterey Sand to a height of approximately 1-foot above the screened interval.

The wells were pre-soaked prior to testing to model behavior of stormwater quality control devices during a design storm event. Following pre-soaking, and based on the results of preliminary field tests, it was determined that a constant head test procedure was warranted, requiring constant water flow, periodic measurements of water level and total water input inside the well at intervals during the test period. Calculated from the test results are "measured" rates of percolation, by dividing the rate of discharge (cubic inches per hour) by the infiltration surface area (flow area in square inches). Discharge volumes were calculated by adding the total volume of water drop inside the PVC pipe and within the porosity-factored annulus material. The flow area was based on the average water height within the slotted pipe section of the test well only.

Rates of yielded field percolation were converted into measured rates of infiltration, as summarized below in Table 1, in units of inches per hour (in/hr). Test data are also presented in Appendix B, *Infiltration Test Results*. The measured rates are defined as "un-factored" in that no safety factor has been applied.

Table 1 – Field Percolation Testing Summary

Percolation Test Boring/Well Designation	Percolation Test Method	Approximate Depth of Test Zone Below Ground Surface (feet)	Unfactored* Infiltration Rate (in/hr)
LP-1	Constant Head	30 – 40	96.0
LP-2	Constant Head	29 - 39	152.9

The calculated rates of infiltration yielded by the Marine Terrace Deposits indicate the use of dry wells founded within this unit represent an opportunity for on-site stormwater disposal. The calculated rates represent the product of relatively

small-scale tests, performed at specific locations and depths, it is possible that rates collected from similar sediments elsewhere on the site may yield slower or faster rates than indicated. Infiltration rates can be expected to decline over the lifespan of the system, and between BMP maintenance cycles as fine particulates accumulate within an infiltration media. As such, to account for these variations, a factor of safety (FS) should be applied to calculated infiltration rates, to derive a "factored" rate for use in system design. Based on the findings of our exploration and laboratory testing, a minimum factor of safety of 3.0 is recommended.

The measured percolation and calculated infiltration rates presented above may be used for the planning level screening phase of design. During the design phase, it should be noted that an elevated factor or safety may also be used by designers in lieu of additional field testing.

Stormwater Infiltration System Setbacks
(Measured from bottom of infiltration device)

Setback	Distance
Any Foundation, Retaining Wall, Basement Wall, or Utility Trench	The invert of any stormwater infiltration shall be set back at least 15 feet, and outside a 1:1 plane drawn down and out from the bottom of adjacent foundations.
Face of any slope-Building Setback	H/2, 20 feet minimum (H is height of slope)

2.4 Groundwater

The California Department of Water Resources (2022) documents no groundwater wells on or within the nearby site vicinity which might provide information representative of groundwater conditions beneath the subject property. The most useful information is derived from the findings of our exploratory borings. Our borings reveal the presence of very moist soils within Marine Terrace deposits, perched above the claystone bedrock. Such conditions were encountered at depths of 47 feet below existing grade in boring LB-1 as wet gravels, and 36 feet in LB-2 as very moist clayey soil.

2.5 Regional Faulting

There are no active or potentially active faults known to cross the project site and the site is not located within an Alquist-Priolo Earthquake Fault Zone (CGS, 1986; Bryant and Hart, 2007) and as such, the potential for surface fault rupture at the

site is considered low. However, several active and potentially active faults are mapped within approximately 6 (3.7 miles) of the site. Figure 4, *Regional Faults and Historic Seismicity Map*, shows the proximity of known active and potentially active faults within the region. Considering the locations of these mapped faults relative to the site, the potential impact of surface fault rupture occurrence at the site is considered to be low. Therefore, the impact of fault rupture is less than significant.

2.6 Seismicity and Ground Shaking

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

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

Table 2 - 2019 CBC Seismic Design Parameters

Categorization/Coefficients	Code-Based (1) (2
Site Longitude (decimal degrees) West	-117.6500°
Site Latitude (decimal degrees) North	33.4570°
Site Class	D
Mapped Spectral Response Acceleration at 0.2s Period, S_s	1.173
Mapped Spectral Response Acceleration at 1s Period, S_1	0.423
Short Period Site Coefficient at 0.2s Period, F_a	1.0
Long Period Site Coefficient at 1s Period, F_v	1.877[3]
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}	1.209
Adjusted Spectral Response Acceleration at 1s Period, S_{M1}	0.794[3]
Design Spectral Response Acceleration at 0.2s Period, S_{DS}	0.806
Design Spectral Response Acceleration at 1s Period, S_{D1}	0.529[3]

1. All were derived from the SEAOC web page: https://seismicmaps.org/
2. All coefficients in units of g (spectral acceleration)
3. Per Exception 2 in Section 11.4.8 of ASCE 7-16, seismic response coefficient C_s to be determined by Eq. 12.8-2 for values of $T \leq 1.5T_s$ and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for $T_L \geq T > 1.5T_s$ or Eq. 12.8-4 for $T > T_L$

The results of this analysis also indicate that the adjusted Peak Ground Acceleration (PGA_M) for this site is 0.557g. The code-based seismic analysis report is included in Appendix E, *Preliminary Seismic Design Parameters*.

3 POTENTIAL GEOTECHNICAL HAZARDS

This section presents the principal geological and geotechnical conditions at the Project site. The potential constraint and impact that each condition may have on the site is subjectively rated as less than significant or potentially significant. Table 3 summarizes the potential geotechnical hazards at the project site. Where the impact is less than significant, no mitigation measures are considered necessary. Where the impact is potentially significant, measures to mitigate the hazard are required. Discussion of these hazards and measures to mitigate these hazards are presented in the following subsections.

Table 3 – Summary of Potential Geotechnical Hazards

Potential Geotechnical Hazard		Hazard Level
Earthquake Damage	Fault Displacement/Ground Rupture	Less than significant
	Seismic Shaking	Potentially significant
	Liquefaction	Less than significant
	Lateral Spreading	Less than significant
	Seismically Induced Settlement	Less than significant
	Seismically Induced Landslides	Less than significant
	Ground Lurching	Less than significant
	Seismically Induced Inundation	Less than significant
	Tsunami	Less than significant
Land Subsidence	Extraction	Less than significant
	Hydroconsolidation	Less than significant
	Compressible Soils	Less than significant
Slope Stability	Unstable Slopes	Less than significant
	Landslides and Mudflows	Less than significant
Soil Erosion		Less than significant
Expansive Soils		Potentially significant
Flooding		Less than significant
Grading Impacts		Less than significant
Volcanic Hazards		Less than significant
Onsite Wastewater Disposal		Less than significant

3.1 Earthquake Damage

3.1.1 Fault Displacement/Ground Rupture

A displacement of the ground surface is possible along faults in earthquakes typically greater than a Magnitude 6.5. The resultant vertical and/or lateral sense of offset can damage structures situated above the fault trace of a fault. No active or sufficiently active faults are known to cross the Project site. The Project site is not located within an Alquist-Priolo Earthquake Fault Zone (Bryant and Hart, 2007). The nearest active or sufficiently active faults are the offshore segment of the Newport-Inglewood / Rose Canyon fault, and Whittier-Elsinore fault, located approximately 4 miles southwest and 20 miles from the site, respectively. The geotechnical hazard posed by ground surface rupture from direct fault offset is considered to be negligible. Therefore, this impact is **less than significant**.

Mitigation Measures: No special precautions or restrictions are considered necessary.

3.1.2 Seismic Shaking

The site is expected to experience ground shaking resulting from an earthquake occurring along several major active or sufficiently active faults located in nearby southern California. The intensity of ground shaking at a given location depends on several factors, but primarily on the earthquake magnitude, the distance from the epicenter to the site of interest, and the response characteristics of the soil and/or bedrock units underlying the site. The peak ground acceleration for the Maximum Considered Earthquake (MCE_G) adjusted for the Site Class effects (PGA_M) is 0.557g. Due to the proximity of known active faults, and given the character of earth materials underlying the site, the site hazard posed by seismic shaking is considered high. This is a **potentially significant** impact.

Mitigation Measures: The site will experience strong ground shaking after the proposed project is developed resulting from an earthquake occurring along one or more of the major active or potentially active faults in southern California. Accordingly, the project should be designed in accordance with all applicable current codes and standards utilizing the appropriate seismic design parameters to reduce seismic risk as defined by California Geological Survey (CGS) Chapter 2 of Special Publication 117a (CGS,

2008). The 2019 edition of the California Building Code (CBC) is the current edition of the code. Through compliance with these regulatory requirements and the utilization of appropriate seismic design parameters selected by the design professionals, potential effects relating to seismic shaking can be reduced to **less than significant**.

3.1.3 Secondary Effects of Seismic Shaking

Secondary effects generally associated with strong seismic shaking include phenomena such as liquefaction, lateral spreading, seismically-induced settlement, seismically-induced landslides and inundation, ground lurching, and tsunamis. Each of these phenomena is discussed below.

Liquefaction: Liquefaction is a seismic phenomenon in which loose, saturated, fine-grained granular soils behave similarly to a fluid when subjected to high-intensity ground shaking. Liquefaction occurs when three general conditions exist: 1) shallow groundwater; 2) low density, fine, clean sandy soils; and 3) high-intensity ground motion. Effects of liquefaction on level ground can include sand boils, settlement, and bearing capacity failures below structural foundations. Effects of liquefaction on pile foundations include reduction in pile's lateral capacities and down drag or negative friction due to settlement of a liquefied layer and the layers above it.

The project site is not located within a liquefaction hazard zone based on the *Seismic Hazard Zone Map for the Orange Quadrangle* (California Geological Survey, 1997) (see Figure 5 *Seismic Hazards Map*). Nor is the site underlain by shallow groundwater or near-surface deposits of non-cohesive soils prone to liquefaction. The effects of liquefaction are expected to be a **less than significant** impact.

Mitigation Measures: No special precautions or restrictions are considered necessary.

Lateral Spreading: Lateral spreading is a phenomenon where large blocks of soil translate laterally along or through a layer of liquefied soil. The mass moves downslope toward an unconfined area, such as the face of a descending slope or riverbank, along adversely oriented subsurface planar structures exhibiting gradients as gentle as one degree. For lateral spreading to occur, a liquefiable material needs to be continuous. As

mentioned in the liquefaction section above, the site is not located in an area susceptible to liquefaction, nor is it prone to liquefaction based on our site-specific subsurface exploration. The effect of lateral spreading is expected to be a **less than significant** impact**.**

Mitigation Measures: No special precautions or restrictions are considered necessary.

Seismically Induced Settlement: This phenomenon, referred to as dry-dynamic settlement (above groundwater) and liquefaction-induced settlement (below groundwater), occur primarily in loose sandy soils due to reduction in volume during or after an earthquake event. The settlement is caused by strong ground shaking that allows the soil particles to become more tightly packed, thereby reducing pore space. If present, poorly compacted artificial fills and poorly consolidated wash deposits are especially susceptible to this phenomenon. And given the potential for different fill thicknesses across the site, relatively different magnitudes of settlement may occur. The impact of seismically induced settlement is **considered potentially significant**.

Mitigation Measures: Future geotechnical field exploration for project design should include Standard Penetration Tests (SPT) and CPT's to evaluate and quantify the extent of existing canyon and other fills, and their settlement potential. In general, engineered fills are not subject to seismically induced settlement. If the existing fills are found to be subject to settlement, certain measures of in-situ mitigation would be required to mitigate anticipated surface effects. Such may include enhanced building design and/or in-place structural improvement of existing ground including but not limited to compaction grouting, deep dynamic compaction or stone column installation. The impacts of seismic induced settlement can be mitigated to **less than significant**.

Seismically Induced Landslides: Marginally stable slopes, including existing landslides, may be subject to landslides caused by seismic shaking. In most cases, this is limited to relatively shallow soil failures on steep slopes, especially where the soil is relatively thick and loose. Areas defined by the state as potentially susceptible to seismically induced landslides are limited to sloping terrain along the southwest margin of the site (CGS,1997). The level area of the site, in areas of planned building construction, are not mapped as susceptible to any landslide hazard. The impacts posed by

landslides within the buildable area of the site is considered **less than significant**.

Mitigation Measures: The potential for landsliding was previously evaluated for a portion of the existing 2.3:1 (horizontal:vertical) 24 foot high southwestern slope by Woodward Clyde (1995, 1998, 1999) indicating Factors of Safety with respect to gross stability ranging from 1.45 to 2.47. The stability of this and other areas of the southwest slope should be analyzed as part of a future geotechnical exploration for project design. Mitigation measures, if required, may consist of construction of shear keys, flattening of the existing slope gradients, or assignments of structural setbacks behind top of slope areas. Incorporation of these mitigation measures is expected to reduce the effects of seismically induced landslides to **less than significant**.

Ground Lurching: Ground lurching is a phenomenon that occurs when masses of soil or rock move at right angles to a cliff or steep slope in response to seismic waves. Structures built within the influence of such conditions can experience significant lateral and vertical deformations in response to ground lurching. As slopes bounding the southwest site margin are flatter than 2:1 (h:v), the potential impact from ground lurching is **less than significant.**

Mitigation Measures: No special precautions or restrictions are considered necessary.

Seismically Induced Inundation: Strong seismic ground motion can cause dams and levees to fail or seiches to occur resulting in damage to structures and properties located downstream. As shown in Figure 6 *Dam Inundation Map*, the Project site is located approximately 0.4 miles downstream of the Palisades Reservoir. Design elements, such as baffles, are required to reduce the potential for seiches in water tanks where overflow or structural failure may result in damage to nearby properties. Criteria for seismic design of water tanks are provided in the American Water Works Association (AWWA) Standards for Design of Steel Water Tanks. We have not reviewed those offsite tanks. Given the measures incorporated into design and construction of the reservoir, the impact of a failure event and resultant site inundation is considered **less than significant**.

Mitigation Measures: No special precautions or restrictions are considered necessary.

Tsunami: Tsunamis are waves generated in large bodies of water by fault displacement or major ground movement. Based on the inland location and elevation of the site, the risk of tsunami impact to the site is considered **less than significant**.

Mitigation Measures: No special precautions or restrictions are considered necessary.

3.2 Land Subsidence

3.2.1 Extraction

Given the site is not located within the nearby influence of any past or present petroleum and/or groundwater withdrawal programs, the effects of potential subsidence due to extraction of these resources is considered **less than significant**.

