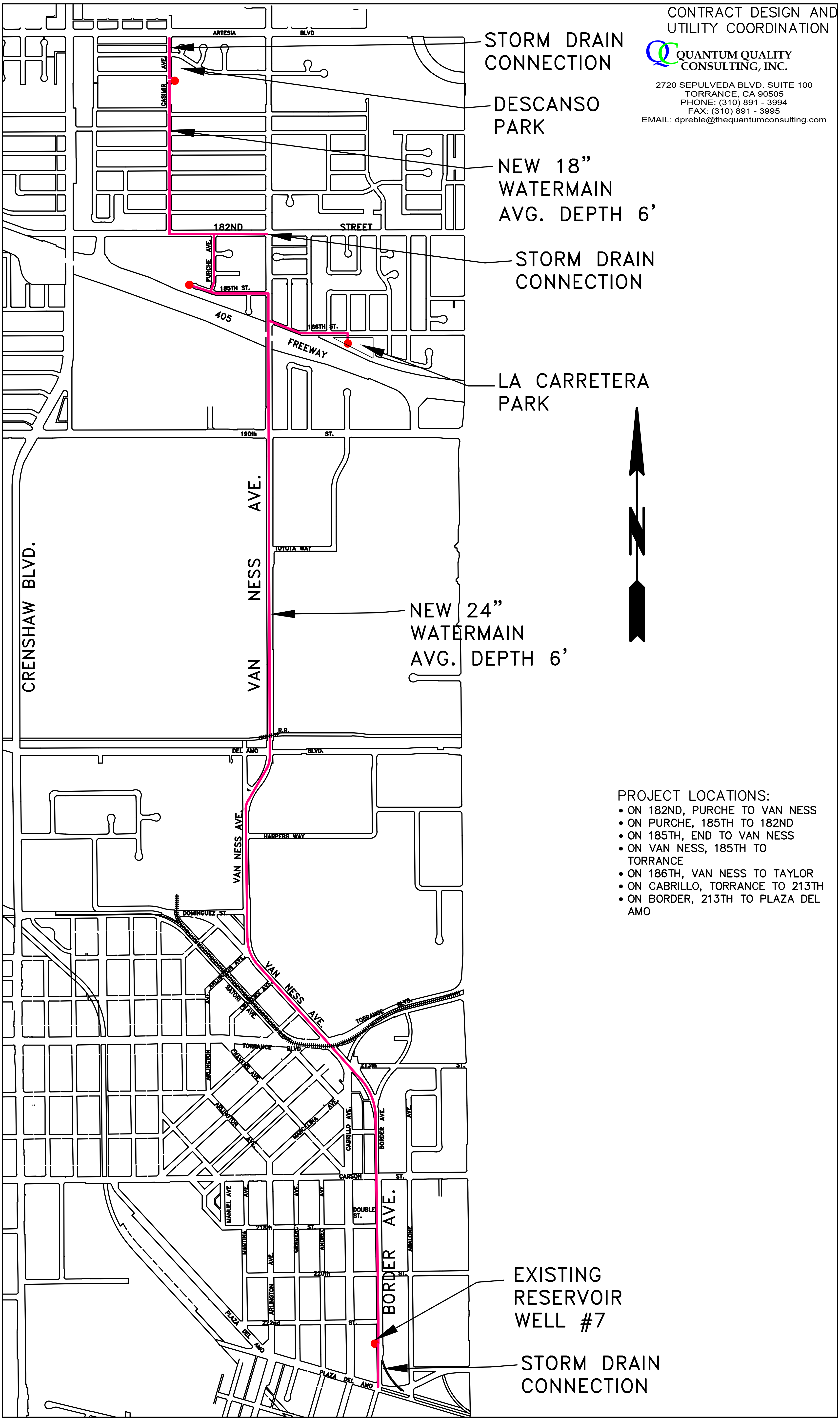


CITY OF TORRANCE WATER MAIN PROJECT CIP No. I-145

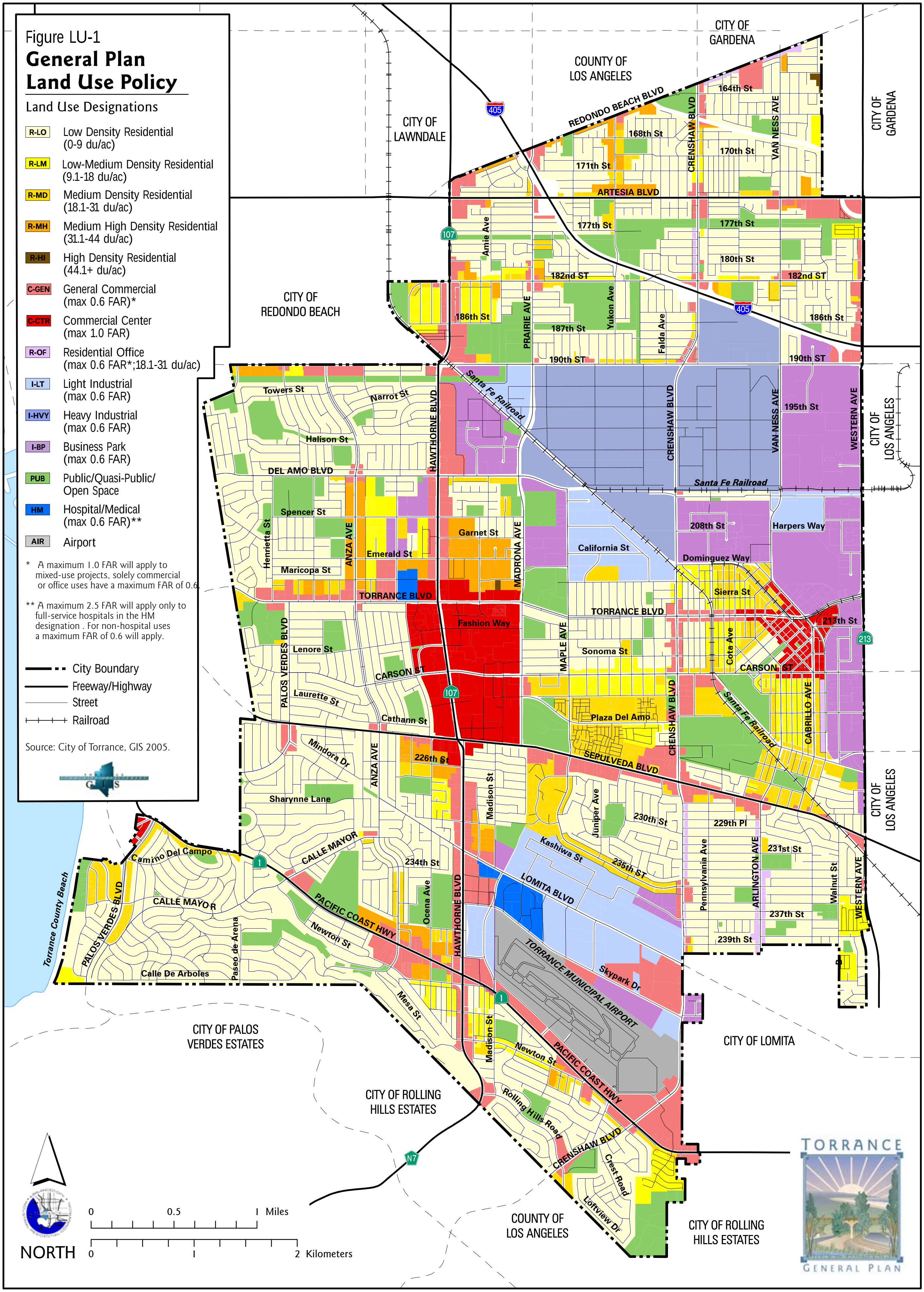


Figure LU-1
General Plan
Land Use Policy
Land Use Designations
R-LO Low Density Residential (0-9 du/ac)
R-LM Low-Medium Density Residential (9.1-18 du/ac)
R-MD Medium Density Residential (18.1-31 du/ac)
R-MH Medium High Density Residential (31.1-44 du/ac)
R-HI High Density Residential (44.1+ du/ac)
C-GEN General Commercial (max 0.6 FAR)*
C-CTR Commercial Center (max 1.0 FAR)
R-OF Residential Office (max 0.6 FAR*;18.1-31 du/ac)
I-LT Light Industrial (max 0.6 FAR)
I-HVY Heavy Industrial (max 0.6 FAR)
I-BP Business Park (max 0.6 FAR)
PUB Public/Quasi-Public/ Open Space
HM Hospital/Medical (max 0.6 FAR)**
AIR Airport
* A maximum 1.0 FAR will apply to mixed-use projects, solely commercial or office uses have a maximum FAR of 0.6.
** A maximum 2.5 FAR will apply only to full-service hospitals in the HM designation . For non-hospital uses a maximum FAR of 0.6 will apply.
City Boundary
Freeway/Highway
Street
Railroad
Source: City of Torrance, GIS 2005.
CITY OF GARDENA
COUNTY OF LOS ANGELES
CITY OF LAWNDALE
CITY OF REDONDO BEACH
CITY OF LOS ANGELES
CITY OF PALOS VERDES ESTATES
CITY OF ROLLING HILLS ESTATES
CITY OF LOMITA
REDONDO BEACH BLVD
ARTESIA BLVD
164th St
168th St
170th St
171th St
177th St
180th St
182nd ST
186th St
187th St
190th ST
195th St
CRENSHAW BLVD
VAN NESS AVE
WESTERN AVE
PRAIRIE AVE
Yukon Ave
Falda Ave
Amie Ave
HAWTHORNE BLVD
Santa Fe Railroad
Towers St
Narrot St
Halison St
DEL AMO BLVD
Spencer St
Henrietta St
ANZA AVE
Emerald St
Maricopa St
Garnet St
MADRONA AVE
California St
208th St
Harpers Way
Dominguez Way
Sierra St
TORRANCE BLVD
213th St
Fashion Way
MAPLE AVE
Sonoma St
Cota Ave
CARSON ST
PALOS VERDES BLVD
Lenore St
Laurette St
Cathann St
Plaza Del Amo
CABRILLO AVE
SEPULVEDA BLVD
Mindora Dr
226th St
Madison St
Juniper Ave
230th St
229th Pl
231st St
Sharynne Lane
CALLE MAYOR
234th St
Kashiwa St
235th ST
LOMITA BLVD
Pennsylvania Ave
ARLINGTON AVE
Walnut St
237th St
239th St
Camino Del Campo
Torrance County Beach
PACIFIC COAST HWY
Newton St
Ocena Ave
Paseo de Arena
Calle De Arboles
TORRANCE MUNICIPAL AIRPORT
Skypark Dr
Mesa St
Newton St
Rolling Hills Road
CRENSHAW BLVD
Crest Road
Loftview Dr
COUNTY OF LOS ANGELES
CITY OF ROLLING HILLS ESTATES
405
107
213
1
N7
NORTH
0 0.5 1 Miles
0 1 2 Kilometers
TORRANCE
GENERAL PLAN

RESOLUTION NO. 2010-29

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TORRANCE, CALIFORNIA, ADOPTING THE CITY OF TORRANCE 2009 GENERAL PLAN

GPA04-00002: CITY OF TORRANCE

WHEREAS, each planning agency shall prepare and the legislative body of each city shall adopt a comprehensive, long-term General Plan for the physical development of the city (Government Code Section 65300); and

WHEREAS, the General Plan shall consist of a statement of development polices and shall include a diagram or diagrams and text setting forth objectives, principles, standards and plan proposals. The plan shall include the following elements: Land Use, Circulation, Housing, Conservation, Open Space, Noise, and Safety (Government Code Section 65302); and

WHEREAS, the General Plan may include other elements or address any other subjects which, in the judgment of the legislative body, relate to the physical development of the city (Government Code Section 65303); and

WHEREAS, on January 8, 1974, the City Council adopted the Parks and Recreation Element and Open Space Element at a public hearing; and

WHEREAS, on January 28, 1974, the City Council adopted the Conservation element at a public hearing; and

WHEREAS, on August 29, 1974, the City Council adopted the Circulation, Land Use, Housing, and Safety Elements at a public hearing; and;

WHEREAS, on March 18, 1975, the City Council adopted the Noise Element at a public hearing; and

WHEREAS, on October 27, 1992, the City Council adopted the 1992 General Plan; and

WHEREAS, on February 27, 2001, the City Council adopted the updated Housing Element as required by State law; and

WHEREAS, the City of Torrance has undertaken a revision and update of the General Plan of the City of Torrance for guiding the future physical development of the city for the next 15 to 20 year that reflects the community's vision; and

WHEREAS, the 2009 General Plan constitutes a comprehensive update of the 1992 General Plan comprising of the Land Use, Circulation and Infrastructure, Community Resources (formerly the Conservation, Open Space, Parks and Recreation Elements), Noise, Safety, and Housing Elements; and

WHEREAS, an Environmental Impact Report was prepared for the 2009 General Plan pursuant to the California Environmental Quality Act (CEQA) and State CEQA Guidelines; and

WHEREAS, from February 23, 2004 to October 14, 2009, there have been 20 General Plan Update commission community workshops held to identify issues and to receive community input; and

WHEREAS, on October 28, 2009, the Planning Commission conducted a public hearing to consider the 2009 Draft General Plan and Environmental Impact Report; and

WHEREAS, on October 28, 2009, the Planning Commission recommended to the City Council certification of the Environmental Impact Report, adoption of the Findings of Fact and Statement of Overriding Considerations, and that the 2009 Draft General Plan be forwarded to the City Council for their review; and

WHEREAS, on November 10, 2009, December 15, 2009, and January 19, 2010, the City Council conducted public workshops on the 2009 Draft General Plan and Environmental Impact Report ; and

WHEREAS, on February 23, 2010 the City Council conducted a public hearing on the 2009 Draft General Plan and Environmental Impact Report; and

WHEREAS, due and legal publication of notice was given to interested persons and parties and owners of property considered for land use designation changes, and due and legal hearings have been held in compliance with local and state statutes; and

WHEREAS, on February 23, 2010, the City Council certified the Environmental Impact Report for the 2009 General Plan; and

WHEREAS, on February 23, 2010, the City Council adopted the Findings of Fact and Statement of Overriding Considerations; and

WHEREAS, on February 23, 2010, the City Council unanimously approved the 2009 General Plan; and

WHEREAS, on April 6, 2010, the City Council considered a resolution certifying the Environmental Impact Report for the 2009, General Plan, adopting the Findings of Fact and Statement of Overriding Considerations, and adopting the Mitigation Monitoring Program; and

WHEREAS, on April 6, 2010, the City Council considered a resolution adopting the 2009 General Plan; and

NOW, THEREFORE, BE IT RESOLVED that 2009 General Plan is hereby ADOPTED,

Introduced, approved and adopted this 6th day of April 2010.

/s/ Frank Scotto
Mayor Frank Scotto
ATTEST:

/s/ Sue Herbers
Sue Herbers, City Clerk

APPROVED AS TO FORM:
JOHN L. FELLOWS III, City Attorney

by /s/ Patrick Q. Sullivan
Patrick Q. Sullivan, Assistant City Attorney

TORRANCE CITY COUNCIL RESOLUTION NO. 2010-29

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss
CITY OF TORRANCE)

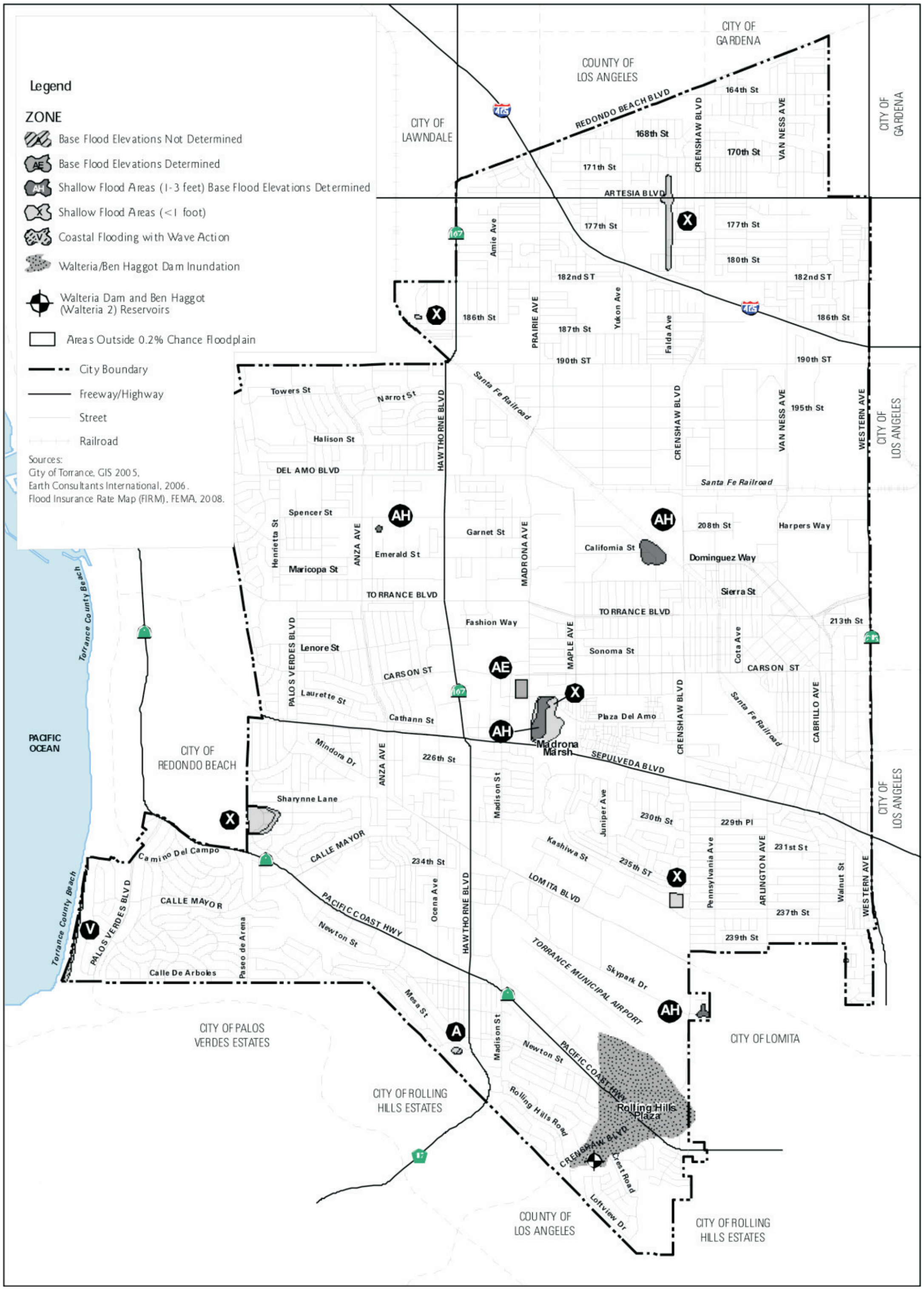
I, Sue Herbers, City Clerk of the City of Torrance, California, do hereby certify that the foregoing resolution was duly introduced, approved, and adopted by the City Council of the City of Torrance at a regular meeting of said Council held on the 6th day of April, 2010 by the following roll call vote:

AYES:	COUNCILMEMBERS	Barnett, Brewer, Furey, Numark, Rhilinger, Sutherland, and Mayor Scotto.
NOES:	COUNCILMEMBERS	None.
ABSTAIN:	COUNCILMEMBERS	None.
ABSENT:	COUNCILMEMBERS	None.

/s/ Sue Herbers
Sue Herbers
City Clerk of the City of Torrance

Date: April 8, 2010

Flood Hazards



City Boundary

0 1
Scale (Miles)

Source: ECI 2005

Department of Public Works
dpw.lacounty.gov

Flood Zone Determination Website

Click for more Information.

LAYERS

FEMA Flood Zone

- [ ] FEMA FIRM Panels
- [x] FEMA Flood Zones
- [ ] FEMA Flood Zone D
- [x] FEMA Base Flood Elevation
- [x] Letter of Map Revision (LOMR)
- [ ] City Boundaries

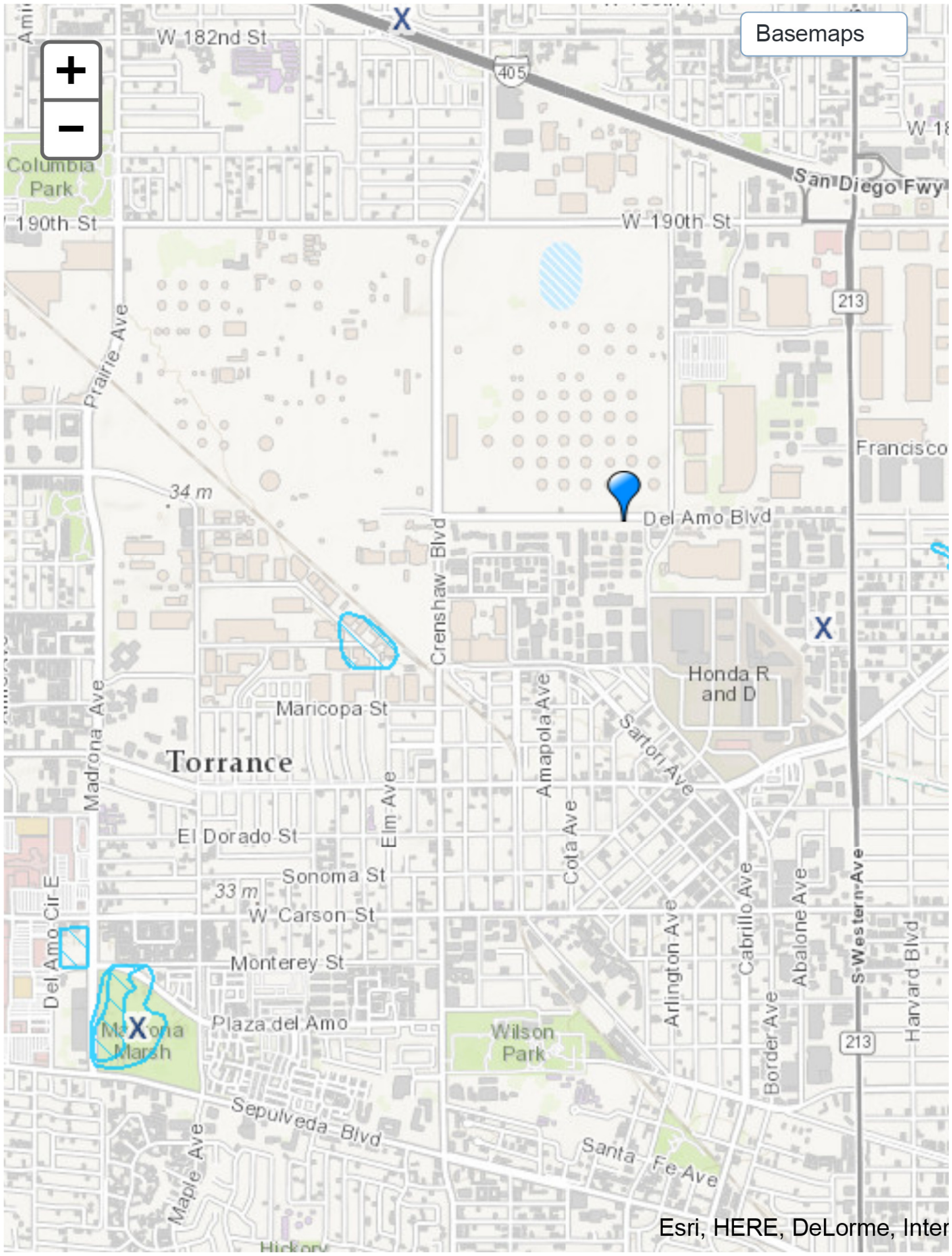
SEARCH

Enter Address or Parcel No.:

(ex: 900 S. Fremont Ave., 5342005904, Fremont@Valley)

Search

NO RESULTS. Please search again.



Map Tips

Peak Flow Hydrologic Analysis

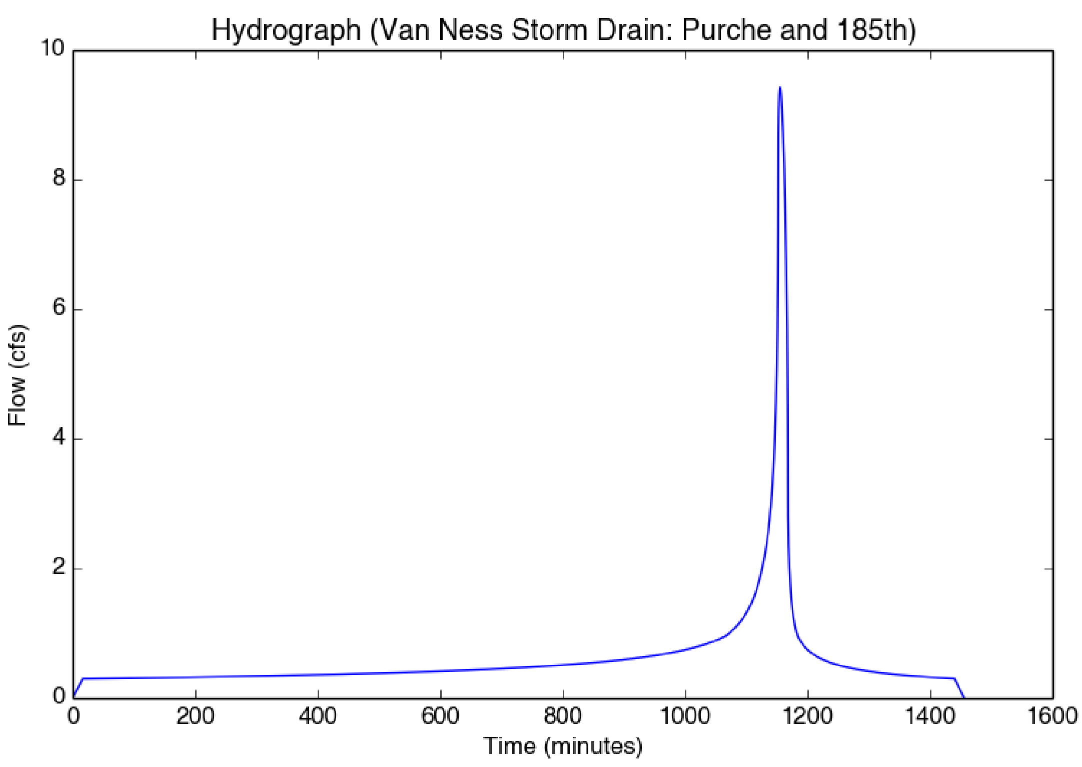
File location: C:/Users/Quantum 4/Desktop/Van Ness Storm Drain - Purche and 185th for 10yrstorm.pdf
Version: HydroCalc 0.2.0-beta

Input Parameters

Project Name	Van Ness Storm Drain
Subarea ID	Purche and 185th
Area (ac)	8.96
Flow Path Length (ft)	808.2
Flow Path Slope (vft/hft)	0.0046
50-yr Rainfall Depth (in)	5.83
Percent Impervious	0.32
Soil Type	9
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

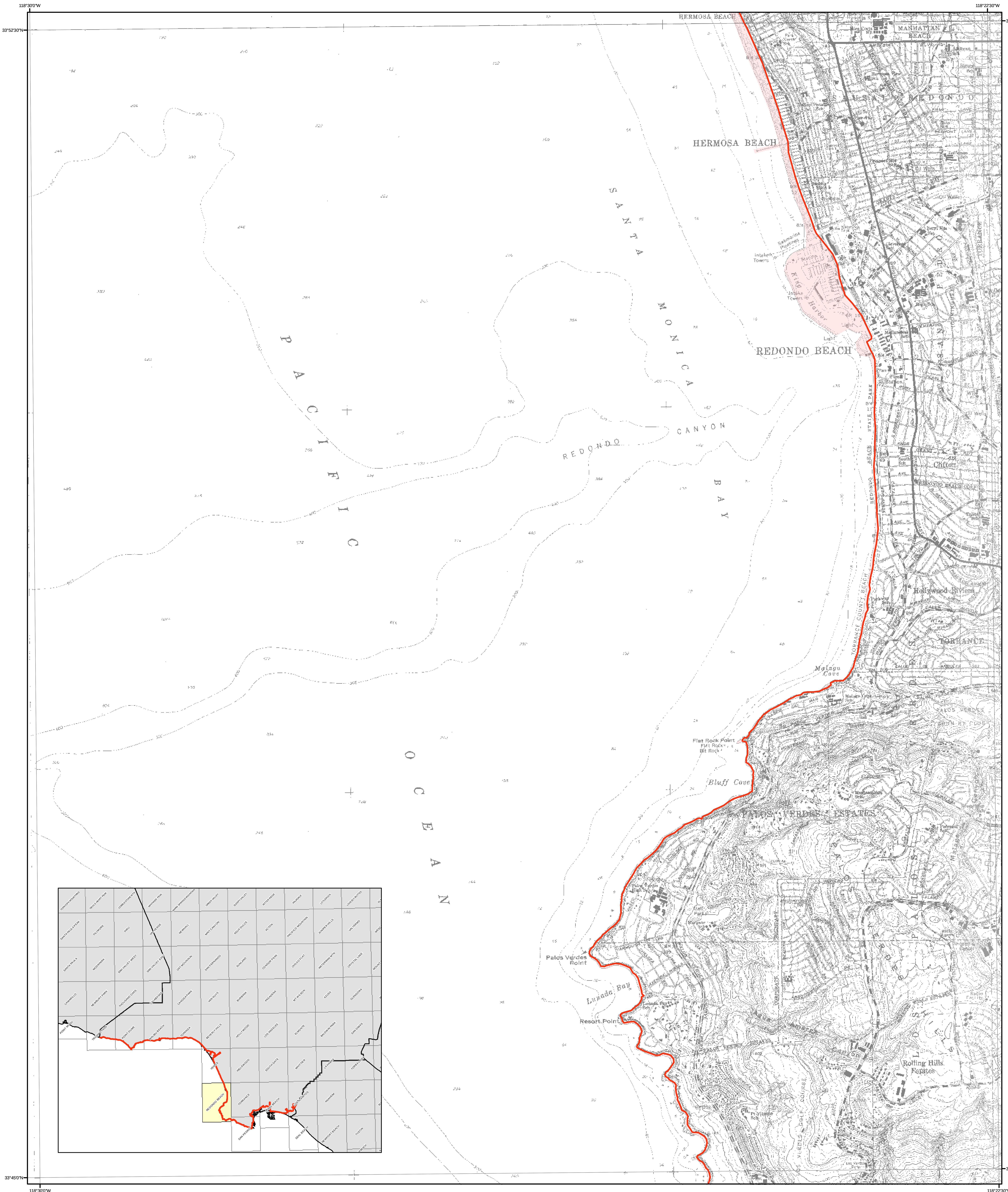
Modeled (10-yr) Rainfall Depth (in)	4.1626
Peak Intensity (in/hr)	1.4376
Undeveloped Runoff Coefficient (Cu)	0.6527
Developed Runoff Coefficient (Cd)	0.7318
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	9.4267
Burned Peak Flow Rate (cfs)	9.4267
24-Hr Clear Runoff Volume (ac-ft)	1.242
24-Hr Clear Runoff Volume (cu-ft)	54103.6773



California Emergency Management Agency
California Geological Survey
University of Southern California

Tsunami Inundation Map for Emergency Planning
Redondo Beach Quadrangle

State of California
County of Los Angeles



TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING

State of California ~ County of Los Angeles

REDONDO BEACH QUADRANGLE

March 1, 2009

SCALE 1:24,000

0.5 0.25 0 0.5 1 Miles

1,000 500 0 1,000 2,000 3,000 4,000 5,000 Feet

0.5 0.25 0 0.5 1 Kilometers

METHOD OF PREPARATION

Initial tsunami modeling was performed by the University of Southern California (USC) Tsunami Research Center funded through the California Emergency Management Agency (CalEMA) by the National Tsunami Hazard Mitigation Program. The tsunami modeling process utilized the MOST (Method of Splitting Tsunamis) computational program (Version 0), which allows for wave evolution over a variable bathymetry and topography used for the inundation mapping (Titov and Gonzalez, 1997; Titov and Synolakis, 1998).

The bathymetric/topographic data that were used in the tsunami models consist of a series of nested grids. Near-shore grids with a 3 arc-second (75- to 90-meters) resolution or higher, were adjusted to "Mean High Water" sea-level conditions, representing a conservative sea level for the intended use of the tsunami modeling and mapping.

A suite of tsunami source events was selected for modeling, representing realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides (Table 1). Local tsunami sources that were considered include offshore reverse-thrust faults, restraining bends on strike-slip fault zones and large submarine landslides capable of significant seafloor displacement and tsunami generation. Distant tsunami sources that were considered include great subduction zone events that are known to have occurred historically (1960 Chile and 1964 Alaska earthquakes) and others which can occur around the Pacific Ocean "Ring of Fire."

In order to enhance the result from the 75- to 90-meter inundation grid data, a method was developed utilizing higher-resolution digital topographic data (3- to 10-meters resolution) that better defines the location of the maximum inundation line (U.S. Geological Survey, 1993; Intermap, 2003; NOAA, 2004). The location of the enhanced inundation line was determined by using digital imagery and terrain data on a GIS platform with consideration given to historic inundation information (Lander, et al., 1993). This information was verified, where possible, by field work coordinated with local county personnel.

The accuracy of the inundation line shown on these maps is subject to limitations in the accuracy and completeness of available terrain and tsunami source information, and the current understanding of tsunami generation and propagation phenomena as expressed in the models. Thus, although an attempt has been made to identify a credible upper bound to inundation at any location along the coastline, it remains possible that actual inundation could be greater in a major tsunami event.

This map does not represent inundation from a single scenario event. It was created by combining inundation results for an ensemble of source events affecting a given region (Table 1). For this reason, all of the inundation region in a particular area will not likely be inundated during a single tsunami event.

References:

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Table 1: Tsunami sources modeled for the Los Angeles County coastline.

Sources (M = moment magnitude used in modeled event)		Areas of Inundation Map Coverage and Sources Used		
		Malibu	Santa Monica	Los Angeles Harbor
Local Sources	Anacapa-Dume Fault	X	X	
	Catalina Fault	X	X	X
	Channel Island Thrust Fault		X	
	Newport-Inglewood Fault			X
	Santa Monica Fault	X	X	
	Palos Verdes Landslide #1		X	X
	Palos Verdes Landslide #2			X
Distant Sources	Cascadia Subduction Zone #2 (M9.2)		X	X
	Central Aleutians Subduction Zone#1 (M8.9)		X	X
	Central Aleutians Subduction Zone#2 (M8.9)		X	X
	Central Aleutians Subduction Zone#3 (M9.2)	X	X	X
	Chile North Subduction Zone (M9.4)	X	X	X
	1960 Chile Earthquake (M9.3)		X	X
	1964 Alaska Earthquake (M9.2)	X	X	X
	Japan Subduction Zone #2 (M8.8)		X	X
	Kuril Islands Subduction Zone #2 (M8.8)		X	X
	Kuril Islands Subduction Zone #3 (M8.8)		X	X
	Kuril Islands Subduction Zone #4 (M8.8)		X	X

Cal EMA
CALIFORNIA EMERGENCY MANAGEMENT AGENCY
CGS
CALIFORNIA GEOLOGICAL SURVEY
USC
UNIVERSITY OF SOUTHERN CALIFORNIA

MAP EXPLANATION

Tsunami Inundation Line

Tsunami Inundation Area

PURPOSE OF THIS MAP

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The inundation map has been compiled with best currently available scientific information. The inundation line represents the maximum considered tsunami runup from a number of extreme, yet realistic, tsunami sources. Tsunamis are rare events; due to a lack of known occurrences in the historical record, this map includes no information about the probability of any tsunami affecting any area within a specific period of time.

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MAP BASE

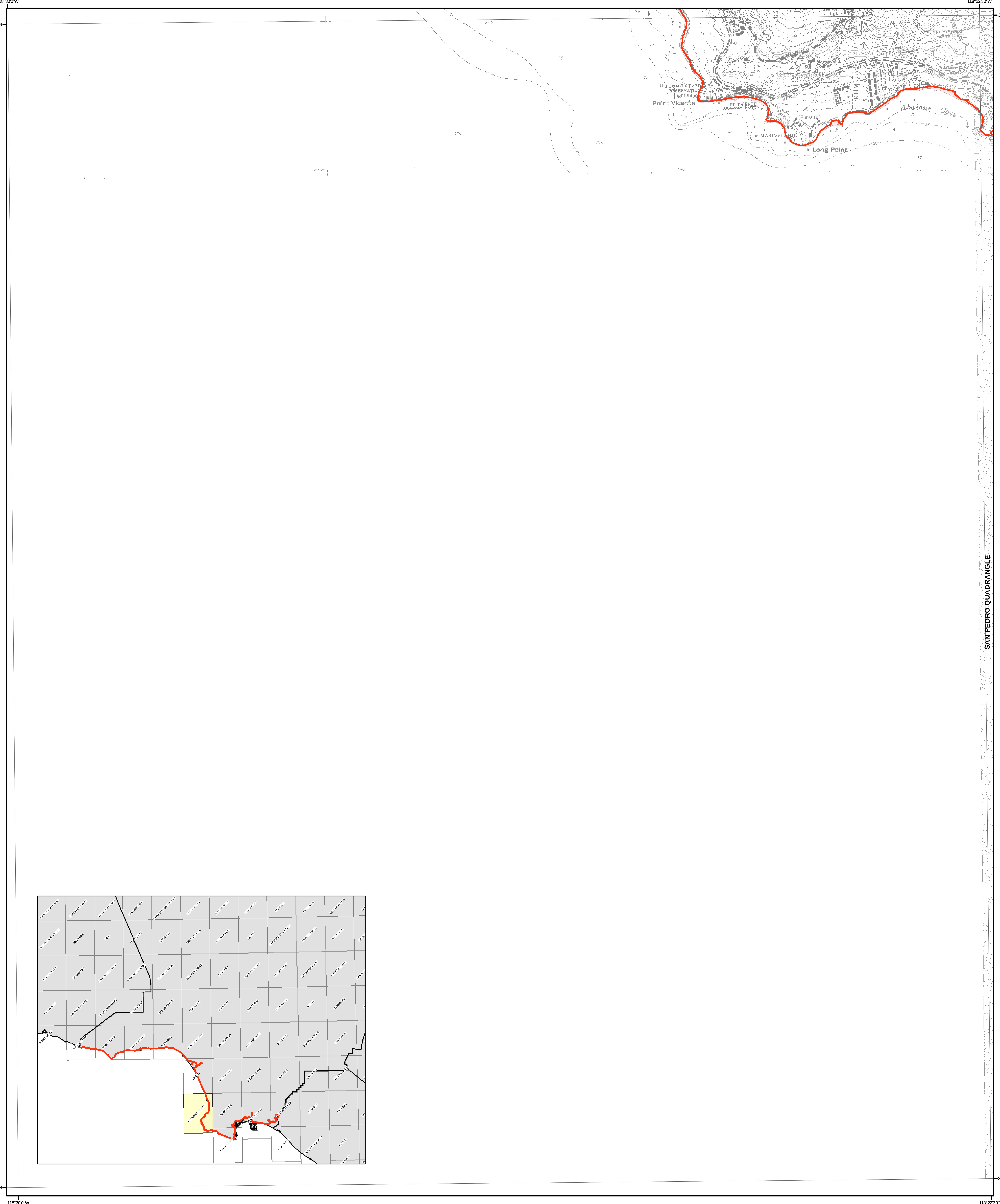
Topographic base maps prepared by U.S. Geological Survey as part of the 7.5-minute Quadrangle Map Series (originally 1:24,000 scale). Tsunami inundation line boundaries may reflect updated digital orthophotographic and topographic data that can differ significantly from contours shown on the base map.