Mitigation Measures: No special precautions or restrictions are considered necessary.

3.2.2 Hydroconsolidation

Soil collapse, or hydroconsolidation, occurs when saturated soil units undergo a rearrangement of their grains and a loss of cohesion or cementation, resulting in substantial and rapid settlement under relatively light loads. Soil collapse is generally associated with recently deposited, Holocene-age soils that have accumulated in an arid or semi-arid environment. Wind-deposited sands and silts, and alluvial fan and debris flow sediments deposited during flash floods represent soils that are susceptible to collapse. Irrigation, or a rise in the groundwater table could increase surface water infiltration, which when combined with the weight of a building or structure, can start rapid settlement and cause foundations and walls to crack. Differential settlement of structures generally occurs when landscaping is heavily irrigated in close proximity to the structure's foundation. Proper surface drainage design, excavation and recompaction and pre-saturation during earthwork construction of the site will reduce the risk with collapse. .

The deposits of alluvium and existing artificial fill underlying the site are comprised of relatively stiff to very stiff non-cohesive clays and silty clays and medium dense to dense sands. Based on these soil properties and bedrock below the site, the impacts of hydroconsolidation are considered **less than significant**.

Mitigation Measures: No special precautions or restrictions are considered necessary.

3.2.3 Compressible Soil

When a load, such as a fill or a structure, is placed on alluvial soils, the underlying soil layers can undergo a certain amount of compression. This compression is due to the deformation of the soil particles, the relocation of soil particles, expulsion of water or air from the void spaces, and other reasons. This settlement occurs both immediately after a load is applied and over a period of time after placement of the load. For engineering applications, it is important to estimate the total amount of settlement that will occur upon placement of a given load and the rate of consolidation.

Existing deposits of artificial fill as encountered are comprised of stiff to very stiff clays and silty clays. Woodward Clyde in their investigation report (1998) prepared for the site in support of observed distress indicate soils at he site below five feet becomes generally very stiff further indicating in their review of reports prepared by Geotechnical Consultants Inc that the fill was properly placed and compacted. While we did not have the compaction reports to review as part of this study. However, given an absence of groundwater, the fine-grained texture and moisture content, and 60-year period of residency beneath the site, the susceptibility of the fill to consolidation is considered low. The potential for soil compressibility is equally low within underlying deposits of native clayey terrace deposits and bedrock. Remedial grading will include a minimum 6-foot overexcavation and recompaction of existing surface soils, and existing fill will be mitigated through ground improvement if warranted, impacts due to consolidation are considered **less than significant**.

Mitigation Measures: Following mitigation of site soils the impact of compressible soil will be **less than significant**.

3.3 Slope Stability

3.3.1 Unstable Slopes

The slopes bounding the southwesterly site margin were documented as stable based on prior geotechnical exploration and engineering analyses (Woodward Clyde (1995, 1998, 1999). The potential for slope instability is considered **less than significant**.

Mitigation Measures: As additional slope stability analysis correlative with planned project improvements will be performed, and remedial grading measures performed as recommended by the geotechnical engineer and engineering geologist, the impact of unstable slopes is considered **less than significant**.

3.3.2 Landslides and Mudflows

Published maps indicate no mapped landslides or debris flows on or adjacent to the project site. As the potential for landslides, mudflows or other types of slope instability will evaluated as part of future design studies, and mitigated through remedial grading where necessary, the potential impacts of this hazard are considered **less than significant.**

Mitigation Measures: No special precautions or restrictions are considered necessary.

3.4 Soil Erosion

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

Mitigation Measures: Impacts due to erosion are considered **less than significant**.

3.5 Expansive Soils

Results of expansion Index testing of shallow soil samples obtained from borings LB-1 and LB-2 reveal a low to medium expansion potential. In general, the existing fill exhibits a low expansion potential, and native non-marine terrace deposits a medium expansion potential. Import material for replacement fill, if needed, should consist of soils with low expansion potential. Standard engineering and earthwork construction practices, such as proper foundation design and controlled moisture conditioning or mixing with non-expansive soils will reduce the impacts associated with expansive soils. **Mitigation Measures**: As the project structural engineer will account for expansive soil conditions as part of design, the effects of expansive soil will be reduced to **less than significant**.

3.6 Flooding

The Project site is not located within a flood hazard zone as defined by FEMA (see Figure 7 *Flood Hazard Zone Map*). The site is however subject to potential inundation in the event of catastrophic failure of the nearby Palisades Reservoir, located up-gradient from the site approximately 0.4 miles to the northwest. Design elements, such as baffles, are required to reduce the potential for seiches in water tanks where overflow or structural failure may result in damage to nearby properties. Criteria for seismic design of water tanks are provided in the American Water Works Association (AWWA) Standards for Design of Steel Water Tanks. We have not reviewed those offsite tanks the tanks are relatively modern and as such the potential for failure is considered **less than significant** to impact to the site.

Mitigation Measures: As the Palisades Reservoir is designed to counter failure, and actively maintained, the potential for catastrophic failure and site impact due to flooding is considered **less than significant**.

3.7 Grading Impacts

The suitability of existing fill soils to support planned improvements will be determined through future design-level geotechnical studies. If required, mitigation is expected to improve the quality of fill through in-place ground improvement measures that minimizes grading. Minimum site grading will include over-excavation and recompaction of the upper 6 feet of soil. Any changes in soil volume due to compaction during remedial grading is expected to be relatively low. The impacts of grading are considered **less than significant.**

3.8 Volcanic Hazards

The site is not located within an area of known volcanism and no volcanoes are mapped on the site or within the surrounding region. The potential impacts to the site due to a lava flow or ash fall is considered **less than significant**.

Mitigation Measures: No special precautions or restrictions are considered necessary.

3.9 Onsite Wastewater Disposal

The project will be connected to local sewers, therefore impacts due to wastewater disposal are not a consideration for the project.

4 FUTURE DEVEL-LEVEL GEOTECHNICAL STUDIES

Based upon the results of our limited geotechnical evaluation of the site, the proposed improvements are considered feasible from a geotechnical standpoint. The nature of many sites is such that differing geotechnical or geological conditions can occur within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Our understanding of site geology and geotechnical conditions relating to project design are based on a limited subsurface exploration as part of an infiltration testing study, and review of past geotechnical reports of site prepared by prior consultants.

A design level geotechnical investigation will be required to obtain permits for the project and to provide earthwork recommendations for support of planned improvements. The scope of future site exploration should include advancement of additional exploratory borings and Cone Penetration Tests (CPT's) to evaluate existing undocumented fill materials. In-situ and composite soil samples should be obtained and subjected to certain laboratory tests to determine in-place moisture and density, gradation, soil plasticity, strength and consolidation characteristics, and corrosivity.

Design of the Project in accordance with standard engineering practice, including requirements of the California Building Code (CBC), City of San Clemente, County of Orange Grading Code, and the recommendations of the project civil and structural engineers, geotechnical consultant and others will reduce the potential for adverse geotechnical conditions impacting the proposed Project.

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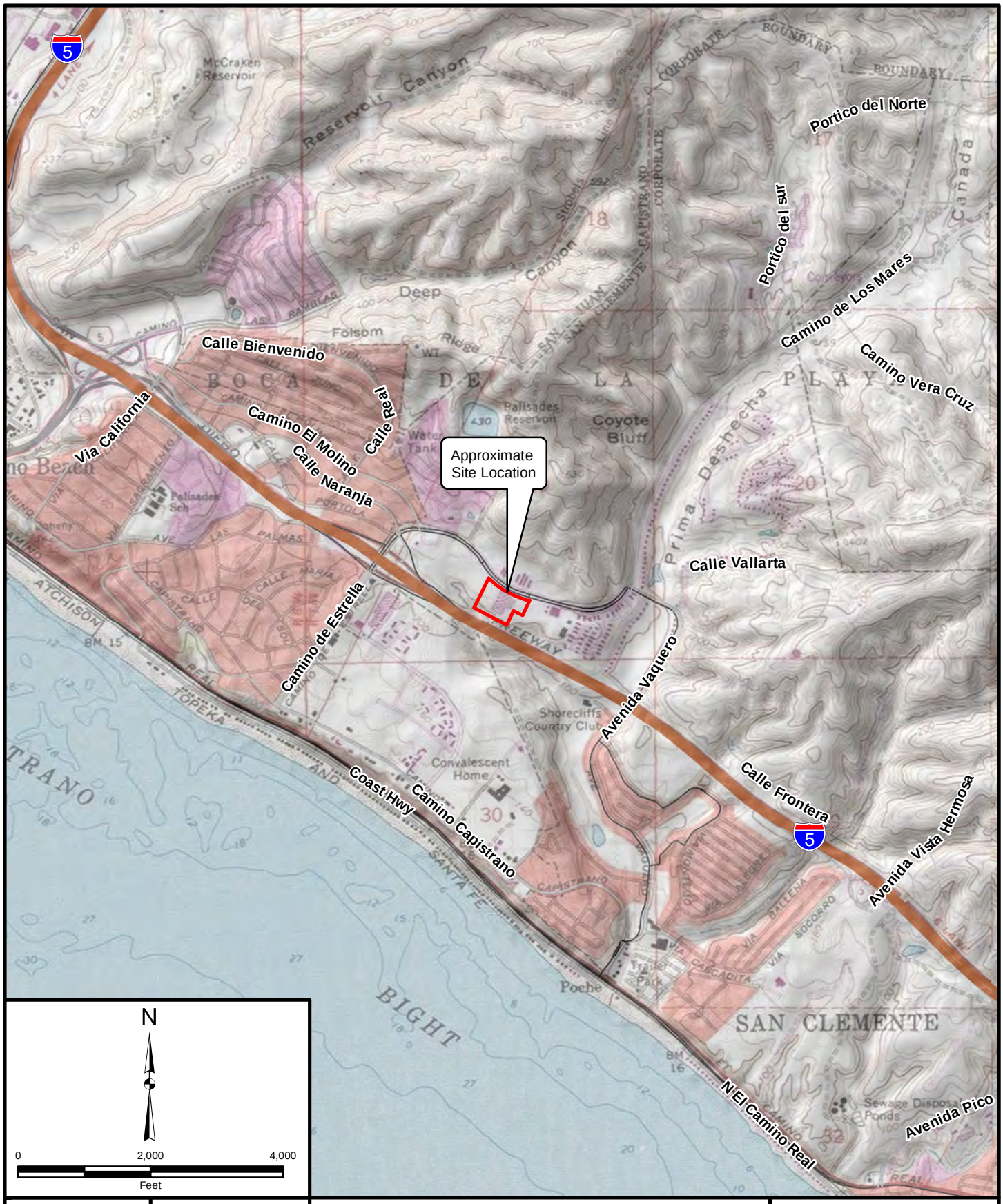

Project: 13468.002	Eng/Geol: JLH
Scale: 1 " = 2,000 '	Date: April 2022

Reference: Copyright:© 2013 National Geographic Society, i-cubed

SITE LOCATION MAP

CEQA-LEVEL GEOLOGIC REVIEW
San Clemente Senior Housing Project
654 Camino De Los Mares, San Clemente, California

FIGURE 1

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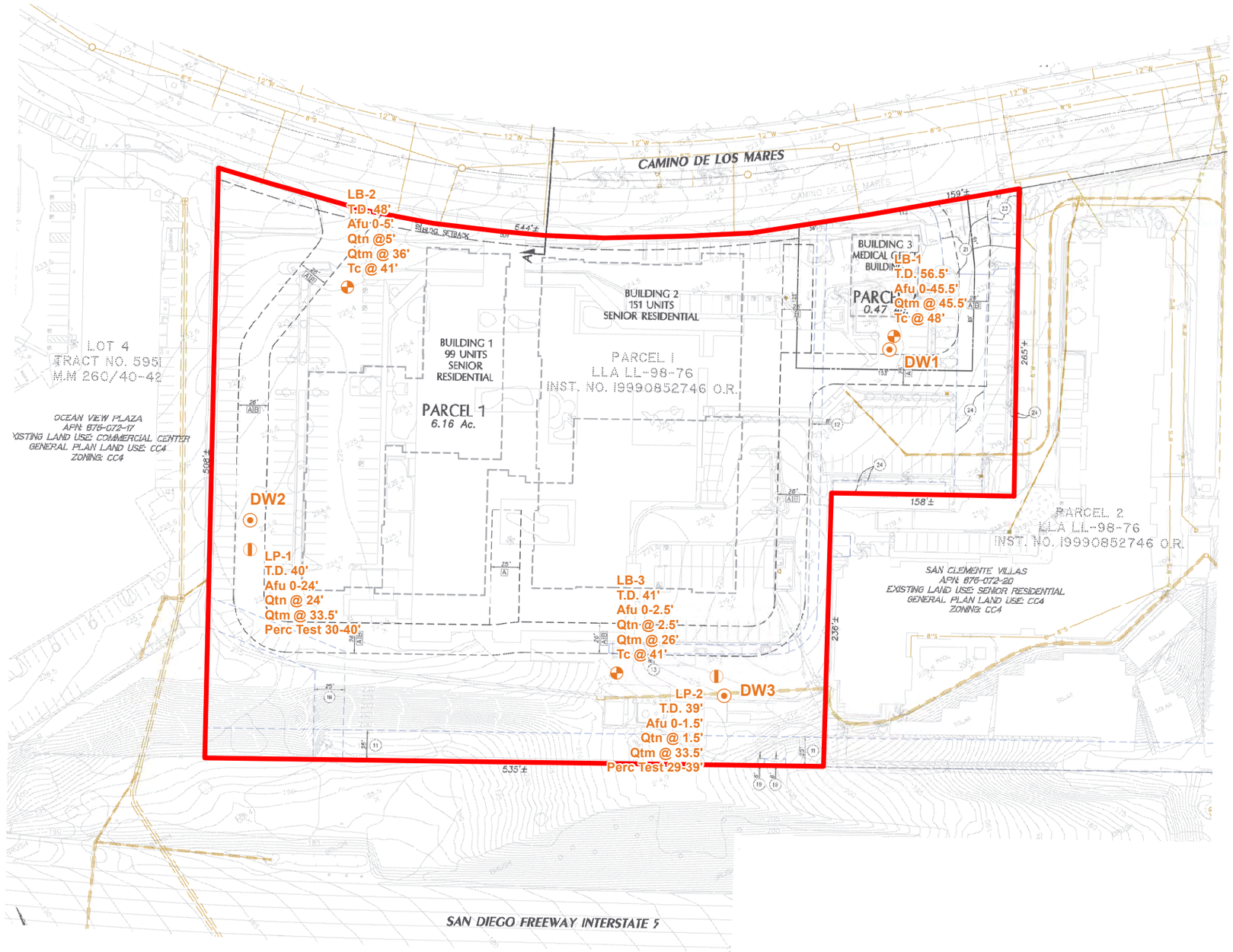

Legend

LB-3 T.D. 41.17' Afu 0-2.5' Qtn @ 2.5' Qtm @ 26' Tc @ 41'	Approximate location of hollow-stem auger boring showing total depth (T.D.), and depth to earth units in feet below existing ground surface.
LP-2 T.D. 39' Afu@0-1.5' Qtn @ 1.5' Qtm @ 33.5' Perc Test 29-39'	Approximate location of percolation test boring showing total depth (T.D.), and depth to earth units in feet below existing ground surface.
DW3	Approximate location of proposed dry well.
Afu	Artificial Fill, Undocumented
Qtn	Quaternary Non-marine Deposits
Qtm	Quaternary Marine Deposits
Tc	Miocene Capistrano Formation
	Approximate site boundary

N

0 100 200
Feet

Project: 13468.002	Eng/Geol: JLH
Scale:1 " = 100 '	Date: May 2022

Reference: Vesting Tentative Parcel, Map No 2022-116, Saddleback Memorial Medical Center

EXPLORATION LOCATION MAP

CEQA-LEVEL GEOLOGIC REVIEW
San Clemente Senior Housing Project
654 Camino De Los Mares, San Clemente, California

FIGURE 2

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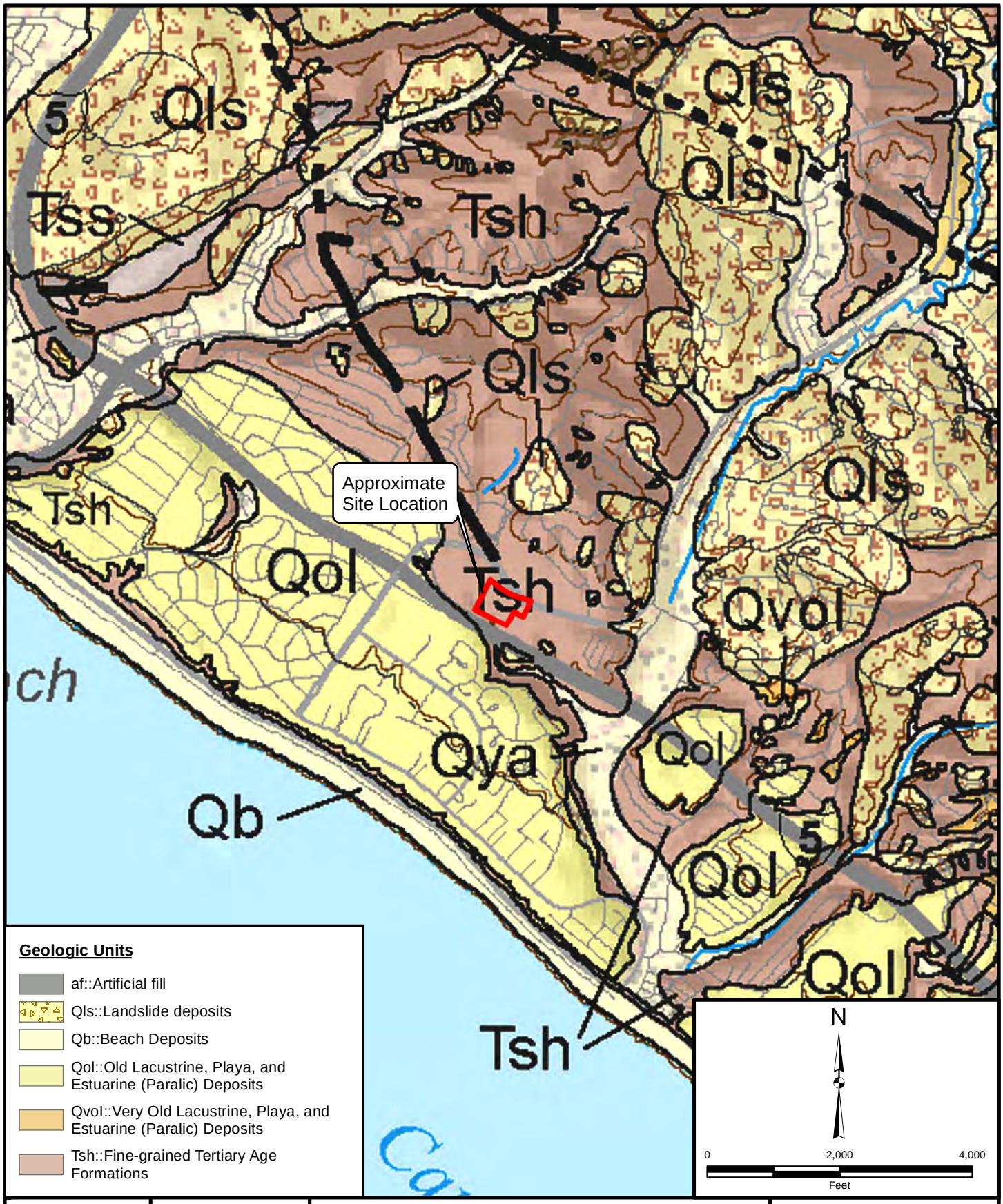

Geologic Units

- af::Artificial fill
- Qls::Landslide deposits
- Qb::Beach Deposits
- Qol::Old Lacustrine, Playa, and Estuarine (Paralic) Deposits
- Qvol::Very Old Lacustrine, Playa, and Estuarine (Paralic) Deposits
- Tsh::Fine-grained Tertiary Age Formations

Project: 13468.002	Eng/Geol: JLH
Scale: 1 " = 2,000 '	Date: May 2022

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REGIONAL GEOLOGY MAP

CEQA-LEVEL GEOLOGIC REVIEW
San Clemente Senior Housing Project
654 Camino De Los Mares, San Clemente, California

FIGURE 3

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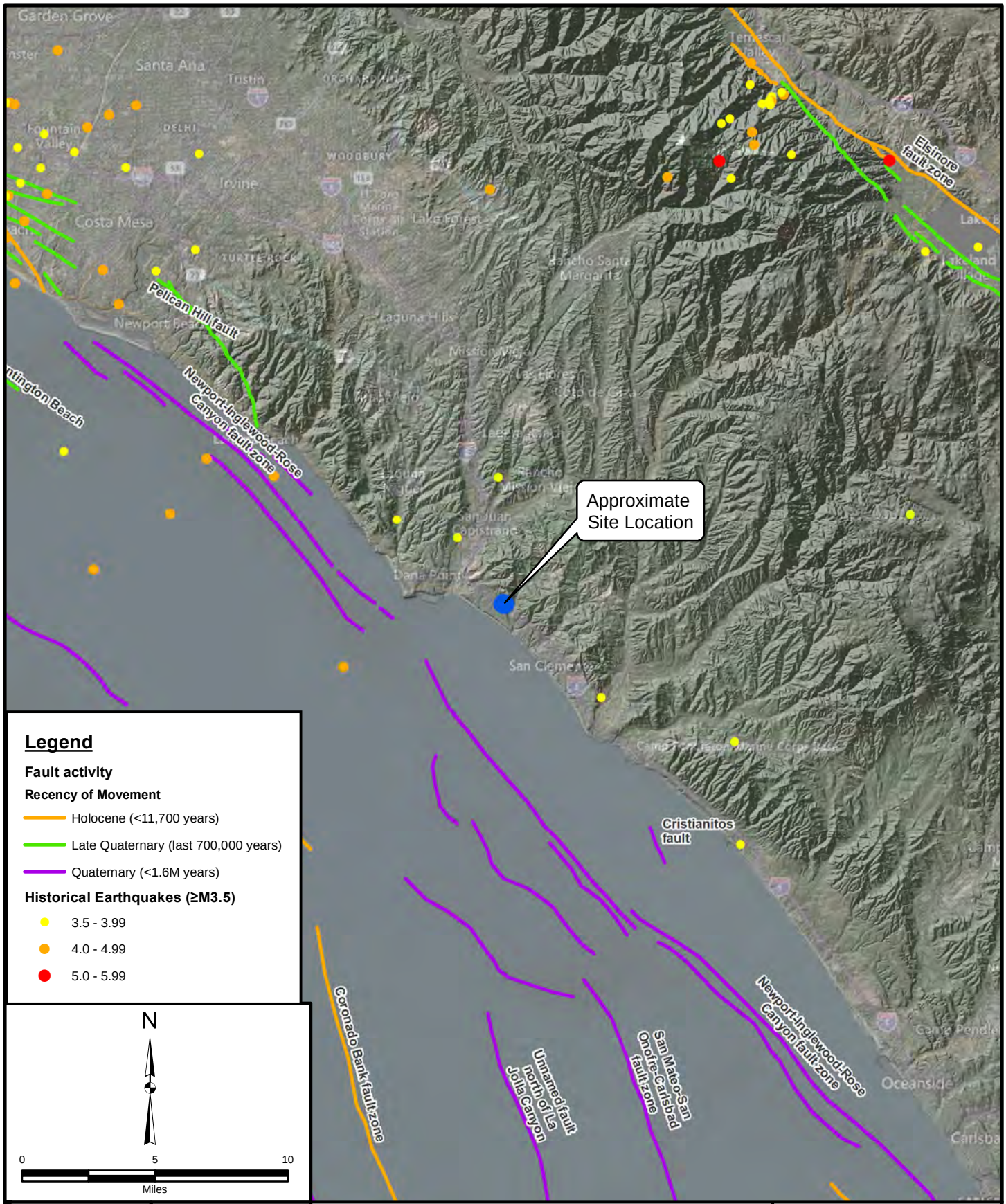

Project: 13468.002	Eng/Geol: JLH
Scale: 1 " = 5 miles	Date: April 2022

Basemap Reference: © 2022 Microsoft Corporation Earthstar Geographics SIO © 2022 TomTom
Seismicity Data Reference: maps.conservation.ca.gov

REGIONAL FAULTS AND HISTORIC SEISMICITY MAP

CEQA-LEVEL GEOLOGIC REVIEW
San Clemente Senior Housing Project
654 Camino De Los Mares, San Clemente, California

FIGURE 4

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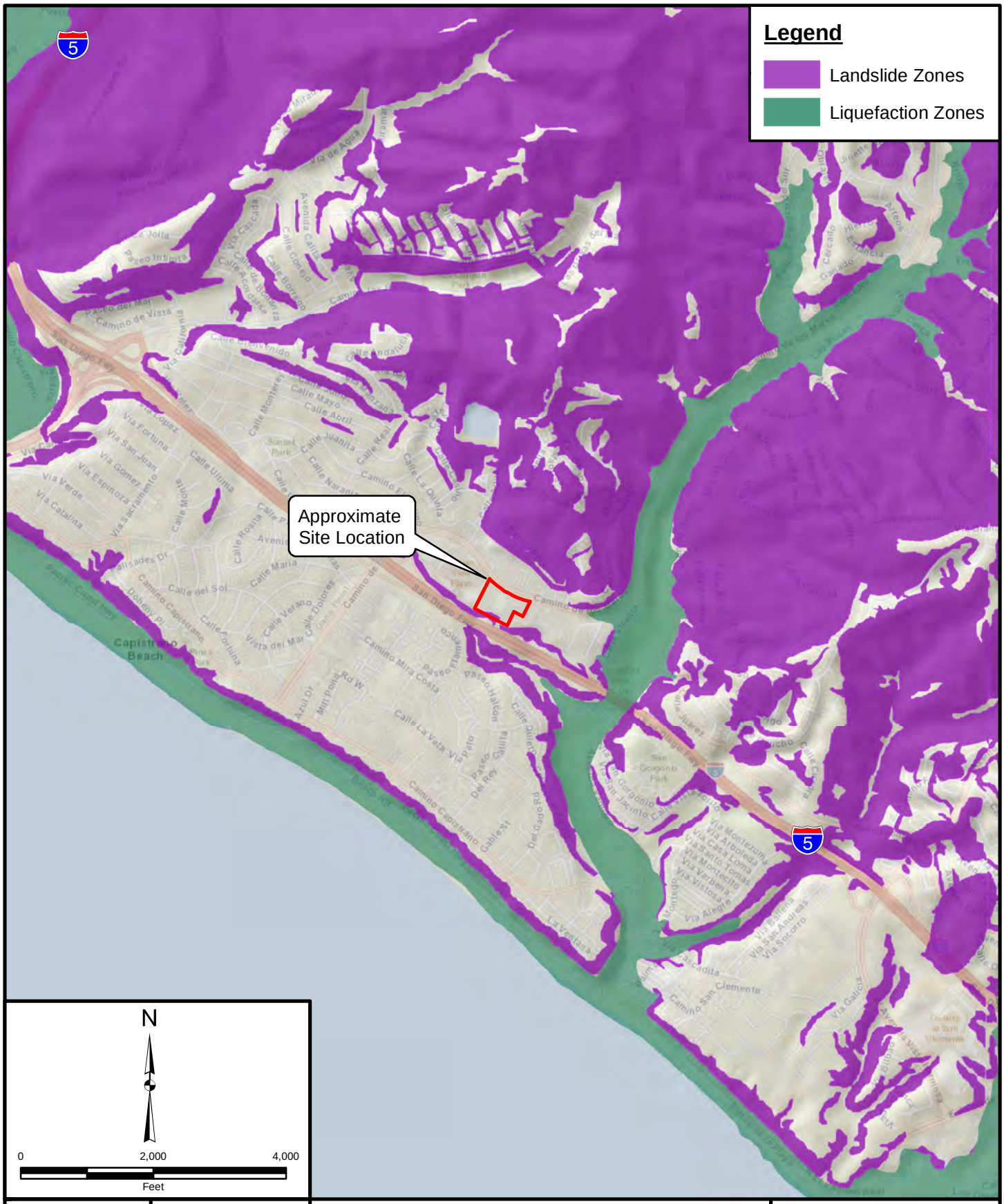