DISCLAIMER

California Emergency Management Agency
California Geological Survey
University of Southern California

Tsunami Inundation Map for Emergency Planning
Redondo Beach (South) Quadrangle

State of California
County of Los Angeles



TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING

State of California ~ County of Los Angeles

REDONDO BEACH (SOUTH) QUADRANGLE

March 1, 2009

SCALE 1:24,000

METHOD OF PREPARATION

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	Palos Verdes Landslide #2			X
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	Chile North Subduction Zone (M9.4)	X	X	X
	1960 Chile Earthquake (M9.3)		X	X
	1964 Alaska Earthquake (M9.2)	X	X	X
	Japan Subduction Zone #2 (M8.8)		X	X
	Kuril Islands Subduction Zone #2 (M8.8)		X	X
	Kuril Islands Subduction Zone #3 (M8.8)		X	X
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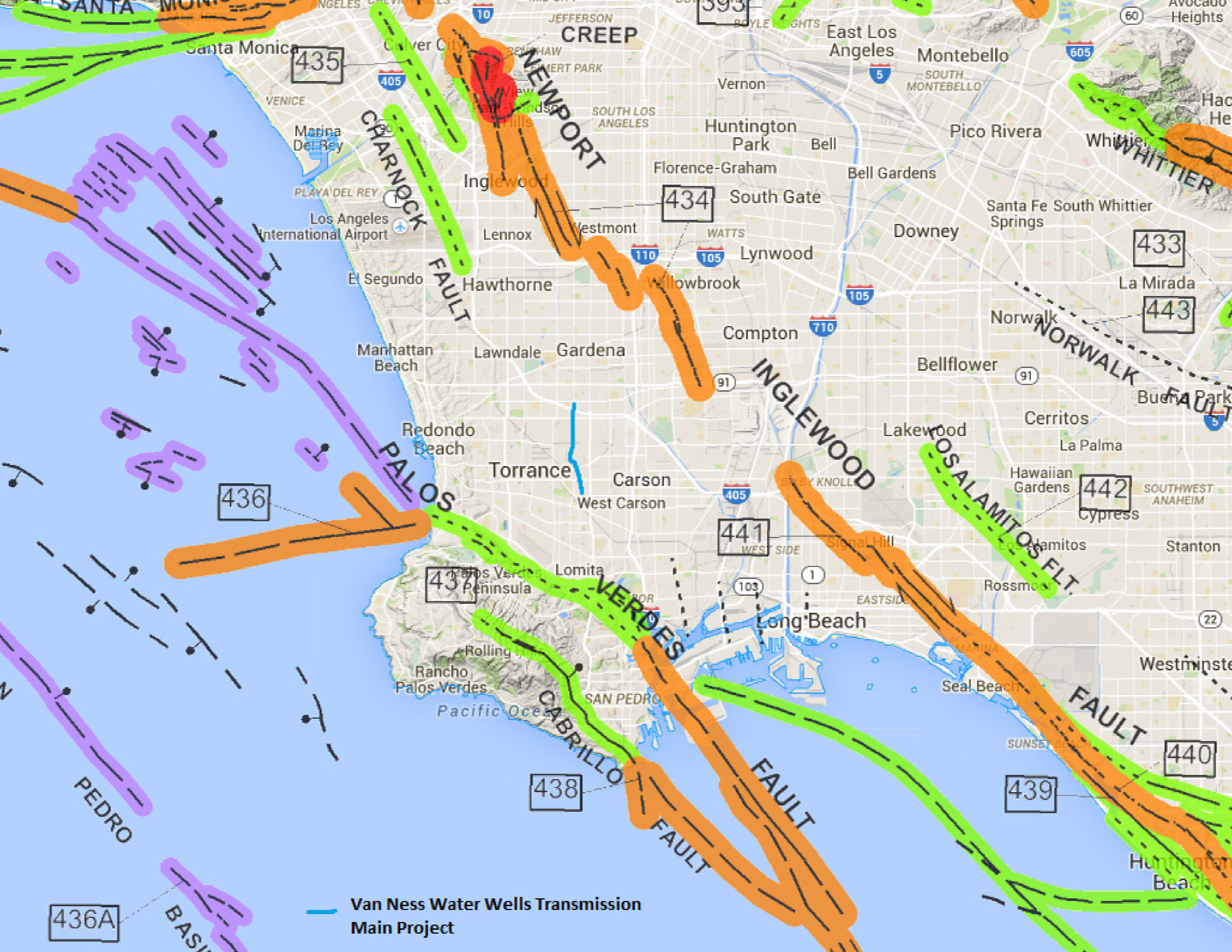
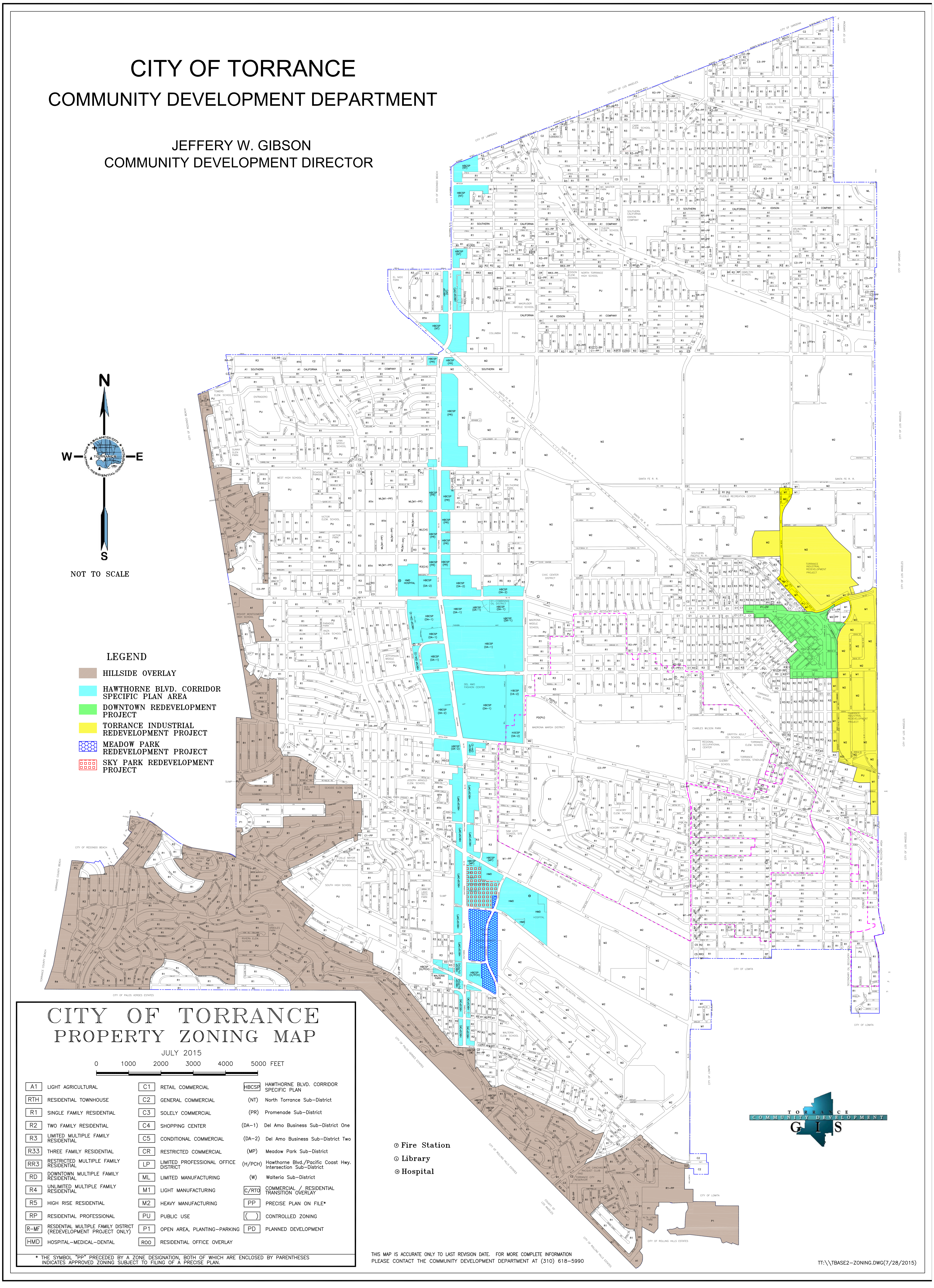

SANTA
Santa Monica
435
Culver City
CREEP
NEWPORT
JEFFERSON
EAST LOS ANGELES
East Los Angeles
Montebello
SOUTH MONTEBELLO
Vernon
SOUTH LOS ANGELES
Huntington Park
Bell
Pico Rivera
Bell Gardens
Florence-Graham
WHITTIER
VENICE
Marina Del Rey
CHARNOCK
FAULT
PLAYA DEL REY
Los Angeles International Airport
Inglewood
Lennox
Westmont
434
South Gate
WATTS
Lynwood
Downey
Santa Fe Springs
South Whittier
433
La Mirada
El Segundo
Hawthorne
Willowbrook
Compton
Norwalk
NORWALK
FAULT
443
Manhattan Beach
Lawndale
Gardena
INGLEWOOD
Bellflower
Buena Park
Cerritos
La Palma
Lakewood
LOS ALAMITOS FLT.
Redondo Beach
Torrance
Carson
West Carson
BIXBY KNOLLS
Hawaiian Gardens
442
Cypress
SOUTHWEST ANAHEIM
Stanton
436
PALOS
VERDES
441
WEST SIDE
Signal Hill
Los Alamitos
437
Palos Verdes Peninsula
Lomita
Rossmoor
EASTSIDE
Long Beach
Rolling Hills
Rancho Palos Verdes
Pacific Ocean
CABRILLO
SAN PEDRO
FAULT
Seal Beach
Westminster
SUNSET BEACH
440
439
438
PEDRO
Huntington Beach
436A
BASIN
Van Ness Water Wells Transmission Main Project


CITY OF TORRANCE
COMMUNITY DEVELOPMENT DEPARTMENT
JEFFERY W. GIBSON
COMMUNITY DEVELOPMENT DIRECTOR
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S
NOT TO SCALE
LEGEND
HILLSIDE OVERLAY
HAWTHORNE BLVD. CORRIDOR SPECIFIC PLAN AREA
DOWNTOWN REDEVELOPMENT PROJECT
TORRANCE INDUSTRIAL REDEVELOPMENT PROJECT
MEADOW PARK REDEVELOPMENT PROJECT
SKY PARK REDEVELOPMENT PROJECT
CITY OF TORRANCE
PROPERTY ZONING MAP
JULY 2015
0 1000 2000 3000 4000 5000 FEET
A1 LIGHT AGRICULTURAL
RTH RESIDENTIAL TOWNHOUSE
R1 SINGLE FAMILY RESIDENTIAL
R2 TWO FAMILY RESIDENTIAL
R3 LIMITED MULTIPLE FAMILY RESIDENTIAL
R33 THREE FAMILY RESIDENTIAL
RR3 RESTRICTED MULTIPLE FAMILY RESIDENTIAL
RD DOWNTOWN MULTIPLE FAMILY RESIDENTIAL
R4 UNLIMITED MULTIPLE FAMILY RESIDENTIAL
R5 HIGH RISE RESIDENTIAL
RP RESIDENTIAL PROFESSIONAL
R-MF RESDENTIAL MULTIPLE FAMILY DISTRICT (REDEVELOPMENT PROJECT ONLY)
HMD HOSPITAL-MEDICAL-DENTAL
C1 RETAIL COMMERCIAL
C2 GENERAL COMMERCIAL
C3 SOLELY COMMERCIAL
C4 SHOPPING CENTER
C5 CONDITIONAL COMMERCIAL
CR RESTRICTED COMMERCIAL
LP LIMITED PROFESSIONAL OFFICE DISTRICT
ML LIMITED MANUFACTURING
M1 LIGHT MANUFACTURING
M2 HEAVY MANUFACTURING
PU PUBLIC USE
P1 OPEN AREA, PLANTING-PARKING
ROO RESIDENTIAL OFFICE OVERLAY
HBCSP HAWTHORNE BLVD. CORRIDOR SPECIFIC PLAN
(NT) North Torrance Sub-District
(PR) Promenade Sub-District
(DA-1) Del Amo Business Sub-District One
(DA-2) Del Amo Business Sub-District Two
(MP) Meadow Park Sub-District
(H/PCH) Hawthorne Blvd./Pacific Coast Hwy. Intersection Sub-District
(W) Walteria Sub-District
C/RTO COMMERCIAL / RESIDENTIAL TRANSITION OVERLAY
PP PRECISE PLAN ON FILE*
( ) CONTROLLED ZONING
PD PLANNED DEVELOPMENT
* THE SYMBOL "PP" PRECEDED BY A ZONE DESIGNATION, BOTH OF WHICH ARE ENCLOSED BY PARENTHESES INDICATES APPROVED ZONING SUBJECT TO FILING OF A PRECISE PLAN.
Fire Station
Library
Hospital
TORRANCE COMMUNITY DEVELOPMENT GIS
THIS MAP IS ACCURATE ONLY TO LAST REVISION DATE. FOR MORE COMPLETE INFORMATION PLEASE CONTACT THE COMMUNITY DEVELOPMENT DEPARTMENT AT (310) 618-5990
TT:\\TBASE2-ZONING.DWG(7/28/2015)

GEO-ENVIRONMENTAL, INC.

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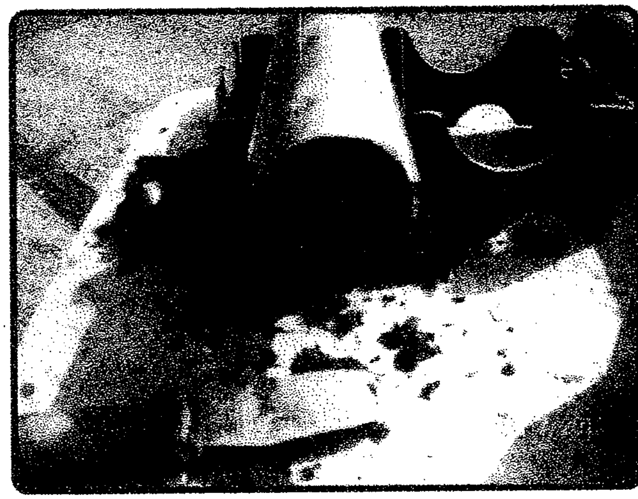
DBE Firm

GEOTECHNICAL INVESTIGATION REPORT

Proposed Western Avenue Jacking Pits
Water Main Replacement Project
City of Torrance, Los Angeles County, California



GEI Project No: 172-49

Prepared for

John Dettle, P.E.
Engineering Manager
City of Torrance Public Works Department
20500 Madrona Avenue
City of Torrance, California 90503

September 2, 2011

Prepared by

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Caltrans Certified
DBE Firm

GEOTECHNICAL INVESTIGATION REPORT
PROPOSED WESTERN AVENUE JACKING PITS FOR WATER MAIN REPLACEMENT PROJECT
CITY OF TORRANCE, LOS ANGELES COUNTY, CALIFORNIA

Prepared for

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STATE OF CALIFORNIA

September 2, 2011

TABLE OF CONTENTS

ILLUSTRATIONS

APPENDICES

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation performed by Geo-Environmental, Inc. (GEI) for the proposed Western Avenue jacking pits as part of the Water Main Replacement Project along Western Avenue in the City of Torrance, County of Los Angeles, California (Figure 1). GEI's services were provided in general accordance with GEI proposal 11-065, dated June 28, 2011. This investigation was authorized by Mr. John Dettle, Engineering Manager for the City of Torrance Public Works Department. This report provides conclusions and recommendations to assist the City of Torrance (City) in preparing project plans, specifications, and estimates for the proposed installation of the water main underneath the existing utility lines crossing perpendicular to Western Avenue.

2.0 PURPOSE AND SCOPE OF WORK

The purpose of this geotechnical investigation was to explore the subsurface conditions along the alignment of the proposed water main, evaluate the engineering properties of the on-site soils, and provide recommendations for the design and installation of the water main as influenced by the subsurface conditions. The scope of our services consisted of the following tasks:

- Data review and preparation of the subsurface exploration program;
- Field investigation consisting of visiting the site and marking boring locations, drilling hollow-stem auger borings, and collecting drive and bulk soil samples from the borings;
- Laboratory testing of selected soil samples obtained from the borings;
- Geotechnical and environmental engineering analysis;
- Preparation of a geotechnical report presenting our conclusions and recommendations regarding:
    - *Subsurface soil and groundwater conditions;*
    - *Suitability of on-site soils for pipe support and backfill;*
    - *Excavation and shoring design;*
    - *Dewatering;*
    - *Jacking operation;*
    - *Pipe-jacking requirements;*
    - *Pipe bedding requirements and installation;*
    - *Pavement section designs;*
    - *Mitigation measures of contaminated onsite soils (if any); and*
    - *Site preparation for the proposed installation of the water main.*

3.0 PROJECT DESCRIPTION AND PROPOSED IMPROVEMENTS

Based on the drawing (Plan No. WP-291) prepared by RBF Consulting for the City of Torrance Public Works Department, it is our understanding that the proposed 12-inch diameter Ductile Iron Pipe (DIP) Class 350 will be installed parallel to Western Avenue. The starting point for the installation of the water line starts at Del Amo Boulevard and Western Avenue intersection at approximate station 10+01. From this point, the proposed 12 inch water line will extend northerly along Western Avenue. At an approximate station 11+35 (jacking pit), the water line will be encased to underpass many utility lines crossing perpendicular to Western Avenue. Approximately 117 lineal feet of a 20-inch diameter steel casing will be jacked to install the proposed water line. It is observed on the drawing that the casing will have a slope gradient of approximately 2%. The proposed water line will be installed to a depth ranging between four (4) and 11 feet below the existing ground surface.

The recommendations presented in this report are based on the depths and locations of the water main stated above. GEI should be notified of any significant pipe alignment and/or grade changes during the project design to either confirm or modify our recommendations.

4.0 FIELD EXPLORATION

The field exploration was conducted on Wednesday, August 17, 2011 and consisted of drilling two (2) eight-inch diameter hollow-stem auger borings, B-1 and B-2 (Figure 2). The borings were drilled to a maximum depth of 15.5 feet below the existing ground surface. No caving was observed in the exploratory borings upon the retrieval of the augers. The boreholes were backfilled with soil cuttings and patched with cold patch asphalt when appropriate immediately after drive samples were successfully obtained.

Relatively undisturbed drive samples were collected from the borings at specified depths using a 2.5-inch outside diameter, 18-inch long split-barrel lined with one-inch-high brass rings. The sampler was driven into the bottom of the borehole using a 140-pound hammer falling 30 inches. The brass rings were carefully removed from the sampler, transferred to a plastic tube, and sealed at both ends with plastic caps to protect and maintain the in-situ moisture content of the soils. Bulk samples of the surficial soils were collected for subsequent laboratory analysis.

The Boring Record was prepared in accordance with Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010). The Logs of Test Borings (LOTB) are presented in Appendix A.

5.0 LABORATORY TESTING

5.1 INTRODUCTION

Laboratory testing on samples of the soils obtained from the borings were performed according to American Society for Testing and Materials (ASTM) and Caltrans specifications. Relatively undisturbed and bulk soil samples obtained from the borings were tested in the laboratory to determine in-situ moisture content and dry density, grain-size distribution, plasticity/expansive characteristics, sand equivalency, compaction characteristics (maximum dry density and optimum water content/maximum wet density) by modified proctor testing and Caltrans method, shear strength, R-Value, and corrosive properties (resistivity, pH, soluble sulfates, and chloride). The results of moisture content and dry density testing are indicated on the boring logs in Appendix A. The results of all other laboratory testing are presented below and in Appendix B. Brief descriptions of the laboratory tests performed are presented in the following sections.

5.2 In-Situ Moisture Content and Dry Density

5.2.1 In-Situ Moisture Content

The in-situ moisture content of the soils was determined in accordance with the ASTM D-2216-05 Test Method and the Caltrans Test Method (CT) 226. This method involves obtaining the moist weight of the sample and then drying the sample to obtain its dry weight. The moisture content is calculated by taking the difference between the wet and dry weights, dividing it by the dry weight of the sample, and expressing the result as a percentage.

5.2.2 In-Situ Dry Density

In-situ dry density testing was performed in accordance with the ASTM D-2937-04 Test Method. This method involves obtaining a relatively undisturbed soil sample by driving a thin-walled cylinder into the soil to determine the dry weight and volume of the sample. Simple computations are then performed to determine the dry unit weight of the soil, generally referred to as the in-situ density of that material. The results of the in-situ moisture content and dry density testing are presented on the boring logs in Appendix A.

5.3 Sieve Analysis

Representative samples were dried, weighed, and soaked in water until individual soil particles were separated; then the samples were washed on the No. 200 sieve. The portion of the material retained on the No. 200 sieve was oven-dried and then run through a standard set of sieves in accordance with the ASTM D-422 Test Method and the CT 202. The grain-size distribution data is shown in Figure B-1 in Appendix B.

5.4 Atterberg Limits

5.4.1 Liquid Limit

The liquid limit (LL) is determined by performing trials in which a portion of the specimen is spread into a brass cup, divided in two (2) with a grooving tool, and allowed to flow together by repeatedly dropping the cup in a standard mechanical device. The multi-point method involves a series of trials over a range of moisture contents. The LL (moisture content at which the soil groove closes for a distance of ½-inch in 25 blows) is determined by the plotted data.

5.4.2 Plastic Limit

The plastic limit (PL) is determined by alternately pressing together and rolling a portion of the plastic soil into a 1/8-inch diameter thread until the moisture content is reduced to a point at which the thread crumbles and is no longer able to be pressed together and rerolled into a 1/8-inch diameter thread. The moisture content at this stage is reported as the PL. The Plasticity Index (PI) is calculated as the difference between the LL and the PL. Test results are presented below in Table 1 and in Figure B-2 in Appendix B.

Table 1 – Atterberg Limits Test Results

Boring No. and Depth	LL (%)	PL (%)	PI (%)	Plasticity Characteristics
B-1 @ 0-5 feet	NP	NP	NP	Non-plastic
B-2 @ 8 feet	36	8	28	High
B-2 @ 14 feet	27	12	15	Medium

NP = Plasticity could not be measured

5.5 Modified Proctor (Compaction)

Compaction testing was performed on representative samples of surficial soils in general accordance with the ASTM D1557-09 Test Method. This method involves placing soil at a selected moisture-content in five (5) layers into a 4-inch diameter mold with a volume of 1/30 cubic foot. Each layer is compacted with 25 blows of a 10-pound hammer dropped from a distance of 18 inches, thus producing a total compactive effort of approximately 56,000 ft.-lb./ft^3. The resulting dry unit weight is determined. The procedure is repeated at different moisture contents to establish a relationship between the moisture content and dry unit weight of the soil. When plotted, the data produces a compaction curve, from which the maximum dry density and optimum moisture content of the soil can be determined. The in-situ dry density determined is compared to the maximum dry density for the same material to determine the degree of relative compaction. Results of the Modified Proctor testing performed on a selected sample of the subgrade soils are presented in Table 2 and on Figure B-3 in Appendix B.

Table 2 – Compaction Test Results

Boring No.	Depth (ft)	Soil Description	Maximum Dry Density (pcf)	Optimum Water Content (%)
B-2	2-5	Sandy Clay (CL)	121.5	10.0

5.6 Direct Shear

Direct shear testing was performed on a selected sample in accordance with the ASTM D-3080-04 Test Method on relatively undisturbed ring samples. This method consists of placement of the soil sample in a direct shear device, application of a predetermined normal stress, provision for wetting or draining of the soil specimen, or both, consolidation of the specimen under the normal stress, and then shearing the specimen at a constant rate of shearing deformation. The shearing force and horizontal displacements are measured and recorded as the soil specimen is sheared. The shearing is continued well beyond the point of maximum stress until the stress reaches a constant or residual value. Three (3) samples of the same material are sheared at different confining pressures. By plotting the shear stress versus the confining pressure for the samples, a best-fit straight line drawn through the data yields the angle of internal friction and the apparent cohesion of the material. Plot of direct shear testing, value of cohesion, and the angle of friction are presented on Figure B-4 in Appendix B. The results are also summarized in Table 3.

Table 3 – Direct Shear Test Results

Boring No. and Depth	Peak Cohesion (psf)	Peak Friction Angle (degrees)
B-1 @ 8 feet	770	29

5.7 Resistance Value (R-Value)

R-Value testing of the subgrade soils was performed in the laboratory on selected samples in accordance with California Test Method No. 301. This method involves six (6) steps: (1) preparation of materials for testing; (2) compaction, exudation pressure determination, and measurements of R-Value test specimens; (3) determination of the expansion pressure of R-Value test specimens; (4) measurement of the horizontal pressure and displacement by means of the stabilometer; (5) calculation of the moisture content and density of R-Value test specimens; and (6) determination of the R-Value of the material. The results of the R-Value testing on a selected soil sample are shown in Table 4.

Table 4 -- R-Value Test Results

Boring No. & Depth	By Exudation (TI = 4.0)	By Expansion (TI = 4.0)
B-1 @ 0-5 feet	10.0	---

5.8 Sand Equivalent

Sand equivalent tests were performed in general accordance with ASTM D2419-95. This method involves determining the relative proportions of clay-like or plastic fines and dust in granular soils and fine aggregates that pass the No. 4 (4.75 mm) sieve. A sample is poured into a plastic cylinder containing a calcium chloride solution, which is then shaken to completely disperse the fine-grained material. An irrigator tube is used to flood the sample and increase the liquid volume to a specified level. The sample is allowed to sit for 20 minutes at which time the level of the clay suspension and sand is recorded. The sand equivalent is computed by dividing the sand reading by the clay suspension reading and expressing the result as a percentage by multiplying it by 100. The results of the test are presented below in Table 5.

Table 5 – Sand Equivalent Test Result

Boring No.	Depth (ft)	Sand Equivalency
B-1	0-5	18

5.9 EXPANSION INDEX

Expansion index testing was performed on a bulk sample of the subsurface soils in accordance with the ASTM D-4829-08 Standard Test Method. This test method allows for determination of expansion potential of compacted soils when inundated with distilled water. The expansion index (EI) provides an indication of swelling potential of a compacted soil. A specimen is compacted into a metal ring so that the degree of saturation is between 40% and 60%, and the specimen and the ring are placed in a consolidometer. A vertical confining pressure of 1.0 pounds per square inch (psi) is applied to the specimen and then the specimen is inundated with distilled water. The deformation of the specimen is recorded for 24 hours or until the rate of deformation becomes less than 0.005 mm/hour. The EI is used to measure a basic index property of soil and therefore, the EI is comparable to other indices such as the liquid limit, plastic limit, and plasticity index of soils. The results of our laboratory expansion index testing are presented in Table 6.

Table 6 – Expansion Index Test Results

Boring No.	Depth (ft)	Soil Description	Expansion Index	Expansion Potential
B-2	0-5	Sandy Clay (CL)	31	Low

5.10 CORROSION POTENTIAL

Soil corrosivity testing was performed in the laboratory on a selected sample (B-1 @ 0 – 5 feet) of the soils encountered in borings drilled at the site.

Caltrans Corrosion Guidelines (2003) classify soil as corrosive if the soluble chloride content is less than 500 ppm, the soluble sulfate content is less than 2,000 ppm, and the pH value is 5.5 or higher. Based on the test results and Caltrans Criteria, the onsite soils should be considered potentially corrosive to bare metals and concrete in contact with the onsite soils. A brief description of each test is described below.

5.8.1 Minimum Resistivity and pH

Testing of the subgrade soils was performed in the laboratory on a selected sample to determine the resistivity and pH of the material in accordance with CT 643. Factors that contribute to corrosion include the presence of soluble salts, soil resistivity, soil pH, and the presence of oxygen. The minimum resistivity of the soil indicates the relative quantity of soluble salts, while the pH of the soil indicates the degree of acidity or alkalinity. The laboratory resistivity and pH measurements for a soil sample are determined using this test method. The pH of the soil is 7.3 which is considered alkaline (Base). The minimum resistivity discovered was 599 ohm-cm which indicates the soil is strongly aggressive electrolytic-type corrosion.

5.8.2 Sulfate Content

Testing of the sulfate content of the subgrade soils was performed in the laboratory on a selected sample in accordance with CT 417. This method is used for determination of the sulfate content of soils and waters. In this test method, the sulfate ion is precipitated with barium chloride, in an acidic medium, to barium sulfate crystals of uniform size. The barium sulfate present in suspension is determined by a measurement of its turbidity and comparison with a known standardization curve. The results are used to determine the corrosive nature of the environment for concrete structures, as well as for other purposes. The soil sulfate content detected was 823 ppm; therefore, a Type II Portland cement may be used for concrete in contact with the subgrade soils.

5.8.3 Chloride Content

Determination of the chloride content in the subgrade soils was performed in the laboratory on the selected samples in accordance with CT 422. The test method is divided into two (2) parts for determination of the chloride content of waters and the water-soluble chloride content of soils. Part 2 was performed to determine the chloride content of the subgrade soils at the subject site. The chloride content of the soil was 148 ppm which generally indicates corrosive potential to ferrous metal in contact with the soils.

In general, metal pipes or structural members to be buried below grade should be properly coated or wrapped and sealed with corrosion resistant tar, enamel, or plastic tape for protection against the onsite soils. As appropriate, a qualified corrosion engineer should be consulted for a more in-depth evaluation of the corrosive nature of the onsite soils and for any special corrosion protection design that may be required.

- DO WE NEED TO COAT THE 20" Ø PIPE?
- IS THE 6 MIL POLY[illegible] FOR THE 12" Ø P[illegible] SUFFI[illegible] [illegible]?

6.0 SITE CONDITIONS

6.1 Surface Conditions

The proposed water main along Western Avenue is located in a commercial area. The proposed water main is within the paved section of the existing road. The ground surface profile along the project alignment generally descends gently to the south. Existing underground storm drains, sewer, water, utility, gas and oil lines are reported extending parallel and perpendicular or across to the proposed water main alignment.

6.2 Subsurface Conditions

The subsurface soils encountered in the borings along the proposed water main alignment generally consist of stiff to very stiff and occasionally hard, sandy clays, with a thin medium dense layer of silt with sand. Caving was not observed in all the borings after removal of the auger at the completion of the drilling operation. A more detailed description of the subsurface conditions is presented in the logs of the soil borings in Appendix A.

6.3 Groundwater

Groundwater was not encountered in any of our exploratory borings, extending to a maximum depth of approximately 15.5 feet below the existing ground surface. The depth of the groundwater table may fluctuate depending on environmental changes such as heavy rains, injection of water in nearby areas, or dewatering operations in surrounding project sites.

7.0 SEISMICITY

An active fault is defined by the California Division of Mines and Geology (now the California Geological Survey, CGS) as a fault that has exhibited surface displacement within the last 11,000 years. Potentially active faults are defined as those with a history of movement between 11,000 and 1.6 million years. Based on our literature research, no active or potentially active faults are mapped as underlying the site. The site is not mapped within a designated Alquist-Priolo Earthquake Fault Zone (CDMG) for fault rupture hazard. The potential for ground surface rupture to occur at the site due to faulting is considered low.

The peak ground acceleration at the site on alluvium (Quaternary old alluvial - Qoa) with a 10% probability of exceedance in 50 years is estimated to be 0.45g, based on the Probabilistic Seismic Hazard Assessment Maps (CGS, 2002) and on the CGS website: http://www.consrv.ca.gov/cgs/rghm/pshamap/pshamain.html.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 GENERAL CONCLUSIONS

Based on the results of our field exploration and laboratory tests, combined with our engineering analysis, experience and judgment, it is our professional opinion that the proposed water main may be installed essentially as planned. Based on our assumption, installation of the water main will involve excavation of the pipe trench ranging from about 9 to 12 feet in depth and jacking operation beneath the utility, oil and gas lines.

The soils to be encountered during excavation for the proposed water main are generally expected to consist predominantly of stiff to very stiff clays with sand deposits. The on-site soils generally are not suitable for use as bedding or shading for the pipe installation, and a select import bedding material is recommended for such application. However, if imported bedding material is placed as recommended in this report, the underlying on-site soils should be capable of providing satisfactory support for the bedding and the pipe.

Groundwater was not encountered in our exploratory borings. Due to the close proximity of the ocean, groundwater level may rise to within or above the proposed pipe zone in the future. The placement of the water line, bedding, pipe zone and backfill materials should generally conform to the most recent Standard Specifications for Public Work Construction, and to the requirements of the City of Torrance, Department of Public Works. The bottom of the trench excavation should be approved by the Soils Engineer before placing pipe bedding material. Recommendations are presented in the following sections for water main design and construction.

8.2 PIPE JACKING

The jacking operation is recommended because of many existing utility, oil, and gas lines crossing perpendicular along the proposed water line at Western Avenue. Since the City of Torrance does not want to reroute or expose these lines at this location, the 117 foot segment underneath these lines should be jacked to complete the project alignment.

It is important to note that the existing soil at this location, based on the laboratory test results and boring logs, is stiff clay with sand which with proper shoring allows a jacking operation for this project. However, the jacking and receiving pits which must be constructed for this project must be securely shored per the recommendation provided in this report under shoring design section to prevent failure. Therefore, the proposed shoring design to support the lateral earth pressure and traffic surcharge is required for the jacking and receiving pits. It should also be noted that the jacking equipment should not impose a reaction more than 4000 psf on the soils adjacent to the jacking pit.

Although no ground water was encountered during drilling, preparation of dewatering including treatment and discharge procedures should be in place when excavating for jacking pits.

Bracing to prevent casing shifting or floatation, and pressure concrete mix design, placement method, and equipment requirements are needed for jacking operation. Installation of the casing by jacking should be performed in accordance with the latest edition of the Standards Specifications for Public Works Construction.

Additional reinforcement or adecuate strength of the casing is required to withstand jacking pressure other than the vertical loads that the casing is designed for. The joints of sections of casing to be jacked should be welded with a continuous circumferential weld. The leading section of the casing should be equipped with a jacking head securely anchored thereto to prevent any wobble or vibration in the project alignment during the jacking operation and must have sufficient bearing shims to properly distribute the jacking stresses.

Excavated material should be removed as jacking operation progresses and the material should not be accumulated. Upon completion of the jacking operations, all voids around the outside face of the water pipe must be grouted using cement Type II.

8.3 Pipe Design and Loadings

The waterline DIP Class 350 sections should be capable of supporting a minimum vertical soil overburden pressure of 125 lb/ft^2 per foot of depth below the finished grade. In the areas where the top of pipe is within 10 feet of the final street grade, a traffic surcharge load from roadway vehicles should be included in the design. An average angle of internal friction of 29 degrees for the subsurface soils may be assumed in design computations.

The allowable design soil bearing value for associated storm drain structures, such as water lines, is 2,500 psf (net) at a minimum depth of 18 inches below the lowest adjacent final grade.

8.4 Temporary Sloped Excavations

Based on our borings, the proposed water line excavation may be accomplished with conventional equipment capable of excavating to the depths of the proposed water pipe. The excavations, however, are not expected to stand vertically for any extended period of time. Therefore all excavations must either be properly sloped or shored. Where sufficient space is available for sloped excavation, the excavation may be sloped to no steeper than 1:1 (horizontal to vertical) in the predominantly clay with sand deposits. Flattened side slopes may be required where less stable localized deposits are encountered. The exposed slope faces should be kept moist and not allowed to dry out. Recommendations for shoring design are given in the Shoring Design section of this report.

Surcharge loads should not be permitted within five (5) feet from the top edge of the slopes, unless the cut is properly shored. Excavations that extend below an imaginary plane inclined at 1.5:1 below adjacent existing facility should be properly shored to maintain support of the adjacent structures.

The contractor should be aware that slope height, slope inclination, excavation depths, and shoring design must be in compliance with local, state and federal safety regulations, e.g. OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if not followed, the owner and contractor could be liable for substantial penalties. Excavations and shoring, which are 20 feet and greater in depth must be designed by a qualified registered Civil Engineer or Structural Engineer.

It is important to note that soil conditions may vary significantly along the proposed water line alignment, and possible localized seeps may be encountered. Our preliminary soil classifications are based solely on the materials encountered at the actual boring locations. The contractor should verify subsurface conditions throughout the proposed areas of excavation. If different subsurface conditions are encountered at the time of construction, we recommend that our office be contacted immediately to evaluate the conditions encountered and provide appropriate recommendations.

8.5 SHORING DESIGN

Because major portions of the proposed water line is located within the existing paved street areas and adjacent to the existing facilities, open-cut excavations generally might not be desirable. Where there are space limitations for sloped excavations or because of nearby existing structures or facilities, temporary shoring is required. Temporary shoring may consist of the use of a trench box, where feasible, conventional soldier piles and lagging or sheeting, or interlocking sheet pile systems. The shoring for the pipe excavations may be cantilevered or may be laterally supported by walers and cross-bracings. Drilled excavations for soldier piles may require casing or drilling mud to prevent caving and to maintain an open hole for pile installation.

For the design of temporary cantilever shoring supporting a level grade, an equivalent fluid pressure of 45 psf/ft of depth below grade may be used.

For the design of braced shoring, we recommend such shoring be designed using a rectangular-shaped distribution of lateral earth pressure. For the case where a level grade is supported by the shoring, the maximum earth pressure would be 19H (in psf) where H is the height (in feet) of the shored cut face.

In addition to the lateral earth pressure, additional pressure due to surcharge loads, such as from soil stockpiles, vehicular traffic, or construction equipment located adjacent to the shoring, should be considered in the design of the shoring. The shoring design should include a minimum surcharge pressure of 100 psf due to regular vehicular traffic within 10 feet of the shoring. All shoring should be designed and installed in accordance with the latest requirements of the Standard Specifications for Public Works Construction, and OSHA Health and Safety Standards for Excavations.

For the design of soldier piles spaced at least two (2) diameters on centers, the passive resistance of the soils adjacent to the piles may be assumed to be 300 psf/ft of embedment depth. Soldier pile members placed in drilled holes should be properly backfilled with sand/cement slurry or lean concrete in order to develop the required passive resistance.

The lagging between the soldier piles may consist of wood members, or solid plywood or steel sheets. In our opinion, steel sheetings are expected to be more expedient than wood lagging to install, especially where running sand, if any, is encountered. Although soldier piles and any bracings used should be designed for the full anticipated earth pressures and surcharge pressures, the pressures on the lagging are less because of the effect of arching between the soldier piles. Accordingly, the lagging between the piles may be designed for a nominal pressure of 400 psf maximum.

8.6 BEDDING AND SHADING

It is anticipated that the on-site soils at the bottom of the proposed water line will be suitable for support of the bedding and pipe. Care should be exercised by the contractor to minimize disturbance to the subgrade soils during excavation. The pipe trench should be overexcavated as recommended by the Soils Engineer to provide at least six (6) inches of approved imported bedding material underneath the pipe for a uniform support. We recommend that the bedding material consist of clean, well-graded sand or a washed, well-graded crushed rock with a maximum particle size of 3/8 inch and a sand equivalent of at least 30. Coarse and uniformly-graded bedding material should be avoided as intrusion of such bedding material into the fine subgrade soils, or migration of the natural soils into the voids of the coarse bedding material are undesirable and potentially detrimental to the quality of the completed construction.

In the event that the subgrade soils below the proposed bottom of pipe are disturbed during excavation or that exceptionally soft and weak material is encountered, the unsuitable soils should be overexcavated to suitable material as recommended by the Soils Engineer. The over-excavated areas may be backfilled using the approved bedding material.

For the shading around the pipe and up to one (1) foot above the top of pipe, an imported granular material with a sand equivalent greater than 30 is recommended. Compaction of the shading material should be accomplished by saturating the shading material with water and or limited jetting (these operations should be closely observed by the Soils Engineer for preventing saturation of the subgrade soils), provided provisions are incorporated to drain and remove the water rapidly from within the bedding material to facilitate densification of the material.

8.7 TRENCH/PIT BACKFILL

Based on the borings, the soils to be excavated for the main water line are expected to be generally acceptable for use as backfill, provided any debris, organic matter, and particles greater than 6 inches are removed. Based on our exploratory borings, the on-site soils generally have moisture contents below or up to the optimum moisture content; drying of the on-site materials prior to placement as backfill soils generally is not anticipated. Additional moisture should be provided as required to facilitate proper backfill compaction.

The backfill soils should be placed in thin layers, 18 inches or less in thickness, and be compacted to at least 90 percent of the maximum dry density as determined by ASTM Test Method D1557 or CT 216. Compaction of the on-site soils by flooding or jetting is not acceptable due to the fine-grained nature of the on-site soils.

Major portions of the trench excavations will be within the existing paved roadway areas where the existing pavement section must be replaced. Before placement of aggregate base, the finished subgrade should be compacted to at least 95 percent in the top 24 inches of final subgrade. The aggregate base material for the pavement section should be compacted to at least 95 percent of the maximum laboratory dry density. The replacement pavement section should be at least one (1) inch greater in thickness than the existing pavement section. Pavement section designs are recommended in Section 8.8 of this report

8.7.1 Imported Fill Material

Fill soils should consist of onsite soils or an approved import material per Caltrans specifications. If import material is required for use as fill for this project, it should be predominantly granular (35% or less passing the No. 200 sieve), non-expansive (Expansion Index (EI) less than 20 and/or PI less than 12), and should be free of organic or inorganic debris, contamination, and materials with any dimension larger than six (6) inches. Import material should be tested and approved by GEI prior to importation to the job site. *GEI should be notified a minimum of three (3) working days prior to the scheduled importation of the soil to the project site.*

8.8 NEW PAVEMENT SECTIONS AND RECONSTRUCTION

For the placement of new pavement sections or for reconstruction, any existing Portland cement concrete (PCC), AC, base material, and debris should be completely removed. The subgrade soils should be prepared and a flexible pavement section should be constructed in accordance with the design recommendations below.

For the proposed design of the street sections, we utilized an R-Value of 10 and Traffic Indexes (TIs) of 7.0, 8.0, and 9.0 to calculate the required pavement sections based on design criteria in accordance with the California Division of Highways Design Method (*Highway Design Manual, Sixth Edition, September 1, 2006*). The results of the calculations are shown in Table 7.