Project: 13468.002	Eng/Geol: JLH
Scale: 1 " = 2,000 '	Date: April 2022

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Seismic Hazards Program, California Geological Survey, California

SEISMIC HAZARD MAP

CEQA-LEVEL GEOLOGIC REVIEW
San Clemente Senior Housing Project
654 Camino De Los Mares, San Clemente, California

FIGURE 5

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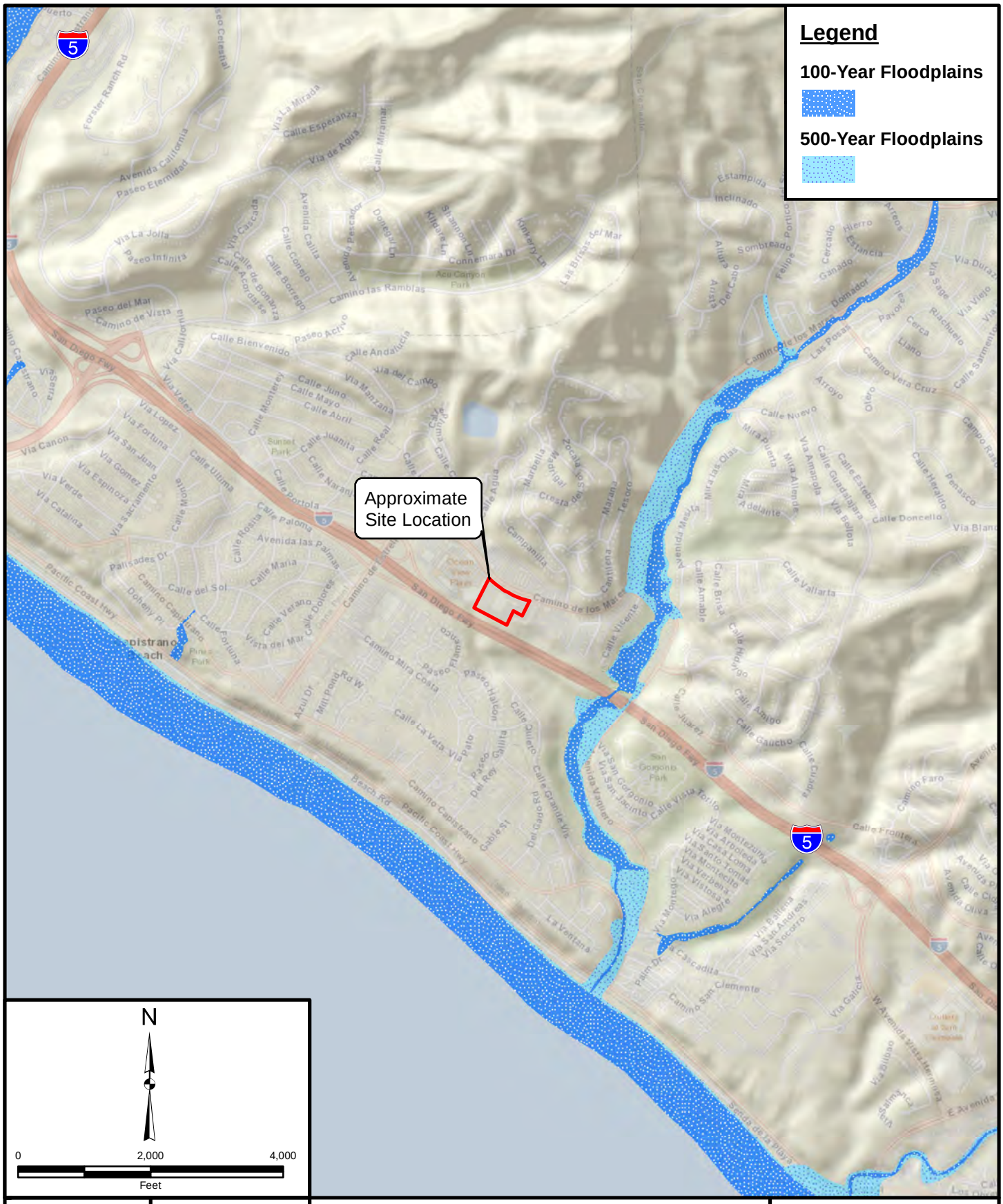

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Reference: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
FEMA (http://www.fema.gov/index.shtm), DWR (http://www.dwr.ca.gov)

FLOOD HAZARD ZONE MAP

CEQA-LEVEL GEOLOGIC REVIEW
San Clemente Senior Housing Project
654 Camino De Los Mares, San Clemente, California

FIGURE 6

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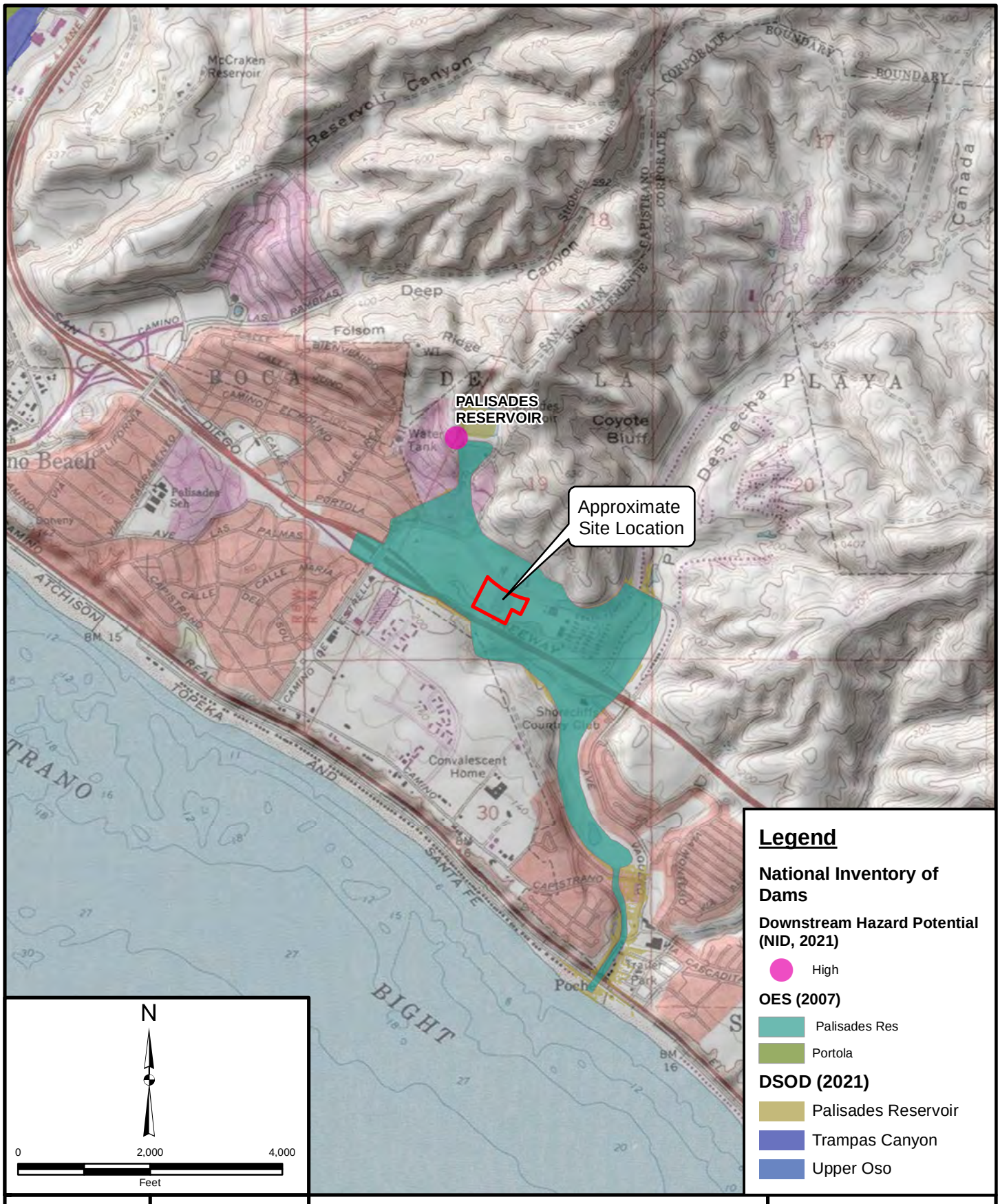

Project: 13468.002	Eng/Geol: JLH
Scale: 1 " = 2,000 '	Date: April 2022

Basemap Reference: Copyright© 2013 National Geographic Society, i-cubed
Reference: Office of Emergency Services (2007), Dept of Safety of Dams (2021)
National Inventory of Dams, Army Corps of Engrs (2021)

DAM INUNDATION MAP

CEQA-LEVEL GEOLOGIC REVIEW
San Clemente Senior Housing Project
654 Camino De Los Mares, San Clemente, California

FIGURE 7

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APPENDIX A

EXPLORATORY BORING LOGS

GEOTECHNICAL BORING LOG LB-1

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	225'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
225	0								ASPHALT-CONCRETE SAND with gravel (SP), AGGREGATE BASE MATERIAL	
				LB1					**ARTIFICIAL FILL / UNDOCUMENTED (Afu):** @0': Lean CLAY w/ Sand, coarse-grained, medium dark olive gray, moist, plastic	EI, AL
				R-1	5 9 15	112.8	15.0	CL	@2.5': Same as above, medium dense	
220	5			R-2	5 9 12	109.6	13.8	SP-CL	@5': Same as above, medium dense	
									@6.5': dark olive gray, stiff, minor horizontal pressure planes	
				R-3	3 8 11	85.5	34.3	CH	@7.5': Fat CLAY, very stiff, dark olive gray, minor horizontal pressure surfaces, some sand, high plasticity	AL
									@9': Silty CLAY, dark olive gray, moist, firm, unoxidized, plastic, local iron-stained gypsum fragments, scattered siltstone clasts	
215	10			R-4	4 8 9	90.9	27.6	ML-CL	@10': SILT with Clay, stiff medium gray, silty claystone clasts in dark grayish black silty clay matrix, moist, firm/soft, plastic, 2" rounded gravel clast in shoe	
210	15			R-5	4 6 8			ML-CL	@15.5': SILT with Clay, stiff, black to dark olive gray and blue-gray siltstone fragments, locally iron-staining, moistNR	
205	20			R-6	8 10 13			ML-CL	@20': driller reports increased density @21.5': 3" diameter polished well rounded cobble clast in fill	
200	25			S-1	3 4 5			ML-CL	@25.5': Clayey Siltstone fragment of Capistrano Fm bedrock in fill, dry, massive, medium hard, local blebs of iron staining and caliche stringers, black and unoxidized, stiff	
195	30									

The Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-1

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	225'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
195	30			S-2	4 6 8			ML-CL	**ARTIFICIAL FILL UNDOCUMENTED (Afu): Continued** @30': SILT w/ Clay, very stiff, with local fragments of iron stained gray and black silts	
190	35			S-3	3 5 6			ML-CL	@35': Same as above, very stiff	
185	40			S-4	3 4 6			ML-CL	@40': 1/4" thick horizontal lifts of fill, black to medium gray brown and olive gray, local trace fossils of coprolite (white sandy blebs), very stiff	
180	45			S-5	4 8 11			SP-GP	**QUATERNARY MARINE TERRACE DEPOSITS (Qtm):** @45.5': SAND with Gravel; medium dense, medium olive-brown color, slightly moist, well-rounded gravel/pebble clasts, minor wetness on clast surfaces, scattered shell fragments in matrix	
175	50			S-6	3 5 7				**CAPISTRANO FORMATION (Tc):** @50': Silty CLAYSTONE; medium olive gray to brown, very thinly laminated discontinuous laminae/beds, local trace fossils of coprolite, pervasively iron-stained, moderately weathered, medium hard to soft, massive, structureless, local iron-staining along discontinuous planar joint surfaces, slightly damp, slightly plastic	
170	55			S-7	3 5 11					
165	60								**TOTAL DEPTH 56.5 FEET** **PERCHED GROUNDWATER AT 51.5 FEET** **BACKFILLED TO 2 FEET BGS WITH BENTONITE GROUT (>3% CEMENT); TO 6-INCHES BGS WITH BENTONITE PELLETS, AND QUICKCRETE TO SURFACE**	

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

GEOTECHNICAL BORING LOG LB-2

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	227'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
	0								ASPHALT CONCRETE AGGREGATE BASE @7": SAND with Gravel; yellow	
225				LB1						CR, EI, MD
				R-1	6 12 30	112.2	17.9	CL	**ARTIFICIAL FILL UNDOCUMENTED (Afu):** @11.5": Lean CLAY; medium yellow brown, fine-grained sand, moist, soft, plastic	
	5			R-2	9 17 33	109.7	17.9	CL	**QUATERNARY NON-MARINE TERRACE DEPOSITS (Qtn):** @5': CLAY, medium yellow brown with reddish hue, hard, moist, mottled gray, massive	
220				R-3	9 17 24	107.5	19.1	CL	@7.5': CLAY, hard, medium yellow brown, indistinctly horizontal laminations, plastic, blebs of iron-oxide, locali white silt fragments, minor MnO2 stains	AL
	10			R-4 LB2	6 13 21	101.5	21.3	CL-ML		
215				R-5	6 11 17	97.1	25.8	CL-ML	@12.5': SILT w/ Clay, very stiff, medium yellow brown, plastic, horizontal laminae, mottled blue gray	
	15			R-6	6 15 21	99.5	24.2	CL-ML	@15': SILT w/ Clay, hard, alternating thin medium brown to yellow brown and local very thin white sand laminae that is horizontally laminated	
210										
	20			R-7	6 12 22	100.5	24.2	CL-ML	@20': CLAY with Silt, very stiff, composed of scattered bedrock fragments of blue gray and black silty claystone, minor iron-staining	
205										
	25			S-1	3 6 8			CL-ML	@25': Same as above @25.5-26.5': CLAY with Silt; thin horizontal laminations, very stiff, moist, local medium gray silty claystone fragments, minor iron-staining, platy partings	
200										
	30									

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

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*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-2