Table 7 -- Recommended Section Thickness (Inches)

R-Value	TI	Reconstruction Pavement Sections (inches)		
		Option 1		Option 2
		AC	AB*	FDA
10.0	7.0	7.0	9.0	10.0
	8.0	8.0	8.0	12.0
	9.0	8.0	12.0	13.0

*Class II Aggregate Base

The improvements to the project streets can be achieved by placement of a new pavement section consisting of either AC and AB (Option 1) or full-depth asphalt (FDA) (Option 2). Thicknesses can be determined from the above table after the selection of the appropriate TI. The selection of the appropriate TI (and hence the corresponding pavement section) should be made by the City or Caltrans personnel who may have data in their possession related to the traffic volume on the street and are in a better position to make a judgment regarding the selection of the TI based on their knowledge of traffic on the street.

8.8.1 Pavement Subgrade Preparation

The subgrade for support of the new pavement section should consist of a firm and unyielding surface. Excavation of a portion of the underlying subgrade may be required where substantially weak or saturated soils are exposed. Prior to placement of any backfill or pavement section, the exposed subgrade should be closely observed by the Soils Engineer or his representative. Additional excavation may be necessary to remove any surplus underlying weak or disturbed soil, along with any deleterious material. Depressions resulting from the site clearing should be properly cleaned of any loose or disturbed soils and deleterious substances.

The onsite soils should be compacted with a water content at or a few percentages over optimum as determined by ASTM Test Method D1557-09 or CT 216; select non-expansive import material may be compacted at about optimum moisture content.

Immediately before placement of the pavement section, the subgrade or base material should be proof-rolled to obtain a firm and unyielding surface for support of the pavement structural section. Any soft and spongy areas should be excavated and replaced with properly compacted fill or AB. The materials should be compacted to a minimum of 95% relative compaction.

The subgrade soils or base materials, if prepared as recommended above, are expected to provide safe support to the new pavement section. No treatment of the subgrade soils with additives such as cement or lime is warranted for this design.

8.9 DEWATERING

Groundwater was not encountered during our drilling operations; however, there is always a possibility that water attributed to minor seeps during construction activities may be encountered. The presence of seepage water at the site is anticipated to be limited and its removal using sumps and pumps should be adequate.

All water encountered during the construction must be disposed in such a manner that will not create a nuisance for health, or damage public or private property. If groundwater is encountered during excavations, the Contractor should provide dewatering and treatment systems to contain, treat, monitor, and discharge groundwater generated from construction dewatering activities. The design, implementation, inspection, monitoring, and maintenance of the dewatering and treatment system should be in full compliance with the Monitoring and Reporting Program and Waste Discharge Requirements (CA G 994002, CI-8354) of the NPDES permit and Caltrans requirements.

All operations by the Contractor should be in full compliance with all other applicable Federal, State, and local laws and regulations that govern water quality.

8.10 Drainage and Other Construction Issues

The existing street drainage should be maintained in accordance with City of Torrance Public Works and Caltrans standards. In general, the proper control of surface drainage is important for the long-term performance of the pavement, supporting base materials, and subgrade soils. Therefore, the final project design should include provisions for the proper collection and disposal of all surface and subsurface drainage within the project areas.

8.11 Environmental Test Results and Conclusions

The soil mixture sample was analyzed in the TestAmerica laboratory located in Irvine, California for metals using U.S. Environmental Protection Agency (EPA) Method 6010B/7471A and for total petroleum hydrocarbons (TPH) in gasoline range, diesel range, and motor oil range using EPA Method 8015M.

The analytical test results obtained testing soil sample collected at B-1 @ 8 feet revealed that the detected concentration levels of metals such as barium, cobalt, copper, mercury, nickel, vanadium, and zinc are all below their respective U.S. EPA Region 9 Preliminary Remediation Goal (PRG) screening levels (EPA, 2008). Chromium was detected at a concentration of 19 milligrams per kilogram (mg/kg), which is slightly above the PRG screening level of 5.6 mg/kg (EPA, 2008) for industrial soil. Also, the analytical test results obtained testing soil sample collected at B-2 @ 14 feet revealed that the detected concentration levels of metals such as barium, beryllium, cobalt, copper, lead, mercury, nickel, vanadium, and zinc are all below their respective U.S. EPA Region 9 Preliminary Remediation Goal (PRG) screening levels (EPA, 2008). Arsenic and chromium were detected at concentrations of 2.7 and 25 mg/kg, which are slightly above the PRG screening levels of 1.6 and 5.6 mg/kg (EPA, 2008) for industrial soil.

All these metals occur naturally in the soil. The concentration level of chromium and arsenic detected in the soil mixture sample could be naturally occurring background level.

TPH in gasoline and diesel range was detected in the soil mixture samples at a concentration ranging between 4.5 mg/kg and 25 mg/kg, respectively, which are below the target screening level of 100 mg/kg as recommended in the California State Water Resources Control Board (SWRCB) leaking underground fuel tank (LUFT) manual (SWRCB, 1989). Based on the test results, we conclude that the soil material can be used as backfill material and it will not have an impact to the human health.

9.0 POST DESIGN SERVICES

Post-design geotechnical services will be required during construction. It is recommended that GEI review the project plans and specifications prior to finalization. Construction should be observed and tested, if necessary, at the following stages by the Soils Engineer and/or his representative:

- *During excavation operations and subgrade preparation;*

- *Bedding and shading of the water line;*
- *During backfilling and compaction operations;*
- *Construction of pavement structural sections; and*
- *When any unusual subsurface soil conditions are encountered.*

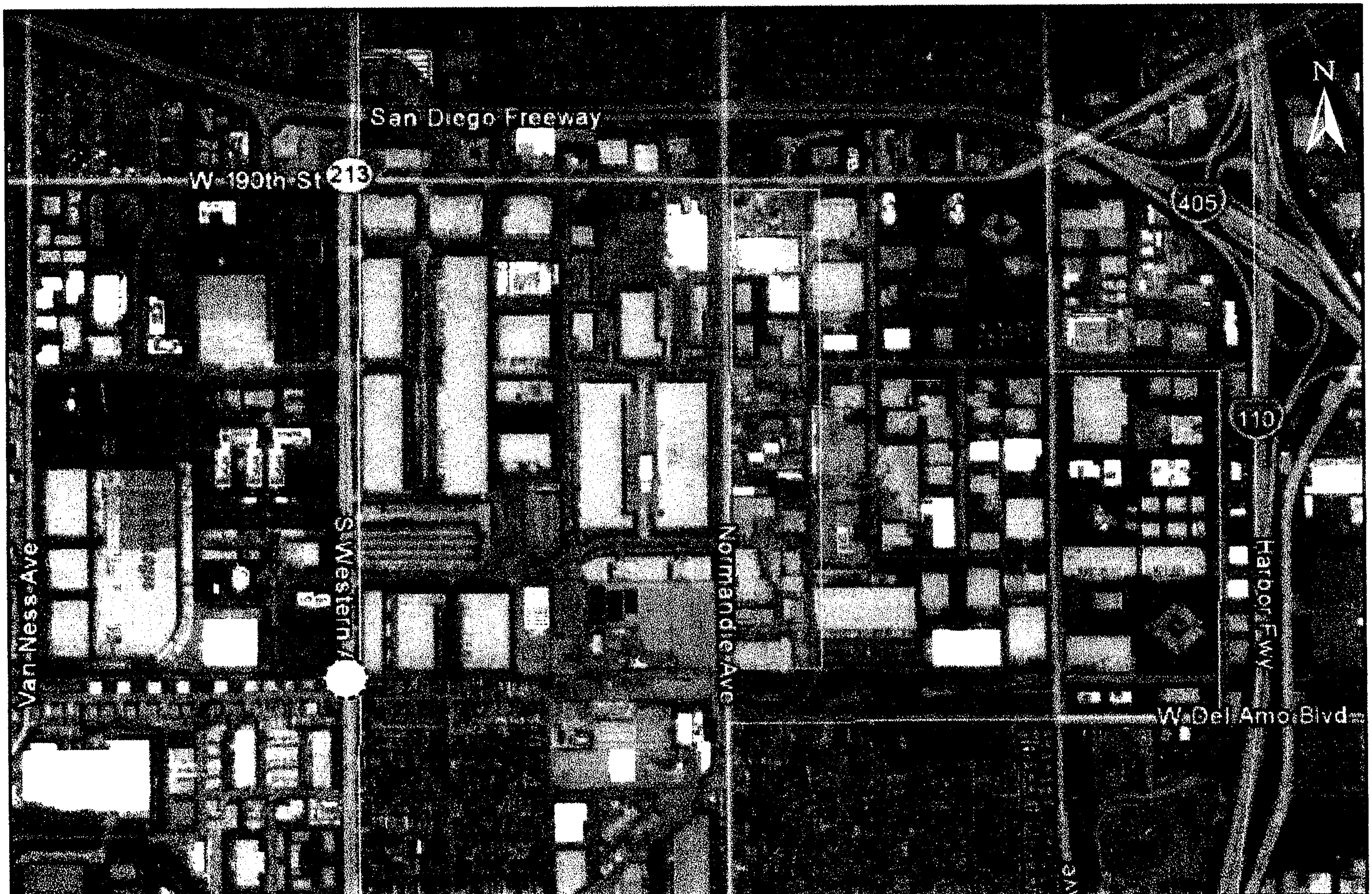
10.0 LIMITATIONS

The report, exploration logs, and other information resulting from GEI's efforts were prepared exclusively for use by the City of Torrance and their consultants in designing the proposed water line. The report is not intended to be suitable for reuse on extensions or modifications of the project or for use on any project other than the currently proposed as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report are provided to the contractors or included in the project specifications, it should be understood that they are provided for information only.

This report presents recommendations for the subject site based on the assumption that the subsurface conditions do not deviate appreciably from those disclosed in our recent site investigation. The possibility of different local soil conditions cannot be discounted. It is the responsibility of the owner or his representative to bring any deviations or unexpected conditions observed during construction to the attention of the Soils Engineer. In this way, any required supplemental recommendations can be made with a minimum of delay to the project.

Our investigation and evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable Soils Engineers practicing in this area. No other representation, either expressed or implied, is included or intended in our report.

ILLUSTRATIONS



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LEGEND:

Project Location

VICINITY MAP

Geotechnical Investigation Report
Proposed Western Avenue Jacking Pits as part of the Water Main Replacement Project
City of Torrance, Los Angeles County, California

FIGURE 1	
DRAWN BY:	RCF
APPROVED BY:	FHS
PROJECT NO:	172-49
DATE:	08/31/2011

APPENDIX A

LOGS OF TEST BORINGS AND BORING RECORDS

LOG OF BOREHOLE B-1

Date Drilled: 8/17/11 Logged by: RCF Project Manager: FHS

Equipment: 8" Hollow Stem Auger Driving Weight and Drop: 140 lbs @ 30" drop

Surface Elevation(ft): ~ 53.3' Depth to Water(ft): Not Encountered

DEPTH (ft)	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT	MOISTURE (%)	DRY UNIT WT. (pcf)	LAB. TESTS And/Or OVA READINGS (ppm)
		ASPHALT CONCRETE (AC), 5 inches thick						
		AGGREGATE BASE (AB), 19 inches thick						
		SANDY SILT (ML), dark brown, moist, fine- to coarse- grained, non-plastic fine	X	X	23	17.4	112.2	R-Value PI, GS, SE, CORROS.
5		**SANDY CLAY (CL)** yellowish brown, moist, very dense, fine- to coarse- grained, mostly plastic fines						
		-Hard	X		57	16.5	116.8	DS
10								
		-Very Stiff	X		43	13.9	123.3	
15								
20		Borehole terminated at 15.5 feet below the existing ground surface. No groundwater was encountered during drilling operations. Borehole was backfilled and compacted with soil cuttings and patched with cold asphalt. This Boring Record was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).						

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Western Ave. Jacking Pits for W. M. R. Project
City of Torrance, CA
GEI Project No.: 172-49

Figure A-1

LOG OF BOREHOLE B-2

Date Drilled: 8/17/11 | Logged by: RCF | Project Manager: FHS

Equipment: 8" Hollow Stem Auger | Driving Weight and Drop: 140 lbs @ 30" drop

Surface Elevation(ft): ~53.6' | Depth to Water(ft): Not Encountered

DEPTH (ft)	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT	MOISTURE (%)	DRY UNIT WT. (pcf)	LAB. TESTS And/Or OVA READINGS (ppm)
		ASPHALT CONCRETE (AC), 4 inches thick						
		AGGREGATE BASE (AB), 20 inches thick						
		SANDY CLAY (CL) dark brown to black, moist, stiff, Plastic, fine- to coarse- grained	X	X	20	15.2	114.3	SE, COMPACT.
5								
		-Yellowish gray, very stiff, high plastic fines	X		33	16.6	115.0	GS, PI
10								
		-Gray, medium plastic fines	X		38	13.7	120.2	GS, PI
15								
20		Borehole terminated at 15.5 feet below the existing ground surface. No groundwater was encountered during drilling operations. Borehole was backfilled and compacted with soil cuttings and patched with cold asphalt. This Boring Record was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).						

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Western Ave. Jacking Pits for W. M. R. Project
City of Torrance, CA
GEI Project No.: 172-49

Figure A-2

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

C	Consolidation (ASTM D 2435)
CL	Collapse Potential (ASTM D 5333)
CP	Compaction Curve (CTM 216)
CR	Corrosion, Sulfates, Chlorides (CTM 643, CTM 417, CTM 422)
CU	Consolidated Undrained Triaxial (ASTM D 4767)
DS	Direct Shear (ASTM D 3080)
EI	Expansion Index (ASTM D 4829)
M	Moisture Content (ASTM D 2216)
OC	Organic Content (ASTM D 2974)
P	Permeability (CTM 220)
PA	Particle Size Analysis (ASTM D 422)
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90)
PL	Point Load Index (ASTM D 5731)
PM	Pressure Meter
R	R-Value (CTM 301)
SE	Sand Equivalent (CTM 217)
SG	Specific Gravity (AASHTO T 100)
SL	Shrinkage Limit (ASTM D 427)
SW	Swell Potential (ASTM D 4546)
UC	Unconfined Compression - Soil (ASTM D 2166) Unconfined Compression - Rock (ASTM D 2938)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850)
UW	Unit Weight (ASTM D 4767)

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (short-term)
- Static Water Level Reading (long-term)

REFERENCE Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

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BORING RECORD LEGEND

Geotechnical Investigation Report
Proposed Jacking Pits as part of the Water Main Replacement Project
City of Torrance, Los Angeles County, California

PROJECT NO: 172-49

CONSISTENCY OF COHESIVE SOILS				
Description	Shear Strength (tsf)	Pocket Penetrometer, PP Measurement (tsf)	Torvane, TV, Measurement (tsf)	Vane Shear, VS, Measurement (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2

APPARENT DENSITY OF COHESIONLESS SOILS	
Description	SPT N_{60} (blows / 12 inches)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE	
Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS	
Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 - 10%
Little	15 - 25%
Some	30 - 45%
Mostly	50 - 100%

PARTICLE SIZE		
Description		Size (in)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

CEMENTATION	
Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010)

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BORING RECORD LEGEND

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Proposed Jacking Pits as part of the Water Main Replacement Project
City of Torrance, Los Angeles County, California

PROJECT NO: 172-49

LEGEND OF ROCK MATERIALS
IGNEOUS ROCK
SEDIMENTARY ROCK
METAMORPHIC ROCK

BEDDING SPACING

Description	Thickness/Spacing
Massive	Greater than 10 ft
Very Thickly Bedded	3 ft - 10 ft
Thickly Bedded	1 ft - 3 ft
Moderately Bedded	4 in - 1 ft
Thinly Bedded	1 in - 4 in
Very Thinly Bedded	1/4 in - 1 in
Laminated	Less than 1/4 in

WEATHERING DESCRIPTORS FOR INTACT ROCK

	Diagnostic Features					
	Chemical Weathering-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Leaching		
Description	Body of Rock	Fracture Surfaces		Texture	Leaching	General Characteristics
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No leaching	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull	Minor to complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty", feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation, grain boundary conditions	All fracture surfaces are discolored or oxidized; surfaces friable	Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated	Texture altered by chemical disintegration (hydration, argillation)	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures or veinlets. Rock is significantly weakened.
Decomposed	Discolored of oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregated)	Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".

PERCENT CORE RECOVERY (REC)

$$\frac{\Sigma \text{ Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100$$

ROCK QUALITY DESIGNATION (RQD)

$$\frac{\Sigma \text{ Length of intact core pieces} \geq 4 \text{ in.}}{\text{Total length of core run (in.)}} \times 100$$

RQD* indicates soundness criteria not met.

ROCK HARDNESS

Description	Criteria
Extremely Hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows
Very Hard	Cannot be scratched with a pocketknife or sharp pick. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty (heavy pressure). Breaks with heavy hammer blows.
Moderately Hard	Can be scratched with a pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows
Moderately Soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily with a pocketknife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
Very Soft	Can be readily indented, grooved or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures
Very Slightly Fractured	Core lengths greater than 3 ft.
Slightly Fractured	Core lengths mostly from 1 to 3 ft.
Moderately Fractured	Core lengths mostly 4 in. to 1 ft.
Intensely Fractured	Core lengths mostly from 1 to 4 in.
Very Intensely Fractured	Mostly chips and fragments.

REFERENCE Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

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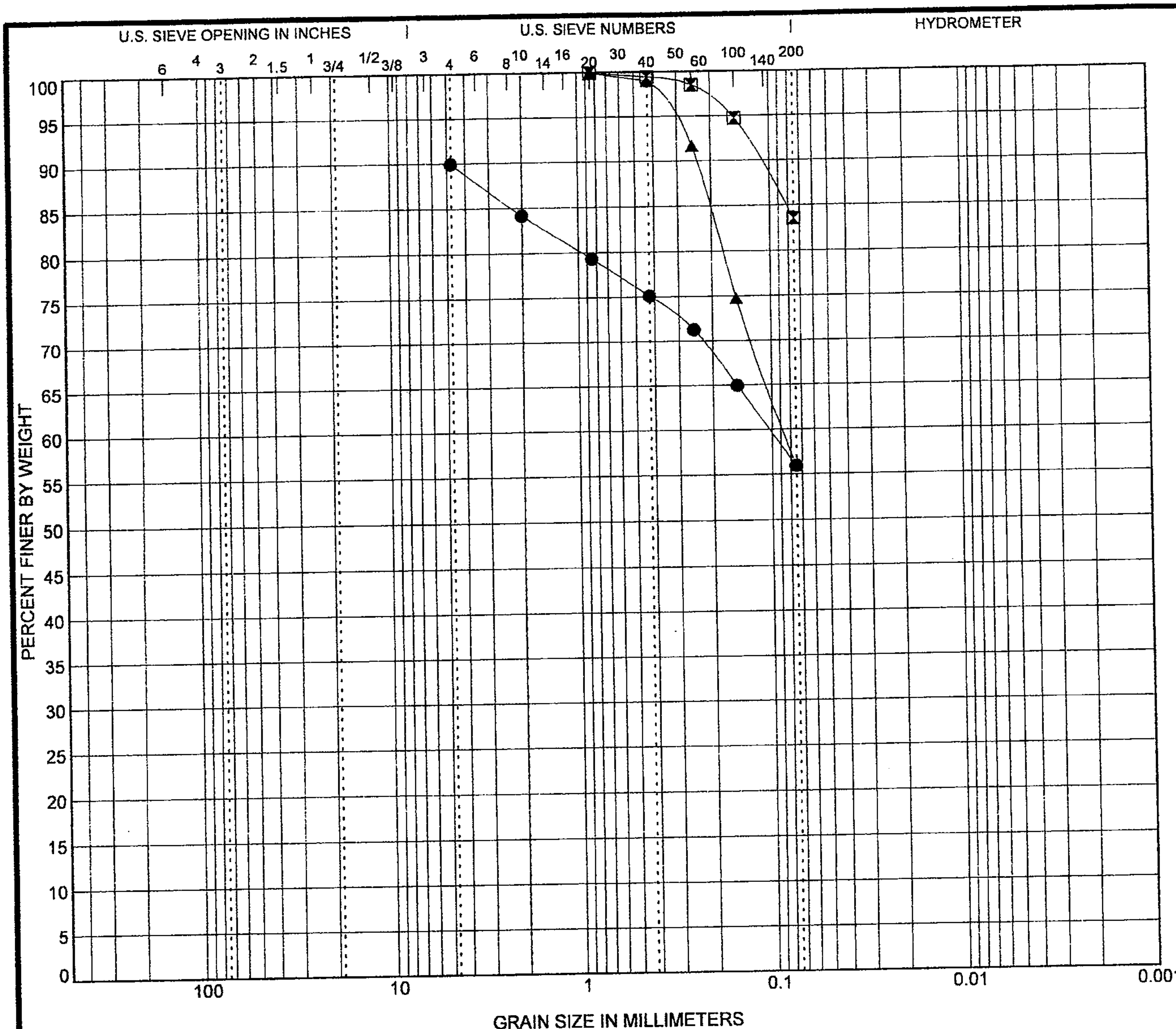
BORING RECORD LEGEND

Geotechnical Investigation Report
Proposed Jacking Pits as part of the Water Main Replacement Project
City of Torrance, Los Angeles County, California

PROJECT NO: 172-49

APPENDIX B

GEOTECHNICAL LABORATORY TESTING



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-1 @ 5.0 ft.	SANDY SILT (ML)	NP	NP	NP		
⊠ B-2 @ 8.0 ft.	SANDY CLAY (CL)	36	8	28		
▲ B-2 @ 14.0 ft.	SANDY CLAY (CL)	27	12	15		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1 @ 5.0 ft.	4.75	0.103			0.0	34.0	55.9	
⊠ B-2 @ 8.0 ft.	0.85				0.0	16.4	83.5	
▲ B-2 @ 14.0 ft.	0.85	0.087			0.0	44.0	55.9	

US_GRAIN_SIZE 172-49.GPJ LAGNNN01.GDT 9/6/11

GEI
GEO-ENVIRONMENTAL, INC.
2691 Richter Avenue, Suite 127
Irvine, California 92606-5125
Telephone: (949) 263-8334
Fax: (949) 263-8338

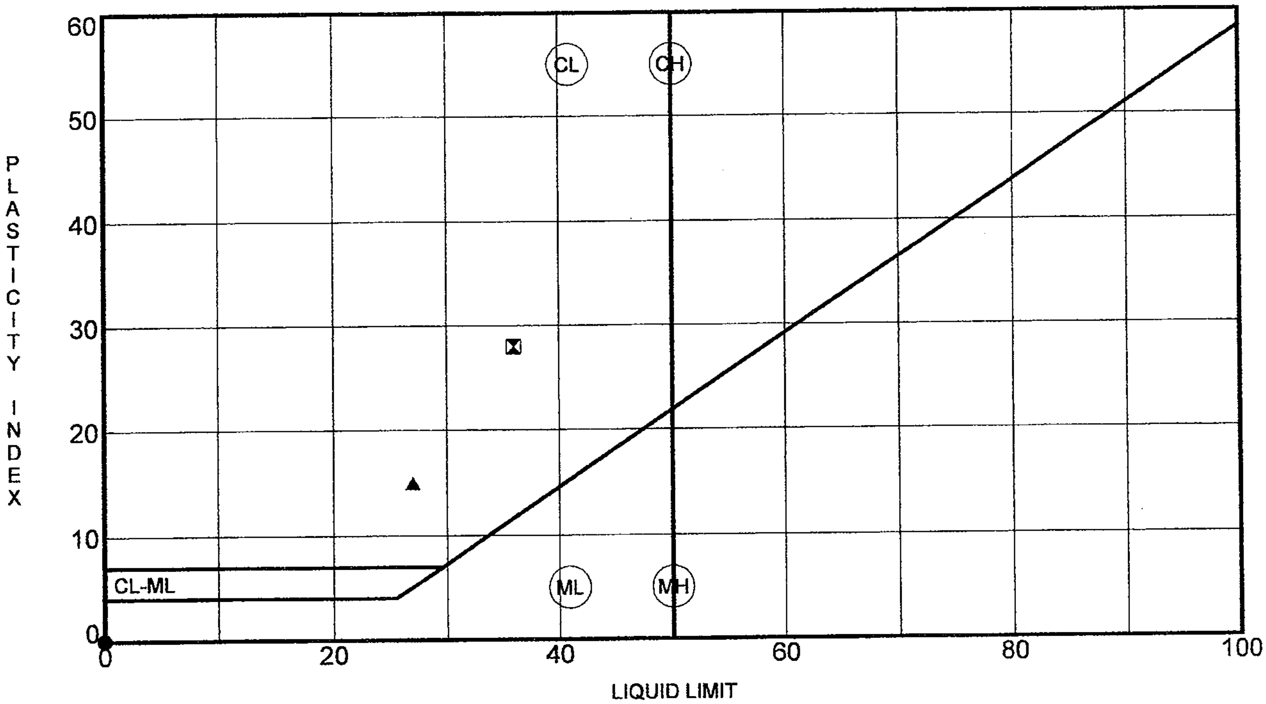
GRAIN SIZE DISTRIBUTION

Project: Western Ave. Jacking Pits for W. M. R. Project

Location: City of Torrance, CA

GEI Project No.: 172-49

Figure B-1



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**B-1**	**5.0**	**NP**	**NP**	**NP**	**56**	**SANDY SILT (ML)**
⊠	**B-2**	**8.0**	**36**	**8**	**28**	**84**	**SANDY CLAY (CL)**
▲	**B-2**	**14.0**	**27**	**12**	**15**	**56**	**SANDY CLAY (CL)**

GEI

GEO-ENVIRONMENTAL, INC.
2691 Richter Avenue, Suite 127
Irvine, California 92606-5125
Telephone: (949) 263-8334
Fax: (949) 263-8338

ATTERBERG LIMITS' RESULTS

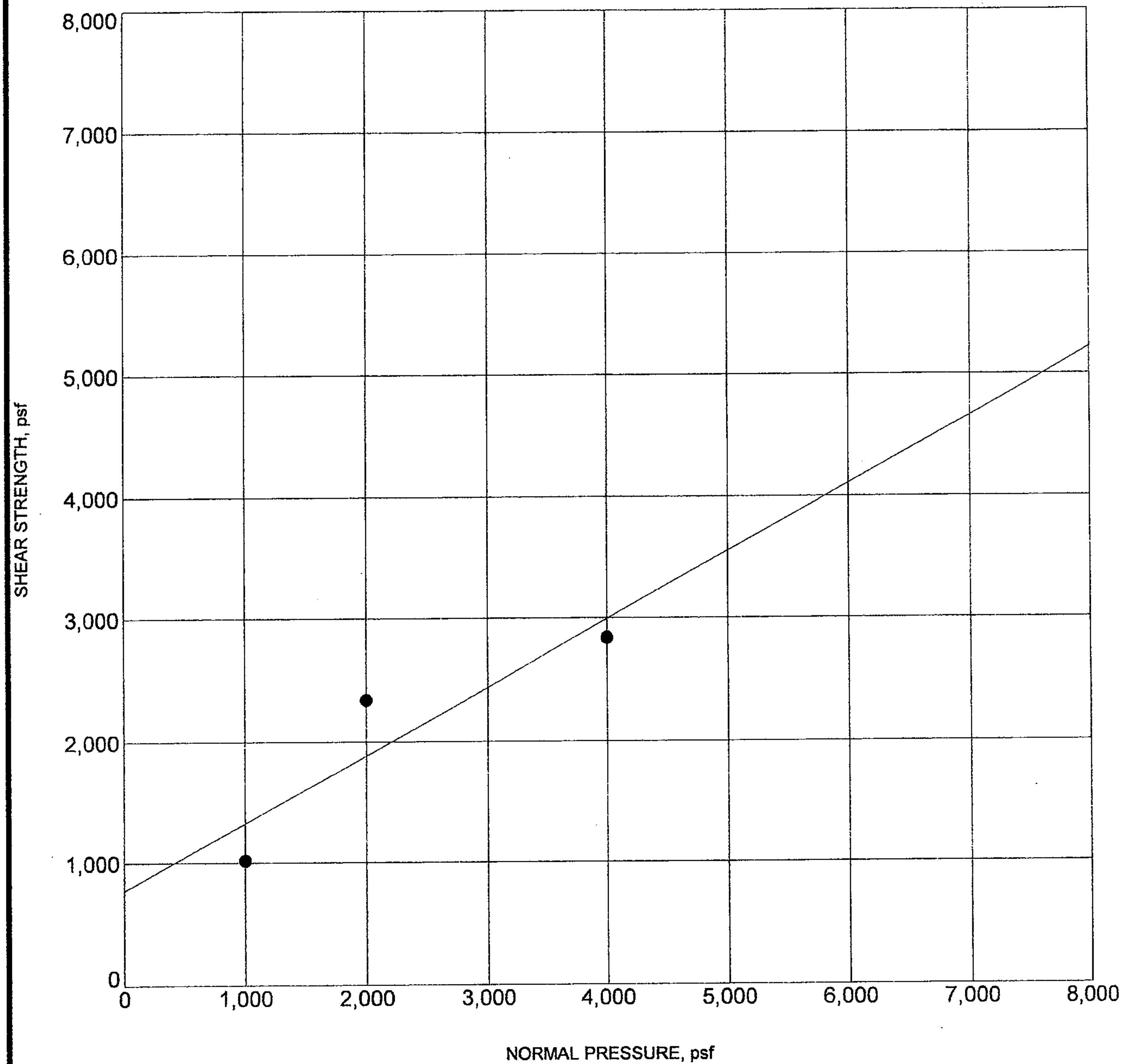
Project: Western Ave. Jacking Pits for W. M. R. Project

Location: City of Torrance, CA

GEI Project No.: 172-49

Figure B-2

US ATTERBERG LIMITS 172-49.GPJ LAGNNN01.GDT 9/1/11



	Specimen Identification	Classification	γ_d	MC%	c	ϕ
●	**B-1 @ 8.0 ft.**	SANDY CLAY (CL)	**117**	**17**	**770**	**29**

US DIRECT SHEAR 172-49.GPJ LAGNNN01.GDT 9/6/11

GEI
GEO-ENVIRONMENTAL, INC.
2691 Richter Avenue, Suite 127
Irvine, California 92606-5125
Telephone: (949) 263-8334
Fax: (949) 263-8338

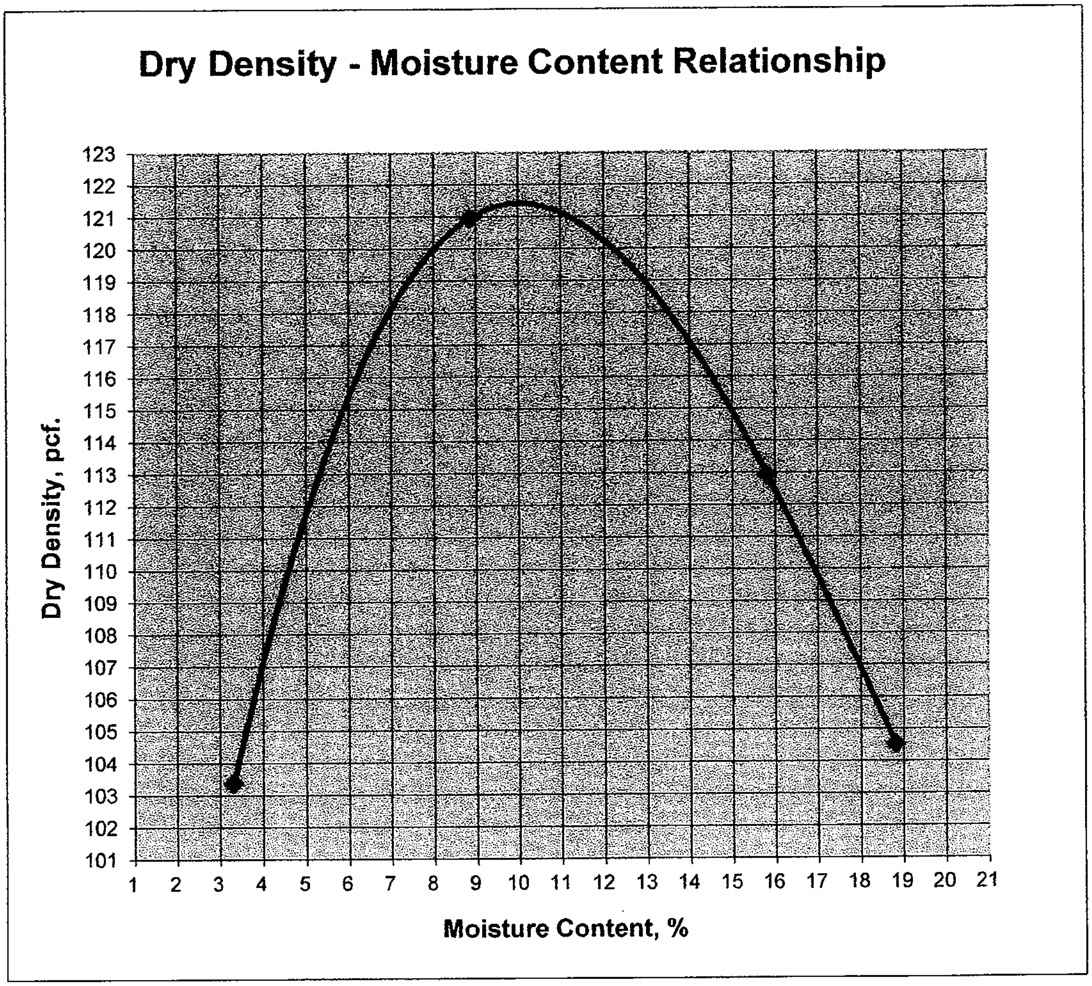
DIRECT SHEAR TEST

Project: Western Ave. Jacking Pits for W. M. R. Project

Location: City of Torrance, CA

GEI Project No.: 172-49

Figure B- 3



Sample No.: B-2 @ 2-5'

Soil Type: SANDY CLAY (CL)

Method of Compaction: ASTM D 1557-00

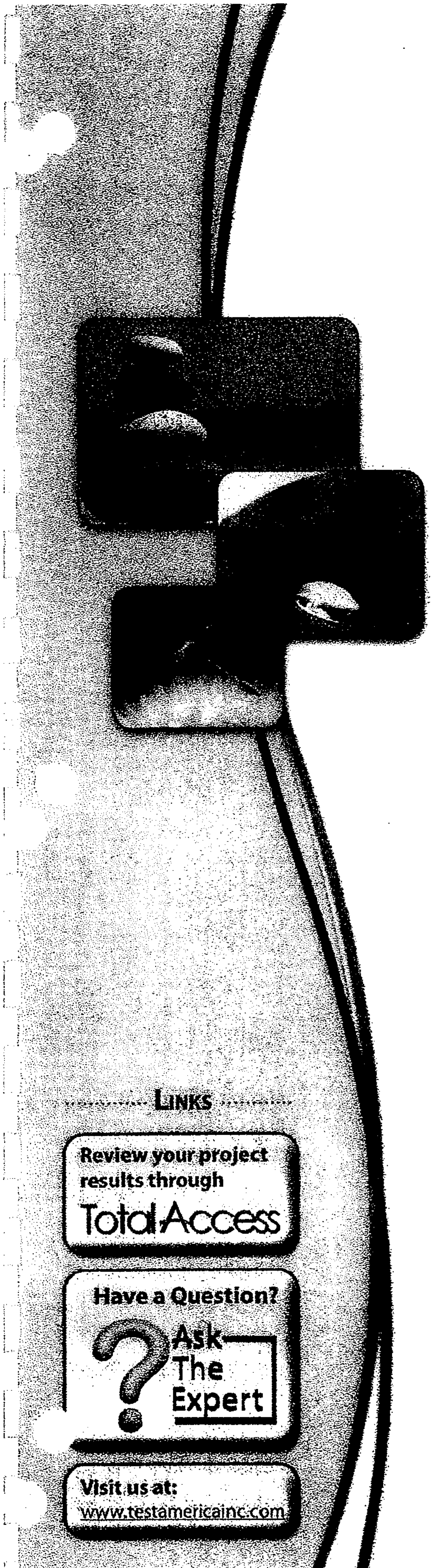
Maximum Dry Density: 121.5 pcf

Optimum Moisture Content: 10.0%

GEO-ENVIRONMENTAL, INC. **Caltrans Certified** **DBE Firm**	**Geotechnical Investigation Report** **Western Ave. Jacking Pits for W. M. R. Project** **City of Torrance, California**
	GEI-Project No: 172-49
	Figure B-4

APPENDIX C

ENVIRONMENTAL LABORATORY TESTING



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Avenue. Suite 100
Irvine, CA 92614
Tel: (949) 261-1022

TestAmerica Job ID: IUH2314
Client Project/Site: 172-49
Client Project Description: Western Ave. - Jacking Pit Project

For:
Geo Environmental, Inc.
2691 Richter Avenue, Suite 127
Irvine, CA 92706-5125

Attn: Arjun Subedi

Authorized for release by:
08/31/2011 04:10:11 PM

Lena Davidkova
Project Manager
Lena.Davidkova@testamericainc.com

Table of Contents

Sample Summary

Client: Geo Environmental, Inc.
Project/Site: 172-49

TestAmerica Job ID: IUH2314

3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
IUH2314-01	B-1 3'	Solid	08/22/11 15:35	08/22/11 15:35
IUH2314-02	B-1 8'	Solid	08/22/11 15:35	08/22/11 15:35
IUH2314-03	B-1 14'	Solid	08/22/11 15:35	08/22/11 15:35
IUH2314-04	B-2 3'	Solid	08/22/11 15:35	08/22/11 15:35
IUH2314-05	B-2 8'	Solid	08/22/11 15:35	08/22/11 15:35
IUH2314-06	B-2 14'	Solid	08/22/11 15:35	08/22/11 15:35

Client: Geo Environmental, Inc.
Project/Site: 172-49

TestAmerica Job ID: IUH2314

Client Sample ID: B-1 3'
Date Collected: 08/22/11 15:35
Date Received: 08/22/11 15:35

Lab Sample ID: IUH2314-01
Matrix: Solid

4

Method: EPA 8015B - EXTRACTABLE FUEL HYDROCARBONS (CADHS/8015B)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
EFH (C13 - C40)	**25**		5.0	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C13 - C14)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C15 - C16)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C17 - C18)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C19 - C20)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C21 - C22)	**4.5**		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C23 - C24)	**5.5**		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C25 - C26)	**5.1**		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C27 - C28)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C29 - C30)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C31 - C32)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C33 - C34)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C35 - C36)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C37 - C38)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0
EFH (C39 - C40)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:23	1.0

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane	*76*		*40 - 140*	*08/27/11 10:04*	*08/27/11 19:23*	*1.0*

Method: EPA 8015B MOD - VOLATILE HYDROCARBON DISTRIBUTION (EPA 8015 Mod.)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
GRO (C4 - C12)	ND		0.39	mg/kg		08/24/11 09:00	08/24/11 22:52	1.0
C4-C5	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 22:52	1.0
C6	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 22:52	1.0
C7	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 22:52	1.0
C8	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 22:52	1.0
C9	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 22:52	1.0
C10	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 22:52	1.0
C11	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 22:52	1.0
C12	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 22:52	1.0

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-BFB (FID)	*85*		*65 - 140*	*08/24/11 09:00*	*08/24/11 22:52*	*1.0*

Client Sample ID: B-1 8'
Date Collected: 08/22/11 15:35
Date Received: 08/22/11 15:35

Lab Sample ID: IUH2314-02
Matrix: Solid

Method: EPA 6010B - METALS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	RL1	20	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Arsenic	ND	RL1	4.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Barium	**120**		2.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Beryllium	ND	RL1	1.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Cadmium	ND	RL1	1.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Chromium	**19**		2.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Cobalt	**7.1**		2.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Copper	**83**		4.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Lead	ND	RL1	4.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Molybdenum	ND	RL1	4.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0

Client: Geo Environmental, Inc.
Project/Site: 172-49

TestAmerica Job ID: IUH2314

Client Sample ID: B-1 8'

Date Collected: 08/22/11 15:35
Date Received: 08/22/11 15:35

Lab Sample ID: IUH2314-02
Matrix: Solid

4

Method: EPA 6010B - METALS (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nickel	12		4.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Selenium	ND	RL1	4.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Silver	ND	RL1	2.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Thallium	ND	RL1	20	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Vanadium	42		2.0	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0
Zinc	75		10	mg/kg		08/26/11 09:36	08/28/11 16:33	2.0

Method: EPA 7471A - METALS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.036		0.020	mg/kg		08/23/11 12:08	08/24/11 15:37	1.0

Client Sample ID: B-1 14'

Date Collected: 08/22/11 15:35
Date Received: 08/22/11 15:35

Lab Sample ID: IUH2314-03
Matrix: Solid

Method: EPA 8015B - EXTRACTABLE FUEL HYDROCARBONS (CADHS/8015B)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
EFH (C13 - C40)	ND		5.0	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C13 - C14)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C15 - C16)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C17 - C18)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C19 - C20)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C21 - C22)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C23 - C24)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C25 - C26)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C27 - C28)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C29 - C30)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C31 - C32)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C33 - C34)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C35 - C36)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C37 - C38)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0
EFH (C39 - C40)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 18:43	1.0

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane	*74*		*40 - 140*	*08/27/11 10:04*	*08/27/11 18:43*	*1.0*

Method: EPA 8015B MOD - VOLATILE HYDROCARBON DISTRIBUTION (EPA 8015 Mod.)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
GRO (C4 - C12)	ND		0.38	mg/kg		08/24/11 09:00	08/24/11 23:19	1.0
C4-C5	ND		0.056	mg/kg		08/24/11 09:00	08/24/11 23:19	1.0
C6	ND		0.056	mg/kg		08/24/11 09:00	08/24/11 23:19	1.0
C7	ND		0.056	mg/kg		08/24/11 09:00	08/24/11 23:19	1.0
C8	ND		0.056	mg/kg		08/24/11 09:00	08/24/11 23:19	1.0
C9	ND		0.056	mg/kg		08/24/11 09:00	08/24/11 23:19	1.0
C10	ND		0.056	mg/kg		08/24/11 09:00	08/24/11 23:19	1.0
C11	ND		0.056	mg/kg		08/24/11 09:00	08/24/11 23:19	1.0
C12	ND		0.056	mg/kg		08/24/11 09:00	08/24/11 23:19	1.0

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-BFB (FID)	*92*		*65 - 140*	*08/24/11 09:00*	*08/24/11 23:19*	*1.0*

Client: Geo Environmental, Inc.
Project/Site: 172-49

TestAmerica Job ID: IUH2314

Client Sample ID: B-2 3'

Lab Sample ID: IUH2314-04
Matrix: Solid

Date Collected: 08/22/11 15:35
Date Received: 08/22/11 15:35

4

Method: EPA 8015B - EXTRACTABLE FUEL HYDROCARBONS (CADHS/8015B)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
EFH (C13 - C40)	ND		5.0	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C13 - C14)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C15 - C16)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C17 - C18)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C19 - C20)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C21 - C22)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C23 - C24)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C25 - C26)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C27 - C28)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C29 - C30)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C31 - C32)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C33 - C34)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C35 - C36)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C37 - C38)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0
EFH (C39 - C40)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:43	1.0

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane	*72*		*40 - 140*	*08/27/11 10:04*	*08/27/11 19:43*	*1.0*

Method: EPA 8015B MOD - VOLATILE HYDROCARBON DISTRIBUTION (EPA 8015 Mod.)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
GRO (C4 - C12)	ND		0.39	mg/kg		08/24/11 09:00	08/24/11 23:46	1.0
C4-C5	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 23:46	1.0
C6	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 23:46	1.0
C7	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 23:46	1.0
C8	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 23:46	1.0
C9	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 23:46	1.0
C10	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 23:46	1.0
C11	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 23:46	1.0
C12	ND		0.058	mg/kg		08/24/11 09:00	08/24/11 23:46	1.0

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-BFB (FID)	*72*		*65 - 140*	*08/24/11 09:00*	*08/24/11 23:46*	*1.0*

Client Sample ID: B-2 8'

Lab Sample ID: IUH2314-05
Matrix: Solid

Date Collected: 08/22/11 15:35
Date Received: 08/22/11 15:35

Method: EPA 8015B - EXTRACTABLE FUEL HYDROCARBONS (CADHS/8015B)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
EFH (C13 - C40)	ND		5.0	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C13 - C14)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C15 - C16)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C17 - C18)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C19 - C20)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C21 - C22)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C23 - C24)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C25 - C26)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C27 - C28)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C29 - C30)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0

Client: Geo Environmental, Inc.
Project/Site: 172-49

TestAmerica Job ID: IUH2314

Client Sample ID: B-2 8'
Date Collected: 08/22/11 15:35
Date Received: 08/22/11 15:35

Lab Sample ID: IUH2314-05
Matrix: Solid

4

Method: EPA 8015B - EXTRACTABLE FUEL HYDROCARBONS (CADHS/8015B) (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
EFH (C31 - C32)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C33 - C34)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C35 - C36)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C37 - C38)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0
EFH (C39 - C40)	ND		3.5	mg/kg		08/27/11 10:04	08/27/11 19:03	1.0

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane	*62*		*40 - 140*	*08/27/11 10:04*	*08/27/11 19:03*	*1.0*

Method: EPA 8015B MOD - VOLATILE HYDROCARBON DISTRIBUTION (EPA 8015 Mod.)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
GRO (C4 - C12)	ND		0.37	mg/kg		08/24/11 09:00	08/25/11 00:13	1.0
C4-C5	ND		0.056	mg/kg		08/24/11 09:00	08/25/11 00:13	1.0
C6	ND		0.056	mg/kg		08/24/11 09:00	08/25/11 00:13	1.0
C7	ND		0.056	mg/kg		08/24/11 09:00	08/25/11 00:13	1.0
C8	ND		0.056	mg/kg		08/24/11 09:00	08/25/11 00:13	1.0
C9	ND		0.056	mg/kg		08/24/11 09:00	08/25/11 00:13	1.0
C10	ND		0.056	mg/kg		08/24/11 09:00	08/25/11 00:13	1.0
C11	ND		0.056	mg/kg		08/24/11 09:00	08/25/11 00:13	1.0
C12	ND		0.056	mg/kg		08/24/11 09:00	08/25/11 00:13	1.0

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-BFB (FID)	*75*		*65 - 140*	*08/24/11 09:00*	*08/25/11 00:13*	*1.0*

Client Sample ID: B-2 14'
Date Collected: 08/22/11 15:35
Date Received: 08/22/11 15:35

Lab Sample ID: IUH2314-06
Matrix: Solid

Method: EPA 6010B - METALS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		10	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Arsenic	**2.7**		2.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Barium	**110**		1.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Beryllium	**0.72**		0.50	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Cadmium	ND		0.50	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Chromium	**25**		1.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Cobalt	**5.2**		1.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Copper	**22**		2.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Lead	**4.6**		2.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Molybdenum	ND		2.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Nickel	**15**		2.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Selenium	ND		2.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Silver	ND		1.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Thallium	ND		10	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Vanadium	**42**		1.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0
Zinc	**48**		5.0	mg/kg		08/26/11 09:36	08/26/11 23:36	1.0

Method: EPA 7471A - METALS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.044**		0.020	mg/kg		08/23/11 12:08	08/24/11 15:44	1.0

5

Client Sample ID: B-1 3'

Lab Sample ID: IUH2314-01
Date Collected: 08/22/11 15:35
Matrix: Solid
Date Received: 08/22/11 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total	Prep	CADHS LUFT		1.0	11H3711_P	08/27/11 10:04	IB	TAL IRV
Total	Analysis	EPA 8015B		1.0	11H3711	08/27/11 19:23	CP	TAL IRV
Total	Prep	EPA 5030B		0.97	11H3271_P	08/24/11 09:00	APT	TAL IRV
Total	Analysis	EPA 8015B MOD		1.0	11H3271	08/24/11 22:52	FB	TAL IRV

Client Sample ID: B-1 8'

Lab Sample ID: IUH2314-02
Date Collected: 08/22/11 15:35
Matrix: Solid
Date Received: 08/22/11 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total	Prep	EPA 3050B ICP		1.0	11H3616_P	08/26/11 09:36	MPS	TAL IRV
Total	Analysis	EPA 6010B		2.0	11H3616	08/28/11 16:33	NH	TAL IRV
Total	Prep	EPA 7471A Hg		1.0	11H3123_P	08/23/11 12:08	SN	TAL IRV
Total	Analysis	EPA 7471A		1.0	11H3123	08/24/11 15:37	DB	TAL IRV

Client Sample ID: B-1 14'

Lab Sample ID: IUH2314-03
Date Collected: 08/22/11 15:35
Matrix: Solid
Date Received: 08/22/11 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total	Prep	CADHS LUFT		1.0	11H3711_P	08/27/11 10:04	IB	TAL IRV
Total	Analysis	EPA 8015B		1.0	11H3711	08/27/11 18:43	CP	TAL IRV
Total	Prep	EPA 5030B		0.94	11H3271_P	08/24/11 09:00	APT	TAL IRV
Total	Analysis	EPA 8015B MOD		1.0	11H3271	08/24/11 23:19	FB	TAL IRV

Client Sample ID: B-2 3'

Lab Sample ID: IUH2314-04
Date Collected: 08/22/11 15:35
Matrix: Solid
Date Received: 08/22/11 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total	Prep	CADHS LUFT		1.0	11H3711_P	08/27/11 10:04	IB	TAL IRV
Total	Analysis	EPA 8015B		1.0	11H3711	08/27/11 19:43	CP	TAL IRV
Total	Prep	EPA 5030B		0.97	11H3271_P	08/24/11 09:00	APT	TAL IRV
Total	Analysis	EPA 8015B MOD		1.0	11H3271	08/24/11 23:46	FB	TAL IRV

Client Sample ID: B-2 8'

Lab Sample ID: IUH2314-05
Date Collected: 08/22/11 15:35
Matrix: Solid
Date Received: 08/22/11 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total	Prep	CADHS LUFT		1.0	11H3711_P	08/27/11 10:04	IB	TAL IRV
Total	Analysis	EPA 8015B		1.0	11H3711	08/27/11 19:03	CP	TAL IRV
Total	Prep	EPA 5030B		0.93	11H3271_P	08/24/11 09:00	APT	TAL IRV
Total	Analysis	EPA 8015B MOD		1.0	11H3271	08/25/11 00:13	FB	TAL IRV

Lab Chronicle

Client: Geo Environmental, Inc.
Project/Site: 172-49

TestAmerica Job ID: IUH2314

Client Sample ID: B-2 14'

Lab Sample ID: IUH2314-06

Date Collected: 08/22/11 15:35
Date Received: 08/22/11 15:35

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total	Prep	EPA 3050B ICP		1.0	11H3616_P	08/26/11 09:36	MPS	TAL IRV
Total	Analysis	EPA 6010B		1.0	11H3616	08/26/11 23:36	DP	TAL IRV
Total	Prep	EPA 7471A Hg		1.0	11H3123_P	08/23/11 12:08	SN	TAL IRV
Total	Analysis	EPA 7471A		1.0	11H3123	08/24/11 15:44	DB	TAL IRV

Laboratory References:
TAL IRV = TestAmerica Irvine, 17461 Derian Avenue. Suite 100, Irvine, CA 92614, TEL (949) 261-1022

Client: Geo Environmental, Inc.
Project/Site: 172-49

TestAmerica Job ID: IUH2314

Method: EPA 8015B - EXTRACTABLE FUEL HYDROCARBONS (CADHS/8015B)

Lab Sample ID: 11H3711-BS1
Matrix: Soil
Analysis Batch: 11H3711

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 11H3711_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
EFH (C10 - C28)	33.3	24.7	MNR	mg/kg		74	45 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
n-Octacosane	*73*	*MNR*	*40 - 140*

Method: EPA 6010B - METALS

Lab Sample ID: 11H3616-BLK1
Matrix: Soil
Analysis Batch: 11H3616

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 11H3616_P

Analyte	Blank Result	Blank Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		10	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Arsenic	ND		2.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Barium	ND		1.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Beryllium	ND		0.50	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Cadmium	ND		0.50	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Chromium	ND		1.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Cobalt	ND		1.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Copper	ND		2.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Lead	ND		2.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Molybdenum	ND		2.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Nickel	ND		2.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Selenium	ND		2.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Silver	ND		1.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Thallium	ND		10	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Vanadium	ND		1.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00
Zinc	ND		5.0	mg/kg		08/26/11 09:36	08/28/11 16:16	1.00

Lab Sample ID: 11H3616-BS1
Matrix: Soil
Analysis Batch: 11H3616

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 11H3616_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Antimony	49.5	43.7		mg/kg		88	80 - 120
Arsenic	49.5	42.9		mg/kg		87	80 - 120
Barium	49.5	45.9		mg/kg		93	80 - 120
Beryllium	49.5	43.5		mg/kg		88	80 - 120
Cadmium	49.5	44.6		mg/kg		90	80 - 120
Chromium	49.5	46.2		mg/kg		93	80 - 120
Cobalt	49.5	44.1		mg/kg		89	80 - 120
Copper	49.5	46.1		mg/kg		93	80 - 120
Lead	49.5	44.4		mg/kg		90	80 - 120
Molybdenum	49.5	43.4		mg/kg		88	80 - 120
Nickel	49.5	43.8		mg/kg		88	80 - 120
Selenium	49.5	40.3		mg/kg		81	80 - 120
Silver	24.8	22.9		mg/kg		93	80 - 120
Thallium	49.5	43.7		mg/kg		88	80 - 120
Vanadium	49.5	45.3		mg/kg		92	80 - 120

Client: Geo Environmental, Inc.
Project/Site: 172-49

TestAmerica Job ID: IUH2314

Method: EPA 6010B - METALS (Continued)

Lab Sample ID: 11H3616-BS1
Matrix: Soil
Analysis Batch: 11H3616

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 11H3616_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Zinc	49.5	42.9		mg/kg		87	80 - 120

Lab Sample ID: 11H3616-MS1
Matrix: Soil
Analysis Batch: 11H3616

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 11H3616_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Antimony	ND		49.8	14.8	M2	mg/kg		30	75 - 125
Arsenic	ND		49.8	40.8		mg/kg		82	75 - 125
Barium	7.84		49.8	51.5		mg/kg		88	75 - 125
Beryllium	ND		49.8	42.0		mg/kg		85	75 - 125
Cadmium	ND		49.8	41.6		mg/kg		84	75 - 125
Chromium	0.488		49.8	43.9		mg/kg		87	75 - 125
Cobalt	ND		49.8	42.1		mg/kg		85	75 - 125
Copper	11.4		49.8	56.8		mg/kg		91	75 - 125
Lead	ND		49.8	41.1		mg/kg		83	75 - 125
Molybdenum	0.730		49.8	29.2	M2	mg/kg		57	75 - 125
Nickel	5.02		49.8	44.7		mg/kg		80	75 - 125
Selenium	ND		49.8	39.4		mg/kg		79	75 - 125
Silver	ND		24.9	20.4		mg/kg		82	75 - 125
Thallium	ND		49.8	16.7	M2	mg/kg		34	75 - 125
Vanadium	0.846		49.8	42.9		mg/kg		85	75 - 125
Zinc	30.3		49.8	67.8		mg/kg		75	75 - 125

Lab Sample ID: 11H3616-MSD1
Matrix: Soil
Analysis Batch: 11H3616

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total
Prep Batch: 11H3616_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Antimony	ND		49.5	14.8	M2	mg/kg		30	75 - 125	0.2	20
Arsenic	ND		49.5	40.9		mg/kg		83	75 - 125	0.3	20
Barium	7.84		49.5	53.6		mg/kg		92	75 - 125	4	20
Beryllium	ND		49.5	42.4		mg/kg		86	75 - 125	0.8	20
Cadmium	ND		49.5	42.2		mg/kg		85	75 - 125	1	20
Chromium	0.488		49.5	46.3		mg/kg		92	75 - 125	5	20
Cobalt	ND		49.5	42.8		mg/kg		87	75 - 125	2	20
Copper	11.4		49.5	67.0		mg/kg		112	75 - 125	16	20
Lead	ND		49.5	41.3		mg/kg		83	75 - 125	0.4	20
Molybdenum	0.730		49.5	29.6	M2	mg/kg		58	75 - 125	1	20
Nickel	5.02		49.5	59.2	R	mg/kg		109	75 - 125	28	20
Selenium	ND		49.5	38.3		mg/kg		77	75 - 125	3	20
Silver	ND		24.8	20.5		mg/kg		83	75 - 125	0.5	20
Thallium	ND		49.5	17.3	M2	mg/kg		35	75 - 125	3	20
Vanadium	0.846		49.5	43.9		mg/kg		87	75 - 125	2	20
Zinc	30.3		49.5	74.5		mg/kg		89	75 - 125	9	20

6

6

Method: EPA 7471A - METALS

Lab Sample ID: 11H3123-BLK1 **Client Sample ID: Method Blank**
Matrix: Soil **Prep Type: Total**
Analysis Batch: 11H3123 **Prep Batch: 11H3123_P**

Analyte	Blank Result	Blank Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020	mg/kg		08/23/11 12:08	08/24/11 15:06	1.00

Lab Sample ID: 11H3123-BS1 **Client Sample ID: Lab Control Sample**
Matrix: Soil **Prep Type: Total**
Analysis Batch: 11H3123 **Prep Batch: 11H3123_P**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Mercury	0.0800	0.0893		mg/kg		112	80 - 120

Lab Sample ID: 11H3123-MS1 **Client Sample ID: Matrix Spike**
Matrix: Soil **Prep Type: Total**
Analysis Batch: 11H3123 **Prep Batch: 11H3123_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Mercury	0.0260		0.800	0.931		mg/kg		113	70 - 130

Lab Sample ID: 11H3123-MSD1 **Client Sample ID: Matrix Spike Duplicate**
Matrix: Soil **Prep Type: Total**
Analysis Batch: 11H3123 **Prep Batch: 11H3123_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Mercury	0.0260		0.800	0.901		mg/kg		109	70 - 130	3	20

Method: EPA 8015B MOD - VOLATILE HYDROCARBON DISTRIBUTION (EPA 8015 Mod.)

Lab Sample ID: 11H3271-BLK1 **Client Sample ID: Method Blank**
Matrix: Soil **Prep Type: Total**
Analysis Batch: 11H3271 **Prep Batch: 11H3271_P**

Analyte	Blank Result	Blank Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
GRO (C4 - C12)	ND		0.40	mg/kg		08/24/11 09:00	08/24/11 10:56	1.00
C4-C5	ND		0.060	mg/kg		08/24/11 09:00	08/24/11 10:56	1.00
C6	ND		0.060	mg/kg		08/24/11 09:00	08/24/11 10:56	1.00
C7	ND		0.060	mg/kg		08/24/11 09:00	08/24/11 10:56	1.00
C8	ND		0.060	mg/kg		08/24/11 09:00	08/24/11 10:56	1.00
C9	ND		0.060	mg/kg		08/24/11 09:00	08/24/11 10:56	1.00
C10	ND		0.060	mg/kg		08/24/11 09:00	08/24/11 10:56	1.00
C11	ND		0.060	mg/kg		08/24/11 09:00	08/24/11 10:56	1.00
C12	ND		0.060	mg/kg		08/24/11 09:00	08/24/11 10:56	1.00

Surrogate	*Blank % Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-BFB (FID)	*109*		*65 - 140*	*08/24/11 09:00*	*08/24/11 10:56*	*1.00*

Lab Sample ID: 11H3271-BS1 **Client Sample ID: Lab Control Sample**
Matrix: Soil **Prep Type: Total**
Analysis Batch: 11H3271 **Prep Batch: 11H3271_P**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
GRO (C4 - C12)	1.60	1.58		mg/kg		99	70 - 135

6

Method: EPA 8015B MOD - VOLATILE HYDROCARBON DISTRIBUTION (EPA 8015 Mod.) (Continued)

Lab Sample ID: 11H3271-BS1
Matrix: Soil
Analysis Batch: 11H3271

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 11H3271_P

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-BFB (FID)	*208*	*Z2*	*65 - 140*

Lab Sample ID: 11H3271-BSD1
Matrix: Soil
Analysis Batch: 11H3271

Client Sample ID: Lab Control Sample Dup
Prep Type: Total
Prep Batch: 11H3271_P

Analyte			Spike Added	LCS Dup Result	LCS Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
GRO (C4 - C12)			1.60	1.54		mg/kg		96	70 - 135	3	20

Surrogate	*LCS Dup % Recovery*	*LCS Dup Qualifier*	*Limits*
4-BFB (FID)	*93*		*65 - 140*

Lab Sample ID: 11H3271-MS1
Matrix: Soil
Analysis Batch: 11H3271

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 11H3271_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
GRO (C4 - C12)	0.241		0.412	0.465	M2	mg/kg		54	60 - 140

Surrogate	*Matrix Spike % Recovery*	*Matrix Spike Qualifier*	*Limits*
4-BFB (FID)	*75*		*65 - 140*

Lab Sample ID: 11H3271-MSD1
Matrix: Soil
Analysis Batch: 11H3271

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total
Prep Batch: 11H3271_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
GRO (C4 - C12)	0.241		0.437	0.579		mg/kg		78	60 - 140	22	30

Surrogate	*Matrix Spike Dup % Recovery*	*Matrix Spike Dup Qualifier*	*Limits*
4-BFB (FID)	*102*		*65 - 140*

Client: Geo Environmental, Inc.
Project/Site: 172-49

TestAmerica Job ID: IUH2314

Qualifiers

Diesel

Qualifier	Qualifier Description
MNR	No results were reported for the MS/MSD. The sample used for the MS/MSD required dilution due to the sample matrix. Because of this, the spike compounds were diluted below the detection limit.

Metals

Qualifier	Qualifier Description
M2	The MS and/or MSD were below the acceptance limits due to sample matrix interference. See Blank Spike (LCS).
R	The RPD exceeded the method control limit due to sample matrix effects. The individual analyte QA/QC recoveries, however, were within acceptance limits.
RL1	Reporting limit raised due to sample matrix effects.

BTEX

Qualifier	Qualifier Description
Z2	Surrogate recovery was above the acceptance limits. Data not impacted.
M2	The MS and/or MSD were below the acceptance limits due to sample matrix interference. See Blank Spike (LCS).

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit (Dioxin)
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or method detection limit if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Irvine	Arizona	State Program	9	AZ0671
TestAmerica Irvine	California	LA Cty Sanitation Districts	9	10256
TestAmerica Irvine	California	NELAC	9	1108CA
TestAmerica Irvine	California	State Program	9	2706
TestAmerica Irvine	Guam	State Program	9	Cert. No. 10.001r
TestAmerica Irvine	Hawaii	State Program	9	N/A
TestAmerica Irvine	Nevada	State Program	9	CA015312007A
TestAmerica Irvine	Northern Mariana Islands	State Program	9	MP0002
TestAmerica Irvine	USDA	USDA		P330-09-00080

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

GEO-ENVIRONMENTAL, INC.
Caltrans Certified
DBE Firm

LABORATORY TESTS REQUEST

1UH2314 - REV

Project Name: Proposed Weston Ave. Jacking Pit for water main replacement project

Client: City of Torrance

Date: 8-22-2011

Requested by: A.S.

Job Number: 172-49

Due by: ~~ASAP~~ @ 7 day TH 8/22/11 per Arjun S.

			Index Properties									Engineering Properties											Corrosion				Compaction		Other		
												Consolidation					Direct Shear														
Boring Number	sample Depth	Sample Type*	Moisture Content	Dry Density	Atterberg Limits	Sieve Analysis	Expansion Index	Hydrometer	% Passing #200	Sand Equivalent	specific Gravity	1st load	add water at	Load to	Reload	Test Progress	1st load	2nd load	3rd load	Test Progress	Unconfined Compression	Triaxial Test	Resistivity	pH	Chloride	Sulfate	ASTM D1557	R. Value	TPH (EPA 8015m)	Title 22 metals (EPA 6010)	
B-1	3'	D																											/		
	8'	D																												/	
	14	D																											/		
B-2	3'	D																											/		
	8'	D																											/		
	14	D																												/	

*D= drive / Tube Sample
BB = big bag
SB = small bag

Technician's Initial:

Special Instructions: Test America lab performed this test. 4 (TPH) and 2 metals (EPA 8015M) (EPA 6010)

Rel. by: Arjun Subedi 8-22-2011, 3:45 R... 8/22/11 15:35

9

GEO-ENVIRONMENTAL, INC.
Caltrans Certified
DBE Firm

LABORATORY TESTS REQUEST

IUH2314

Project Name: Proposed Weston Ave. Jacking Pit for water main replacement project
Client: City of Torrance
Date: 8-22-2011
Requested by: A.S.
Job Number: 172-49
Due by: ASAP

			Index Properties									Engineering Properties											Corrosion				Compaction		Other		
												Consolidation					Direct Shear														
Boring Number	sample Depth	Sample Type*	Moisture Content	Dry Density	Atterberg Limits	Sieve Analysis	Expansion Index	Hydrometer	% Passing #200	Sand Equivalent	specific Gravity	1st load	add water at	Load to	Reload	Test Progress	1st load	2nd load	3rd load	Test Progress	Unconfined Compression	Triaxial Test	Resistivity	pH	Chlorine	Sulfate	ASTM D1557	R. Value	TPH (EPA 8015m)	Title 22 metals (EPA 6010)	
B-1	3'	D																											/		
	8'	D																												/	
	14	D																											/		
B-2	3'	D																											/		
	8'	D																											/		
	14	D																												/	

8/22 1405

*D= drive / Tube Sample
BB = big bag
SB = small bag

Technician's Initial:

Special Instructions: Test America lab performed this test. 4 TPH (EPA 8015M) and 2 metals (EPA 6010)

Rel. by: Arjun Subedi 8-22-2011, 15:35

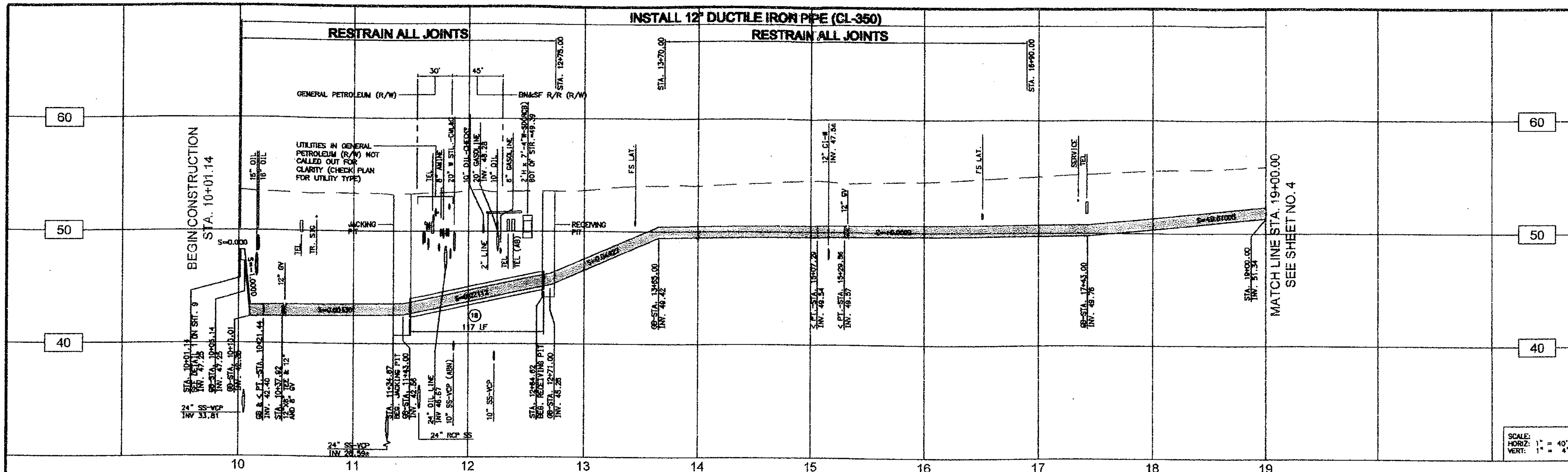
R'd by: V. Bomb 8/22/11 15:35 F °C

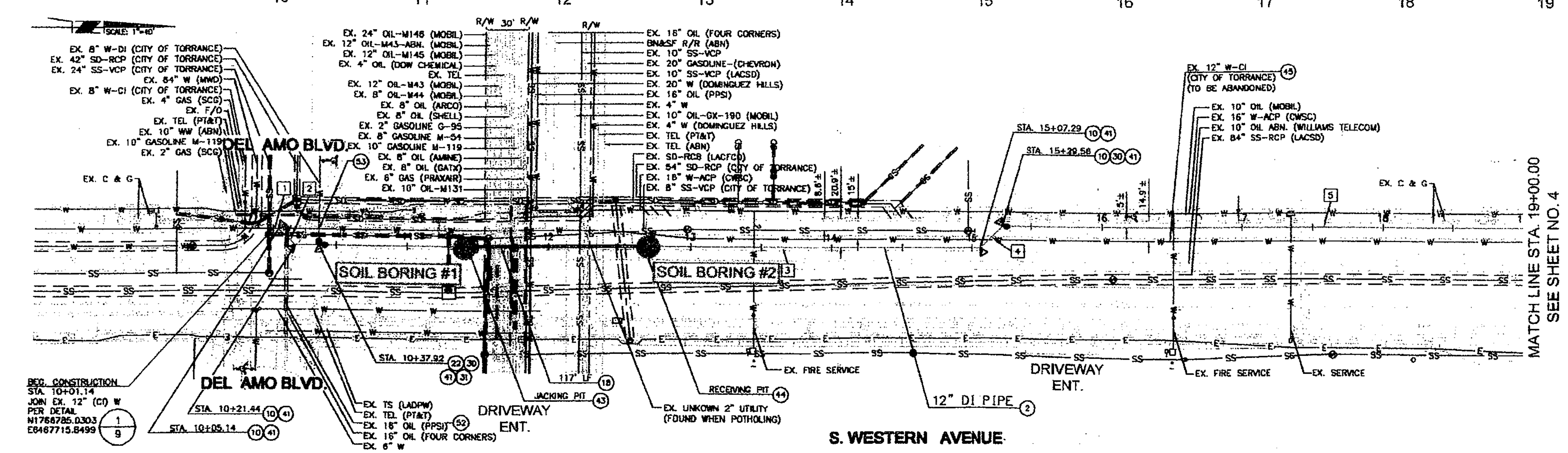
APPENDIX D

SITE PHOTOGRAPHS

Photo 1: Photograph showing the drilling operations at soil boring location B-1 on Western Avenue in the City of Torrance, California.

Photo 2: Photograph showing type of soil encountered at soil boring B-2.





CONSTRUCTION NOTES

(2) INSTALL 12" DI PIPE, CL-350, BEDDING PER CITY OF TORRANCE STD. NO. T701

(10) INSTALL 12"-45° DI BEND, MJ OR FLG'D.

(18) INSTALL 20" STEEL CASING PER CITY OF TORRANCE STD. NO. T715-2

(22) INSTALL 12"X8" DI TEE, MJ OR FLG'D.

(30) INSTALL 12" RW GATE VALVE, MJ OR FLG'D AND VALVE BOX PER CITY OF TORRANCE STD. NO. T712

(31) INSTALL 8" RW GATE VALVE, MJ OR FLG'D AND VALVE BOX PER CITY OF TORRANCE STD. NO. T712

(41) CONSTRUCT CONCRETE THRUST BLOCK PER CITY OF TORRANCE STD. NO. T713

(43) JACKING PIT

(44) RECEIVING PIT

(45) EXISTING WATERMAIN TO BE ABANDONED IN PLACE OR CUT UNLESS SHOWN ON THE PLANS. DO NOT FILL EXISTING WATERMAIN WITH SLURRY

(52) ALL MANHOLES ON 18" OIL PIPE LINE (PIPELINE CATHODIC PROTECTION MANHOLES) TO BE PROTECTED IN PLACE. DO NOT REPAVE OVER, GRIND OVER OR ALTER MANHOLES IN ANY WAY. CONTACT ENGINEER FOR ANY MODIFICATIONS.

(53) CUT, REMOVE INTERFERING PORTIONS OF EXISTING PIPE AND RECONNECT WITH FLEX COUPLING

LINE/CURVE DATA TABLE

NO.	BEARING/DELTA	RADIUS	LENGTH	TANGENT
1	N 00°12'41" W	—	4.00'	—
2	N 44°47'19" E	—	18.30'	—
3	N 00°12'41" W	—	485.84'	—
4	N 45°12'41" W	—	22.27'	—
5	N 00°12'41" W	—	1020.19'	—	(TOTAL DISTANCE)

SCALE: 1"=40'

RBF CONSULTING
PLANNING ■ DESIGN ■ CONSTRUCTION

REV.	DATE	DESCRIPTION	BY	CHECKED

CITY OF TORRANCE
PUBLIC WORKS DEPARTMENT

DRAWN: D.M.
DESIGNED: S. CONNER
PROJECT ENGINEER:
ENGINEERING MANAGER:

FIGURE 2

ELIZABETH OVERSTREET DATE
ACTING CITY ENGINEER
R.C.E. NO. 63944 EXP. 09/30/12

SCALE: AS SHOWN SHEET 3 OF 18
PLAN NO. **WP-291**

Photo 1: Photograph showing the drilling operations at soil boring location B-1 on Western Avenue in the City of Torrance, California.

Photo 2: Photograph showing type of soil encountered at soil boring B-2.

January 2018 | Noise and Vibration Technical Memorandum

Van Ness Avenue Well Field Project

Torrance, California

Prepared for:

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PLACEWORKS

Table of Contents

Table of Contents

List of Tables

1. Introduction

This Noise Technical Memorandum evaluates the potential noise and vibration impacts resulting from the construction and operation of the Descanso/Van Ness Avenue Water Mains project in the City of Torrance.

1.1. NOISE TERMINOLOGY AND DESCRIPTORS

Noise is most often defined as unwanted sound. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness."

The following are brief definitions of terminology used in this chapter:

Sound. A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

Noise. Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

Decibel (dB). A unitless measure of sound, expressed on a logarithmic scale and with respect to a defined reference sound pressure. The standard reference pressure is 20 micropascals (20 μPa).

Vibration Decibel (VdB). A unitless measure of vibration, expressed on a logarithmic scale and with respect to a defined reference vibration velocity. In the United States, the standard reference velocity is 1 microinch per second ($1x10^{-6}$ in/sec).

A-Weighted Decibel (dBA). An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level. The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.

Statistical Sound Level (L_n). The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is

1. Introduction

often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

Day-Night Sound Level (L_{dn} or DNL). The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.

Community Noise Equivalent Level (CNEL). The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the sound levels occurring during the period from 7:00 PM to 10:00 PM and 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.

Note: For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive—that is, higher than the L_{dn} value). As a matter of practice, L_{dn} and CNEL values are considered to be interchangeable and are treated as equivalent in this assessment.

Sensitive Receptor. Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

1.2. CHARACTERISTICS OF SOUND

When an object vibrates, it radiates part of its energy as acoustical pressure in the form of a sound wave. Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). The human hearing system is not equally sensitive to sound at all frequencies. Therefore, to approximate the human, frequency-dependent response, the A-weighted filter system is used to adjust measured sound levels. The normal range of human hearing extends from approximately 0 dBA (the threshold of detection) to 140 dBA (the threshold of pain).

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 1 presents the subjective effect of changes in sound pressure levels.

Table 1 Change in Apparent Loudness

± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies and Hansen, 2009.

Perceptible increases in noise levels generally refer to a change of 3 dBA or more, as this level has been found to be the perceptibility threshold for exterior noise environments. Barely perceptible noise increases refer to a change of between 1 and 3 dBA. This range of noise levels was found to be noticeable to sensitive people in laboratory environments. Noise increases of less than 1 dBA are typically inaudible to the human ear except under very quiet conditions in controlled environments.

Sound is generated from a source and the decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. This phenomenon is known as spreading loss or distance attenuation.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and nighttime hours, state law requires that, for planning purposes and to account for this increased receptiveness of noise, an artificial decibel increment is to be added to quiet-time noise levels to calculate the 24-hour CNEL noise metric. These adjustment increments are +5 dB for sound levels between 7:00 PM to 10:00 PM and +10 dB between 10:00 PM and the following 7:00 AM.

1.3. PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF NOISE

Exposure to high noise levels can affect the entire physiological system, with prolonged noise exposure in excess of 75 dBA increasing tension responses, thereby affecting blood pressure, heart performance, and nervous system functionality. Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Extended periods of noise exposure above 90 dBA results in permanent cell damage, which is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread, through generally worse in urban areas than in outlying, less-developed areas. Elevated ambient noise levels can result in annoyance and interference (e.g., speech interruption/masking, sleep disturbance, hindrance of concentration).

Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level (SPL) number means. To help relate noise level values to common experience, Table 2 shows typical noise levels from common sources.

1. Introduction

Table 2 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
Very Remote & Unpopulated Area Nighttime		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 2009.

1.4. VIBRATION TERMINOLOGY AND DESCRIPTORS

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities such as railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a point on a surface moves from its original static position. The instantaneous speed that a point on a surface moves is the velocity, and the rate of change of the speed is the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During project construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure. These types of vibration are best measured and described in terms of velocity and acceleration.

Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is the maximum instantaneous peak of the vibration signal and RMS is the square root of the average of the squared amplitude of the signal. PPV and RMS are related to each other by the signal's crest factor. PPV is more appropriate for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response.

The units for PPV and RMS velocity are normally inches per second (in/sec). Often vibration is presented and discussed in dB units in order to compress the range of numbers required to describe the vibration. In this study, all PPV and RMS velocity levels are in in/sec and all vibration levels are in dB relative to one microinch per second (abbreviated as VdB). Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration. Man-made vibration problems are, therefore, usually confined to short distances (500 to 600 feet or less) from the source (FTA 2006).

Construction operations generally include a wide range of activities that can generate groundborne vibration. In general, blasting and demolition of structures generate the highest vibrations. Pile drivers, vibratory compactors or rollers, and pavement breakers can generate perceptible amounts of vibration at up to 200 feet. Heavy trucks can also generate groundborne vibrations, which can vary, depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, and differential settlement of pavement all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration from normal traffic flows on streets and freeways with smooth pavement conditions (Caltrans 2009). Trains generate substantial quantities of vibration due to their wheel-rail interactions, steel wheels, heavy loads, and engine operations (FTA 2006).

1.5. PROJECT DESCRIPTION

The proposed project would result in the installation of three water wells and approximately 4.0 miles of water transmission lines. The new well sites would be on City-owned property—Site 1 (Well No. 12) is on 185th Street west of Purche Avenue; Site 2 (Well No. 13) is at the extreme west end of La Carretera Park, at 2040 186th Street; and Site 3 (Well No. 14) is in Descanso Park. A new water well would be required to be drilled at each of the three sites. Drilling operations would be continuous, 24-hour operations and the well construction/drilling would occur at one site at a time. Upon completion of the drilling operations at each site, an electric pump would be installed and would be enclosed in a structure.

The project also includes construction of new storm drain piping—a new 16- to 24-inch plastic discharge (storm drain) pipeline from Site 1 to Site 3 and from Site 3 to an existing City storm drain in Border Avenue north of Plaza Del Amo. Additionally, a 12-inch pipe would connect Site 2 to the 24-inch pipe in Van Ness Avenue. The City of Torrance also requested additional work items at well Site 2, at the east edge of La Carretera Park, which could generate construction-related air quality emissions (which are analyzed in a separate document[1]). These additional items include resurfacing the existing basketball court, fence reconstruction, replacing the existing play equipment and lighting, installation of additional lighting, and paving the walking trail around park. The new water transmission lines would bring fresh well water to the City's existing reservoir and booster pump station at 2223 Border Avenue. The water transmission line improvements would be within the existing right-of-way.

[1] "Air Quality and Greenhouse Gas Emissions Technical Memorandum – Van Ness Avenue Well Field Project", Prepared by PlaceWorks and dated January 2018. See this Air Quality memo for additional details on the air-related assessment and conclusions.

1. Introduction

Residential land uses are adjacent to the City properties (Sites 1, 2, and 3) and along the transmission route. Other sensitive receptors proximate to the City properties and along the transmission route include parks and schools (e.g., La Carretera Park, Descanso Park, Torrance Adult School).

2. Regulatory Setting

To limit people's exposure to physically and/or psychologically damaging as well as intrusive noise levels, federal, state, and local agencies have established standards and ordinances to control noise. Potential noise and vibration impacts were evaluated based on the City of Torrance Municipal Code and General Plan to determine whether significant adverse noise impacts would result from construction and operation of the proposed project. The pertinent City documents are included in the appendix.

2.1 STATE LAWS

The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, and the California Building Code. These noise standards are applied to new or renovation construction in California for the purpose of controlling interior noise levels resulting from exterior noise sources. The regulations are intended to mitigate potential noise impacts at noise-sensitive structures—such as residences, schools, or hospitals—that are near major transportation noise sources and where such traffic-related noise sources create an exterior noise level of 60 dBA CNEL or higher. Since the proposed uses are *not* noise-sensitive applications, the Title 24 regulations would not apply to this project.

2.2 CITY OF TORRANCE REGULATIONS

2.2.1 Noise Element

The City of Torrance Noise Element, a component of the City's general plan, sets goals and policies to minimize adverse noise impacts and preserve a high quality of life for residents. It also serves as a tool for local planners to use in achieving and maintaining compatible land use with environmental noise levels. The noise element contains criteria designed to integrate noise considerations into land use planning to prevent noise/land use conflicts. However, it is important to note that with the recent California Supreme Court decision regarding the assessment of the environment's impacts on proposed projects (CBIA v BAAQMD, issued December 17, 2015), it is generally no longer the purview of the CEQA process to evaluate the impact of existing environmental conditions on any given project. Therefore, exterior noise effects from nearby noise sources relative to land use compatibility of the project is no longer a topic for impact evaluation under CEQA, and no statement of impact significance is germane. For reference, applicable portions of the City of Torrance General Plan Noise Element will be included in the appendix. The goals of the noise element are implemented and enforced through the municipal code.