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	227'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
	30			S-2	4 7 8			CL-ML	**QUATERNARY NON-MARINE TERRACE DEPOSITS (Qtn) Continued:** @31.5': CLAY with Silt; thin horizontal laminations, very stiff, moist, local medium gray silty claystone fragments, minor iron-staining @35': CLAY with Silt; thin horizontal laminations, hard, moist, local medium gray silty claystone fragments, minor iron-staining @36': Very moist	
195										
	35			S-3	3 30 43			CL-ML		
190									**QUATERNARY MARINE TERRACE DEPOSITS (Qtm):** @36': medium brown, rounded gravels, /clast, non cohesive, dry, non marine (colluded gravel only)	
	40			S-4	16 34 50			GP	@40': cobble lag, rig/auger, shell fragments, well rounded pebbles, pebbles subrounded to well rounded, very moist	
185									**CAPISTRANO FORMATION (Tc):** @41': SILTY CLAYSTONE; dry, medium hard, medium olive brown, thinnly lamintated, local iron-stained blebs, damp	
	45			S-5					@47': Unoxidized SILTSTONE; masive, dark gray to black, medium hard, indistinct laminae	
180										
	50								**TOTAL DEPTH 48 FEET** **NO GROUNDWATER** **BORING BACKFILLED WITH BENTONITE GROUT (>3% CEMENT) TO WITHIN 2 FEET OF SURFACE, BENTONITE CHIPS TO WITHIN 6 INCHES OF SURFACE, AND QUICKCRETE TO SURRFACE**	
175										
	55									
170										
	60									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-3

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	213'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0			LB3					ASPHALT CONCRETE AGGREGATE BASE @3": GRAVEL with Sand; light brown, medium dense, dry	
210								CL	**QUATERNARY NON-MARINE TERRACE DEPOSITS (Qtn):** @2.5': Silty CLAY, medium olive brown, soft, plastic, moist to very moist	
	5									
205										
	10							CL-ML	@10': SILT w/ Clay, medium olive brown, plastic, moist to very moist	
200										
	15								@15': SILT w/ Clay, medium olive brown, plastic, moist to very moist	
195										
	20			S-1	3 4 6			CL-ML	@20': SILT w/ Clay, medium olive brown to tan, moist, very well laminated in thin horizontal layers, local gray silstone clasts, stiff	
190				S-2	3 6 7			CL-ML	@23': very stiff, slightly moist	
	25									
				S-3	4 12 20			SP	**QUATERNARY MARINE TERRACE DEPOSITS (Qtm):** @26': SAND; well sorted, medium-grained, dry, dense, non-cohesive	
185				R-1	11 21 31			SP	@28': minor pebble clasts, dense @29': SAND; well-sorted, medium-grained, non cohesive	SA
	30									

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

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GEOTECHNICAL BORING LOG LB-3

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	213'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
	30							SP	**QUATERNARY MARINE TERRACE DEPOSITS (Qtm): Continued**	
180				R-2	26 36 40			SPg	@32': SAND with Gravel, very dense, scattered shell fragments (mash), mostly dark mafic clasts, well rounded, poorly graded, slightly moist, non cohesive, medium to light gray, alternating beach ramp to tidal environment changes in section	SA
	35								@36': SAND with Gravel; poorly graded, dry to slightly moist, well rounded igneous clasts, frequent shell fragments	
175				R-3	16 26 32			SPg	@36.5': SAND with Gravel, dense poorly graded, fine-grained, medium brown to gray, damp to slightly moist, non-cohesive, thinly bedded/laminated, (driller reports smooth feel @ 37')	SA
	40			R-4	15 22 50/4			SPg	@40': damp, slightly moist, very dense	SA
170									**CAPISTRANO FORMATION (Tc):** @41': SILTY CLAYSTONE; medium dark gray to olive brown, medium hard, very thinly bedded, local 1/4" wide gypsum seams of high angle, local iron-stained sand blebs @41'2": unoxidized, hard	
	45								**TOTAL DEPTH 41 FEET 2 INCHES** **NO GROUNDWATER** **BORING BACKFILLED WITH BENTONITE SLURRY MIX (>3% CEMENT) TO WITHIN 2 FEET OF SURFACE, BENTONITE CHIPS TO WITHIN 6 INCHES OF SURFACE, AND QUICKCRETE TO SURFACE**	
165										
	50									
160										
	55									
155										
	60									

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

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GEOTECHNICAL BORING LOG LP-1

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	224'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
	0								**ASPHALT CONCRETE**	
									AGGREGATE BASE	
									@3.5"Asphalt Concrete over 8" Sandy Gravel	
220	5							CL	**ARTIFICIAL FILL UNDOCUMENTED (Afu):**	
									@11.5"-24': CLAY; moist, horizonal lifts	
215	10									
210	15									
205	20									
200										
	25							CL	**QUATERNARY NON-MARINE TERRACE DEPOSITS (Qtn):**	
									@24-33.5': CLAY typical, yellow brown, moist, locally thinly laminated	
195	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LP-1

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	224'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30							CL	**QUATERNARY NON-MARINE TERRACE DEPOSITS (Qtn): Continued**	
190									**QUATERNARY MARINE TERRACE DEPOSITS (Qtm):**	
	35							SPg	@37': increased gravels @38': shell fragments	
185	40								**NOTES** - TOTAL DEPTH 40 FEET BGS - NO GROUNDWATER - TEMPORARY PERCOLATION TEST WELL CONSTRUCTION - 2-INCH DIAMETER PVC CASING - SOLID INTERVAL 0-30 FEET BGS - SCREENED INTERVAL 30-40 FEET BGS - ANNULAR SPACE BACKFILL CONSISTS OF #3 MONTEREY SAND 20.7-40 FEET - BENTONITE CHIP SEAL 16.6-20.7 FEET BGS - NATIVE SOIL 16.6-0.6 - ASPHALT/CONCRETE 0.6-0 FEET BGS - CASING PLUG AND WELL BOX COVER - WELL DESTRUCTION SCHEDULED FOR LATER DATE	
180	45									
175	50									
170	55									
165	60									

SOIL DESCRIPTION: This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LP-2

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	216'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
215	0								**ASPHALT CONCRETE**	
									AGGREGATE BASE	
									@3.5"-16.5": SAND with Gravel;	
								CL	**QUATERNARY NON-MARINE TERRACE DEPOSITS (Qtn):**	
									@24-33.5': CLAY typical, yellow brown, moist	
210	5									
205	10									
200	15									
195	20									
190	25									
	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LP-2

Project No.	13468.002	**Date Drilled**	4-9-22
Project	Sr, Housing Percolation	**Logged By**	JLH
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	CME-75 HSA Truck - 140lb - Autohammer - 30" Drop	**Ground Elevation**	216'
Location	See Figure 2 - Exploration Location Map	**Sampled By**	JLH

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30							CL-SM	**QUATERNARY NON-MARINE TERRACE DEPOSITS (Qtn):** **Continued**	
185										
									QUATERNARY MARINE TERRACE DEPOSITS (Qtm):	
	35			R-1x	11 11 23			SPg		
180									@37': increased gravels, medium dense @38': shell fragments	
	40								**NOTES** - TOTAL DEPTH 39 FEET BGS - NO GROUNDWATER - TEMPORARY PERCOLATION TEST WELL CONSTRUCTION - 2-INCH DIAMETER PVC CASING - SCREENED INTERVAL 29-39 FEET BGS - SOLID INTERVAL 0-29 FEET BGS - ANNULAR SPACE BACKFILL CONSISTS OF #3 MONTEREY SAND 21.9-39 FEET - BENTONITE CHIP SEAL 21.9-15.5 FEET BGS - NATIVE SOIL 15.5-0.6 - ASPHALT/CONCRETE 0.6-0 FEET BGS - CASING PLUG AND WELL BOX COVER - WELL DESTRUCTION SCHEDULED FOR LATER DATE	
175										
	45									
170										
	50									
165										
	55									
160										
	60									

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

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APPENDIX B

INFILTRATION TEST RESULTS

Boring Percolation Test Data Sheet

Project Number:	13468.002	**Test Hole Number:**	LP-1
Project Name:	SCL SR CTR	**Date Excavated:**	4/9/2022
Earth Description:	Qtm	**Date Tested:**	4/11/2022
Liquid Description:	Tap Water	**Depth of boring (ft):**	39.42
Tested By:	BTM	**Radius of boring, r (in):**	4
		Diameter of casing (in):	2
		Length of slotted of casing (ft):	10
		Depth to Initial Water Depth (ft):	36.26
		Porosity of Annulus Material, *n* :	0.35
		Bentonite Plug at Bottom:	No

Field Percolation Data

Reading	Time	Time Interval, Δt (minutes)	Depth to Water (feet bgs)	Water Height, H (inches)	Cumulative Water Volume Delivered (gallons)
1	8:32	-	-	-	237.8
2	8:42	10	36.22	38.4	296.9
3	8:52	10	36.15	39.2	368.5
4	9:02	10	36.11	39.7	417.4
5	9:12	10	36.09	40.0	476.8
6	9:22	10	36.07	40.2	537.6
7	9:32	10	36.05	40.4	598.3
8	9:42	10	36.03	40.7	659.1
9	9:52	10	36.02	40.8	720.7
10	10:02	10	36.00	41.0	780.6
11	10:12	10	35.97	41.4	842.2
12	10:22	10	35.94	41.8	904.5
13	10:32	10	35.95	41.6	966.6
14	10:42	10	35.94	41.8	1028.7
15	10:52	10	35.93	41.9	1090.8
16	11:02	10	35.77	43.8	1157.9
17	11:12	10	35.74	44.2	1225.5
18	11:22	10	35.73	44.3	1293.4
19	11:32	10	35.71	44.5	1361.0

High Flowrate Percolation Test Calculation

Total Volume of Water Delivered (gallons)	1361.0
Total Volume of Water Delivered (cubic inches)	314391
Average Water Height (inches)	41.4
Average Percolation Surface Area (cubic Inches)	1091.4
Duration of Test (minutes)	180
Duration of Test (hours)	3.00

Measured Infiltration Rate = (Total Volume)/(Test Duration)/(Surface Area)

Measured Infiltration Rate (inches per hour) = 96.0

Boring Percolation Test Data Sheet

Project Number:	13468.002	**Test Hole Number:**	LP-2
Project Name:	SCL SR CTR	**Date Excavated:**	4/9/2022
Earth Description:	Qtm	**Date Tested:**	4/11/2022
Liquid Description:	Tap Water	**Depth of boring (ft):**	37.92
Tested By:	BTM	**Radius of boring, r (in):**	4
		Diameter of casing (in):	2
		Length of slotted of casing (ft):	10
		Depth to Initial Water Depth (ft):	35.72
		Porosity of Annulus Material, *n* :	0.35
		Bentonite Plug at Bottom:	No

Field Percolation Data

Reading	Time	Time Interval, Δt (minutes)	Depth to Water (feet bgs)	Water Height, H (inches)	Cumulative Water Volume Delivered (gallons)
1	1:30	-	-	-	280.0
2	1:40	10	36.01	22.9	344.0
3	1:50	10	35.97	23.4	404.2
4	2:00	10	35.92	24.0	466.0
5	2:10	10	35.87	24.6	528.1
6	2:20	10	35.84	25.0	590.2
7	2:30	10	35.81	25.3	652.5
8	2:40	10	35.78	25.7	714.6
9	2:50	10	35.76	25.9	776.7
10	3:00	10	35.74	26.2	839.0
11	3:10	10	35.72	26.4	900.8
12	3:20	10	35.70	26.6	962.9
13	3:30	10	35.69	26.8	1025.0
14	3:40	10	35.66	27.1	1087.1
15	3:50	10	35.64	27.4	1149.1
16	4:00	10	35.62	27.6	1211.4
17	4:10	10	35.62	27.6	1273.3
18	4:20	10	35.61	27.7	1335.7
19	4:30	10	35.59	28.0	1397.7

High Flowrate Percolation Test Calculation

Total Volume of Water Delivered (gallons)	1397.7
Total Volume of Water Delivered (cubic inches)	322868.7
Average Water Height (inches)	26.0
Average Percolation Surface Area (cubic Inches)	703.9
Duration of Test (minutes)	180
Duration of Test (hours)	3.00

$$\text{Measured Infiltration Rate} = (\text{Total Volume})/(\text{Test Duration})/(\text{Surface Area})$$

Measured Infiltration Rate (inches per hour) = 152.9

APPENDIX C

LABORATORY TEST RESULTS

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Memorial Care Sr, Ctr Tested By : G. Berdy Date: 04/25/22

Project No. : 13468.002 Checked By: A. Santos Date: 04/27/22

Boring No.	LB-2			
Sample No.	LB1			
Sample Depth (ft)	1-5			
Soil Identification:	Olive brown (CL)			
Wet Weight of Soil + Container (g)	0.00			
Dry Weight of Soil + Container (g)	0.00			
Weight of Container (g)	1.00			
Moisture Content (%)	0.00			
Weight of Soaked Soil (g)	100.33			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	10			
Crucible No.	4			
Furnace Temperature (°C)	860			
Time In / Time Out	8:00/8:45			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	21.6356			
Wt. of Crucible (g)	21.6330			
Wt. of Residue (g) (A)	0.0026			
PPM of Sulfate (A) x 41150	106.99			
PPM of Sulfate, Dry Weight Basis	**107**			

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15			
ml of AgNO3 Soln. Used in Titration (C)	0.6			
PPM of Chloride (C -0.2) * 100 * 30 / B	80			
PPM of Chloride, Dry Wt. Basis	**80**			

pH TEST, DOT California Test 643

pH Value	**8.46**			
Temperature °C	20.9			

SOIL RESISTIVITY TEST

DOT CA TEST 643

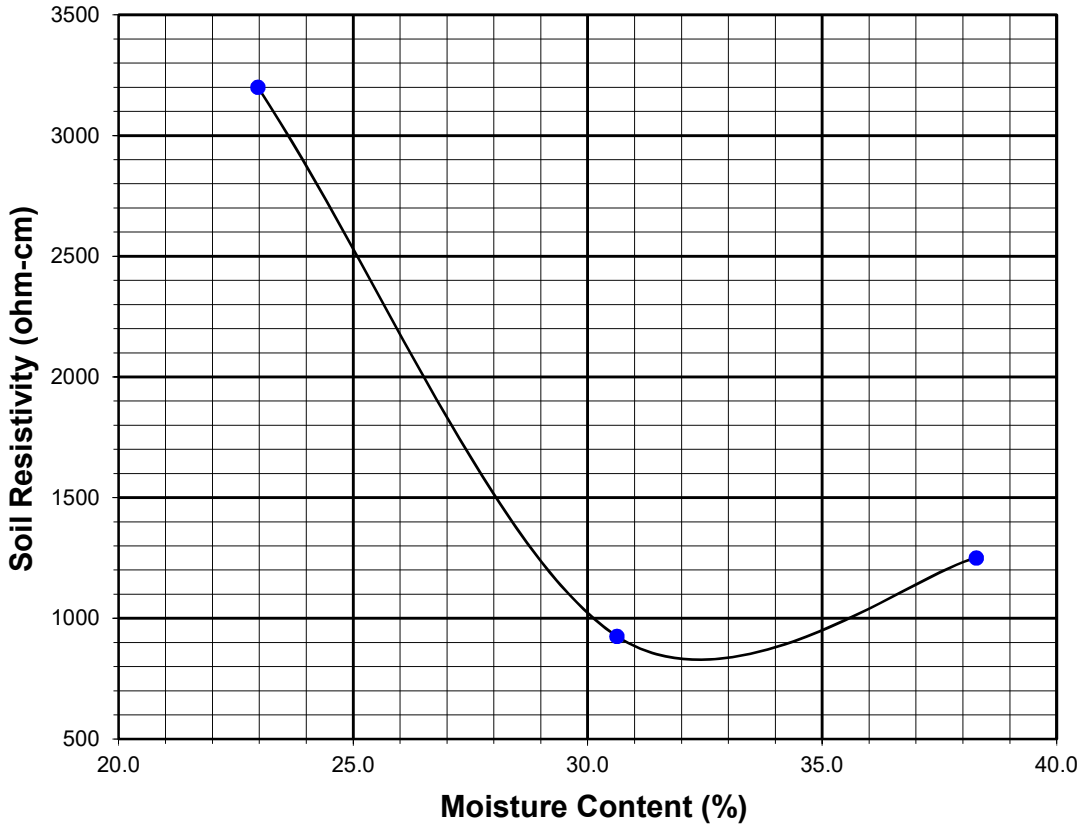
Project Name:	Memorial Care Sr, Ctr		Tested By :	G. Berdy	Date: 04/27/22
Project No. :	13468.002		Checked By:	A. Santos	Date: 04/27/22
Boring No.:	LB-2		Depth (ft.) :	1-5	
Sample No. :	LB1				
Soil Identification:*	Olive brown (CL)				

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	30	22.97	3200	3200
2	40	30.63	925	925
3	50	38.28	1250	1250
4				
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	0.00
Dry Wt. of Soil + Cont. (g)	0.00
Wt. of Container (g)	1.00
Container No.	
Initial Soil Wt. (g) (Wt)	130.60
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
820	**33.5**	**107**	**80**	**8.46**	**20.9**



EXPANSION INDEX of SOILS
ASTM D 4829

Project Name:	Memorial Care Sr. Ctr	Tested By:	G. Berdy	Date:	04/25/22
Project No.:	13468.002	Checked By:	A. Santos	Date:	04/27/22
Boring No.:	LB-1	Depth (ft.):	13.5"-5'		
Sample No.:	LB1				
Soil Identification:	Grayish brown lean clay with sand (CL)s				

Dry Wt. of Soil + Cont. (g)	1000.00
Wt. of Container No. (g)	0.00
Dry Wt. of Soil (g)	1000.00
Weight Soil Retained on #4 Sieve	0.00
Percent Passing # 4	100.00

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0390
Wt. Comp. Soil + Mold (g)	609.60	443.30
Wt. of Mold (g)	203.30	0.00
Specific Gravity (Assumed)	2.70	2.70
Container No.	O	O
Wet Wt. of Soil + Cont. (g)	808.60	646.60
Dry Wt. of Soil + Cont. (g)	738.50	574.35
Wt. of Container (g)	0.00	203.30
Moisture Content (%)	9.49	19.47
Wet Density (pcf)	122.6	128.7
Dry Density (pcf)	111.9	107.7
Void Ratio	0.506	0.565
Total Porosity	0.336	0.361
Pore Volume (cc)	69.6	77.6
Degree of Saturation (%) [S_{meas}]	**50.6**	93.1

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
04/25/22	13:48	1.0	0	0.6685
04/25/22	13:58	1.0	10	0.6665
Add Distilled Water to the Specimen				
04/25/22	14:20	1.0	22	0.6880
04/26/22	16:04	1.0	1566	0.7075
04/26/22	17:05	1.0	1627	0.7075

Expansion Index (EI_{meas}) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	**41**

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name:	Memorial Care Sr. Ctr	Tested By:	G. Berdy	Date:	04/25/22
Project No.:	13468.002	Checked By:	A. Santos	Date:	04/27/22
Boring No.:	LB-2	Depth (ft.):	1-5		
Sample No.:	LB1				
Soil Identification:	Olive brown lean clay (CL)				

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0830
Wt. Comp. Soil + Mold (g)	586.00	438.90
Wt. of Mold (g)	201.30	0.00
Specific Gravity (Assumed)	2.70	2.70
Container No.	O	O
Wet Wt. of Soil + Cont. (g)	780.10	640.20
Dry Wt. of Soil + Cont. (g)	703.40	548.19
Wt. of Container (g)	0.00	201.30
Moisture Content (%)	10.90	26.52
Wet Density (pcf)	116.0	122.2
Dry Density (pcf)	104.6	96.6
Void Ratio	0.611	0.745
Total Porosity	0.379	0.427
Pore Volume (cc)	78.5	95.7
Degree of Saturation (%) [S_{meas}]	**48.2**	96.1

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
04/25/22	14:20	1.0	0	0.6020
04/25/22	14:30	1.0	10	0.6000
Add Distilled Water to the Specimen				
04/25/22	16:00	1.0	90	0.6440
04/26/22	16:03	1.0	1533	0.6845
04/26/22	17:12	1.0	1602	0.6850

Expansion Index (EI_{meas}) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	**85**

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Memorial Care Sr. Ctr	Tested By:	J. Gonzalez	Date:	04/25/22
Project No.:	13468.002	Checked By:	A. Santos	Date:	04/26/22
Boring No.:	LB-2	Depth (ft.):	1-5		
Sample No.:	LB1				
Soil Identification:	Olive brown lean clay (CL)				

Preparation Method: [X] Moist [ ] Dry

[X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03330 *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3629	3789	3795			
Weight of Mold (g)	1826	1826	1826			
Net Weight of Soil (g)	1803	1963	1969			
Wet Weight of Soil + Cont. (g)	462.8	473.6	448.8			
Dry Weight of Soil + Cont. (g)	427.9	426.8	396.5			
Weight of Container (g)	39.2	38.8	39.6			
Moisture Content (%)	8.98	12.06	14.65			
Wet Density (pcf)	119.4	130.0	130.4			
Dry Density (pcf)	109.5	116.0	113.7			

Maximum Dry Density (pcf) **116.1** **Optimum Moisture Content (%)** **12.5**

PROCEDURE USED

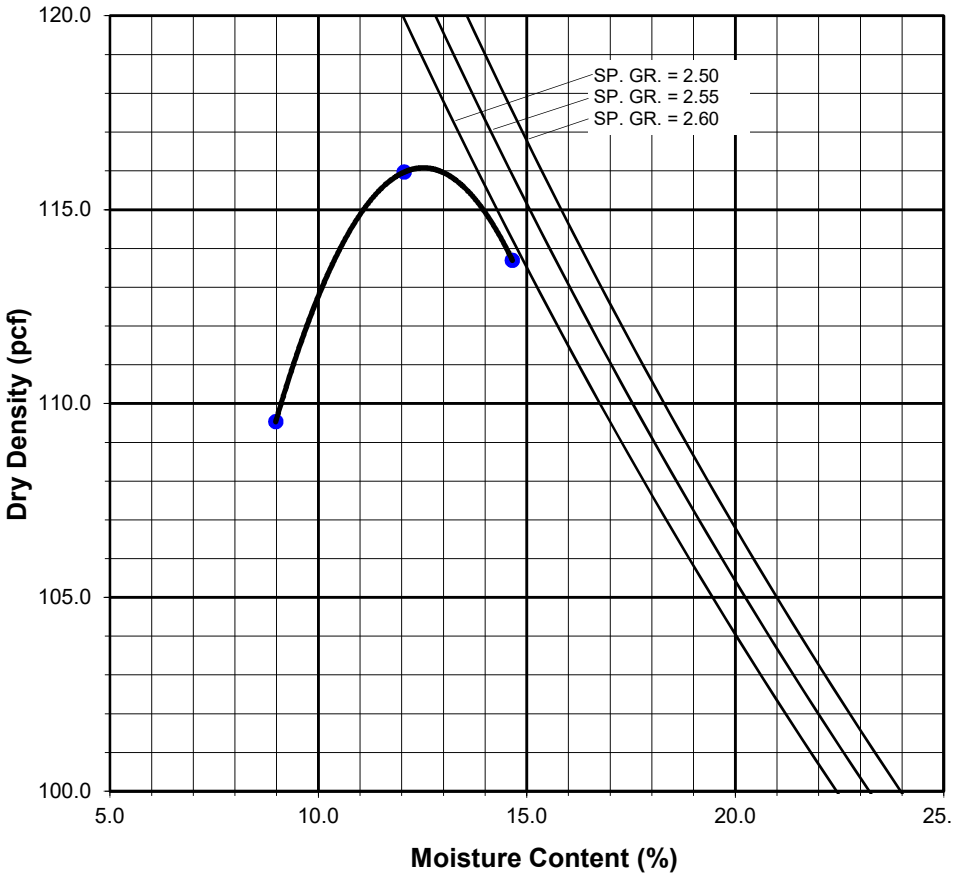
[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
GR:SA:FI

Atterberg Limits:
LL,PL,PI



ATTERBERG LIMITS
ASTM D 4318

Project Name:	Memorial Care Sr. Ctr	Tested By:	J. Domingo	Date:	04/25/22
Project No. :	13468.002	Input By:	G. Bathala	Date:	04/27/22
Boring No.:	LB-1	Checked By:	A. Santos		
Sample No.:	LB1	Depth (ft.)	13.5"-5.0		
Soil Identification:	Grayish brown lean clay with sand (CL)s				

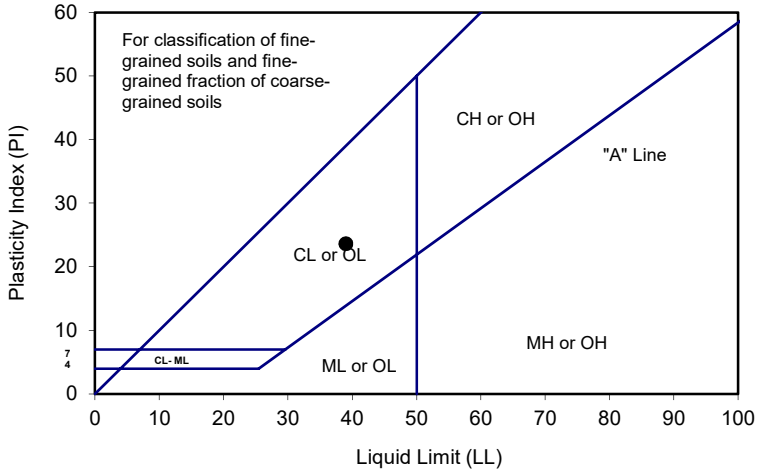
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			31	24	17	
Wet Wt. of Soil + Cont. (g)	9.31	9.12	21.24	21.35	21.60	
Dry Wt. of Soil + Cont. (g)	8.20	8.04	15.71	15.65	15.57	
Wt. of Container (g)	0.99	1.03	1.03	1.10	1.02	
Moisture Content (%) [Wn]	15.40	15.41	37.67	39.18	41.44	

Liquid Limit	**39**
Plastic Limit	**15**
Plasticity Index	**24**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) 13.87

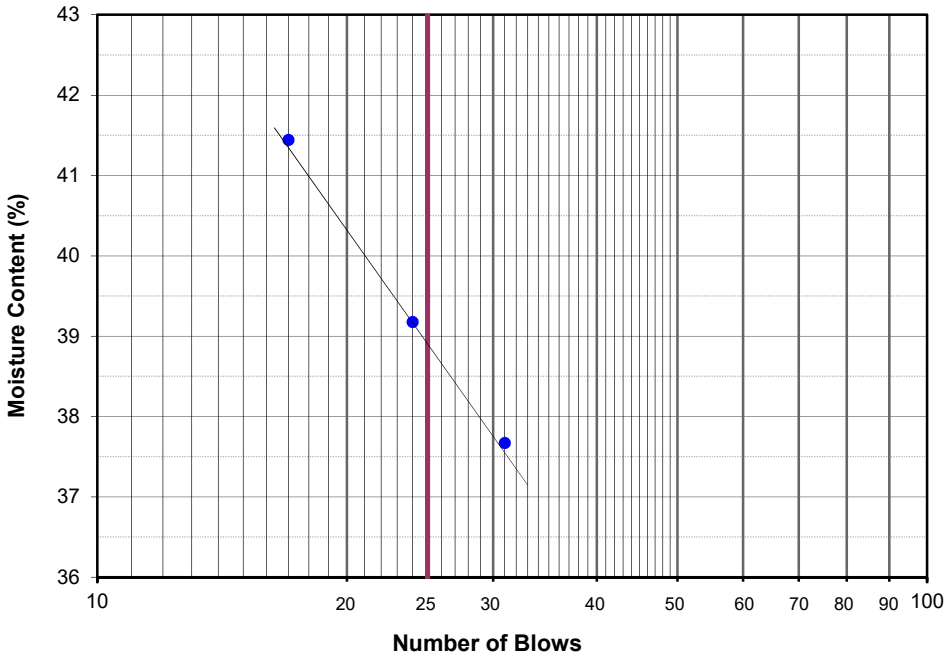
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [X] Dry Preparation
  Multipoint - Dry
- [X] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test



ATTERBERG LIMITS

ASTM D 4318

Project Name:	Memorial Care Sr. Ctr	Tested By:	S. Felter	Date:	04/20/22
Project No. :	13468.002	Input By:	G. Bathala	Date:	04/27/22
Boring No.:	LB-1	Checked By:	A. Santos		
Sample No.:	R-3	Depth (ft.)	7.5		
Soil Identification:	Brown fat clay (CH)				