2.2.2 Municipal Code

2.2.2.1 OPERATIONAL/LONG-TERM NOISE

Torrance's noise ordinance is designed to protect people from non-transportation noise sources such as music, construction activity, machinery and pumps, and air conditioners. Enforcement of the ordinance ensures that adjacent properties are not exposed to excessive noise from stationary sources. It is unlawful to produce noise that exceeds the limits in the municipal code (specifically, section 46.7.2).

The municipal code sets noise limits by (a) receiver type and (b) regions in the city. Torrance's Noise Element includes descriptions for the noise regions presented in the municipal code, as follows:

- **Region 1** includes the predominantly industrial areas in and around the refineries and industrial uses on the western edge of the City.
- **Region 2** includes the area in and around the airport and includes the commercial and industrial uses south of Lomita Boulevard and north of Pacific Coast Highway.
- **Region 3** encompasses the residential neighborhoods south of Pacific Coast Highway and west of Hawthorne Boulevard.
- **Region 4** includes the remainder of the City.

For receivers on residential properties 500 feet or more from the boundaries of Regions 1 and 2, the noise limits are shown in Table 3. For receivers within 500 feet of the boundary of Regions 1 or 2, the limits are 5 dB above the levels in Table 3 or 5 dB above the ambient noise level, whichever is lowest. The regions and the related 500-foot boundary zones are mapped on Exhibit A in Section 46.7.2 of the municipal code, which is provided in the appendix to this study. The project site and surrounding areas are all within Regions 1 and 4. Noise sources on industrial and commercial land are prohibited from producing noise levels at their property boundaries above the thresholds in Table 4. Table 5 shows the adjustments to the limits in Tables 3 and 4 under certain conditions.

Table 3 Noise Level Limits for Residential Receivers

Receiver Region	Noise Level (dB)[1]	
	Day (7 AM to 10 PM)	Night (10 PM to 7 AM)
3	50	45
4	55	50

[1] Although Sections 46.1 through 46.8 of the municipal code intermix "dB" and "dBA," it is assumed that the City intended to specify noise level limits in terms of A-weighted decibels (i.e., "dBA").

Table 4 Noise Limits at Industrial and Commercial Boundaries

Source Region	Noise Level (dB)[1]	
	Day (7 AM to 10 PM)	Night (10 PM to 7 AM)
1	70	65
2	60	55
All Remaining Industrial Land Uses	60	55
All Commercial Land Use	60	55

[1] Although Sections 46.1 through 46.8 of the municipal code intermix "dB" and "dBA," it is assumed that the City intended to specify noise level limits in terms of A-weighted decibels (i.e., "dBA").

Table 5 Corrections to Noise Limits

Noise Conditions	Correction to Limits (dB)
1. Noise contains a steady, audible tone, such as a whine, screech, or hum.	–5
2. Noise is a repetitive impulsive noise, such as hammering or riveting	–5
3. If the noise is not continuous, one of the following corrections to the limits shall be applied:	
a) Noise occurs less than 5 hours per day or less than 1 hour per night	+5
b) Noise occurs less than 90 minutes per day or less than 20 minutes per night	+10
c) Noise occurs less than 30 minutes per day or less than 6 minutes per night	+15
4. Noise occurs on Sunday morning (12:01 AM to 12:01 PM)	–5

2.2.2.2 CONSTRUCTION NOISE

According to the municipal code, Section 46.3.1, construction is allowed from 7:30 AM to 6:00 PM Monday through Friday and 9:00 AM to 5:00 PM on Saturdays. Construction is prohibited on Sundays and holidays (that are observed by City Hall), except between the hours of 10:00 AM to 4:00 PM for homeowners who reside at the property. Construction is allowed outside these hours as long as noise levels do not exceed 50 dB,[2] as measured at property lines in or adjacent to a residential area, or a written request has been approved by the community development director. Except for emergencies, heavy construction equipment—pile drivers, mechanical shovels, derricks, hoists, pneumatic hammers, compressors—is prohibited from operating in or adjacent to a residential area without permission from the community development director.

2.2.2.3 VIBRATION STANDARDS

The City of Torrance Municipal Code does not include vibration standards. Instead, this analysis will use the standards in the Federal Transit Administration's (FTA) guideline manual, Transit Noise and Vibration Impact Assessment (May 2006). Based on the FTA guidelines, an impact would occur if construction activities generate vibration that is strong enough to physically damage buildings. The threshold for vibration-induced architectural damage is 0.2 peak particle velocity (PPV) in inches per second (in/sec) for typical wood-framed buildings. The threshold for human annoyance at residential receptors during the daytime is 78 VdB and 84 VdB at offices.

[2] Understood to be A-weighted decibels (dBA) per the definitions of Code Section 46.1.2.

2. Regulatory Setting

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3. Environmental Setting

3.1 EXISTING NOISE ENVIRONMENT

The proposed project includes the construction and operation of three wells and approximately 4.0 miles of water pipelines throughout the City of Torrance. The proposed wells and pipelines are in the eastern part of the city, near various land use types. The proposed pipeline runs through Noise Regions 1 and 4, as defined by municipal code section 46.7.2, Exhibit A.

The locations of the wells in the project description are in Noise Region 4 in a residential area near Van Ness Avenue, just north of the 405 freeway. The noise environment around this residential area will be primarily controlled by roadway noise from I-405, and to a lesser extent, Van Ness Avenue. Residential operations (property maintenance, people talking, etc.) may also, at times, be audible around the project area, but it is not expected to notably contribute to the overall noise environment around these residential areas. According to the Baseline Noise Condition Contours in the Torrance General Plan Noise Element, Wells Nos. 12 and 13 are within the 65 dBA CNEL contour, and well No. 14 is within the 60 dBA CNEL contour. The Torrance Noise Element is included in the attached appendix, for reference.

The majority of the proposed water pipeline is within Noise Region 1 and will run along the right-of-way of Van Ness Avenue. South of Torrance Boulevard, the proposed pipeline will run along the right-of-way of Border Avenue and end just north of Plaza Del Amo. The primary existing noise source along the proposed pipeline pathway is traffic flow noise along the associated roadway right-of-way.

3.2 SENSITIVE RECEPTORS

Residences are within 500 feet of the pipeline for about half of its length. Residential land uses will be the most sensitive receptors in terms of construction and operation of the proposed project. For the remainder of the length, the pipeline is surrounded by commercial and industrial receptors, which are less sensitive to noise.

Receptors in proximity to the proposed wells and pipeline are expected to be exposed to temporary levels of construction noise. As a linear project, the construction of the pipeline portion of the project would create temporary construction noise levels that would move along the pipeline's pathway. That is, for any given receptor along the pathway, noise levels would increase as the pipeline installation activities came nearer to that location, and then diminish as the installation activities moved away from that location; returning to the pre-project ambient conditions.

Conversely, the three proposed well locations would have relatively stationary construction activities throughout the duration of the drilling process. These three well sites are surrounded by single-family residences, recreational park space, and, for Well No. 12, the Hamilton School. Receptors near the proposed wells would be exposed to construction noise and may also be exposed to operational noise; both of which will be discussed in detail in the Environmental Impacts Section, below.

3. Environmental Setting

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4. Thresholds of Significance

4.1 CEQA APPENDIX G THRESHOLDS

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would result in:

N-1 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.

N-2 Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

N-3 A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

N-4 A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

N-5 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, expose people residing or working in the project area to excessive noise levels.

N-6 For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

4.2 METHODOLOGY

Noise impacts on the surrounding community are assessed through local noise ordinances, supported by policies from the General Plan Noise Element, as well as from industry standards (primarily on the issue of vibration impacts). In general, noise-related impacts would occur if the project created a significant increase in noise above the ambient noise level as a result of a new noise source (either through on-site emissions or through noise generated by project traffic). This increase will be judged in terms of the potential to adversely affect noise-sensitive land uses.

Noise level limits on the surrounding community are enforced through local noise ordinances, supported by nuisance complaints and subsequent investigation. The second measure of impact used in this analysis is whether the increase in noise above the ambient noise level as a result of a new noise source (either through on-site emissions or through noise generated by project traffic) has the potential to adversely affect noise-sensitive land uses.

4. Thresholds of Significance

4.2.1 Traffic Noise Thresholds

Neither CEQA nor the City defines the magnitude of the increase in the ambient noise level at noise-sensitive receptors that would be considered a substantial increase. The Torrance Noise Element simply states that:

> The City's goals and policies regarding noise aim to minimize adverse noise impacts and to preserve the high quality of life for City residents. Torrance will maintain a peaceful environment by identifying noise impacts and mitigating noise problems through acoustical treatments and appropriate land use policies. (Torrance 2010, p. N-16)

In general, people tend to compare intruding noise with the existing background noise. If the new noise is readily identifiable or considerably louder than the background, it has the potential to be objectionable or annoying (Caltrans 2009). In lieu of specific thresholds from the noise element, the traffic noise impact thresholds used herein are based on human tolerance to noise (see Table 1) and are widely used for assessing traffic noise impacts. That is, human sound perception is generally such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving of sound level. Only audible changes of 3 dBA or greater at sensitive receptors are considered potentially significant when noise levels exceed the compatibility criteria. Based on the City of Torrance guidelines for what would be considered "normally compatible" for office, commercial, and medical uses, project-related traffic noise impacts would be substantial when the ambient noise environment along the roadway segments in the project's study area under with-project conditions increases by 3 dB *and* exceeds 70 dBA CNEL.

4.2.2 Stationary Noise Thresholds

The stationary noise thresholds are based on a combination of the human awareness of noise and local criteria for stationary noise sources as established by the City of Torrance for noise control. Pursuant to municipal code section 46.7.2, the City restricts stationary noise levels generated by air conditioning, refrigeration, heating, pumping, and filtering equipment as follows:

For receivers on residential land within Region 4 (which pertains to this project site and vicinity), the noise limits are 55 dBA during the daytime (7 AM to 10 PM) and 50 dBA during the nighttime (10 PM to 7 AM). For receivers on industrial or commercial land, the noise limits are 60 dBA during the daytime (7 AM to 10 PM) and 55 dBA during the nighttime (10PM to 7 AM). In all cases, the limits are the lowest of these values *or* 5 dB above the ambient noise level. Additionally, the corrections summarized in Table 5 above would be applied, if appropriate (such as for steady, audible tones, or repetitive impulses noise sources).

A significant impact would occur if the project would cause an exceedance of the municipal code thresholds (see Tables 3, 4, and 5, above).

4.2.3 Construction Noise Thresholds

According to the municipal code, Section 46.3.1, construction is allowed from 7:30 AM to 6:00 PM Monday through Friday and 9:00 AM to 5:00 PM on Saturdays. Construction is prohibited on Sundays and holidays (that are observed by City Hall).[3] For all of the above, construction is allowed outside these hours as long as noise levels do not exceed 50 dB,[4] as measured at property lines in or adjacent to a residential area, or as long as a written request has been approved by the community development director. Except for emergencies, heavy construction equipment—pile drivers, mechanical shovels, derricks, hoists, pneumatic hammers, compressors—is prohibited from operating in or adjacent to a residential area without permission from the community development director.

[3] With an exception for homeowners who reside at the property, who can conduct such activities between the hours of 10:00 AM to 4:00 PM.
[4] Understood to be A-weighted decibels (dBA) per the definitions of Code Section 46.1.2.

4. Thresholds of Significance

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5. Environmental Impacts

This section discusses the project-specific impacts related to noise and vibration.

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?

Less Than Significant Impact.

The following impact assessment discussion focuses on operational noise with respect to established and applicable standards. For a similar assessment discussion for construction noise and vibration, please see impact items d. and b. below, respectively.

Stationary Equipment Noise Sources

Wells

On-site stationary noise sources would include mechanical equipment at Wells Nos. 12, 13, and 14 (Site 1, 2, and 3, respectively). All noise sources at these well facilities would be enclosed in masonry structures, which would be treated with internal acoustical panels, and any ventilation would face away from local residences and Hamilton School. Thus, noise exposure due to the operation of the proposed well facilities is expected to be minimal. Since the residential areas just north of I-405 currently experience high ambient noise levels, noise due to operation of the well facilities would not approach or exceed the ambient noise environment around the project sites. Operational noise due to the well facilities is not expected to be audible, even at the receptors closest to the project sites. Therefore, no significant impacts would occur and no mitigation measures are necessary.

Storm Drain/Water Transmission Line

The pipeline system would be subterranean, and once installed, operational noise would not be audible at any receptor. Implementation of stationary equipment due to the potential development would not result in an increase above existing ambient noise levels. Therefore, no significant impacts would occur and no mitigation measures are necessary.

Roadway Noise Sources

Implementation of the proposed project would not alter the current traffic patterns around the proposed project sites. Operation of the wells would require up to one worker trip per day for maintenance, which would be completely negligible in comparison to the existing traffic flows along residential arterials. Thus, there is not expected to be any increases in roadway noise due to project operations.

5. Environmental Impacts

No significant permanent noise increases due to project-related activities, equipment, or traffic would occur, and no mitigation measures are necessary.

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact.

Operational Vibration

While the proposed project would include pumping equipment at the well sites, the operation of the proposed project would not include any notable, long-term vibration sources. Thus, no significant vibration effects or impacts from operations sources would occur, and no mitigation measures are required.

Construction Vibration

The proposed project would include the construction of three well facilities and approximately 4.0 miles of water transmission lines. Regardless of the location (well site or linear pipeline), construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance.

Construction activities can generate ground vibration that varies depending on the construction procedures, equipment used, and proximity to vibration-sensitive uses. Such vibrations may have two types of potential impacts: (a) architectural damage to nearby buildings and (b) annoyance to vibration-sensitive receptors. Groundborne vibration is usually highest during the demolition and grading phases of construction, which use the heaviest equipment. The proposed project would not include building demolition and would require minimal grading associated with asphalt trenching for the pipeline.

It is important to note that groundborne vibration is typically not perceptible outdoors and, therefore, impacts are normally based on the distance to the nearest building (FTA 2006). All receptor buildings surrounding the project site are more than 50 feet from the nearest project boundary. Table 6 lists vibration levels for different types of common construction equipment at a reference distance of 50 feet. Vibration levels are presented in VdB (for vibration annoyance), and PPV (for architectural damage due to vibration).

Table 6 Typical Vibration Levels Produced by Common Construction Equipment

Equipment	Approximate RMS[1] Velocity Level at 50 feet (VdB)	Approximate PPV Velocity at 50 feet (in/sec)
Pile Driver, Impact (typical)	95	0.235
Pile Driver, Sonic (typical)	84	0.060
Vibratory Roller	85	0.074
Large Bulldozer	78	0.031
Caisson Drilling	78	0.031
Loaded Trucks	77	0.027
Jackhammer	70	0.012
Small Bulldozer	49	0.001

Source: FTA 2006.
[1] RMS velocity calculated from vibration level (VdB) using the reference of 1 microinch/second and a crest factor of 4.

5. Environmental Impacts

Large, vibration-intensive construction equipment can potentially exceed levels where they become strongly perceptible (i.e., 78 VdB) or where they could exceed the threshold for architectural damage (i.e., 0.2 PPV in/sec). However, the proposed well construction would not use construction equipment similar to pile drivers or vibratory rollers. Rather than a vibratory roller, the project would use a sheepsfoot compactor[5] and a steam roller,[6] both of which generate much less intense vibration. Other equipment items expected to be employed during construction activities would be similar to large or small bulldozers.[7]

Given that neither pile driving nor vibratory rollers are expected to be needed for this project, the equipment item with the highest vibration level that would be expected to be used would be from a large bulldozer or a drilling rig[8] (see Table 6, above), each of which generates approximately 78 VdB, or 0.031 PPV at 50 feet.

Since vibration dissipates quickly with distance and since the nearest residences are over 50 feet from the project boundary, vibration levels would be expected to remain below the pertinent FTA thresholds (78 VdB for annoyance, 0.2 PPV for architectural damage), even for large bulldozers or caisson drills. Therefore, construction-related vibration impacts for both annoyance- and damage-related effects would be less than significant and no mitigation measures are necessary.

c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

Less than Significant Impact.

As presented in item a, above, project-generated operational noise from the proposed wells, pipeline system, or project-related traffic would not result in a substantial permanent increase in ambient noise levels. Therefore, these ongoing activities would generate less-than-significant noise impacts. Thus, no mitigation measures are needed.

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Less Than Significant Impact (Pipeline).

Less Than Significant Impact with Mitigation Measures Incorporated (Well Drilling).

Construction Noise, Overview

Temporary increases in ambient noise levels may result from construction activities. Sensitivity to noise is based on the location of the equipment relative to sensitive receptors, the time of day, and the duration of the noise-generating activities. Noise produced from construction is commonly held to decrease at a rate of at least 6 decibels (dB) per doubling of distance, conservatively ignoring other attenuation effects from air absorption, ground effects, and shielding from existing structures. For example, a dozer that generates 85

5 An example of such a machine is the Caterpillar CP-433C.

6 According to the associated Air Quality and Greenhouse Gas Emissions Technical Memorandum.

7 A "large" bulldozer is above an operating weight of 85,000 pounds (e.g., Caterpillar D8-class or larger); a "medium" bulldozer has an operating weight range of 25,000 to 60,000 pounds (e.g., Caterpillar D6- or D7-class); and a "small" bulldozer has an operating weight range of 15,000 to 20,000 pounds (e.g., Caterpillar D3-, D4-, or D5-class).

8 Denoted as 'Caisson Drilling' in the reference table.

5. Environmental Impacts

dBA at 50 feet would measure 79 dBA at 100 feet, 73 dBA at 200 feet, and 67 dBA at 400 feet (at minus 6 dB per doubling of distance).

Construction activities are exempt from the noise regulations of the Torrance Municipal Code as long as they occur between the hours of 7:30 AM and 6:00 PM on weekdays, or between the hours of 9:00 AM and 5:00 PM on Saturdays. If construction activities were conducted outside of these hours (including any time on Sundays or holidays observed by City Hall), such activities would be subject to the basic municipal code noise limits (Section 46.7.2), presented herein in Tables 3, 4, and 5.

Using information provided by Quantum Consulting, Inc., coupled with methodologies and inputs employed in the air quality assessment, the expected construction equipment mixes were estimated and categorized by construction activity. The associated, aggregate sound levels—grouped by construction activity—were estimated at a reference distance from the accumulated source, and the basic sound propagation attenuation factor (6 dB per distance doubling) was applied to calculate construction noise levels at the nearby receptors.

The two major scenarios of construction activities—the linear pipeline and the stationary well drilling—are discussed separately as follows.

Construction Noise, Pipeline

The proposed project includes the installation of approximately 4.0 miles of water transmission lines. The majority of the proposed pipeline would be in Noise Region 1 and run along the right-of-way of Van Ness Avenue. For project areas south of Torrance Boulevard, the proposed pipeline would run along the right-of-way of Border Avenue and would end just north of Plaza Del Amo. Residences are within 500 feet of the pipeline for about half of its length of the entire pipeline (primarily north of 190th Street). For the remainder of its length, the pipeline is surrounded by commercial and industrial receptors, which are less sensitive to noise than are residential land uses.

Additional daily traffic due to the transport of workers and equipment to the construction site could increase roadway noise around the project site. However, the proposed pipeline location runs along Van Ness Avenue, which is a heavily trafficked roadway. Additional vehicles due to construction operations would not demonstrably increase traffic along Van Ness Avenue, and this small increment of additional vehicles would not result in notable roadway noise increases. The proposed pipeline would also run along Border Avenue, which is a less trafficked street. However, the industrial and commercial receptors surrounding this stretch of pipeline are not noise-sensitive land uses, and construction vehicle noise is not expected to result in a significant impact.

Total construction of the pipeline is expected to take approximately 7 months.[9] Assuming that the pipeline would be constructed step-by-step, sensitive residential receptors would be affected by construction noise for approximately 3.5 months (while construction is in residential areas). Furthermore, individual residential receptors would be affected for a fraction of that time, because equipment would not be in use at any one location for an extended period of time. Based on the anticipated construction schedule, 183 days, and the project size, approximately 21,000 lineal feet, it is anticipated that, on average, construction activities would

[9] According to the associated Air Quality and Greenhouse Gas Emissions Technical Memorandum.

cover approximately 115 lineal feet per day. Thus, any given receptor location would be expected to experience audible pipeline construction noise for no more than a week or two.

To represent the anticipated construction-related noise levels along the entire pipeline, aggregated construction noise was projected out to 50 feet, 100 feet, 150 feet, and 200 feet from any given pipeline activity location. Construction noise levels would be reduced at a conservative rate of approximately 6 dB per doubling distance (while neglecting other sound attenuation factors such as air absorption, ground effects, and shielding from existing structures). These calculations apply to any of the receptors near the project site (at the pertinent distance from the source). Construction noise level estimates for the pipeline are summarized in Table 7.

Table 7 Pipeline Construction Noise Levels, Energy-Average (L_{eq}) Sound Levels

Construction Phase	Pipeline Construction Noise Levels at Defined Distances (dBA L_{eq})			
	At 50 feet	At 100 feet	At 150 feet	At 200 feet
Demolition	79	73	70	67
Site Preparation/Grading	85	79	75	73
Utility Trenching	83	77	74	71
Pipeline Construction	84	78	75	72

Notes: Calculations performed with the FHWA's RCNM software and are included in the appendix.

As shown in the table, combined noise levels for each pipeline construction phase would range from 79 to 85 dBA L_{eq} (due to distance attenuation alone). Construction activities would result in lower noise levels at more distant receptors due to attenuation from increasing distances from the source, as well as from shielding provided by intervening structures (such as rows of houses).

Pipeline construction activities would be limited to relatively small- to medium-sized equipment (i.e., bulldozers, grading tractors, dump trucks, rollers, back hoes, pavers, and a concrete saw), would be temporary and of very limited duration (i.e., generally less than two weeks), would occur during the least sensitive portions of the day (when many residents would be away from their homes), and would conform to the time-of-day restrictions of the City's municipal code. Therefore, pipeline construction noise impacts would be less than significant and no mitigation measures are necessary.

Construction Noise, Well Facilities

The proposed project includes the construction of three well facilities in residential areas. The typical residential urban noise environment close to major roads such as I-405 would be in the range of 50 to 60 dBA. The major work effort for these facilities would be the drilling of new, permanent wells.[10] These drilling activities would occur one site at a time, would have an expected total duration of approximately four weeks, and would have to be conducted continuously (due to the nature of the drilling process). The expected four-

[10] Sites 1 and 2 have been predrilled, but would have to undergo the same drilling process as at Site 3 for the permanent well shaft.

5. Environmental Impacts

week total duration would consist of one week of mobilization and set-up, two weeks of drilling, and one week for tear-down and demobilization. It is our understanding that the drilling effort will be conducted by an entity other than the Applicant, but these drilling activities are covered in this environmental assessment as part of the overall project. Following completion of the drilling at each wellhead, the enclosures around the wells and pumps would be constructed.

All three well sites would include similar construction processes, and all are in close proximity to single-family homes. To represent the generalized construction-related noise levels at all three locations, the construction noise for the well facilities was projected outward at several selected distances from the proposed construction site. Only the construction equipment mix associated with the well facilities is included in this analysis.[11] These calculations generally apply to the noise-sensitive receptors near the project's three well sites, and the aggregate, generalized construction noise level estimates for the well facilities are summarized in Table 8.

Table 8 Generalized Well Construction Noise Levels, Energy-Average (L_{eq}) Sound Levels

Construction Phase	Well Construction Noise Levels at Selected Distances (dBA L_{eq})									
	At 50 feet	At 100 feet	At 150 feet	At 200 feet	At 250 feet	At 400 feet	At 445 feet	At 790 feet	At 1,415 feet	At 2,500 feet
Well Construction	79	73	70	67	65	61	60	55	50	45

Notes: Noted attenuation with distance ONLY includes spherical spreading loss for basic energy propagation, without consideration of ground effects, atmospheric absorption, reflections, scattering, or shielding reductions from barriers/structures.
Calculations performed with the FHWA's RCNM software and included in the appendix.
Some selected distances are to show 6 dB per distance-doubling relationship and some selected distances are to show 5 dB increments relative to the Municipal Code standards.

As shown in the table, combined noise levels for each construction phase would range from 79 to 65 dBA L_{eq} (due to distance attenuation alone relative to a range of 50 feet to 250 feet). Noise levels from construction activities would be lower at more distant receptors due to attenuation from increasing distances from the sources. With only distance attenuation considered, well construction noise would be reduced to 50 dBA at approximately 1,425 feet and to 45 dBA at approximately 2,500 feet. In practical, real-world application, however, the 45 dBA level would be experienced at distances considerably less than 2,500 feet due to the inclusion of ground effects, atmospheric absorption, reflections, scattering, or shielding reductions from barriers/structures (that were not considered in the calculation results of Table 8).

For daytime hours, construction activities would be limited to relatively small- to medium-sized equipment (i.e., dump trucks, back hoes, and a drill rig), would be temporary and of limited duration, would occur during the least sensitive portions of the day (when many residents would be away from their homes), and would conform to the time-of-day restrictions of the City's municipal code. Therefore, well construction noise impacts during the *daytime* hours would be less than significant.

However, the drilling process needs to be continuous until the desired depth is achieved. Thus, once started, the two (possibly three) weeks of drilling will be 24 hours and will not conform to the time-of-day restrictions

[11] Per the Air Quality evaluations, the following equipment were assumed for the generalized well drilling and wellhead construction phases: one backhoe, one dump truck, one drill rig truck, one pick-up truck (equivalent to a forklift), one crane, and one pump.

of the City's municipal code (i.e., between 6:00 PM and the following 7:30 AM on weekdays [Monday through Thursday], between 6:00 PM on Friday night to the following 9:00 AM on Saturday morning, or between 5:00 PM on Saturdays through to the following 7:30 AM on Monday morning). During these nonconforming *evening and nighttime* hours, such activities would be subject to the basic municipal code noise limits (Section 46.7.2), shown in Tables 3, 4, and 5, specifically, for residential receptors in Noise Zone 4 (which is applicable for all receptors near all three well sites). Table 3 shows that the morning limit (i.e., from 7:00 AM to 7:30 AM) and the evening limit (i.e., from 6:00 PM to 10:00 PM) are 55 dBA, and the nighttime limit (i.e., from 10:00 PM to 7:00 AM) is 50 dBA. The corrections for these limits (shown in Table 5) would not apply for correction items 1, 2, or 3, since drilling would not be expected to generate steady whine/screech/hum sounds, would not generate impulsive noise, and would be continuous (relative to items 1, 2, and 3, respectively). However, a minus 5 dB correction to the nominal limits would be applied to drilling activities on Sunday mornings (between 12:01 AM to 12:01 PM). These off-hour restrictions are summarized in Table 9.

Table 9 Effective Noise Limits for Overnight Drilling Activities at Residential Receptors

Time Period				
Morning (7:00 AM to 7:30 AM)	Evening (6:00 PM to 10:00 PM)	Nighttime 10:00 PM to 7:00 AM)	Sunday Morning - early 12:01 AM to 7:00 AM)	Sunday Morning - late 7:01 AM to 12:01 PM)
55 dBA[1]	55 dBA	50 dBA	45 dBA[2]	50 dBA[3]

1 Although Sections 46.1 through 46.8 of the municipal code intermix "dB" and "dBA," it is assumed that the City intended to specify noise level limits in terms of A-weighted decibels (i.e., "dBA").
2 This is the nominal overnight limit of 50 dBA with a 5 dB penalty applied to arrive at 45 dBA.
3 This is the nominal daytime limit of 55 dBA with a 5 dB penalty applied to arrive at 50 dBA.

Given that drilling will take place over at least one Sunday, Table 9 shows that the most restrictive limit is 45 dBA at residential receptors (for the seven hours on Sunday morning between midnight and 7 AM). This would require a 34 dB reduction of noise emissions, relative to the 50-foot reference distance. For the other overnight periods (i.e., 10 PM to the following 7 AM), the limit is 50 dBA at residential receptors, which would require a 29 dB reduction of noise emissions (relative to the 50-foot reference distance).

For aggregate noise level emissions from evening and nighttime, it is likely that a smaller set of equipment would actually be used than for the generalized equipment set noted above, which is expected during daytime construction periods. For example, only the essential drilling equipment of the drill rig truck and the drilling fluid pump would likely be used during these off-hour activities. Therefore, overnight noise levels would tend to be somewhat less than during the full-complement daytime operations (as depicted in Table 8 above). Nonetheless, for conservatism, the full-set equipment noise levels shown in Table 8 are assumed for the overnight drilling operations. These drilling noise emissions and ordinance restriction conditions are discussed separately for each well site.

Well Drilling, Site 1 (Well No. 12)

This well site is just beyond the southeast corner of the Hamilton Education Center campus and adjacent to the termination of 185th Street (which ends at a gate to the campus). There are homes on either side of 185th Street that would be in close proximity to the drilling location, as well as homes along Purche Avenue

5. Environmental Impacts

(which back to the campus) that would also have direct line-of-sight to the drilling location. Residential structures along either side of 185th Street are within the range of 77 to 167 feet of the wellhead. The rear facades of residential structures along the west side of Purche Avenue (that still would have line-of-sight access) are within 81 to 344 feet of the wellhead. In all, residential receptors are in three directions from the well site, and the educational campus is in the fourth direction.

At these noted distances, well drilling activities would be expected—in the absence of noise mitigation measures—to result in sound levels between approximately 62 and 75 dBA at the residential structures (while *only* considering distance attenuation of the well drilling noise emissions). Thus, reductions of up to 30 dB would be required to meet the most restrictive limit of 45 dBA at residential receptors (for the seven hours on Sunday morning between midnight and 7 AM), and reductions of up to 25 dB would be required to meet the general overnight limit of 50 dBA at residential receptors (between 10 PM and the following 7 AM). Therefore, unmitigated noise from drilling activities would be a significant impact during the evening and overnight hours.

For informational purposes and assuming a windows-closed configuration—which would be expected to achieve approximately 25 dB of reduction for exterior-to-interior sound transmission loss (Caltrans 2013 and SAE 1971)—interior levels would be predicted to be in the range of 37 to 50 dBA.[12]

Given the triangular shape of the drilling site and the orientation of noise-sensitive receptors, drilling activity noise emissions would require substantial reduction along all portions of the well site.

Well Drilling, Site 2 (Well No. 13)

This well site is in the northwest corner of the triangular-shaped (existing) La Carretera Park. The development of Site 2 (Well No. 13) would require the renovation of the La Carretera Park. Modifications include: design of a new picnic area on the east side of the existing play equipment area, replacement and reconfiguration of play equipment and ground cover, improvements to the basketball courts, replacement of the existing fences, and installation of new light fixtures. The renovations of La Carreterra Park would not require construction equipment capable of generating excessive noise, and therefore will not result in significant daytime noise impacts around the community.

The site is adjacent to 186th Street (to the north), midblock between Wilton Place and Taylor Court. The site is also adjacent to Caltrans right-of-way and the nearby I-405 freeway. The ambient noise environment at this location would be primarily controlled by traffic flows along the freeway, regardless of time of day.

There are homes to the east of the well site, beyond the eastern boundary of La Carretera Park, and approximately 620 feet from the proposed wellhead. Also, there are homes to the north of the site, across 186th Street, the closest of which are approximately 100 feet to the wellhead. These northern and eastern receptor locations would have direct line-of-sight access to the well drilling area.

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[12] Note that the City of Torrance does not have specific interior noise level restrictions in either the Noise Element or the Municipal Code.

5. Environmental Impacts

There are also residences to the southwest of the site, across the I-405 freeway, that are as close as 330 feet from the wellhead. It should be noted that this section of the I-405 freeway has sound wall on both sides of the outermost lanes of travel. Thus, noise from well-drilling activities would be attenuated notably by these roadway noise barriers with respect to the homes to the southwest of the site—possibly by as much as 25 to 30 dB (in addition to distance propagation). In all, residential receptors are to the northwest, north, northeast, east, and southwest of the well site.

At these noted distances, well-drilling activities would be expected—in the absence of noise mitigation measures—to result in sound levels between approximately 57 and 73 dBA at the residential structures (while *only* considering distance attenuation of the well drilling noise emissions). Thus, reductions of up to 28 dB would be required to meet the most restrictive limit of 45 dBA at residential receptors (for the seven hours on Sunday morning between midnight and 7 AM) and reductions of up to 23 dB would be required to meet the general overnight limit of 50 dBA at residential receptors (between 10 PM and the following 7 AM). Therefore, unmitigated noise from drilling activities would be a significant impact during the evening and overnight hours.

For informational purposes and assuming a windows-closed configuration—which would be expected to achieve approximately 25 dB of reduction for exterior-to-interior sound transmission loss (Caltrans 2013 and SAE 1971)—interior levels would be predicted to be in the range of 32 to 48 dBA.[13]

Given the triangular shape of the drilling site and the orientation of noise-sensitive receptors, drilling activity noise emissions would require substantial reduction along the western, northern, and eastern portions of the well site. No mitigation measures are expected to be needed along the southern boundary since distance attenuation to homes to the south of the I-405 freeway would provide approximately 16 dB of noise reduction, roadway barrier walls would provide at least an additional 25 dB or reduction—for a combined reduction of 41 dB which would yield projected drilling noise levels of approximately 38 dBA—and the ambient environment (even late at night) is expected to be dominated by traffic flow sources and to be well above 38 dBA.

Well Drilling, Site 3 (Well No. 14)

This well site is in the southwest corner of the triangular-shaped (existing) Descanso Park. The development of Site 3 (Well No. 14) would not require any renovations at this park. The site is adjacent to Casimir Avenue (to the west). The site is also adjacent to an electrical transmission line right-of-way, which is being used as a plant nursery storage area (to the southwest, south, and southeast of the site). This nursery is not a noise-sensitive land use and would not be occupied during evening or nighttime hours.

There are homes to the east of the well site, beyond the eastern boundary of Descanso Park, and approximately 470 feet from the proposed wellhead. Also, there are homes to the north of the site, across Descanso Way, the closest of which are approximately 360 feet to the wellhead. These northern and eastern receptor locations would have direct line-of-sight access to the well drilling area. There are also residences to

[13] Note that the City of Torrance does not have specific interior noise level restrictions in either the Noise Element or the Municipal Code.

5. Environmental Impacts

the west of the site, across Casimir Avenue, which are as close as 80 feet from the wellhead. Beyond the transmission line and nursery area, there are residences to the south of the site, the closest of which are approximately 350 feet from the wellhead. In all, residential receptors are in all directions from the well site.

At these noted distances, well drilling activities would be expected—in the absence of noise mitigation measures—to result in sound levels between approximately 60 and 75 dBA at the residential structures (while *only* considering distance attenuation of the well drilling noise emissions). Thus, reductions of up to 30 dB would be required to meet the most restrictive limit of 45 dBA at residential receptors (for the seven hours on Sunday morning between midnight and 7 AM) and reductions of up to 25 dB would be required to meet the general overnight limit of 50 dBA at residential receptors (between 10 PM and the following 7 AM). As such, unmitigated noise from drilling activities would be a significant impact during the evening and overnight hours.

For informational purposes and assuming a window-closed configuration—which would be expected to achieve approximately 25 dB of reduction for exterior-to-interior sound transmission loss (Caltrans 2013 and SAE 1971),—interior levels would be predicted to be in the range of 35 to 50 dBA.[14]

Given the location of the drilling site, coupled with the orientation of noise-sensitive receptors, drilling activity noise emissions would require substantial reduction along the four sides of the well site.

Mitigation Measures (Well Drilling)

MM NOI-1 Prior to issuance of permits to perform construction, a construction noise mitigation plan shall be prepared, reviewed, and approved by the City of Torrance Community Development Director. The plan shall be implemented during project construction per the following methods:

a. At least 90 days prior to the start of construction activities, residents within 1,000 feet of the project site shall be notified of the planned construction activities. The notification shall include a brief description of the project, the activities that would occur, the duration and hours when construction would occur. The notification should include the telephone number of the City's authorized representative to respond in the event of a vibration or noise complaint.

b. At least 10 days prior to the start of construction activities, a sign shall be posted at the entrance to the job site, clearly visible to the public, which contains a contact name and telephone number of the City's authorized representative to respond in the event of a vibration or noise complaint. If the authorized representative receives a complaint, he/she shall investigate, take appropriate corrective action, and report the action to the City.

[14] Note that the City of Torrance does not have specific interior noise level restrictions in either the Noise Element or the Municipal Code.

c. During the entire active construction period and to the extent feasible, limit construction-related trips (including worker commuting, material deliveries, and debris/soil hauling) from residential areas around the project site.

d. During the entire active construction period, all heavy construction equipment used on the proposed project shall be maintained in good operating condition, with all internal combustion, engine-driven equipment fitted with intake and exhaust muffles, air intake silencers, and engine shrouds no less effective than as originally equipped by the manufacturer.

e. During the entire active construction period and to the extent feasible, use electrically powered equipment instead of pneumatic or internal combustion powered equipment.

f. During the entire active construction period and to the extent feasible, all stationary noise-generating equipment shall be located as far away as possible from neighboring property lines.

g. During the entire active construction period and to the extent feasible, limit all internal combustion engine idling both on the site and at nearby queuing areas to no more than five minutes for any given vehicle or machine. Signs shall be posted at the job site and along queueing lanes to reinforce the prohibition of unnecessary engine idling.

h. During the entire active construction period and to the extent feasible, the use of noise producing signals, including horns, whistles, alarms, and bells will be for safety warning purposes only. Use of smart back-up alarms, which automatically adjust the alarm level based on the background noise level shall be utilized, or back-up alarms shall be turned off and replaced with human spotters.

The above conditions shall be implemented by the construction contractor(s) via a designated health, safety and environmental (HSE) coordinator or a similar person. The details of the construction noise mitigation plan, including those listed above, shall be included as part of the permit application drawing set and as part of the construction drawing set. Verification shall be performed by the City's Project Manager and the City's building inspection staff.

MM NOI-2 Where feasible, erect a temporary noise barrier/curtain as close as possible to the drilling rig and pumping units as practical. The term "feasible" is defined in CEQA to mean "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors."[15]

These temporary noise barriers/curtains shall be between the drilling rig and all residential receptors that are within 500 feet of the wellhead and shall be relative to all directions from the wellhead that have direct line-of-site access to the drilling equipment; to the extent

[15] Public Resources Code, Section 21061.1.

5. Environmental Impacts

feasible. For Well Site 1 (Well No. 12), this shall be along the entire well site perimeter. For Well Site 2 (Well No. 13), this shall be along the western, northern, and eastern boundaries of the well site. For Well Site 3 (Well No. 14), this shall be along the entire well site perimeter.

The temporary sound barrier shall have a minimum height of 16 feet. The barrier can be implemented via:

(a) a 1-inch-thick plywood wall

OR

(b) a hanging blanket/curtain with a surface density or at least 2 pounds per square foot. For this configuration, the construction side of the barrier shall have an exterior lining of sound absorption material with a Noise Reduction Coefficient (NRC) rating of at least 0.7.

OR

(c) a stacked arrangement of two standard shipping containers (which would yield a height of 17 feet).

For all the above alternatives, the entire barrier system shall be continuous along the noted site boundaries such that there shall be no holes, gaps, and discontinuities. For all the above alternatives, the entire barrier system, as implemented in the field, shall achieve a Sound Transmission Class (STC) of 35 or greater.

The above conditions shall be implemented by the construction contractor(s) via a designated health, safety and environmental (HSE) coordinator or a similar person. The details of the construction noise mitigation plan, including those listed above, shall be included as part of the permit application drawing set and as part of the construction drawing set. Verification shall be performed by the City's Project Manager and the City's building inspection staff.

Impacts with Mitigation Measures

With Mitigation Measure NOI-1, particularly items (a) and (b), there is a reasonable *administrative process* that will be implemented to facilitate a communication loop between affected residents and the appropriate City staff, such that complaints and other disturbance issues can be efficiently addressed during the well drilling portions of the project. With Mitigation Measure NOI-2, there is a feasible *physical method* for reducing drilling operations noise emissions, which are expected to be reduced by increments between 20 to as much as 30 dB; depending on the orientation, distance to given receptors, and the intervening pathways (for sound propagation).[16] It is important to note that additional wall height (beyond 16 feet) and/or additional

[16] More precise numerical benefits that could be expected at individual receptor locations would require complicated and extensive sound propagation modeling efforts, coupled with detailed evaluations of ambient conditions, both of which are beyond the scope and extent of this assessment.

equipment-centric sound blanketing methods – while being technically possible – are not considered to be 'feasible'[17] for this particular project.[18]

In summary, late night drilling operations at the three well sites can be expected to be audible above the existing ambient conditions, except for those residences within approximately 300 feet of the I-405 freeway. However, while audible and potentially annoying to nearby residents, such drilling noise emissions are expected to be at or below the 50 dBA nighttime limit, thus remaining within compliance of the effective Municipal Code requirements. Likewise, the predicted drilling noise levels would be well below the morning, daytime, and evening limits. Conversely, at times and under heavy load conditions, there may be excursions of the effective Municipal Code limits (as presented in Table 9 above); particularly during the most restrictive period on Sunday mornings (i.e., for the seven hours between midnight and 7 AM). It is important to note, though, that such excursions could potentially occur only across seven hours out of a weekly set of 168 hours and, given the relatively short durations of the drilling process at each wellhead, would be expected to occur on – at most – three consecutive Sunday mornings. Initial calculations indicate that a relatively small number of households would be impacted during these seven Sunday morning hours.[19] Therefore, given the relatively very short-term nature of well drilling activities (expected to be no more than three weeks at each wellhead), the low percentage of time in any given week[20] that would be expected to exceed the Code limits, the inclusion of an administrative process for addressing noise complaints from the public (MM NOI-1), and the physical reduction of drilling noise to the extent that is reasonably feasible (MM NOI-2), it is concluded that drilling construction noise levels would be less than significant with the implementation of these measures.