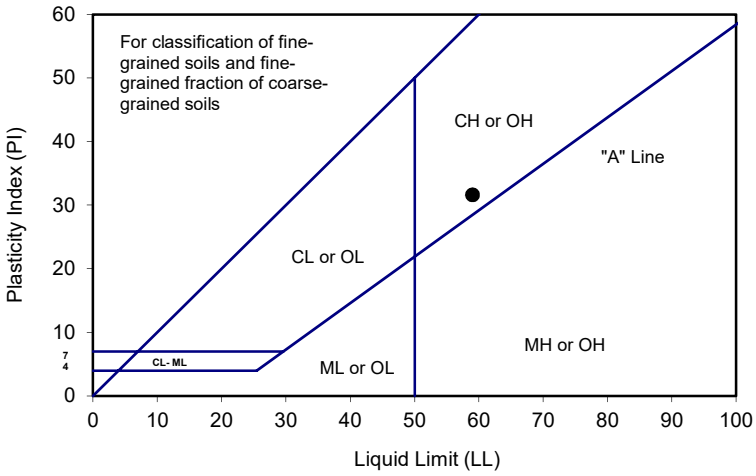
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			32	26	20	
Wet Wt. of Soil + Cont. (g)	9.46	9.44	20.46	20.48	20.64	
Dry Wt. of Soil + Cont. (g)	7.66	7.65	13.38	13.26	13.26	
Wt. of Container (g)	1.04	1.15	1.04	1.08	1.12	
Moisture Content (%) [Wn]	27.19	27.54	57.37	59.28	60.79	

Liquid Limit	**59**
Plastic Limit	**27**
Plasticity Index	**32**
Classification	**CH**

PI at "A" - Line = 0.73(LL-20) 28.47

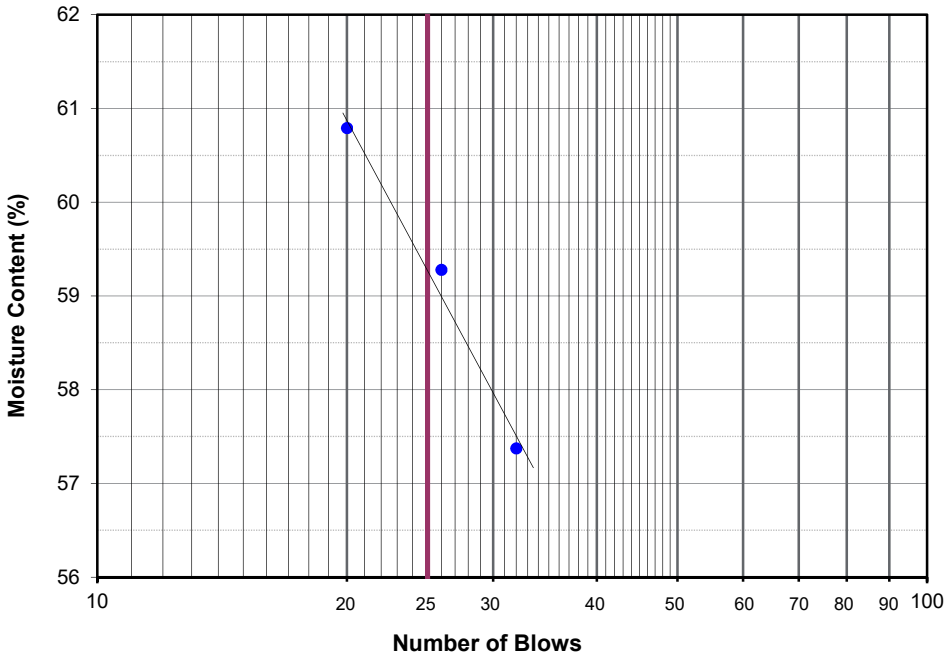
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [X] Dry Preparation
  Multipoint - Dry
- [X] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test



ATTERBERG LIMITS
ASTM D 4318

Project Name:	Memorial Care Sr. Ctr	Tested By:	S. Felter	Date:	04/20/22
Project No. :	13468.002	Input By:	G. Bathala	Date:	04/22/22
Boring No.:	LB-2	Checked By:	A. Santos		
Sample No.:	R-3	Depth (ft.)	7.5		
Soil Identification:	Brown lean clay (CL)				

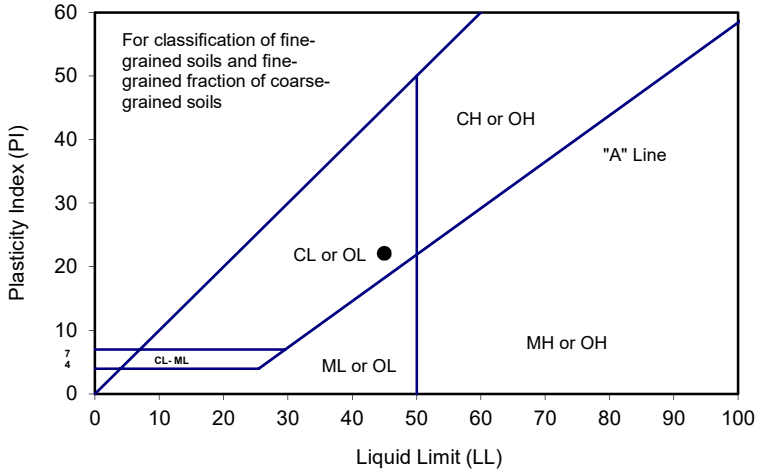
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			34	26	20	
Wet Wt. of Soil + Cont. (g)	10.11	10.11	20.22	21.53	20.06	
Dry Wt. of Soil + Cont. (g)	8.46	8.41	14.53	15.24	14.07	
Wt. of Container (g)	1.12	1.12	1.10	1.14	1.06	
Moisture Content (%) [Wn]	22.48	23.32	42.37	44.61	46.04	

Liquid Limit	**45**
Plastic Limit	**23**
Plasticity Index	**22**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) 18.25

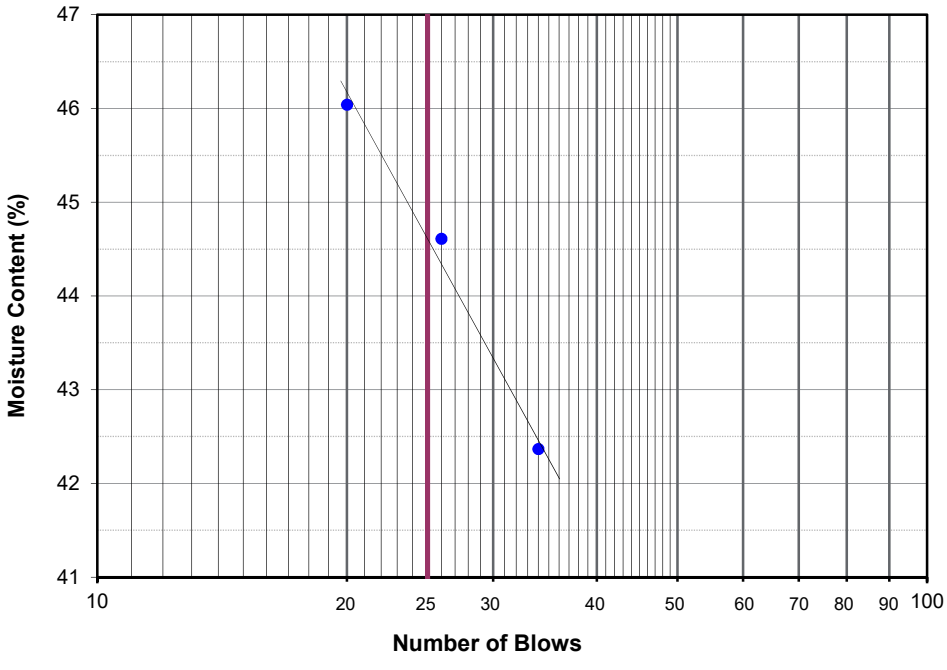
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

	Wet Preparation
	Multipoint - Wet
X	Dry Preparation
	Multipoint - Dry
X	Procedure A
	Multipoint Test
	Procedure B
	One-point Test



PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D6913

Project Name: Memorial Care Sr. Ctr
Project No.: 13468.002
Boring No.: LB-3
Sample No.: R-1x thru R-4ax, Composite
Soil Identification: Grayish brown poorly-graded sand (SP)g

Tested By: J. Domingo Date: 04/25/22
Checked By: A. Santos Date: 04/27/22
Depth (feet): 29-41.4

Calculation of Dry Weights	Whole Sample	Sample Passing #4	Moisture Contents	Whole Sample	Sample passing #4
Container No.:	SP-03	912	Wt. of Air-Dry Soil + Cont.(g)	0.0	0.0
Wt. Air-Dried Soil + Cont.(g)	9671.5	626.7	Wt. of Dry Soil + Cont. (g)	0.0	0.0
Wt. of Container (g)	745.4	106.1	Wt. of Container No._____(g)	1.0	1.0
Dry Wt. of Soil (g)	8926.1	520.6	Moisture Content (%)	0.0	0.0

Passing #4 Material After Wet Sieve		
	Container No.	912
	Wt. of Dry Soil + Container (g)	604.4
	Wt. of Container (g)	106.1
	Dry Wt. of Soil Retained on # 200 Sieve (g)	498.3

U. S. Sieve Size		Cumulative Weight of Dry Soil Retained (g)		Percent Passing (%)
	(mm.)	Whole Sample	Sample Passing #4	
3"	75.0			
1 1/2"	37.5	0.0		100.0
1"	25.0	181.9		98.0
3/4"	19.0	402.5		95.5
1/2"	12.5	680.1		92.4
3/8"	9.5	905.3		89.9
#4	4.75	1553.6		82.6
#8	2.36		34.5	77.1
#16	1.18		65.8	72.2
#30	0.600		113.8	64.5
#50	0.300		154.0	58.2
#100	0.150		338.3	28.9
#200	0.075		493.6	4.3
PAN				

GRAVEL: **17 %**
SAND: **79 %**
FINES: **4 %**
GROUP SYMBOL: **(SP)g**

Cu = D60/D10 = 3.56
Cc = $(D30)^2/(D60*D10)$ = 1.00

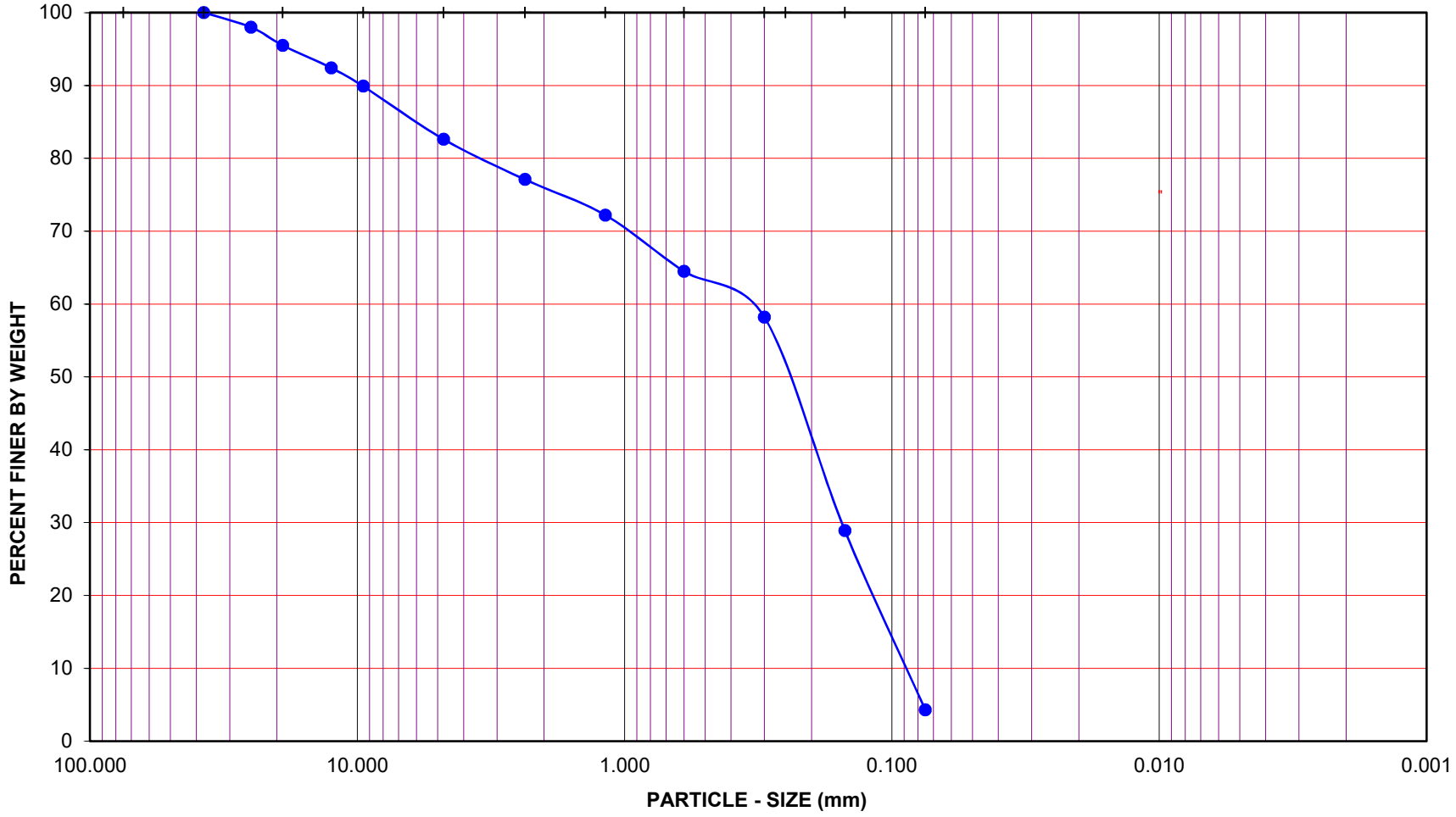
Remarks:

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"

U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200

HYDROMETER



Project Name: Memorial Care Sr. Ctr

Project No.: 13468.002

Boring No.: LB-3 Sample No.: R-1x thru R-4ax, Composite

Depth (feet): 29-41.4 Soil Type : (SP)g

Soil Identification: Grayish brown poorly-graded sand (SP)g

GR:SA:FI : (%) 17 : 79 : 4

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Apr-22

Sieve LB-3, R-1x thru R-4ax @ 29-41.4 Composite

APPENDIX D

CEQA QUESTIONNAIRE FOR GEOLOGY AND SOILS

Print Form

Appendix G

Environmental Checklist Form

NOTE: The following is a sample form and may be tailored to satisfy individual agencies' needs and project circumstances. It may be used to meet the requirements for an initial study when the criteria set forth in CEQA Guidelines have been met. Substantial evidence of potential impacts that are not listed on this form must also be considered. The sample questions in this form are intended to encourage thoughtful assessment of impacts, and do not necessarily represent thresholds of significance.