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, expose people residing or working in the project area to excessive noise levels.

No Impact. None of the well or pipeline sites are within an airport land use plan or within two miles of a public use airport. The nearest airports are Hawthorne Municipal Airport, Torrance Municipal Airport, Los Angeles International Airport, and Long Beach International Airport, and all of these are more than two miles from the Van Ness Avenue water wells transmission mains and well sites. Relatedly, the project would not result in changes to the usage at any of these public airport facilities. Therefore, no impacts related to an airport land use plan or a public/public use airport would occur and no mitigation measures would be required.

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[17] Recall that the CEQA definition of the term feasible is: "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors."

[18] For example, additional wall height would necessitate the creation of extensive foundations and footings for the associated wall structure which, of itself, would be another, separate construction project that would create noise levels. Likewise, additional equipment-centric noise reduction methods would likely impede the basic operations of the drill rig(s), which could result in prolonged durations for drilling at each site (thus, exacerbating the time periods of noise effects/impacts).

[19] Specifically, approximately 17 residences would be impacted at Well Site 1, approximately 15 residences would be impacted at Well Site 2, and approximately 10 residences would be impacted at Well Site 3 during the most restrictive, Sunday morning periods (including the implementation of the MM NOI-2 sound walls).

[20] Seven Sunday morning hours relative to 168 weekly hours equates to 4.2% ($^{7}/_{168}$ = 0.0416 = 4.2%).

5. Environmental Impacts

f. For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

No Impact. There are no private airstrips in the vicinity of the well or pipeline project sites. The nearest private airport/heliport to the project area is the Carson Sheriff Station Heliport, approximately 3.5 miles to the east. Relatedly, the project will not result in changes to the usage at any of these private airport facilities. Therefore, no impacts related to private airstrips would occur, and no mitigation measures would be required.

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Appendix. Noise and Vibration Details

Appendix

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Appendix- Noise Background and Modeling Data

NOISE

Noise is most often defined as unwanted sound; whether it is loud, unpleasant, unexpected, or otherwise undesirable. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness."

Noise Descriptors

The following are brief definitions of terminology used in this chapter:

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

- **Decibel (dB).** A unitless measure of sound, expressed on a logarithmic scale and with respect to a defined reference sound pressure. The standard reference pressure is 20 micropascals (20 μPa).

- **Vibration Decibel (VdB).** A unitless measure of vibration, expressed on a logarithmic scale and with respect to a defined reference vibration velocity. In the U.S., the standard reference velocity is 1 micro-inch per second ($1x10^{-6}$ in/sec).

- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

- **Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.

- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

- **Day-Night Sound Level (L_{dn} or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.

- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added from 7:00 PM to 10:00 PM and 10 dB from 10:00 PM to 7:00 AM. NOTE: For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive – that is, higher than the L_{dn} value). As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.

- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

Characteristics of Sound

When an object vibrates, it radiates part of its energy in the form of a pressure wave. Sound is that pressure wave transmitted through the air. Technically, airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure that creates sound waves.

Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). Loudness or amplitude is measured in dB, frequency or pitch is measured in Hertz [Hz] or cycles per second, and duration or time variations is measured in seconds or minutes.

Amplitude

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 1 presents the subjective effect of changes in sound pressure levels. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud). Changes of 1 to 3 dB are detectable under quiet, controlled conditions, and changes of less than 1 dB are usually not discernible (even under ideal conditions). A 3 dB change in noise levels is considered the minimum change that is detectable with human hearing in outside environments. A change of 5 dB is readily discernible to most people in an exterior environment, and a 10 dB change is perceived as a doubling (or halving) of the sound.

Table 1 Noise Perceptibility

Change in dB	Noise Level
± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies, David A. and Colin H. Hansen. 2009. *Engineering Noise Control: Theory and Practice*. 4th ed. New York: Spon Press.

Frequency

The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz are not heard at all, but are "felt" more as a vibration. Similarly, though people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off rapidly above about 10,000 Hz and below about 200 Hz.

When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to approximate the response of the human ear. The A-weighted noise level has been found to correlate well with people's judgments of the "noisiness" of different sounds and has been used for many years as a measure of community and industrial noise. Although the A-weighted scale and the energy-equivalent metric are commonly used to quantify the range of human response to individual events or general community sound levels, the degree of annoyance or other response also depends on several other perceptibility factors, including:

- Ambient (background) sound level
- General nature of the existing conditions (e.g., quiet rural or busy urban)
- Difference between the magnitude of the sound event level and the ambient condition
- Duration of the sound event
- Number of event occurrences and their repetitiveness
- Time of day that the event occurs

Duration

Time variation in noise exposure is typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called L_{eq}), or alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. For example, the L_{50} noise level represents the noise level that is exceeded 50 percent of the time; half the time the noise level exceeds this level and half the time the noise level is less than this level. This level is also representative of the level that is exceeded 30 minutes in an hour. Similarly, the L_2, L_8 and L_{25} values represent the noise levels that are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour, respectively. These "n" values are typically used to demonstrate compliance for stationary noise sources with many cities' noise ordinances. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period, respectively.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law and many local jurisdictions use an adjusted 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level (L_{dn}). The CNEL descriptor requires that an artificial increment (or "penalty") of 5 dBA be added to the actual noise level for the hours from 7:00 PM to 10:00 PM and 10 dBA for the hours from 10:00 PM to 7:00 AM. The L_{dn} descriptor uses the same methodology except that there is no artificial increment added to the hours between 7:00 PM and 10:00 PM. Both descriptors give roughly the same 24-hour level, with the CNEL being only slightly more restrictive (i.e., higher). The CNEL or L_{dn} metrics are commonly applied to the assessment of roadway and airport-related noise sources.

Sound Propagation

Sound dissipates exponentially with distance from the noise source. This phenomenon is known as "spreading loss." For a single-point source, sound levels decrease by approximately 6 dB for each doubling of distance from the source (conservatively neglecting ground attenuation effects, air absorption factors, and barrier shielding). For example, if a backhoe at 50 feet generates 84 dBA, at 100 feet the noise level would be 79 dBA, and at 200 feet it would be 73 dBA. This drop-off rate is appropriate for noise generated by on-site operations from stationary equipment or activity at a project site. If noise is produced by a line source, such as highway traffic, the sound decreases by 3 dB for each doubling of distance over a reflective ("hard site") surface such as concrete or asphalt. Line source noise in a relatively flat environment with ground-level absorptive vegetation decreases by an additional 1.5 dB for each doubling of distance.

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. Extended periods of noise exposure above 90 dBA results in permanent cell damage, which is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread, through generally worse in urban areas than in outlying, less-developed areas. Elevated ambient noise levels can result in noise interference (e.g., speech interruption/masking, sleep disturbance, disturbance of concentration) and cause annoyance. Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level number means. To help relate noise level values to common experience, Table 2 shows typical noise levels from familiar sources.

Table 2 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Onset of physical discomfort	120+	
	110	Rock Band (near amplification system)
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: California Department of Transportation (Caltrans). 2009, November. Technical Noise Supplement ("TeNS"). Prepared by ICF International.

Vibration Fundamentals

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities stemming from operations of railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. As with noise, vibration can be described by both its amplitude and frequency. Vibration displacement is the distance that a point on a surface moves away from its original static position; velocity is the instantaneous speed that a point on a surface moves; and acceleration is the rate of change of the speed. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure.

Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is the maximum instantaneous peak of the vibration signal and RMS is the square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage and RMS is typically more suitable for evaluating human response.

The units for PPV and RMS velocity are normally inches per second (in/sec). However, vibration is often presented and discussed in dB units in order to compress the range of numbers. In this analysis, PPV and RMS velocities are in in/sec, and vibration levels are in dB relative to 1 micro-inch per second (abbreviated as VdB). Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration, therefore, man-made vibration problems are usually confined to relatively short distances from the source (500 to 600 feet or less).

As with airborne sound, annoyance with vibrational energy is a subjective measure, depending on the level of activity and the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Persons accustomed to elevated ambient vibration levels, such as in an urban environment, may tolerate higher vibration levels. Table 3 displays the human response and the effects on buildings resulting from continuous vibration (in terms of various levels of PPV).

Table 3 Human Reaction to Typical Vibration Levels

Vibration Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e. not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Source: California Department of Transportation (Caltrans). 2004, June. Transportation- and Construction-Induced Vibration Guidance Manual. Prepared by ICF International.

Construction operations can generate varying degrees of ground vibration, depending on the construction procedures and equipment. Operation of construction equipment generates vibrations that spread through the ground and diminish with distance from the source. The effect on buildings in the vicinity of the construction site varies depending on soil type, ground strata, and receptor-building construction. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Vibration from construction activities rarely reaches the levels that can damage structures, but can achieve the audible and perceptible ranges in buildings close to the construction site. Table 4 lists vibration levels for typical construction equipment (not all of which is expected to be used at the proposed project site).

Table 4 Vibration Levels for Typical Construction Equipment

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS[1] Velocity at 25 Feet (in/sec)
Pile Driver (impact) Upper Range	112	1.518
Pile Driver (impact) Lower Range	104	0.644
Pile Driver (sonic) Upper Range	105	0.734

Table 4 Vibration Levels for Typical Construction Equipment

Equipment		Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS[1] Velocity at 25 Feet (in/sec)
Pile Driver (sonic) Lower Range		93	0.170
Large Bulldozer		87	0.089
Caisson Drilling		87	0.089
Jackhammer		79	0.035
Small Bulldozer		58	0.003
Loaded Trucks		86	0.076
Criteria	*FTA – Human Annoyance (Residential Daytime)* *FTA – Human Annoyance (Residential Nighttime)* *FTA – Human Annoyance (Office)*	*78* *72* *84*	—
	FTA – Structural Damage (Residential)	—	*0.20*
	FTA – Structural Damage (Office)	—	*0.30*

Source: FTA 2006
[1] RMS velocity calculated from vibration level (VdB) using the reference of 1 microinch/second.

As shown in Table 4, vibration generated by certain, vibration-intensive construction equipment has the potential to be substantial (should those particular items be employed at any given construction site), since these items have the potential to exceed the FTA criteria for structural damage of 0.20 in/sec.

Construction Equipment Noise Levels

Construction Equipment

Each stage of construction involves the use of different kinds of construction equipment and therefore has its own distinct noise characteristics. Noise levels from construction activities are dominated by the loudest piece of equipment and generally occur during the site preparation and grading phase, when bulldozers, backhoes, and graders are used. Table 5 shows the average noise levels from individual pieces of construction equipment. Table 6 shows the maximum operational noise levels of heavy construction equipment.

Table 5 Average Construction Equipment Noise Levels

Type of Equipment	Average Measured Sound Levels (dBA at 50 feet)
Pile Driver, Impact	101
Pile Driver, Sonic	96
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Crane, Mobile	83
Crane, Derrick	88
Loader, Large	85
Loader, Front-End	79
Paver	89
Scraper	89
Jack Hammers	88
Pneumatic Tools	85
Pumps	76

Table 5 Average Construction Equipment Noise Levels

Type of Equipment	Average Measured Sound Levels (dBA at 50 feet)
Dozer, Small	80
Dozer, Large	86
Hydraulic Backhoe	85
Hydraulic Excavators	82
Graders	85
Air Compressors	81
Trucks	91

Source: Bolt, Beranek and Newman, 1971; FTA, 2006.[1]

Table 6 Maximum Heavy Construction Equipment Noise Levels

Type of Equipment	Range of Maximum Sound Levels Measured (dBA at 50 ft.)	Suggested Maximum Sound Levels for Analysis (dBA at 50 ft.)
Jack Hammers	75–88	82
Pneumatic Tools	78–88	85
Pumps	74–84	80
Dozers	77–90	85
Pile Driver, Impact	95–110	105
Pile Driver, Sonic	90-105	100
Scrapers	83–91	87
Haul Trucks	83–94	88
Cranes	79–86	82
Portable Generators	71–87	80
Rollers	75–82	80
Tractors	77–82	80
Front-End Loaders	77–90	86
Hydraulic Backhoe	81–90	86
Hydraulic Excavators	81–90	86
Graders	79–89	86
Air Compressors	76–89	86
Trucks	81–87	86

Source: Bolt, Beranek & Newman; Noise Control for Buildings and Manufacturing Plants, 1987.

Construction equipment typically moves around on the project site and under variable power levels. Noise from construction equipment decreases by 6 to 7.5 dB with each doubling of distance between the source and receptor.[2] For example, the noise levels from a bulldozer that generates 85 dBA at 50 feet would measure 79 dBA at 100 feet, 73 dBA at 200 feet, 67 dBA at 400 feet, and 61 dBA at 800 feet (conservatively using a 6 dB

[1] Bolt, Beranek & Newman (BBN); Noise Control for Buildings and Manufacturing Plants, 1987; Federal Transit Administration (FTA). 2006, May. Transit Noise and Vibration Impact Assessment. U.S. Department of Transportation (DoT). FTA-VA-90-1003-06.

[2] As sound energy travels outward from the source, spreading loss accounts for a 6 dB decrease in noise level. Soft ground and atmospheric absorption effects can add another decrement of 1.5 dB (for a total of 7.5 dB per distance doubling).

per doubling of distance attenuation factor). Also, noise levels are typically reduced from this value due to usage factors[3] as well as the barrier effects provided by the physical structures once erected.

REGULATORY FRAMEWORK

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise.

Federal Regulations

Federal Highway Administration

The FHWA values are the maximum desirable values by land use type and area based on a "trade-off" of what is desirable and what is reasonably feasible. These values recognize that in many cases lower noise exposures would result in greater community benefits. The FHWA design noise levels are included in Table 7.

Table 7 FHWA Design Noise Levels

Activity Category	Design Noise Levels [1]		Description of Activity Category
	L_{eq} (dBA)	L_{10} (dBA)	
A	57 (exterior)	60 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	70 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	75 (exterior)	Developed lands, properties, or activities not included in Categories A or B, above
D	–	–	Undeveloped lands.
E	52 (interior)	55 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: FHWA
[1] Either L_{eq} or L_{10} (but not both) design noise levels may be used on a project.

U.S. Environmental Protection Agency

In addition to FHWA standards, the United States Environmental Protection Agency (EPA) has identified the relationship between noise levels and human response. The EPA has determined that over a 24-hour period, a L_{eq} of 70 dBA will result in some hearing loss. Interference with activity and annoyance will not occur if exterior levels are maintained at an L_{eq} of 55 dBA and interior levels at or below 45 dBA. While these levels are relevant for planning and design and useful for informational purposes, they are not land use planning criteria because they do not consider economic cost, technical feasibility, or the needs of the community.

The EPA also set 55 dBA L_{dn} as the basic goal for exterior residential noise intrusion. However, other federal agencies, in consideration of their own program requirements and goals, as well as difficulty of actually achieving a goal of 55 dBA L_{dn}, have settled on the 65 dBA L_{dn} level as their standard. At 65 dBA L_{dn}, activity

[3] Usage factor is the percentage of time during the workday that the equipment is operating at full power (on which the reference noise ratings for typical average and typical maximum noise emissions are based).

interference is kept to a minimum, and annoyance levels are still low. It is also a level that can realistically be achieved.

Occupational Health and Safety Administration

The federal government regulates occupational noise exposure common in the workplace through the Occupational Health and Safety Administration (OSHA) under the EPA. Such limitations would apply to the operation of construction equipment and could also apply to any proposed industrial land uses. Noise exposure of this type is dependent on work conditions and is addressed through a facility's Health and Safety Plan, as required under OSHA, and is therefore not addressed further in this analysis.

California State Regulations

The State regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise insulation standards and provides guidance for local land use compatibility.

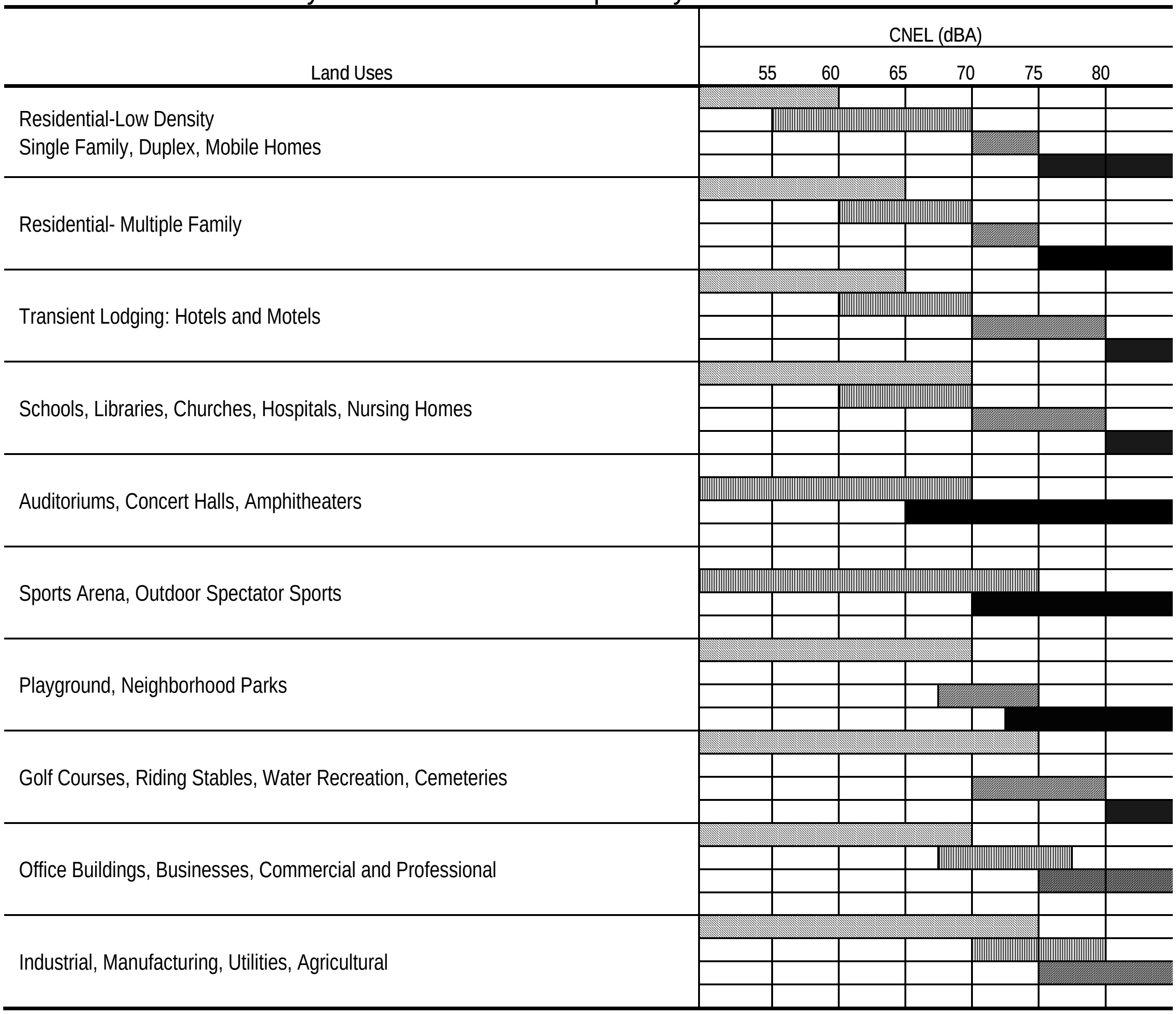
The California Building Code (CBC), Title 24, Part 2, Volume 1, Chapter 12, *Interior Environment*, Section 1207.11.2, *Allowable Interior Noise Levels*, requires that interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric is evaluated as either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), consistent with the noise element of the local general plan.

The California Green Building Standards Code (CALGreen), Chapter 5, Division, 5.5 has additional requirements for insulation that affect exterior-interior noise transmission for non-residential structures: Pursuant to section 5.507.4.1, *Exterior Noise Transmission, Prescriptive Method*, Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite sound transmission class (STC) rating of at least 50 L_{dn} or CNEL or a composite outdoor-indoor transmission class (OITC) rating of no less than 40 L_{dn} or CNEL with exterior windows of a minimum STC of 40 or OITC of 30 within a 65 dBA CNEL noise contour of an airport or within a 65 dBA CNEL or L_{dn} noise contour of a freeway, expressway, railroad, industrial source, or fixed-guideway source as determined by the noise element of the general plan. Where noise contours are not readily available, buildings exposed to a noise level of 65 dBA L_{eq} 1-hour during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 L_{dn} or CNEL (or OITC 35), with exterior windows of a minimum of STC 40 (or OITC 30).

Residential structures located within the noise contours identified above require an acoustical analysis showing that the structure has been designed to limit intruding noise in the prescribed allowable levels. To comply with these regulations, applicants for new the residential projects are required to submit an acoustical analysis report. The report is required to show topographical relationship of noise sources and dwelling site, identification of noise sources and their characteristics, predicted noise spectra at the exterior of the proposed dwelling structure considering present and future land usage, basis for the prediction (measured or obtained from published data), noise attenuation measures to be applied, and an analysis of the noise insulation effectiveness of the proposed construction showing that the prescribed interior noise level requirements are met. If interior allowable noise levels are met by requiring that windows be unopenable or closed, the design for the structure must also specify the means that will be employed to provide ventilation and cooling, if necessary, to provide a habitable interior environment.

Table 8, presents a land use compatibility chart for community noise prepared by the California Office of Noise Control. This table provides urban planners with a tool to gauge the compatibility of land uses relative to existing and future noise levels. Table 8 identifies ‘normally acceptable’, ‘conditionally acceptable’, ‘normally unacceptable’, and ‘clearly unacceptable’ noise levels for various land uses. The ‘conditionally acceptable’ and ‘normally unacceptable’ designations indicate that new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated into the design. By comparison, a ‘normally acceptable’ designation indicates that standard construction can occur with no special noise reduction requirements.

Table 8 Community Noise and Land Use Compatibility



Explanatory Notes

Normally Acceptable:
With no special noise reduction requirements assuming standard construction.

Normally Unacceptable:
New construction is discouraged. If new construction does not proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Conditionally Acceptable:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design.

Clearly Unacceptable:
New construction or development should generally not be undertaken.

Source: California Office of Noise Control. *Guidelines for the Preparation and Content of Noise Elements of the General Plan.* February 1976. Adapted from the US EPA Office of Noise Abatement Control, Washington D.C. Community Noise. Prepared by Wyle Laboratories. December 1971.

City of Torrance Municipal Code: Chapter 6, Noise Regulation

ARTICLE 1- GENERAL PROVISIONS (Added by O-2170; Amended by O-2211)

46.1.1 DECLARATION OF POLICY.

It is hereby declared to be the policy of the City to prohibit unnecessary, excessive and annoying noises from all sources subject to its police power. At certain levels noises are detrimental to the health and welfare of the citizenry and in the public interests shall be systematically proscribed.

46.1.2 DEFINITIONS. (Amended by O-2466)

As used in this Chapter, unless the context otherwise clearly indicates, the words and phrases used in this Chapter are defined as follows:

a) Ambient noise is the all encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far, without inclusion of intruding noises from isolated identifiable sources.

b) Decibel (db) shall mean a unit of level which denotes the ratio between two (2) quantities which are proportional to power; the number of decibels corresponding to the ratio to two (2) amounts of power is ten (10) times the logarithm to the base ten (10) of this ratio.

c) Emergency work shall mean work made necessary to restore property to a safe condition following a public calamity or work required to protect persons or property from an imminent exposure to danger.

d) Noise level, in decibels, is the A-weighted sound pressure level as measured using the slow dynamic characteristic for sound level meters specified in ASA S1.4-1961, American Standard Specification for General Purpose Sound Level Meters, or latest revision thereof. The reference pressure is twenty (20) micronewtons/square meter (2 x 10-4 microbar).

e) Person shall mean a person, firm, association, copartnership, joint venture, corporation or any entity, public or private in nature.

f) Sound level meter shall mean an instrument including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement of noise and sound levels in a specified manner as specified in ASA S1.4-1961, American Standard Specification for General Purpose Sound Level Meters, or latest revision thereof.

g) Sound pressure level, in decibels (db) of a sound is twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of this sound to the reference pressure. For the purpose of this Chapter the reference pressure shall be twenty (20) micronewtons/square meter (2 x 10-4 microbar).

h) Impulsive sound means a short duration sound (such as might be produced by the impact of a drophammer or pile driver) with one (1) second or less duration.

i) Motor vehicles shall include, but not be limited to, minibikes and go carts.

j) Sound amplifying equipment shall mean any machine or device for the amplification of the human voice, music, or any other sound. Sound amplifying equipment shall not include standard automobile radios when used and heard only by the occupants of the vehicle in which the automobile radio is installed. Sound amplifying equipment, as used in this Chapter, shall not include warning devices on authorized emergency vehicles or horns or other warning devices on any vehicle used only for traffic safety purposes.

k) Sound truck shall mean any motor vehicle, or any other vehicle regardless of motive power, whether in motion or stationary, having mounted thereon, or attached thereto, any sound amplifying equipment.

l) Commercial purpose shall mean and include the use, operation or maintenance of any sound amplifying equipment for the purpose of advertising any business or any goods or any services, or for the purpose of attracting the attention of the public to, or advertising for, or soliciting patronage or customers to or for any performance, show, entertainment, exhibition, or event, or for the purpose of demonstrating any such sound equipment.

m) Noncommercial purpose shall mean the use, operation or maintenance of any sound equipment for other than a commercial purpose. Noncommercial purposes shall mean and include, but shall not be limited to, philanthropic, political, patriotic and charitable purposes.

n) Residential land shall mean that land which is utilized for residential purposes or zoned for residential purposes.

o) Residential purpose means any purpose involving routine and relatively permanent use of a building as a dwelling, as opposed to relatively transient uses such as hotels and motels.

p) Day means the time period from 7:00 A.M. to 10:00 P.M.

q) Night means the time period from 10:00 P.M. to 7:00 A.M.

46.1.3 MEASUREMENTS.

Noise levels shall be measured with a sound level meter satisfying the requirements of ASA S1.4-1961, American Standard Specification for General Purpose Sound Level Meters, or latest revision thereof. Noise level of steady or slowly varying sounds shall be measured using the slow dynamic characteristic of the sound level meter and by reading the central tendency of the needle. Noise level of impulse sounds shall be measured using the fast dynamic characteristic of the sound level meter and by reading the maximum indication of the needle.

ARTICLE 2- SPECIAL NOISE SOURCES

46.2.1 RADIOS, TELEVISION SETS AND SIMILAR DEVICES.

a) Use Restricted. It shall be unlawful for any person within the City of Torrance to use or operate any radio receiving set, musical instrument, phonograph, television set, or other machine or device for the producing or reproducing of sound at any time in such a manner as to produce noise levels on residential land which would disturb the peace, quiet and comfort of neighboring residents or any reasonable person of normal sensitiveness residing in the area.

b) Prima Facie Violation. Any noise exceeding the ambient noise level at the property line of any residential land (or if a condominium or apartment house, within any adjoining apartment) by more than five (5) decibels shall be deemed to be prima facie evidence of a violation of the provisions of this Section.

46.2.2 HAWKERS AND PEDDLERS.

It shall be unlawful for any person within the City to sell anything by outcry within any area of the City utilized for residential purposes. The provisions of this Section shall not be construed to prohibit the selling by outcry of merchandise, food and beverages at licensed sporting events, parades, fairs, circuses and other similar licensed public entertainment events.

46.2.3 DRUMS.

It shall be unlawful for any person to use any drum or other instrument or device of any kind for the purpose of attracting attention by the creation of noise within the City. This Section shall not apply to any person who is a participant in a school band or duly licensed parade or who has been otherwise duly authorized by the City to engage in such conduct.

46.2.4 SCHOOLS, HOSPITALS AND CHURCHES.

It shall be unlawful for any person to create any noise on any street, sidewalk or public place adjacent to any school, institution of learning or church while the same is in use or adjacent to any hospital, which noise unreasonably interferes with the workings of such institution or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such streets, sidewalks or public place indicating the presence of a school, church or hospital.

46.2.5 ANIMALS AND FOWL.

No person shall keep or maintain, or permit the keeping of upon any premises owned, occupied or controlled by such person, any animal or fowl otherwise permitted to be kept which, by any sound, cry or behavior shall cause annoyance or discomfort to a reasonable person of normal sensitiveness on any residential land.

46.2.6 MACHINERY, EQUIPMENT, FANS AND AIR CONDITIONING.

It shall be unlawful for any person to operate any machinery, equipment, pump, fan, air conditioning apparatus or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any residential land to exceed the ambient noise level by more than five (5) decibels.

46.2.7 OIL PRODUCTION EQUIPMENT. (Added by O-2528)

It shall be unlawful for any person to operate, or cause to be operated any oil production equipment in any manner so as to create any noise which would cause the noise level at the nearest property line of any residential land to exceed the ambient noise level by more than five (5) decibels; provided, however, that the aforesaid provisions of this Section shall not apply to oil production equipment being used in the drilling, redrilling, deepening, repair, maintenance or abandonment of an oil well.

ARTICLE 3- CONSTRUCTION

46.3.1 CONSTRUCTION OF BUILDINGS AND PROJECTS. (Amended by O-3712)

a) It shall be unlawful for any person within the City of Torrance to operate power construction tools, equipment, or engage in the performance of any outside construction or repair work on buildings, structures, or projects in or adjacent to a residential area involving the creation of noise beyond 50 decibels (db) as measured at property lines, except between the hours of 7:30 A.M. to 6:00 P.M. Monday through Friday and 9:00 A.M. to 5:00 P.M. on Saturdays. Construction shall be prohibited on Sundays and Holidays observed by City Hall. An exception exists between the hours of 10:00 A.M. to 4:00 P.M. for homeowners that reside at the property.

b) The Community Development Director may allow expanded hours and days of construction if unusual circumstances and conditions exist. Such requests must be made in writing and must receive approval by the Director prior to any expansion of the hour and day restrictions listed above.

c) Every construction project requiring Planning Commission review or considered to be a significant remodel as defined by Section 231.1.2, shall be required to post an information board along the front property line that displays the property owner's name and contact number, contractor's name and contact number, a copy of TMC Section 46.3.1, a list of any special conditions, and the Code Enforcement phone number where violations can be reported.

d) Properties zoned as commercial, industrial or within an established redevelopment District, are exempted from the above day and hour restrictions if a minimum buffer of 300 feet is maintained from the subject property's property line to the closest residential property. The Community Development Director, may, however, revoke such exemption for a particular project if the noise level exceeds 50 decibels (db) at the property line of a residential property beyond the 300 linear foot buffer.

e) Heavy construction equipment such as pile drivers, mechanical shovels, derricks, hoists, pneumatic hammers, compressors or similar devices shall not be operated at any time, within or adjacent to a residential area, without first obtaining from the Community Development Director permission to do so. Such request for permission shall include a list and type of equipment to be used, the requested hours and locations of its use, and the applicant shall be required to show that the selection of equipment and construction techniques has been based on minimization of noise within the limitations of such equipment as is commercially available or combinations of such equipment and auxiliary sound barriers. Such permission to operate heavy construction equipment will be revoked if operation of such equipment is not in accordance to approval. No permission shall be required to perform emergency work as defined in Article 1 of this Chapter.

46.3.2 OPERATION OF OIL EQUIPMENT. (Added by O-2528)

a) It shall be unlawful for any person to operate machinery or power tools for the repair, maintenance or abandonment of oil well equipment on Sundays and legal holidays and, except between the hours of 7:00 A.M. and 8:00 P.M., on any other day; provided, however, that the provisions of this subsection shall not apply to any well, the surface of which is three hundred (300) or more feet from any dwelling.

b) It shall be unlawful for any person to conduct oil drilling or redrilling operations other than circulation of mud, on Sundays and legal holidays and, except between the hours of 7:00 A.M. and 9:00 P.M., on any other day; provided, however, that the provisions of this subsection shall not apply to any well the surface of which is three hundred (300) or more feet from any dwelling.

c) It shall be unlawful for any person to operate machinery or power tools for the repair, maintenance or abandonment of oil well equipment or to conduct oil well drilling or redrilling operations at any time within three hundred (300) feet of any dwelling without first obtaining from the Director of Building and Safety permission to do so. Such request for permission shall include a list and type of equipment to be used, the requested hours and locations of its use. The Director of Building and Safety shall issue such permit only if the applicant demonstrates to the reasonable satisfaction of the Director that the selection of equipment and construction techniques has been based on minimization of noise within the limitations of such equipment as is commercially available or combinations of such equipment and auxiliary sound barriers or acoustical sound blankets as provided in Section 46.3.3. Such permission to operate oil well equipment shall be revoked if such equipment is not operated and construction is not accomplished in accordance with the conditions of approval. No permission shall be required to perform emergency work as defined in Article 1 of this Chapter. The person performing such emergency work shall first notify the occupants of adjacent residences and the Torrance Police Department as to the nature and extent of the work to be performed.

46.3.3 ACOUSTICAL BLANKETS. (Added by O-2528)

Acoustical blankets shall be made of fibrous glass insulation 1-1/2 inches thick, 0.50 pounds per cubic foot density, 0.63 pounds per square foot weight, .00010 to .00015 fibre diameter (inches) with phenolic binder having a temperature limit of 450 degrees F. sewed between layers of fire retardant vinyl fibre glass cloth, 15-17 ounces per square yard sewed with dacron thread D-92 with stitches not more than six (6) to the inch. The lacing cord shall be flat vinyl coated tape composed of fibrous glass yard braided, heat set and bonded. The tape shall have a 90 pound tensile strength. Grommets shall be No. 4 brass. Provided, however, that there may be substituted for the aforesaid specifications an acoustical blanket which in the opinion of the Director of Building and Safety is equal to sound-proofing ability and fire resistive qualities to the aforesaid specifications.

ARTICLE 4- VEHICLES

46.4.1 VEHICLE REPAIRS.

It shall be unlawful for any person within the City of Torrance to repair, rebuild or test any motor vehicle at any time in such a manner that a reasonable person of normal sensitiveness located on residential land is caused discomfort or annoyance by reason of the noise produced therefrom.

46.4.2 MOTOR DRIVEN VEHICLES.

It shall be unlawful for any person to operate any motor driven vehicle within the City in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance; provided, however, that any such vehicle which is operated upon any public highway, street or right-of-way shall be excluded from the provisions of this Section, provided the provisions of the California Motor Vehicle Code, Sections 23130, 27150 and 27151 are complied with.

ARTICLE 5- AMPLIFIED SOUND (Amended by O-3360)

46.5.1 PURPOSE.

The Council enacts the provisions of this Article for the sole purpose of securing and promoting the public health, comfort, safety, and welfare for its citizenry. While recognizing that the use of sound amplifying equipment is protected by the constitutional rights of freedom of speech and assembly, the Council nevertheless feels obligated to reasonably regulate the use of sound amplifying equipment in order to protect the correlative constitutional rights of the citizens of this community to privacy and freedom from public nuisance of loud and unnecessary noise.

46.5.2 APPLICATION REQUIRED.

It shall be unlawful for any person, other than personnel of law enforcement or governmental agencies, to install, use or operate within the City a loudspeaker or sound amplifying equipment in a fixed or movable position or mounted upon any sound truck for the purposes of giving instructions, directions, talks, addresses, lectures or transmitting music to any persons or assemblages of persons in or upon any street, alley, sidewalk, park, place or public property without first filing an application and obtaining a permit therefor as set forth in Division 3 of this Code.

46.5.3 REGULATIONS.

The commercial and noncommercial use of sound amplifying equipment shall be subject to the following regulations:

a) The only sounds permitted shall be either music or human speech, or both.

b) The operation of sound amplifying equipment shall only occur between the hours of 9:00 A.M. and 9:00 P.M. each day except on Sundays and legal holidays. The operation of sound amplifying equipment for noncommercial purposes on Sundays and legal holidays shall only occur between the hours of 10:00 A.M. and 6:00 P.M.

c) No sound emanating from sound amplifying equipment shall exceed fifteen (15) dBA above the ambient as measured at any property line.

d) Notwithstanding the provisions of subsection c) of this Section, sound amplifying equipment shall not be operated within two hundred (200) feet of churches, schools or hospitals.

e) In any event, the volume of sound shall be so controlled that it will not be unreasonably loud, raucous, jarring, disturbing or a nuisance to reasonable persons of normal sensitiveness within the area of audibility.

ARTICLE 6- TRAIN HORNS AND WHISTLES

46.6.1 EXCESSIVE SOUND PROHIBITED.

It shall be unlawful for any person to operate or sound or cause to be operated or sounded, between the hours of 10:00 P.M. of one day and 7:00 A.M. of the next day, a train horn or train whistle which creates noise in excess of ninety (90) db at any place or point three hundred (300) feet or more distant from along a line normal to the direction of travel of the source of such sound.

ARTICLE 7- GENERAL NOISE REGULATIONS

46.7.1 GENERAL NOISE REGULATIONS.

Notwithstanding any other provision of this Chapter and in addition thereto, it shall be unlawful for any person to willfully make or continue, or cause to be made or continued, any loud, unnecessary or unusual noise which disturbs the peace or quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.

46.7.2 NOISE LIMITS.

To provide for methodical enforcement and to give reasonable notice of the performance standards to be met, the foregoing intent is expressed in the following numerical standards. For purposes of this Chapter, the City is divided into regions as set forth in Exhibit A.

a) Noise Limits on Residential Land. It shall be unlawful for any person within the City of Torrance (wherever located) to produce noise in excess of the following levels as received on residential land owned or occupied by another person within the designated regions. In addition to the noise limits stated herein, the noise limits set forth in Sec. 46.7.2.b) shall also be complied with.

1) For noise receivers located on residential land, for measurement positions five hundred (500) feet or more distant from the boundaries of Regions 1 and 2, the following limits apply:

REGION (in which noise receiver is located)	NOISE LEVEL, dB	
	Day	Night
3	50	45
4	55	50

2) For noise receivers located on residential land, for positions within five hundred (500) feet from the boundary of Region 1 or 2, the following limits apply:

Five (5) dB above the limits set forth in Section 46.7.2.a) 1 above, or 5 dB above the ambient noise level, whichever is the lower number.

b) Noise Limits at Industrial and Commercial Boundaries:

1) Noise Sources in Region 1: It shall be unlawful for any person in Region 1 to produce noise levels at the boundary of Region 1 in excess of 70 dB during the day or 65 dB during the night.

2) Noise Sources in Region 2: It shall be unlawful for any person in Region 2 to produce noise levels at the boundary of Region 2 in excess of 60 dB during the day or 55 dB during the night.

3) Noise Sources in All Remaining Industrial Use Land: It shall be unlawful for any person on industrial use land outside Region 1 and 2 to produce noise levels at his own property boundary in excess of 60 dB during the day or 55 dB during the night.

4) Noise Sources on All Land Use for Commercial Purposes: It shall be unlawful for any person on land used for commercial purposes to produce noise levels at his own property boundary in excess of 60 dB during the day or 55 dB during the night.

In addition to the noise limits set forth herein (Sec. 46.7.2.b), the noise limits set forth in Sec. 46.7.2.(a) shall also be complied with.

c) Corrections to the Noise Limits: The numerical limits given in Sec. 46.7.2.(a) and (b) shall be adjusted by addition of the following corrections where appropriate.

Noise Conditions		Correction to the Limits, decibels
1.	Noise contains a steady, audible tone, such as a whine, screech or hum	-5
2.	Noise is a repetitive impulsive noise, such as hammering or riveting	-5
3.	If the noise is not continuous, one of the following corrections to the limits shall be applied:	
	a) Noise occurs less than 5 hours per day or less than 1 hour per night	+5
	b) Noise occurs less than 90 minutes per day or less than 20 minutes per night	+10
	c) Noise occurs less than 30 minutes per day or less than 6 minutes per night	+15
4.	Noise occurs on Sunday morning (between 12:01 A.M. and 12:01 P.M. Sunday)	-5

46.7.3 EXCEPTIONS.

The following noise sources are specifically excluded from the provisions of this Chapter:

1) Aircraft in flight.

2) Motor vehicles operating in accordance with Sec. 46.4.2. and in accordance with all the sections of the California Motor Vehicles Code.

ARTICLE 8- AIRPORT NOISE LIMITS (Added by O-2784)

46.8.1 VIOLATIONS UNLAWFUL.

It shall be unlawful for any person to pilot or operate or permit to be piloted or operated an aircraft in violation of the provisions of Sections 46.8.8., 46.8.9. or 46.8.14.

46.8.2 EXTENDED AIRPORT BOUNDARIES DEFINED.

For the purposes of this Article, the term extended airport boundaries shall mean the area enclosed by Lomita Boulevard on the north, Crenshaw Boulevard on the east, Pacific Coast Highway on the south and Hawthorne Boulevard on the west.

46.8.3 TAKE-OFF DEFINED. (Amended by O-3270)

For the purposes of this Article, take-off shall mean the flight of an aircraft departing Torrance Airport from the time it commences on its departure on the runway.

46.8.4 LANDING DEFINED. (Amended by O-3270)

For the purposes of this Article, landing shall mean the flight of an aircraft from the time it begins its landing approach until it is taxied from the runway.

46.8.5 SOUND EXPOSURE LEVEL.

For the purposes of this Article, the sound exposure level is the level of sound accumulated during a given event, with reference to a duration of one second. More specifically, sound exposure level, in decibels, is the level of the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on the reference pressure of 20 micronewtons per square meter and reference duration of one second.

46.8.6 SENEL.

For the purposes of this Article, the single event noise exposure level (SENEL), in decibels, is the sound exposure level of a single event, such as an aircraft fly-by, measured over the time interval between the initial and final times for which the sound level of a single event exceeds the threshold sound level. For implementation of the provisions of this Article, the threshold noise level shall be at least 20 decibels below the numerical value of the single event noise exposure level limits specified in Sections 46.8.8. or 46.8.9. as the case may be.

46.8.7 MAXIMUM SOUND LEVEL DEFINED.

For the purposes of this Article, the maximum sound level, in decibels, is the highest sound level reached at any instant of time during the time interval used in measuring the sound exposure level of a single event.

46.8.8 AIRCRAFT NOISE LIMIT.

Except as provided in Section 46.8.10., no aircraft taking off from or landing on the Torrance Municipal Airport may exceed a single event noise exposure level (SENEL) of 88 dBA or a maximum sound level of 82 dBA measured at ground level outside the extended Airport boundaries.

46.8.9 AIRCRAFT NOISE LIMIT AT NIGHT. (Amended by O-3284)

Notwithstanding the provisions of Section 46.8.8., except as provided in Section 46.8.10., no aircraft taking off from or landing on the Torrance Municipal Airport between the hours of 10:00 P.M. of any day and 7:00 A.M. of the following morning on any Monday through Friday inclusive, nor between the hours of 10:00 P.M. each night and 8:00 A.M. of the following morning on any Saturday or Sunday inclusive, nor on any of the following holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day; provided, however, that if any such holiday falls on a Saturday or Sunday, the observance of which is then moved to the preceding Friday, or the following Monday, then such Friday or Monday shall be considered to be a holiday for purposes of this section, may exceed a single event noise exposure level (SENEL) of 82 dBA or a maximum sound level of 76 dBA measured at ground level outside the extended Airport boundaries.

46.8.10 AIRCRAFT NOISE EXEMPTION. (Amended by O-3382)

The following categories of aircraft shall be exempt from the provisions of Sections 46.8.8. and 46.8.9.:

1) Aircraft operated by the United States of America or the State of California;

2) Law enforcement, emergency, fire or rescue aircraft operated by any county or city of said state;

3) Aircraft used for emergency purposes during an emergency that has been officially proclaimed by competent authority pursuant to the laws of the United States, said State or the City;

4) Civil Air Patrol aircraft when engaged in actual search and rescue missions;

5) Aircraft engaged in landings or takeoffs while conducting tests under the direction of the Airport Manager in an attempt to rebut the presumption of aircraft noise violation pursuant to the provisions of Section 46.8.13

6) Aircraft while participating in a City-sponsored event approved by City Council.

46.8.11 CULPABILITY OF INSTRUCTOR PILOT.

In the case of any training flight in which both an instructor pilot and a student pilot are in the aircraft which is flown in violation of any of the provisions of this Article, the instructor pilot shall be rebuttably presumed to have caused such violation.

46.8.12 CULPABILITY OF AIRCRAFT OWNER OR LESSEE.

For purposes of this Article, the beneficial owner of an aircraft shall be presumed to be the pilot of the aircraft with authority to control the aircraft's operations, except that where the aircraft is leased, the lessee shall be presumed to be the pilot. Such presumption may be rebutted only if the owner or lessee identifies the person who in fact was the pilot at the time of the asserted violation.

46.8.13 DENIAL OF USE OF AIRPORT.

(See Section 51.7.2. et seq. concerning denial of the use of the Airport for repeated violations of this Article.)

46.8.14 PRESUMPTION OF AIRCRAFT NOISE VIOLATION.

In the event that the Airport Manager determines to his reasonable satisfaction that available published noise measurements for a particular type or class of aircraft indicate that it cannot meet the noise levels set forth in Sections 46.8.8. and 46.8.9., it shall be presumed that operation of such aircraft will result in violation of the provisions of Sections 46.8.8. and 46.8.9. and such aircraft will not be permitted to land on, tie down on, be based at or take off from the Torrance Municipal Airport, except in emergencies as set forth in Section 51.4.2.; provided, however, that the owner or operator of such aircraft shall be entitled to rebut such presumption to the reasonable satisfaction of the Airport Manager by furnishing evidence to the contrary.

46.8.15 DESIGNATED ENFORCEMENT OFFICIAL.

The Director of Building and Safety, the Administrator of Environmental Quality, the Environmental Quality Officers and such other City employees as are designated by the Director of Building and Safety with the approval of the City Manager, all acting under the direction and control of the City Manager, shall have the duty and authority to enforce the provisions of this Article, pursuant to the provisions of Section 836.5 of the State Penal Code.

CHAPTER 5 NOISE ELEMENT

TABLE OF CONTENTS

List of Tables

List of Figures

CHAPTER 5 NOISE ELEMENT

INTRODUCTION

Noise that is experienced by people who did not produce it is "second-hand sound," and is among the most pervasive pollutants today. Like second-hand smoke, it has detrimental effects on people who had no part in creating it.
- Noise Pollution Clearinghouse, 2004

Excessive noise can disrupt our lives. Noise can interrupt our conversations, thoughts, and leisure activities. Noise sensitivity varies depending on the time of day, its duration and pitch, and preferences of individuals. Despite this variability, most residents agree that too much noise or the wrong type of noise can be irritating and interfere with sleep, speech, recreation, and tasks that require concentration or coordination. Therefore, noise not only decreases environmental quality but can also adversely affect our physical and mental health.

In Torrance, street and freeway traffic represent the primary source of noise. The I-405 Freeway, which traverses the northeastern portion of the City, presents concerns where it runs adjacent to residential neighborhoods and schools. Other significant sources of noise include arterial roadways and intersections, the Santa Fe Railroad, and Torrance Municipal Airport.

Because Torrance is largely built out and the street system well developed, the City faces challenges in separating noise-sensitive land uses from primary noise sources. Thus, the Noise Element establishes policies to guard against creation of any new noise/land use conflicts and to minimize the impact of existing noise sources on the community.

RELATIONSHIP TO OTHER GENERAL PLAN ELEMENTS

Land use relationships and noise associated with roadways, train traffic, and operations at Torrance Municipal Airport represent the focus of community noise concerns. Therefore, policies in this Noise Element are tied most closely to policies and programs set forth in the Land Use and Circulation Elements. For example, community noise standards affect the location or treatment of proposed new land uses, such as uses within the noise contours of the airport. With regard to the local road network, this Element contains noise contour maps that identify anticipated noise levels associated with future traffic volumes, and includes policies and programs intended to reduce adverse noise conditions.

SCOPE AND REQUIREMENTS OF THE NOISE ELEMENT

In recognition of the adverse health effects associated with excessive noise, the California Government Code, Section 65302(f) very specifically identifies the types of community noise to be addressed in the General Plan. The Noise Element addresses noise sources from:

- Highways and freeways
- Primary arterials and major local streets
- Passenger and freight on-line railroad operations and ground rapid transit systems
- Commercial, general aviation, heliport, and military airport operations, aircraft over-flights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operations
- Local industrial plants, including, but not limited to, railroad classification yards
- Other stationary ground noise sources identified by local agencies as contributing to the community noise environment

1. MEASURING NOISE

Noise is often described as unwanted or irritating sound. Defining noise with a single unit of measure is difficult because noise consists of several components — pitch, loudness, and duration — and because noise includes subjective qualities. At the objective level, scientists have developed the A-weighted sound pressure level, or dB(A), to describe the loudness of a sound or sound environment based on the sensitivity of the human ear. At 60 dB(A), noise impairs the ability to hear speech, and sound levels over 40 to 45 dB(A) can disturb sleep. A person's likelihood of hearing loss strongly increases at prolonged exposure to sound levels over 85 dB(A). To provide some perspective on the relative loudness of various types of noise, Table N-1 lists common sources of noise and their approximate noise levels.

Table N-1
Typical Noise Levels

Common Outdoor Activities	Noise Level in dB(A)	Common Indoor Activities
	110	Rock Band
Jet Fly-over at 1,000 feet	100	
	90	
Diesel Truck at 50 feet at 50 mph		Food Blender at three feet
	80	Garbage Disposal at three feet
Noisy Urban Area, Daytime		
Gas Lawn Mower at 3 feet	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night
		Concert Hall (background sound)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Table N-2136.2 of California Department of Transportation's Traffic Noise Analysis Protocol (October 1998).

Table N-2 describes State criteria for minimizing harmful noise effects.

Table N-2
State Criteria for Minimizing Adverse Noise Effects on Humans

Objective	dB(A) Range
Prevent Hearing Loss	75-80
Prevent Physiological Effects (other than hearing loss)	65-75
Prevent Speech Interference	50-60
Address People's Subjective Preference for Noise Control	45-50
Prevent Sleep Interruption	35-45

Source: California General Plan Guidelines, 2000.

Acousticians have developed noise metrics to account for the fact that noise during nighttime hours can be more bothersome than daytime noise. The noise metrics apply a weighted ambient noise level average over a 24-hour period, and assigns "penalties" to noise that occurs between 10:00 P.M. to 7:00 A.M. These metrics are defined as either the Community Equivalent Noise Level (CNEL) or Day-Night Level (Ldn).

Figure N-1 shows common CNEL and Ldn noise exposure levels at different locations. The highest dB(A) level is listed for the area next to a freeway, which has a noise exposure level of 85 dB(A). The lowest dBA level is listed for a farm, which is 40 dB(A). The figure also indicates that 65 dB(A) is the common standard for noise level in outdoor residential areas, and 45 dB(A) is the common standard for the interior of residences

The objectives and policies in this element aim to meet the City's overarching goal for noise regulation in the City of Torrance:

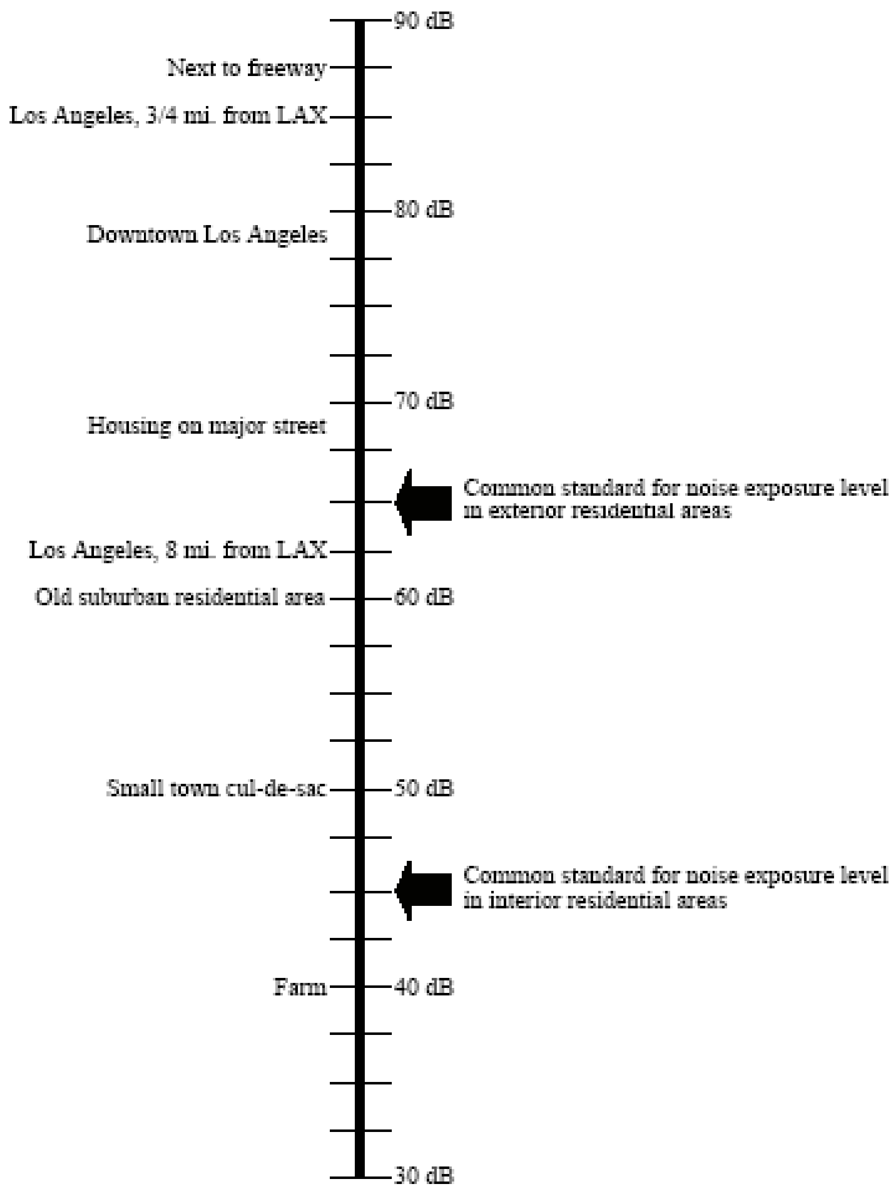
GOAL:	Minimize exposure of residents to noise

2. BASELINE NOISE CONDITIONS

The community noise environment can be described using contours derived from monitoring major sources of noise. Noise contours are analogous to topographic contours on a map showing terrain. Just as topographic contours illustrate elevations of the ground surface, noise contours define noise levels at particular locations. The contours generally represent average noise levels, such as the CNEL or Ldn, based on major noise sources in the community. The contours assist in setting policies for distribution of land uses and establishment of development standards.

A study of baseline noise sources and levels was completed in August, 2006. Noise level measurements were collected during a typical weekday at 20 locations throughout Torrance. Criteria for site selection included geographical distribution, land uses suspected of noisy activities, and proximity to transportation facilities and sensitive receptor locations. The primary purpose of noise monitoring was to establish a noise profile for the community that could be used to determine areas of concern.

Figure N-2 shows noise contours for noise conditions in Torrance in 2006. The contours account for the many noise sources in the City, including I-405, arterial and collector roadways, train operations along the Santa Fe Railroad, the Honeywell facility, and Torrance Airport. Each source is described in greater detail in Figure N-1.

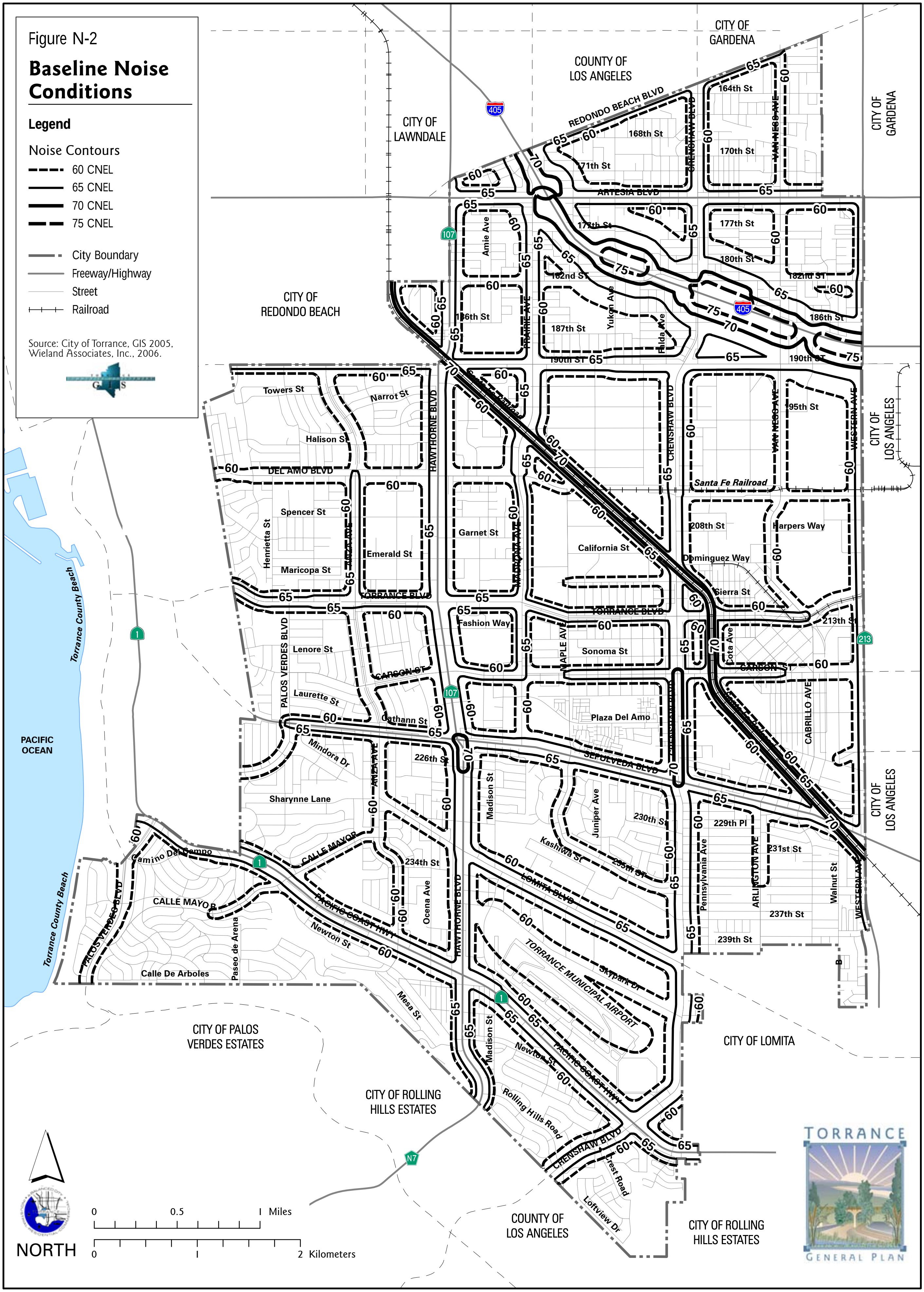


Source: Wieland Associates, Inc., July 2006.

Figure N-1:
Common CNEL and Ldn Noise Exposure Levels at Various Locations

Figure N-2

Baseline Noise Conditions



2.1 TRANSPORTATION-RELATED NOISE

2.1.1 I-405 FREEWAY

Interstate 405 crosses the northeastern portion of Torrance and is busy for most daylight hours. Traffic levels create noise conditions in excess of 65 CNEL along the freeway's path. As noted in Figure N-1, this is generally considered the threshold noise level for residential use. Figure N-2 shows that several residential neighborhoods and public facilities are exposed to high noise levels from freeway traffic.

As freeways are under the jurisdiction of Caltrans, this State agency is responsible for addressing noise abatement issues where Caltrans' activities have created adverse noise conditions, pursuant to the Streets and Highway Code. Consistent with Section 216 of the Code, Caltrans has, for example, implemented a School Noise Abatement Program that takes measures to reduce classroom interior noise levels to below 52 dB(A). Yukon Elementary, located immediately north of I-405 between Crenshaw Boulevard and Prairie Avenue, is exposed to noise levels of 75 dB(A) and higher; the school has benefitted from soundproofing and air-conditioning as part of this program.[1] As regional traffic continues to increase, freeway noise mitigation will continue to be a key policy issue for Torrance.

2.1.2 MAJOR ROADWAYS

Residents whose homes either abut or are in proximity to major roadways may experience high noise levels during peak commute hours. Generally, Torrance's historic land use patterns have resulted in commercial and industrial land uses along arterial roadways. Also, the noise contours shown on Figure N-2 indicate that roadway noise generally does not exceed 65 CNEL. As of 2006, the only roadway sections with noise levels at or above 65 CNEL were Crenshaw Boulevard between Carson Street and Sepulveda Boulevard and the intersection of Sepulveda Boulevard and Hawthorne Boulevard.

2.1.3 SANTA FE RAILROAD

In Torrance, noise from the Santa Fe Railroad is sporadic because trains do not run continuously throughout the day. However, when trains do run through the City, they are as noisy as peak hours of automobile and truck traffic. Freight trains pass through Torrance daily in route to and from Long Beach. Figure N-2 indicates that, compared to noise effects of I-405, a limited buffer area surrounding the railroad is exposed to noise levels of 60 CNEL or higher.

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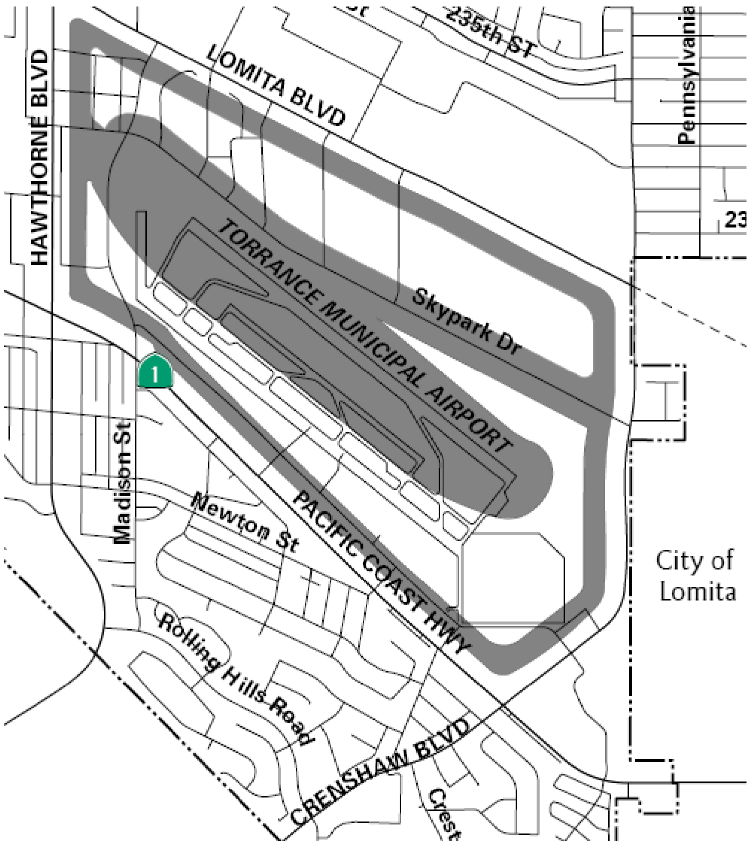
[1] Caltrans District 7, Project Information, Soundwalls.
http://www.dot.ca.gov/dist07/aboutdist7/projects/soundwalls_02/index.php?strpg=noise



60 CNEL Noise Contour
Wieland Associates, Inc., 2006

Figure N-3:
Noise Conditions, Torrance Airport

A few residential uses near the intersection of Torrance Boulevard and the railroad line are adversely impacted by railroad noise.

2.1.4 TORRANCE MUNICIPAL AIRPORT (ZAMPERINI FIELD)

Torrance Municipal Airport is a general aviation facility that accommodates both propeller and jet aircraft (although jet traffic is limited by the fact that jet fuel is not sold at the airport). The Torrance Municipal Code includes stringent noise standards intended to make the airport compatible with adjacent land uses. The airport follows the Federal Aviation Administration's (FAA) land use restrictions, which regulate land uses surrounding airports and flight paths. In addition to safety concerns, these restrictions also restrict incompatible land uses near airports because of noise concerns. The City also has adopted a strict Airport Noise Abatement Program. Noise monitors report excessive aircraft noise to City staff, and staff works with pilots to find ways to meet the established noise limits.

The City's Noise Abatement program has resulted in reduced noise complaints from aircraft activity at Torrance Airport.

Figure N-3 indicates that critical noise contours associated with Torrance Airport do not impact any residential neighborhoods. In fact, most of the 60 dBA noise contour is confined to airport property, although properties along the north most sections of Skypark Drive are marginally affected by noise. The majority of noise affecting the rest of Skypark Drive, Hawthorne Boulevard, and Pacific Coast Highway is automobile related.

Adjacent to Torrance Airport, Robinson Helicopter manufactures civil helicopters. Helicopter noise often may be more irritating than noise from other aircraft because helicopters operate at low altitudes and therefore produce more noise. Robinson Helicopter adheres to the City's noise standards to ensure that late-night helicopter operations are limited.

2.2 NON-TRANSPORTATION NOISE

Non-transportation noise sources include various activities in commercial and industrial districts, which may include potential stationary noise sources.

As a matter of practice, the City reviews all development applications to identify issues of concern, including potential noise exposure and generation. An acoustical analysis is required for projects that could have potentially adverse noise effects on sensitive receptors such as schools, hospitals, churches, and residential neighborhoods. Mitigating features or conditions must be included in a project when significant noise impacts are identified.

Other sources of community noise are often associated with ordinary daily activities such as property maintenance and construction. Excessive noise from lawnmowers, leaf blowers, mechanical equipment, power tools, and the like can generate complaints when noise-generating activities occur in the evening or during restful weekend hours. The City's noise standards will be implemented to help maintain optimal interior and exterior noise levels within residential areas.

3. FUTURE NOISE CONDITIONS

As Torrance is largely developed, new development over time will be limited to the recycling of uses to slightly higher densities and intensities at limited locations. The long-established land use patterns generally will not change. More intense development will be focused along major corridors, such as Hawthorne Boulevard.

Over the long term, noise conditions in Torrance are not anticipated to change significantly from the baseline conditions modeled in 2006. Future noise contours have been developed based on anticipated traffic volumes, rail traffic, airport operations, and general land use activity. These contours assist in the review of land use and development proposals. Figure N-4 presents the projected noise contours and noise impact areas.

Overall, the increase in noise over the life of the General Plan is minimal. The primary stationary noise sources — Torrance Municipal Airport and major industrial operations — will continue to exist. Roadway noise along major roads such as Hawthorne Boulevard and Crenshaw Boulevard will increase slightly due to increase in traffic volumes mostly attributable to regional growth. Small entryway segments of Torrance Boulevard and Carson Street at the east end of the City will also experience minimal increases in noise. A small segment of Prairie Avenue just north and south of the I-405 will also experience an increase in noise levels attributable to expected traffic growth along the I-405. Areas that are expected to experience increased noise levels are primarily limited to non-residential areas. Most residential areas will not experience noise levels above baseline conditions with the exception of two short segments of Palos Verdes Boulevard (the segment from Torrance Boulevard to Sepulveda Boulevard and a segment just north of Calle Mayor).

Table N-3 establishes the noise/land use compatibility criteria Torrance will use in determining whether a new use is appropriate within a given noise environment.

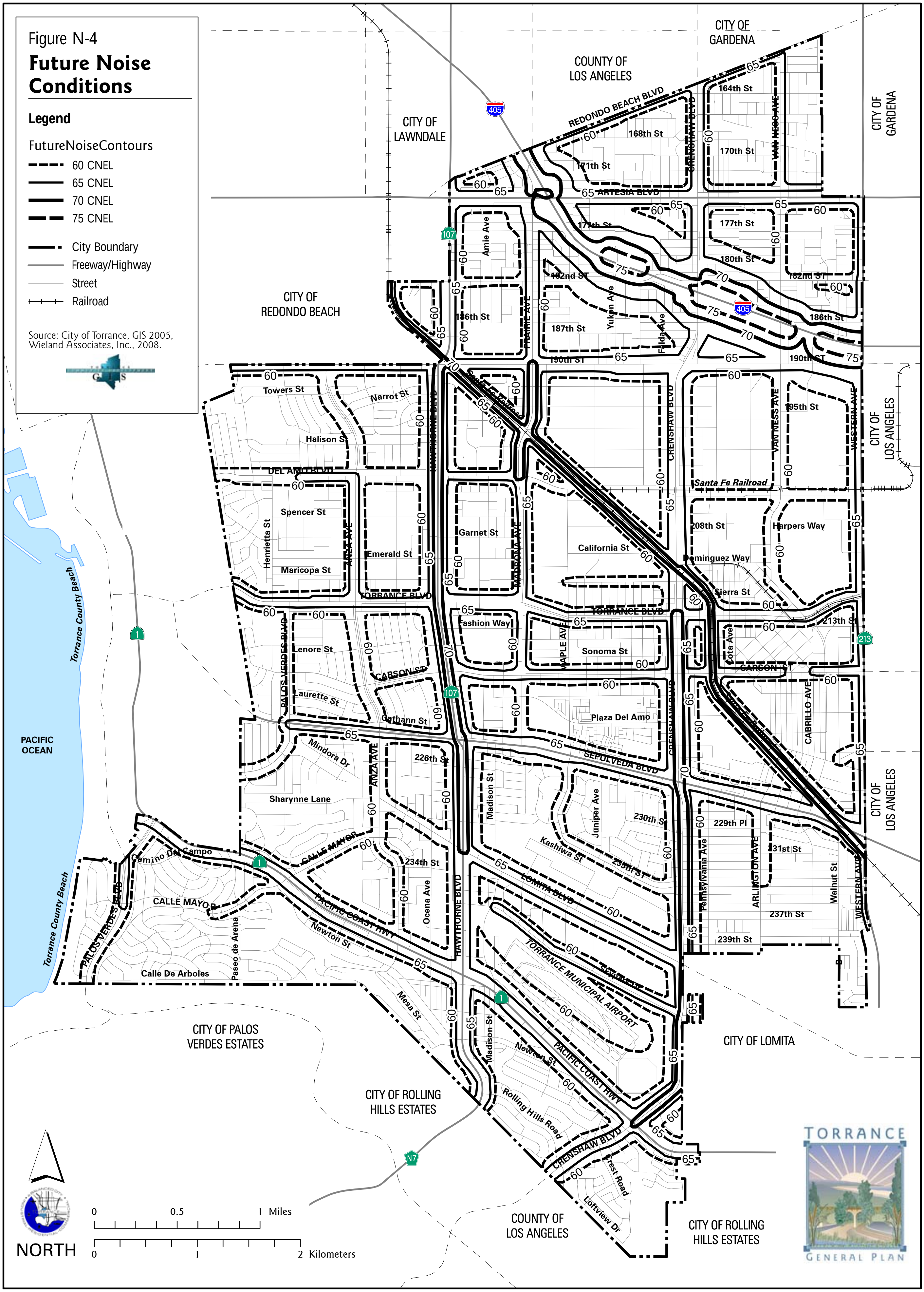


Figure N-4
Future Noise Conditions
Legend
FutureNoiseContours
60 CNEL
65 CNEL
70 CNEL
75 CNEL
City Boundary
Freeway/Highway
Street
Railroad
Source: City of Torrance, GIS 2005, Wieland Associates, Inc., 2008.
CITY OF GARDENA
COUNTY OF LOS ANGELES
CITY OF LAWNDALE
CITY OF REDONDO BEACH
CITY OF LOS ANGELES
PACIFIC OCEAN
Torrance County Beach
CITY OF PALOS VERDES ESTATES
CITY OF ROLLING HILLS ESTATES
CITY OF LOMITA
REDONDO BEACH BLVD
ARTESIA BLVD
CRENSHAW BLVD
HAWTHORNE BLVD
PRAIRIE AVE
VAN NESS AVE
WESTERN AVE
DEL AMO BLVD
TORRANCE BLVD
CARSON ST
SEPULVEDA BLVD
LOMITA BLVD
PACIFIC COAST HWY
PALOS VERDES BLVD
ANZA AVE
MADRONA AVE
MAPLE AVE
ARLINGTON AVE
CABRILLO AVE
CALLE MAYOR
Santa Fe Railroad
TORRANCE MUNICIPAL AIRPORT
Plaza Del Amo
164th St
168th St
170th St
171th St
177th St
180th St
182nd St
186th St
187th St
190th St
195th St
208th St
213th St
226th St
229th Pl
230th St
231st St
234th St
235th St
237th St
239th St
Towers St
Narrot St
Halison St
Spencer St
Henrietta St
Maricopa St
Emerald St
Garnet St
California St
Fashion Way
Sonoma St
Lenore St
Laurette St
Cathann St
Mindora Dr
Sharynne Lane
Camino Del Campo
Calle De Arboles
Paseo de Arena
Newton St
Mesa St
Madison St
Ocena Ave
Juniper Ave
Kashiwa St
Rolling Hills Road
Crest Road
Loftview Dr
Harpers Way
Dominguez Way
Sierra St
Amie Ave
Yukon Ave
Pennsylvania Ave
Walnut St
0 0.5 1 Miles
0 1 2 Kilometers
NORTH
TORRANCE
GENERAL PLAN

Table N-3
Torrance Noise/Land Use Compatibility Guidelines

Property Receiving Noise		Maximum Noise Level Ldn or CNEL, dB(A)	
Type of Use	Land Use Designations	Interior	Exterior
Residential[3]	Low Density Residential Low Medium Density Residential Medium Density Residential	45	60/65[1]
	Medium High Density Residential	45	65 / 70[2]
	High Density Residential	45	70[1]
Commercial and Office	General Commercial Commercial Center	--	70
	Residential Office	50	70
Industrial	Business Park	55	75
	Light Industrial		
	Heavy Industrial		
Public and Medical Uses	Public/Quasi-Public/Open Space	50	65
	Hospital/Medical	50	70
Airport	Airport	--	70

1. The normally acceptable standard is 60 db(A). The higher standard is acceptable subject to inclusion of noise-reduction features in project design and construction.
2. Maximum exterior noise levels up to 70 dB CNEL are allowed for Multiple-Family Housing.
3. Regarding aircraft-related noise, the maximum acceptable exposure for new residential development is 60 dB(A) CNEL.

These compatibility criteria serve as guidelines. For example, an acoustical analysis must be prepared when noise-sensitive land uses are proposed within noise impact areas. The analysis must show that the project is designed to attenuate noise to meet the City's noise standards in order to receive approval. If the project design does not meet the noise standards, mitigation can be recommended in the analysis. If the analysis demonstrates that the noise standards can be met by implementing the mitigation measures, the project can be approved conditioned upon implementation of the mitigation measures.

4. NOISE ABATEMENT

Recognizing the need to protect residents from noise, the City has adopted specific regulations for noise produced by transportation sources, trains, and aircraft. These regulations offer protection to residents and users of facilities like schools and libraries, where noise can have particularly disruptive impacts, while also balancing the need of industry and commuters to make a reasonable amount of noise associated with commerce and industry during a workday.

4.1 NOISE ABATEMENT PROGRAMS

4.1.1 AIRPORT NOISE ABATEMENT PROGRAM

The City's Noise Abatement Program, which is enforced by the Environmental Division of the Community Development Department, provides for on-going monitoring of aircraft noise. City ordinances do not allow aircraft landing on or taking off from the airport to exceed a Single Event Noise Exposure Level (SENEL) of 88 dB(A) or a maximum sound level of 82 dB(A), measured at ground level outside the extended airport boundaries. The program imposes even more restrictive noise limits for night flights.

Established in 1977, the noise abatement program has dramatically decreased noise complaints related to airport operation. The airport program relies on noise monitors in areas of the community under aircraft flight paths. If an aircraft exceeds specified noise limits, pilots are notified by the City. The City also aims to be proactive in stemming aircraft noise complaints by working with pilots to test noise levels and find ways to safely get planes in and out of the airport without exceeding the established noise limits. This type of aircraft noise mitigation is possible for most aircraft using the airport. Since the inception of the noise abatement program, the variety of aircraft using the airport has become noticeably quieter, and the number of noise violations per operations has decreased over the years to well below one percent. The majority of noise violations are made by transient aircraft.

Since its inception almost 20 years ago, the program has become one of the most effective programs in the country, and has been used as a model by other cities and airports. The program significantly decreased aircraft noise violations from between 4.5 to 5 percent of operations in 1976 to less than one percent by 1987.[2] Noise violations have been reduced to less than 0.2 percent of total airport operations. Through this program, the City has successfully balanced the airport's needs with the community's requirements for a livable environment.

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[2] "History of Noise Abatement Program" memo, presented to the Airport Commission on April 9, 1987

4.1.2 MUNICIPAL CODE NOISE AND LAND USE COMPATIBILITY REGULATIONS

Quality of life is tied to living in an environment where we can carry out daily activities without the interference and harmful effects from excessive noise. The Municipal Code has noise guidelines that stress the importance of protecting indoor and outdoor noise environments. Protecting sensitive receptors and residential neighborhoods is particularly important, and the City has established maximum acceptable noise levels within noise zones.

Municipal Code, Division 4: Public Health and Welfare (Chapter 6 - Noise Regulation) establishes noise level limits in most residential areas of 50 to 55 db(A) between 7:00 A.M. to 10:00 P.M., and 45-50 db(A) between 10:00 P.M. to 7:00 A.M., depending on location. The regulations establish regions with differing noise regulations, as indicated on Figure N-5.

- Region 1 includes the predominantly industrial areas in and around the refineries and industrial uses on the western edge of the City.
- Region 2 includes the area in and around the airport and includes the commercial and industrial uses south of Lomita Boulevard and north of Pacific Coast Highway.
- Region 3 encompasses the residential neighborhoods south of Pacific Coast Highway and west of Hawthorne Boulevard.
- Region 4 includes the remainder of the City.

Acceptable noise levels are lower for neighborhoods in Region 3. Noise levels in most of the City's industrial and commercial areas cannot exceed 60 dB(A) during the day or 55 dB(A) during the night. The ordinance offers flexibility in the areas surrounding the oil refineries (Region 1), where noise levels cannot exceed 70 dB(A) during the day or 65 dB(A) at night.

Understanding that certain types of noise are more harmful and annoying, the City's noise regulations penalize certain types of noise sources by lowering the permitted decibels allowed. In other cases such as those where noise is not continuous and occurs only during a very limited timeframe or duration, decibel limits can be higher.

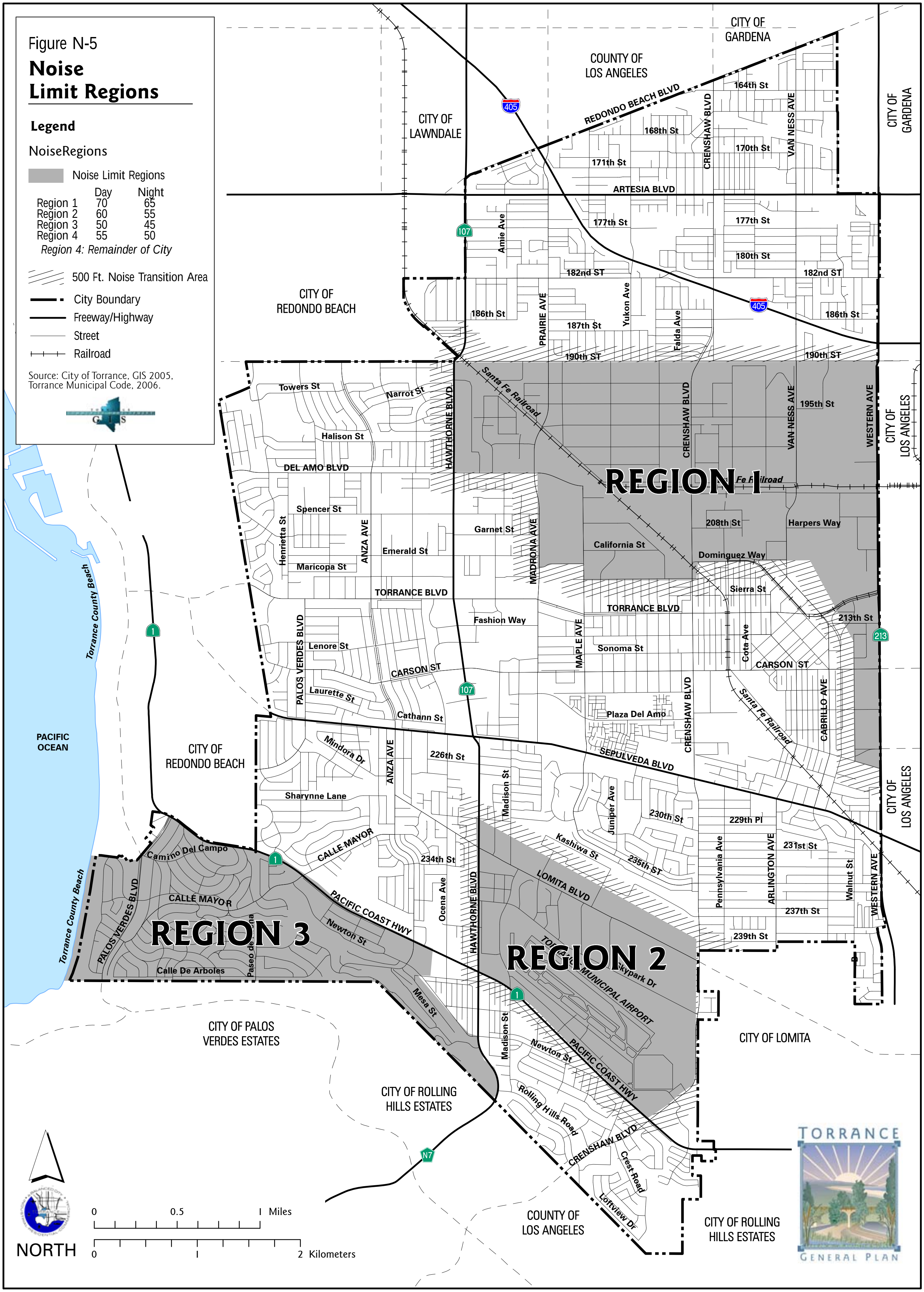
Figure N-5
Noise Limit Regions
Legend
NoiseRegions
Noise Limit Regions
Day Night
Region 1 70 65
Region 2 60 55
Region 3 50 45
Region 4 55 50
Region 4: Remainder of City
500 Ft. Noise Transition Area
City Boundary
Freeway/Highway
Street
Railroad
Source: City of Torrance, GIS 2005, Torrance Municipal Code, 2006.
REGION 1
REGION 2
REGION 3
CITY OF GARDENA
COUNTY OF LOS ANGELES
CITY OF LAWNDALE
CITY OF REDONDO BEACH
CITY OF LOS ANGELES
PACIFIC OCEAN
CITY OF PALOS VERDES ESTATES
CITY OF ROLLING HILLS ESTATES
CITY OF LOMITA
Torrance County Beach
REDONDO BEACH BLVD
ARTESIA BLVD
DEL AMO BLVD
TORRANCE BLVD
CARSON ST
SEPULVEDA BLVD
PACIFIC COAST HWY
HAWTHORNE BLVD
CRENSHAW BLVD
WESTERN AVE
VAN NESS AVE
PRAIRIE AVE
MADRONA AVE
MAPLE AVE
ANZA AVE
PALOS VERDES BLVD
ARLINGTON AVE
CABRILLO AVE
LOMITA BLVD
CALLE MAYOR
Santa Fe Railroad
TORRANCE MUNICIPAL AIRPORT
0 0.5 1 Miles
0 1 2 Kilometers
NORTH
TORRANCE
GENERAL PLAN

Table N-4
Noise Conditions Correction to the Limits, (in Decibels)

1	Noise contains a steady, audible tone, such as a whine, screech or hum	-5
2	Noise is a repetitive impulsive noise, such as hammering or riveting	-5
3	If the noise is not continuous, one of the following corrections to the limits shall be applied:	
a	Noise occurs less than 5 hours per day or less than 1 hour per night	+5
b	Noise occurs less than 90 minutes per day or less than 20 minutes per night	+10
c	Noise occurs less than 30 minutes per day or less than 6 minutes per night	+15
4	Noise occurs on Sunday morning (between 12:01 A.M. and 12:01 P.M. Sunday)	-5

City of Torrance Municipal Code

For construction work, the ordinance limits the use of power construction tools or equipment for construction work adjacent to residential areas. With regard to railroad noise, the ordinance places restrictions on night-time operations and the decibel level of train whistles.