1. Project title:_____

2. Lead agency name and address:
_____
_____
_____

3. Contact person and phone number: _____

4. Project location: _____

5. Project sponsor's name and address:
_____
_____
_____

6. General plan designation: _____ 7. Zoning:_____

8. Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)
_____
_____
_____
_____

9. Surrounding land uses and setting: Briefly describe the project's surroundings:
_____
_____
_____
_____

10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)
_____
_____
_____
_____

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology /Soils
☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials	☐ Hydrology / Water Quality
☐ Land Use / Planning	☐ Mineral Resources	☐ Noise
☐ Population / Housing	☐ Public Services	☐ Recreation
☐ Transportation/Traffic	☐ Utilities / Service Systems	☐ Mandatory Findings of Significance

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

_____ _____

Signature Date

_____ _____

Signature Date

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

    a) Earlier Analysis Used. Identify and state where they are available for review.

    b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

    c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

    a) the significance criteria or threshold, if any, used to evaluate each question; and

    b) the mitigation measure identified, if any, to reduce the impact to less than significance.

SAMPLE QUESTION
Issues:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS -- Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☐
II. AGRICULTURE AND FOREST RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. -- Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☐
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☐
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Production (as defined by Government Code section 51104(g))?				
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☐
de) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☐
III. AIR QUALITY -- Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☐
IV. BIOLOGICAL RESOURCES -- Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?				
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☐
V. CULTURAL RESOURCES -- Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☐	☐	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☐	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☐
VI. GEOLOGY AND SOILS -- Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☒	☐
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☒	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☒	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☒	☐	☐
VII. GREENHOUSE GAS EMISSIONS -- Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☐	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☐
VIII. HAZARDS AND HAZARDOUS MATERIALS - Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
for people residing or working in the project area?				
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☐
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☐
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☐
IX. HYDROLOGY AND WATER QUALITY -- Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☐
f) Otherwise substantially degrade water quality?	☐	☐	☐	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☐
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☐
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☐
X. LAND USE AND PLANNING - Would the project:				
a) Physically divide an established community?	☐	☐	☐	☐
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☐
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☐
XI. MINERAL RESOURCES -- Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☐
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☐
XII. NOISE -- Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☐
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☐
XIII. POPULATION AND HOUSING -- Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☐
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☐
XIV. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☐
Police protection?	☐	☐	☐	☐
Schools?	☐	☐	☐	☐
Parks?	☐	☐	☐	☐
Other public facilities?	☐	☐	☐	☐
XV. RECREATION --				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☐
XVI. TRANSPORTATION/TRAFFIC -- Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☐
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☐
e) Result in inadequate emergency access?	☐	☐	☐	☐
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☐
XVII. UTILITIES AND SERVICE SYSTEMS -- Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
could cause significant environmental effects?				
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☐
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☐
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE --				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☐

Note: Authority cited: Sections 21083, 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080, 21083.05, 21095, Pub. Resources Code; *Eureka Citizens for Responsible Govt. v. City of Eureka* (2007) 147 Cal.App.4th 357; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th at 1109; *San Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656.

Revised 2009

APPENDIX E

PRELIMINARY SEISMIC DESIGN PARAMETERS

13468.002

Latitude, Longitude: 33.4570, -117.6500

Date	4/22/2022, 4:13:48 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.173	MCE_R ground motion. (for 0.2 second period)
S_1	0.423	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.209	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.806	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.031	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.507	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.557	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.173	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.273	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	3.204	Factored deterministic acceleration value. (0.2 second)
S1RT	0.423	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.455	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.033	Factored deterministic acceleration value. (1.0 second)
PGAd	1.285	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.922	Mapped value of the risk coefficient at short periods
C_{R1}	0.93	Mapped value of the risk coefficient at a period of 1 s

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U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (update…

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.457

Time Horizon

Return period in years

2475

Longitude

Decimal degrees, negative values for western longitudes

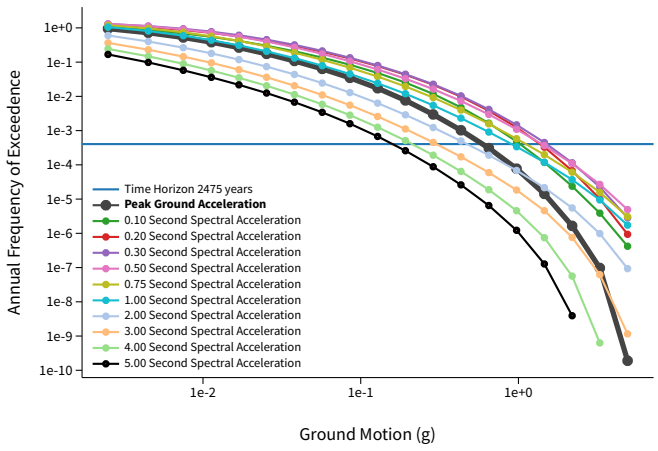
-117.65

Site Class

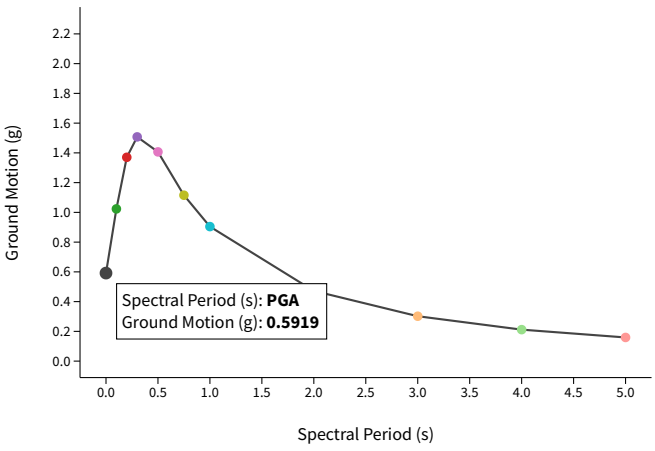
259 m/s (Site class D)

Hazard Curve

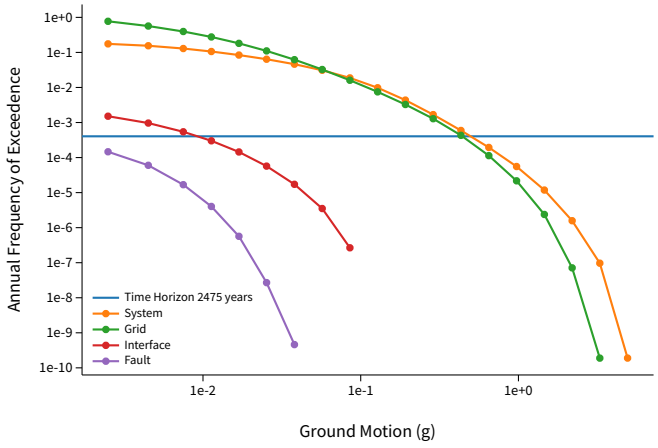
Hazard Curves



Uniform Hazard Response Spectrum



Component Curves for Peak Ground Acceleration

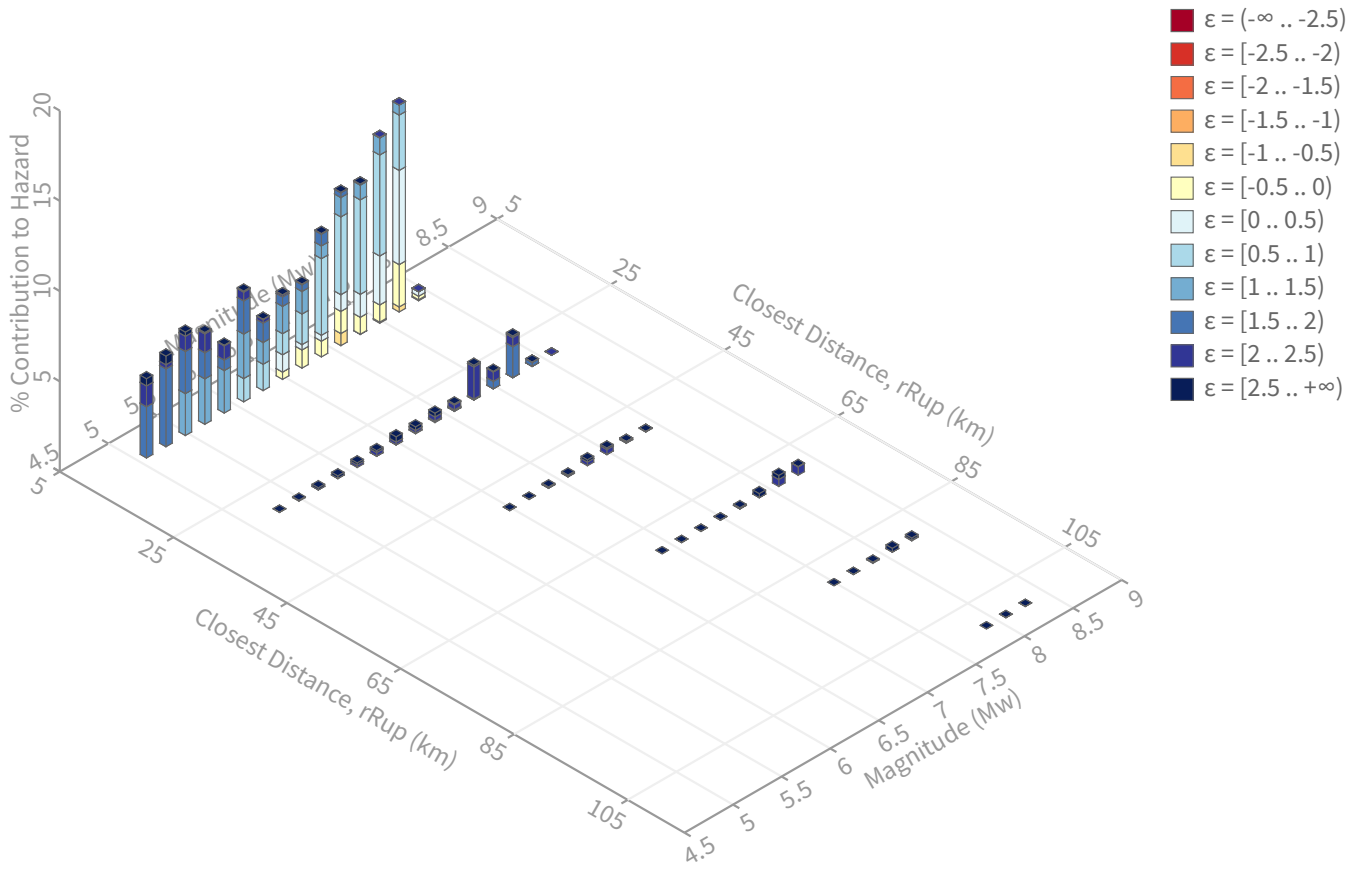


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.59185776 g

Recovered targets

Return period: 2845.7638 yrs
Exceedance rate: 0.00035139951 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.12 %

Mean (over all sources)

m: 6.72
r: 11.85 km
ε_0: 1.09 σ

Mode (largest m-r bin)

m: 7.69
r: 6.46 km
ε_0: 0.25 σ
Contribution: 11.46 %

Mode (largest m-r-ε_0 bin)

m: 7.49
r: 6.95 km
ε_0: 0.65 σ
Contribution: 5.6 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ϵ_0	lon	lat	az	%
UC33brAvg_FM31	System							34.49
Oceanside alt1 [5]		6.20	7.28	0.07	117.768°W	33.419°N	249.11	15.32
Newport-Inglewood (Offshore) [5]		6.74	7.26	0.75	117.704°W	33.417°N	228.59	10.85
Elsinore (Glen Ivy) rev [3]		35.82	7.59	2.07	117.412°W	33.711°N	37.93	1.29
Palos Verdes [1]		31.30	7.25	2.19	117.941°W	33.315°N	239.73	1.29
UC33brAvg_FM32	System							28.13
Newport-Inglewood (Offshore) [5]		6.74	7.24	0.76	117.704°W	33.417°N	228.59	10.94
San Joaquin Hills [2]		10.99	6.97	0.86	117.685°W	33.577°N	346.37	5.14
Oceanside alt2 [11]		6.19	7.62	0.02	117.769°W	33.420°N	249.75	5.04
Palos Verdes [1]		31.30	7.46	2.04	117.941°W	33.315°N	239.73	1.46
Elsinore (Glen Ivy) rev [3]		35.82	7.62	2.05	117.412°W	33.711°N	37.93	1.37
UC33brAvg_FM31 (opt)	Grid							18.73
PointSourceFinite: -117.650, 33.515		8.03	5.70	1.38	117.650°W	33.515°N	0.00	4.12
PointSourceFinite: -117.650, 33.515		8.03	5.70	1.38	117.650°W	33.515°N	0.00	4.12
PointSourceFinite: -117.650, 33.524		8.96	5.61	1.56	117.650°W	33.524°N	0.00	2.49
PointSourceFinite: -117.650, 33.524		8.96	5.61	1.56	117.650°W	33.524°N	0.00	2.49
UC33brAvg_FM32 (opt)	Grid							18.64
PointSourceFinite: -117.650, 33.515		8.03	5.70	1.38	117.650°W	33.515°N	0.00	4.14
PointSourceFinite: -117.650, 33.515		8.03	5.70	1.38	117.650°W	33.515°N	0.00	4.14
PointSourceFinite: -117.650, 33.524		8.96	5.61	1.56	117.650°W	33.524°N	0.00	2.48
PointSourceFinite: -117.650, 33.524		8.96	5.61	1.56	117.650°W	33.524°N	0.00	2.48