4.1.3 MOTOR VEHICLE NOISE

As Figure N-4 indicates, noise from vehicles traveling along Torrance's roadways will continue to represent the primary noise source in the community. The City has very limited ability to abate vehicle-related noise at a local level. The State of California establishes noise limits for vehicles, and at the local level, the City can cite any driver on City streets whose vehicle exceeds the limits. This applies to engine and exhaust system noise, as well as any noise from inside the vehicle that can be heard (or felt) beyond the vehicle.

With regard to freeway noise, as discussed above, Caltrans is responsible for noise abatement. The City's best defense against exposing any additional residents or noise-sensitive uses to I-405 noise is to apply the noise/land use compatibility criteria set forth in Table N-3 in the review of development applications.

4.2 NOISE GOALS AND POLICIES

The City's goals and policies regarding noise aim to minimize adverse noise impacts and to preserve the high quality of life for City residents. Torrance will maintain a peaceful environment by identifying noise impacts and mitigating noise problems through acoustical treatments and appropriate land use policies.

Transportation routes represent the predominant noise source in Torrance. Sounds emitted from automobiles, aircraft, and rail can be mitigated through sound barriers, and with regard to Torrance Municipal Airport and rail activities, strict enforcement of Municipal Code provisions that pertain to noise abatement.

OBJECTIVE N.1:	To identify noise pollution and establish effective noise abatement methods
Policy N.1.1:	Continue to strictly enforce the provisions of the City's Noise Ordinance to ensure that stationary noise, traffic-related noise, railroad noise, airport-related noise, and noise emanating from construction activities and special events are minimized.
Policy N.1.2:	Maintain a workable, reasonable, and effective noise ordinance. Update the ordinance as necessary to respond to community noise issues.
Policy N.1.3:	Seek grants and loans for noise abatement projects.
Policy N.1.4:	Minimize unnecessary outdoor noise through enforcement of the noise ordinance and through permit processes that regulate noise-producing activities.

OBJECTIVE N.2:	To minimize transportation-related noise impacts
Policy N.2.1:	Enforce all local noise regulations pertaining to motor vehicle operations.
Policy N.2.2:	Prioritize locations for implementing noise reduction, such as residential areas near major roads or areas near railroads.
Policy N.2.3:	Require developers and business owners to minimize noise impacts associated with on-site motor vehicle activity through the use of noise-reduction features (e.g., berms, walls, well-designed site plans).
Policy N.2.4:	Ensure that all new development within the identified noise contours of Torrance Municipal Airport will be compatible with existing and projected airport noise levels.
Policy N.2.5:	Minimize airport operations-related noise violations by maintaining the City's Noise Abatement Program.

OBJECTIVE N.3:	To minimize noise incompatibilities between land uses
Policy N.3.1:	Review industrial, commercial, or other noise-generating land use proposals for compatibility with nearby noise-sensitive land uses, and require that appropriate mitigation be provided.
Policy N.3.2:	Require the inclusion of noise-reducing design features for developments near noise-sensitive land uses.

Policy N.3.3:	Encourage dense, attractive landscape planting along roadways and adjacent to other noise sources to increase absorption of noise.
Policy N.3.4:	Work with property and business owners to avoid or resolve noise incompatibilities in commercial or industrial areas.

OBJECTIVE N.4:	To research and implement new means of noise abatement
Policy N.4.1:	Encourage and support efforts by the State of California to abate noise pollution by using stricter quantitative noise standards, shorter compliance time governing operation of all types of motor vehicles, etc.
Policy N.4.2:	Maintain open lines of communication between the City and all federal, State, and County agencies involved in noise abatement.
Policy N.4.3:	Educate residents and businesses of the effects of noise pollution, ways they can assist in noise abatement, and noise abatement programs within the City.
Policy N.4.4:	Support legislation at all levels of government that enhances local authority over noise sources.

Methodology

The analysis of noise impacts considers project construction and operations noise as defined by the City of Torrance (for noise compatibility, construction noise impacts, and stationary noise impacts) and the Federal Transit Administration (FTA) methodology (for construction vibration impacts). The proposed project would have a significant adverse noise impact if the project results in any of the following:

Traffic Noise Levels

The traffic noise thresholds are based on human tolerance to noise and are widely used for assessing traffic noise impacts. The threshold for increase in traffic noise levels is based on the potential for traffic noise to become considerably louder than the ambient noise level. In general, noise levels must increase by 10 dB in order to double ambient noise levels. An increase of 5 dB is readily perceptible to the public, and a 3 dB increase is barely perceivable to the average healthy human ear (Caltrans 2009). An audible noise level increase in project-related traffic noise of 3 dB or more is to be considered substantial and will be treated as a significant impact.

Stationary-Source Noise

The stationary noise thresholds are based on a combination of the human tolerance to noise and local criteria for stationary noise sources as established by the City of Torrance for noise control. Nuisance noise criteria is found in the City's Municipal Code, shown above. Any project related operations that are expected to exceed the criteria included in the City of Torrance municipal code will be treated as a noise impact.

Construction

The potential for construction noise impacts to be objectionable depends on the magnitude of noise generated by the construction equipment, the frequency of noise sources during the construction day, and total duration of construction activities. The City's Noise Ordinance regulates the timing of construction activities. The City of Torrance restricts construction activities to the daytime hours of 7:30 AM to 6:00 PM Monday through Friday, 9:00 AM to 5:00 PM on Saturday, and prohibits construction activities on Sundays and holidays observed by City Hall (Section 46.3.1 of the City's Municipal Code). In order to calculate construction noise as it affects sensitive receptors, the FWHA Roadway Construction Noise Model calculation methodology was used. Using information provided by the City of Torrance, coupled with methodologies and inputs employed in the air quality assessment, the expected construction equipment mix was estimated and categorized by construction activity. FWHA RCNM includes reference noise levels for numerous equipment items, which were combined based on the equipment mix to establish a baseline noise levels per construction phase. Since this calculation does not account for shielding due to intervening buildings and structures, ground effects, or air absorption, the results of these calculations are conservative.

Vibration

Based on the FTA vibration criteria, vibration annoyance impacts are considered significant when average vibration levels produced by construction equipment would produce excessive levels of vibration (78 VdB) during the daytime at offsite vibration-sensitive structures. In addition, the vibration level at which there is a risk of architectural damage is based on the FTA criteria (0.2 in/sec for typical wood-framed buildings or 0.5 in/sec for reinforced concrete, steel, or timber). The FTA Transit Noise and Vibration Impact Assessment Manual includes reference levels for numerous equipment items. An impact due to vibration will occur if the measured vibration levels at any sensitive receiver exceeds the vibration criteria for that receiver.

Calculations

Pipeline Construction Phases and Equipment Mix

TYPE PHASE NAME >>>			Demolition	(per 8 hour day)	Site Prep/Grading		Trenching		Pipeline Construction		N/A		N/A	
Equipment Item (Dropdown Menu)	**Leq** @ 50 ft	**Lmax** @ 50 ft	Quantity	Hours of Usage	Quantity	Hours of Usage	Quantity	Hours of Usage	Quantity	Hours of Usage	Quantity	Hours of Usage	Quantity	Hours of Usage
(RCNM) Dozer	77.7	81.7	1	6		8		8		8		8		8
(RCNM) Backhoe	73.6	77.6	1	6	1	6	1	6	1	6	0	6		8
(RCNM) Dump Truck	72.5	76.5	1	6	1	6	1	6		8	0	6		8
(RCNM) Flat Bed Truck	70.3	74.3	1	6	1	6	1	6		8		8		8
(RCNM) Jack Hammer (impact device)	81.9	88.9		8	1	6		8		8		8		8
(RCNM) Concrete Saw	82.6	89.6		8	1	6	1	6	1	6		8		8
(RCNM) Compactor (ground)	76.2	83.2		8		8		8	0	6		8		8
(RCNM) Paver	74.2	77.2		8		8		8	1	6		8		8
(RCNM) Roller	73	80		8		8		8	2	6		8		8
(RCNM) Concrete Mixer Truck	74.8	78.8		8		8		8	1	6		8		8
(RCNM) Drill Rig Truck	72.2	79.1		8		8		8		8	0	6		8
(RCNM) Pickup Truck	71	75		8		8		8		8	0	6		8
(RCNM) Excavator	76.7	80.7		8		8	1	6		8	0	8		8
(RCNM) Crane	72.6	80.6		8		8		8	1	6	0	6		8
(FTA) Pump	76	79		8		8		8		8	0	6		8
None	0	0		8		8		8		8		8		8
None	0	0		8		8		8		8		8		8
None	0	0		8		8		8		8		8		8
None	0	0		8		8		8		8		8		8
None	0	0		8		8		8		8		8		8
None	0	0		8		8		8		8		8		8
PLACEWORKS			Demolition		Site Prep/Grading		Trenching		Pipeline Construction		N/A		N/A	
		Totals at	**Total Leq**	**Lmax**	**Total Leq**	**Lmax**	**Total Leq**	**Lmax**	**Total Leq**	**Lmax**	**Total Leq**	**Lmax**	**Total Leq**	**Lmax**
		50 feet	**79.2**	**83.2**	**84.6**	**91.3**	**83.2**	**89.4**	**83.8**	**90.3**	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**

Pipeline Construction Noise & Vibration Results

		Total Leq/Lmax (dBA)											
	Sensitive Receptor	Demolition		Site Prep/Grading		Trenching		peline Constructio		N/A		N/A	
	[READ ONLY]	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
1	50 feet from Construction	79.2	83.2	84.6	91.3	83.2	89.4	83.8	90.3				
2	100 feet from Construction	73.2	77.2	78.6	85.3	77.2	83.4	77.8	84.2				
3	150 feet from Construction	69.6	73.6	75.1	81.8	73.7	79.8	74.3	80.7				
4	200 feet from Construction	67.1	71.1	72.6	79.3	71.2	77.3	71.8	78.2				
5	Receptor 5												
6	Receptor 6												
7	Receptor 7												
8	Receptor 8												

Leq measured from spatially averaged distance

Lmax measured from worst-case distance

RCNM Appendix A: Practices for Calculating Estimated Shielding (fwha.dot.gov)

Attenuation (dB)	Instance
3	If a noise barrier or other obstruction (like a dirt mound) just barely breaks the line-of-sight between the noise source and the receptor
5	If the noise source is in a enclosure and/or barrier that has some gaps in it
5	If a noise source is enclosed or shielded with heavy vinyl noise curtain material (e.g., SoundSeal BBC-13-2" or equivalent)
8	If the noise source is completely enclosed OR completely shielded with a solid barrier located close to the source
10	If the noise source is completely enclosed AND completely shielded with a solid barrier located close to the source
12	If work is occurring deep inside a tunnel using the "top-down" construction method (i.e. cover the tunnel work with concrete roadway decks to allow surface traffic and then excavate underneath the roof deck)
15	If a building stands between the noise source and receptor and completely shields the noise source
35	If dilapidated windows are replaced with new acoustical windows, or quality internal or exterior storm sashes, use an incremental improvement of 10 dBA for an overall Outside-to-Inside Noise Reduction (OINR) of 35 dBA

References (RCNM)

1. Roadway Construction Noise Model User's Guide. Federal Highway Administration. FHWA-HEP-05-054. January 2006

2. Construction Noise Control Specification 721.560, Central Artery/Tunnel Project, Massachusetts Turnpike Authority, Boston, MA, 2002.

3. Thalheimer, Erich. "Construction Noise Control Program and Mitigation Strategy at the Central Artery/Tunnel Project". Noise Control Engineering Journal, Vol. 48, No. 5, pp 157-165, September - October 2000.

4. "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety", Environmental Protection Agency, ONAC 550/9-74-004. Washington, DC, March 1974.

5. "Power Plant Construction Noise Guide". Bolt, Beranek, and Newman Inc. and Empire State Electric Energy Research Corp., Report No. 3321. New York, NY May 1977.

References (FTA Reference Lvls)

Federal Transit Administration (FTA). 2006, May. Transit Noise and Vibration Impact Assessment. U.S. Depart-ment of Transportation (DoT). FTA-VA-90-1003-06.

Red Cell indicates level exceeds FTA criteria

Vibration Annoyance											
Equipment Item	VdB at 25 ft	Distance to 78 VdB	to 84 VdB	0 feet from Constructio	100 feet from Constructio	0 feet from Construc	feet from Constru	Receptor 5	Receptor 6	Receptor 7	Receptor 8
Pile Driver (impact)(typ)	104	183.9	116.0	95.0	85.9	80.7	76.9				
Pile Driver (sonic)(typ)	93	79.1	49.9	84.0	74.9	69.7	65.9				
Clam Shovel drop (slurry wall)	94	85.4	53.9	85.0	75.9	70.7	66.9				
Hydromill (slurry wall)(soil)	66	10.0	6.3	57.0	47.9	42.7	38.9				
Vibratory Roller	94	85.4	53.9	85.0	75.9	70.7	66.9				
Hoe Ram	87	49.9	31.5	78.0	68.9	63.7	59.9				
Large Bulldozer	87	49.9	31.5	78.0	68.9	63.7	59.9				
Caisson Drilling	87	49.9	31.5	78.0	68.9	63.7	59.9				
Loaded Trucks	86	46.2	29.1	77.0	67.9	62.7	58.9				
Jackhammer	79	27.0	17.0	70.0	60.9	55.7	51.9				
Small Bulldozer	58	5.4	3.4	49.0	39.9	34.7	30.9				
Vibration Damage											
Equipment Item	PPV at 25 ft	Distance to .2 PPV	to .3 PPV	0 feet from Constructio	100 feet from Constructio	0 feet from Construc	feet from Constru	Receptor 5	Receptor 6	Receptor 7	Receptor 8
Pile Driver (impact)(typ)	0.664	55.6	42.5	0.235	0.083	0.045	0.029				
Pile Driver (sonic)(typ)	0.17	22.4	17.1	0.060	0.021	0.012	0.008				
Clam Shovel drop (slurry wall)	0.202	25.2	19.2	0.071	0.025	0.014	0.009				
Hydromill (slurry wall)(soil)	0.008	2.9	2.2	0.003	0.001	0.001	0.000				
Vibratory Roller	0.21	25.8	19.7	0.074	0.026	0.014	0.009				
Hoe Ram	0.089	14.6	11.1	0.031	0.011	0.006	0.004				
Large Bulldozer	0.089	14.6	11.1	0.031	0.011	0.006	0.004				
Caisson Drilling	0.089	14.6	11.1	0.031	0.011	0.006	0.004				
Loaded Trucks	0.076	13.1	10.0	0.027	0.010	0.005	0.003				
Jackhammer	0.035	7.8	6.0	0.012	0.004	0.002	0.002				
Small Bulldozer	0.003	1.5	1.2	0.001	0.000	0.000	0.000				

Well Construction Phases and Equipment Mix

TYPE PHASE NAME >>>			Clearing & Gr (per 8 hour day)		Well Construction	
Equipment Item (Dropdown Menu)	**Leq** @ 50 ft	**Lmax** @ 50 ft	Quantity	Hours of Usage	Quantity	Hours of Usage
(RCNM) Dozer	77.7	81.7	1	6		8
(RCNM) Backhoe	73.6	77.6	1	6	1	6
(RCNM) Dump Truck	72.5	76.5	1	6	1	4
(RCNM) Flat Bed Truck	70.3	74.3	1	6		6
(RCNM) Jack Hammer (impact device)	81.9	88.9		8		6
(RCNM) Concrete Saw	82.6	89.6		8		6
(RCNM) Compactor (ground)	76.2	83.2		8		8
(RCNM) Paver	74.2	77.2		8		8
(RCNM) Roller	73	80		8		8
(RCNM) Concrete Mixer Truck	74.8	78.8		8		8
(RCNM) Drill Rig Truck	72.2	79.1		8	1	6
(RCNM) Pickup Truck	71	75		8	1	4
(RCNM) Excavator	76.7	80.7		8		8
(RCNM) Crane	72.6	80.6		8	1	6
(FTA) Pump	76	79		8	1	6
None	0	0		8		8
None	0	0		8		8
None	0	0		8		8
None	0	0		8		8
None	0	0		8		8
None	0	0		8		8
			Clearing & Grubbing		**Well Construction**	
PLACEWORKS		**Totals at**	Total Leq	Lmax	Total Leq	Lmax
		50 feet	79.2	83.2	79.5	84.6

Well Construction Noise & Vibration Results

		Total Leq/Lmax (dBA)			
	Sensitive Receptor	learing & Grubbir		Well Construction	
	[READ ONLY]	Leq	Lmax	Leq	Lmax
1	Residences 50 ft	79.2	83.2	79.5	84.6
2	Residences 100 ft	73.2	77.2	73.4	78.6
3	Residences 150 ft	69.6	73.6	69.9	75.1
4	Residences 200 ft	67.1	71.1	67.4	72.6
5	Receptor 5	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6	Receptor 6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
7	Receptor 7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8	Receptor 8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Leq measured from spatially averaged distance

Lmax measured from worst-case distance

RCNM Appendix A: Practices for Calculating Estimated Shielding (fwha.dot.gov)

Attenuation (dB)	Instance
3	If a noise barrier or other obstruction (like a dirt mound) just barely breaks the line-of-sight between the noise source and the receptor
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15	If a building stands between the noise source and receptor and completely shields the noise source
35	If dilapidated windows are replaced with new acoustical windows, or quality internal or exterior storm sashes, use an incremental improvement of 10 dBA for an overall Outside-to-Inside Noise Reduction (OINR) of 35 dBA

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Vibration Annoyance Equipment Item	VdB at 25 ft	Distance to 78 VdB	to 84 VdB	Residences 50 ft	Residences 100 ft	Residences 150 ft	Residences 200 ft
Pile Driver (impact)(typ)	104	183.9	116.0	95.0	85.9	80.7	76.9
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Clam Shovel drop (slurry wall)	94	85.4	53.9	85.0	75.9	70.7	66.9
Hydromill (slurry wall)(soil)	66	10.0	6.3	57.0	47.9	42.7	38.9
Vibratory Roller	94	85.4	53.9	85.0	75.9	70.7	66.9
Hoe Ram	87	49.9	31.5	78.0	68.9	63.7	59.9
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Caisson Drilling	87	49.9	31.5	78.0	68.9	63.7	59.9
Loaded Trucks	86	46.2	29.1	77.0	67.9	62.7	58.9
Jackhammer	79	27.0	17.0	70.0	60.9	55.7	51.9
Small Bulldozer	58	5.4	3.4	49.0	39.9	34.7	30.9

Vibration Damage Equipment Item	PPV at 25 ft	Distance to .2 PPV	to .3 PPV	Residences 50 ft	Residences 100 ft	Residences 150 ft	Residences 200 ft
Pile Driver (impact)(typ)	0.664	55.6	42.5	0.235	0.083	0.045	0.029
Pile Driver (sonic)(typ)	0.17	22.4	17.1	0.060	0.021	0.012	0.008
Clam Shovel drop (slurry wall)	0.202	25.2	19.2	0.071	0.025	0.014	0.009
Hydromill (slurry wall)(soil)	0.008	2.9	2.2	0.003	0.001	0.001	0.000
Vibratory Roller	0.21	25.8	19.7	0.074	0.026	0.014	0.009
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Caisson Drilling	0.089	14.6	11.1	0.031	0.011	0.006	0.004
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Jackhammer	0.035	7.8	6.0	0.012	0.004	0.002	0.002
Small Bulldozer	0.003	1.5	1.2	0.001	0.000	0.000	0.000

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January 2018 | Air Quality and Greenhouse Gas Emissions Technical Memorandum

Van Ness Avenue Well Field Project

Torrance, California

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PLACEWORKS

Table of Contents

APPENDICES

Table of Contents

List of Tables

1. Introduction

This Technical Memorandum evaluates the potential air quality and greenhouse gas (GHG) emissions impacts from development of the proposed Descanso/Van Ness Avenue Water Mains project in accordance with the California Environmental Quality Act (CEQA). The analysis evaluates the potential impacts from construction and operation activities associated with the pipeline and well improvements compared to the significance criteria adopted by the South Coast Air Quality Management District (SCAQMD).

1.1 MODELING METHODOLOGY

Pollutant emissions from project-related construction activities are calculated using the California Emissions Estimator Model (CalEEMod), version 2016.3.1. CalEEMod compiles a construction emissions inventory consisting of fugitive dust, off-gas emissions, and on-road and off-road vehicle emissions. Construction data was provided by Quantum Consulting, Inc. and the City of Torrance. Modeling datasheets for the project can be found in the Appendix.

1.2 PROJECT DESCRIPTION

The proposed project would result in the installation of three new water wells and approximately 4.0 miles of water transmission lines. The new well sites would be on City-owned property—Site 1 (Well No. 12) is on 185th Street west of Purche Avenue; Site 2 (Well No. 13) is at the extreme west end of La Carretera Park, at 2040 186th Street; and Site 3 (Well No. 14) is in Descanso Park. A new water well would be required to be drilled at each of the three sites. Drilling operations would be continuous 24-hour operations and well construction would occur at one site at a time. Upon completion of the drilling operations at each site, an electric pump would be installed and would be enclosed in a structure.

The project also includes construction of new storm drain piping—a new 16- to 24-inch plastic discharge (storm drain) pipeline from Site 1 to Site 3 and from Site 3 to an existing City storm drain in Border Avenue north of Plaza Del Amo. Additionally, a 12-inch pipe would connect Site 2 to the 24-inch pipe in Van Ness Avenue. The City of Torrance also requested additional work items at well Site 2, at the east edge of La Carretera Park, that could generate construction-related air quality emissions. These additional items include resurfacing the existing basketball court, fence reconstruction, replacing the existing play equipment and lighting, installation of additional lighting, and paving the walking trail around park. The new water transmission lines would bring fresh well water to the City's existing reservoir and booster pump station at 2223 Border Avenue. The water transmission line improvements would be within the existing right-of-way.

Residential land uses are adjacent to the City properties (Sites 1, 2, and 3) and along the transmission route. Other sensitive receptors proximate to the City properties and along the transmission route include parks and schools (e.g., La Carretera Park, Descanso Park, Torrance Adult School).

1. Introduction

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2. Regulatory Setting

2.1 AIR QUALITY

2.1.1 Federal and State Laws

Ambient air quality standards (AAQS) have been adopted and are periodically updated at state and federal levels for criteria air pollutants. In addition, both the state and federal governments regulate the release of toxic air contaminants (TACs). The project site is within the South Coast Air Basin (SoCAB). Land use is subject to the rules and regulations imposed by the South Coast Air Quality Management District (SCAQMD), the California AAQS adopted by the California Air Resources Board (CARB), and National AAQS adopted by the United States Environmental Protection Agency (EPA). Federal, state, regional, and local laws, regulations, plans, or guidelines that are potentially applicable to the proposed project are summarized below.

2.1.1.1 AMBIENT AIR QUALITY STANDARDS

The Clean Air Act was passed in 1963 by the US Congress and has been amended several times. The 1970 Clean Air Act amendments strengthened previous legislation and laid the foundation for the regulatory scheme of the 1970s and 1980s. In 1977, Congress again added several provisions, including nonattainment requirements for areas not meeting National AAQS and the Prevention of Significant Deterioration program. The 1990 amendments represent the latest in a series of federal efforts to regulate the protection of air quality in the United States. The Clean Air Act allows states to adopt more stringent standards or to include other pollutants. The California Clean Air Act, signed into law in 1988, requires all areas of the state to achieve and maintain the California AAQS by the earliest practical date. The California AAQS tend to be more restrictive than the National AAQS.

The National and California AAQS are the levels of air quality considered to provide a margin of safety in the protection of the public health and welfare. They are designed to protect "sensitive receptors" most susceptible to further respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed.

Both California and the federal government have established health-based AAQS for seven air pollutants, which are shown in Table 1, *Ambient Air Quality Standards for Criteria Pollutants*. These pollutants are ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), coarse inhalable particulate matter (PM_{10}), fine inhalable particulate matter ($PM_{2.5}$), and lead (Pb). In addition, the state has set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

2. Regulatory Setting

Table 1 Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Time	California Standard[1]	Federal Primary Standard[2]	Major Pollutant Sources
Ozone (O_3)[3]	1 hour	0.09 ppm	*	Motor vehicles, paints, coatings, and solvents.
	8 hours	0.070 ppm	0.070 ppm	
Carbon Monoxide (CO)	1 hour	20 ppm	35 ppm	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 hours	9.0 ppm	9 ppm	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm	0.053 ppm	Motor vehicles, petroleum-refining operations, industrial sources, aircraft, ships, and railroads.
	1 hour	0.18 ppm	0.100 ppm	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	*	0.030 ppm	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	1 hour	0.25 ppm	0.075 ppm	
	24 hours	0.04 ppm	0.14 ppm	
Respirable Coarse Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m³	*	Dust and fume-producing construction, industrial, and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	24 hours	50 µg/m³	150 µg/m³	
Respirable Fine Particulate Matter ($PM_{2.5}$)[4]	Annual Arithmetic Mean	12 µg/m³	12 µg/m³	Dust and fume-producing construction, industrial, and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	24 hours	*	35 µg/m³	
Lead (Pb)	30-Day Average	1.5 µg/m³	*	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.
	Calendar Quarter	*	1.5 µg/m³	
	Rolling 3-Month Average	*	0.15 µg/m³	
Sulfates (SO_4)[5]	24 hours	25 µg/m³	*	Industrial processes.
Visibility Reducing Particles	8 hours	ExCo =0.23/km visibility of 10≥ miles	No Federal Standard	Visibility-reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt.

Table 1 Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Time	California Standard[1]	Federal Primary Standard[2]	Major Pollutant Sources
Hydrogen Sulfide	1 hour	0.03 ppm	No Federal Standard	Hydrogen sulfide (H_2S) is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. Also, it can be present in sewer gas and some natural gas, and can be emitted as the result of geothermal energy exploitation.
Vinyl Chloride	24 hour	0.01 ppm	No Federal Standard	Vinyl chloride (chloroethene), a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents.

Source: CARB 2016a.
Notes: ppm: parts per million; µg/m³: micrograms per cubic meter
* Standard has not been established for this pollutant/duration by this entity.
1 California standards for O_3, CO (except 8-hour Lake Tahoe), SO_2 (1 and 24 hour), NO_2, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2 National standards (other than O_3, PM, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m³ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.
3 On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
4 On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m³ to 12.0 µg/m³. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m³, as was the annual secondary standard of 15 µg/m³. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m³ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
5 On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. The 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

California has also adopted a host of other regulations that reduce criteria pollutant emissions, including:

- AB 1493: Pavley Fuel Efficiency Standards
- Title 20 California Code of Regulations (CCR): Appliance Energy Efficiency Standards
- Title 24, Part 6, CCR: Building Energy Efficiency Standards
- Title 24, Part 11, CCR: Green Building Standards Code

2.1.1.2 TANNER AIR TOXICS ACT AND AIR TOXICS "HOT SPOT" INFORMATION AND ASSESSMENT ACT

Public exposure to TACs is a significant environmental health issue in California. In 1983, the California legislature enacted a program to identify the health effects of TACs and to reduce exposure to them. The California Health and Safety Code defines a TAC as "an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health" (17 CCR § 93000). A substance that is listed as a hazardous air pollutant pursuant to Section 112(b) of the federal Clean Air Act (42 U.S. Code § 7412[b]) is a toxic air contaminant. Under state law, the California Environmental Protection Agency, acting through CARB, is authorized to identify a substance as a TAC if it is an air pollutant that may cause or contribute to an increase in mortality or serious illness, or may pose a present or potential hazard to human health.

California regulates TACs primarily through AB 1807 (Tanner Air Toxics Act) and AB 2588 (Air Toxics "Hot Spot" Information and Assessment Act of 1987). The Tanner Air Toxics Act set up a formal procedure for CARB to designate substances as TACs. Once a TAC is identified, CARB adopts an "airborne toxics control measure" for sources that emit that TAC. If there is a safe threshold for a substance (i.e., a point below which there is no toxic effect), the control measure must reduce exposure to below that threshold. If there is no safe threshold, the measure must incorporate "toxics best available control technology" to minimize emissions. To date, CARB has established formal control measures for 11 TACs that are identified as having no safe threshold.

Under AB 2588, TAC emissions from individual facilities are quantified and prioritized by the air quality management district or air pollution control district. High priority facilities are required to perform a health risk assessment, and if specific thresholds are exceeded, are required to communicate the results to the public through notices and public meetings.

CARB has promulgated the following specific rules to limit TAC emissions:

- **13 CCR Chapter 10, § 2485**, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling
- **13 CCR Chapter 10, § 2480**, Airborne Toxic Control Measure to Limit School Bus Idling and Idling at Schools
- **13 CCR § 2477 and Article 8**, Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets and Facilities Where TRUs Operate

2.1.2 Air Pollutants of Concern

2.1.2.1 CRITERIA AIR POLLUTANTS

The pollutants emitted into the ambient air by stationary and mobile sources are categorized as primary and/or secondary pollutants. Primary air pollutants are emitted directly from sources. Carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NOx), sulfur dioxide (SO_2), coarse inhalable particulate matter (PM_{10}), fine inhalable particulate matter ($PM_{2.5}$), and lead (Pb) are primary air pollutants. Of these, CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$ are "criteria air pollutants," which means that AAQS have been established for them. VOC and NOx are criteria pollutant precursors that form secondary criteria air pollutants through chemical and photochemical reactions in the atmosphere. Ozone (O_3) and nitrogen dioxide (NO_2) are the principal secondary pollutants. Each of the primary and secondary criteria air pollutants and its known health effects is described here.

2. Regulatory Setting

- **Carbon Monoxide** is a colorless, odorless gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. CO is a primary criteria air pollutant. CO concentrations tend to be the highest during winter mornings with little to no wind, when surface-based inversions trap the pollutant at ground levels. The highest ambient CO concentrations are generally found near traffic-congested corridors and intersections. The primary adverse health effect associated with CO is interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation (SCAQMD 2005; USEPA 2017a). The SoCAB is designated in attainment of CO criteria levels under the California and National AAQS (CARB 2016b).

- **Volatile Organic Compounds** are composed primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicle usage is the major source of VOCs. Other sources include evaporative emissions from paints and solvents, asphalt paving, and household consumer products such as aerosols (SCAQMD 2005). There are no AAQS for VOCs. However, because they contribute to the formation of O_3, SCAQMD has established a significance threshold (see Section 4, *Thresholds of Significance*).

- **Nitrogen Oxides** are a by-product of fuel combustion and contribute to the formation of ground-level O_3, PM_{10}, and $PM_{2.5}$. The two major forms of NOx are nitric oxide (NO) and nitrogen dioxide (NO_2). NO is a colorless, odorless gas formed from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure. The principal form of NOx produced by combustion is NO, but NO reacts quickly with oxygen to form NO_2, creating the mixture of NO and NO_2 commonly called NOx. NO_2 is an acute irritant and more injurious than NO in equal concentrations. At atmospheric concentrations, however, NO_2 is only potentially irritating. NO_2 absorbs blue light; the result is a brownish-red cast to the atmosphere and reduced visibility. NO_2 exposure concentrations near roadways are of particular concern for susceptible individuals, including asthmatics, children, and the elderly. Current scientific evidence links short-term NO_2 exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects, including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between elevated short-term NO_2 concentrations and increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma (SCAQMD 2005; USEPA 2017). The SoCAB is designated an attainment area for NO_2 under the National and California AAQS (CARB 2016b).

- **Sulfur Dioxide** is a colorless, pungent, irritating gas formed by the combustion of sulfurous fossil fuels. It enters the atmosphere as a result of burning high-sulfur-content fuel oils and coal and chemical processes at plants and refineries. Gasoline and natural gas have very low sulfur content and do not release significant quantities of SO_2. When sulfur dioxide forms sulfates (SO_4) in the atmosphere, together these pollutants are referred to as sulfur oxides (SOx). Thus, SO_2 is both a primary and secondary criteria air pollutant. At sufficiently high concentrations, SO_2 may irritate the upper respiratory tract. Current scientific evidence links short-term exposures to SO_2, ranging from 5 minutes to 24 hours, with an array of adverse respiratory effects, including bronchoconstriction and increased asthma symptoms. These effects are particularly adverse for asthmatics at elevated ventilation rates (e.g., while exercising or playing.) At lower concentrations and when combined with particulates, SO_2 may do greater harm by injuring lung tissue. Studies also show a connection between short-term exposure and increased visits to emergency facilities and hospital admissions for respiratory illnesses, particularly in at-risk populations such as children, the elderly, and asthmatics (SCAQMD 2005; USEPA 2017). The SoCAB is designated attainment for SO_2 under the California and National AAQS (CARB 2016b).

- **Suspended Particulate Matter** consists of finely divided solids or liquids such as soot, dust, aerosols, fumes, and mists. Two forms of fine particulates are now recognized and regulated. Inhalable coarse particles, or PM_{10}, include particulate matter with an aerodynamic diameter of 10 microns or less (i.e., ≤10 millionths of a meter or 0.0004 inch). Inhalable fine particles, or $PM_{2.5}$, have an aerodynamic diameter of 2.5 microns or less (i.e., ≤2.5 millionths of a meter or 0.0001 inch). Particulate discharge into the atmosphere results primarily from industrial, agricultural, construction, and transportation activities. Both PM_{10} and $PM_{2.5}$ may adversely affect the human respiratory system, especially in people who are naturally sensitive or susceptible to breathing problems. The EPA's scientific review concluded that PM2.5, which penetrates deeply into the lungs, is more likely than PM_{10} to contribute to health effects and at far lower concentrations. These health effects include premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms (e.g., irritation of the airways, coughing, or difficulty breathing) (SCAQMD 2005). There has been emerging evidence that ultrafine particulates, which are even smaller particulates with an aerodynamic diameter of <0.1 microns or less (i.e., ≤0.1 millionths of a meter or <0.000004 inch), have human health implications, because ultrafine particulates' toxic components may initiate or facilitate biological processes that may lead to adverse effects to the heart, lungs, and other organs (SCAQMD 2013). However, the EPA and CARB have yet to adopt AAQS to regulate these particulates. Diesel particulate matter (DPM) is classified by CARB as a carcinogen (CARB 1998). Particulate matter can also cause environmental effects such as visibility impairment,[1] environmental damage,[2] and aesthetic damage[3] (SCAQMD 2005; USEPA 2017). The SoCAB is a nonattainment area for $PM_{2.5}$ under California and National AAQS and a nonattainment area for PM_{10} under the California AAQS (CARB 2016b).

- **Ozone** is commonly referred to as "smog" and is a gas that is formed when VOCs and NOx, both by-products of internal combustion engine exhaust, undergo photochemical reactions in sunlight; therefore, it is a secondary criteria air pollutant. O_3 concentrations are generally highest during the summer months when direct sunlight, light winds, and warm temperatures create favorable conditions for its formation. O_3 poses a health threat to those who already suffer from respiratory diseases as well as to healthy people. Breathing O_3 can trigger a variety of health problems, including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground-level O_3 also can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. O_3 also affects sensitive vegetation and ecosystems, including forests, parks, wildlife refuges, and wilderness

1 $PM_{2.5}$ is the main cause of reduced visibility (haze) in parts of the United States.

2 Particulate matter can be carried over long distances by wind and settle on ground or water, making lakes and streams acidic, changing the nutrient balance in coastal waters and large river basins, depleting the nutrients in soil, damaging sensitive forests and farm crops, and affecting the diversity of ecosystems.

3 Particulate matter can stain and damage stone and other materials, including culturally important objects such as statues and monuments.

areas. In particular, O_3 harms sensitive vegetation during the growing season (SCAQMD 2005; USEPA 2017a). The SoCAB is designated extreme nonattainment under the California AAQS (1 hour and 8 hour) and National AAQS (8 hour) (CARB 2016b).

- **Lead** is a metal found naturally in the environment as well as in manufactured products. Once taken into the body, lead distributes throughout the body in the blood and accumulates in the bones. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems, and the cardiovascular system. Lead exposure also affects the oxygen-carrying capacity of the blood. The effects of lead most commonly encountered in current populations are neurological effects in children and cardiovascular effects in adults (e.g., high blood pressure and heart disease). Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits, and lowered IQ (SCAMQD 2005; USEPA 2017a). The major sources of lead emissions have historically been mobile and industrial sources. As a result of the EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector dramatically declined by 95 percent between 1980 and 1999, and levels of lead in the air decreased by 94 percent between 1980 and 1999. Today, the highest levels of lead in air are usually found near lead smelters. The major sources of lead emissions today are ore and metals processing and piston-engine aircraft operating on leaded aviation gasoline. However, in 2008 the EPA and CARB adopted stricter lead standards, and special monitoring sites immediately downwind of lead sources recorded very localized violations of the new state and federal standards.[4] As a result of these violations, the Los Angeles County portion of the SoCAB is designated nonattainment under the National AAQS for lead (SCAQMD 2012; CARB 2016b). Because emissions of lead are found only in projects that are permitted by SCAQMD, lead is not a pollutant of concern for the project.

2.1.2.2 TOXIC AIR CONTAMINANTS

By the last update to the TAC list in December 1999, CARB had designated 244 compounds as TACs (CARB 1999). Additionally, CARB has implemented control measures for a number of compounds that pose high risks and show potential for effective control. The majority of the estimated health risks from TACs can be attributed to relatively few compounds, the most important being particulate matter from diesel-fueled engines.

Diesel Particulate Matter

In 1998, CARB identified DPM as a TAC. Previously, the individual chemical compounds in diesel exhaust were considered TACs. Almost all diesel exhaust particles are 10 microns or less in diameter. Because of their extremely small size, these particles can be inhaled and eventually trapped in the bronchial and alveolar regions of the lungs.

[4] Source-oriented monitors record concentrations of lead at lead-related industrial facilities in the SoCAB, which include Exide Technologies in the City of Commerce; Quemetco, Inc., in the City of Industry; Trojan Battery Company in Santa Fe Springs; and Exide Technologies in Vernon. Monitoring conducted between 2004 through 2007 showed that the Trojan Battery Company and Exide Technologies exceed the federal standards (SCAQMD 2012).

2. Regulatory Setting

Community Risk

To reduce exposure to TACs, CARB developed and approved the *Air Quality and Land Use Handbook: A Community Health Perspective* (2005) to provide guidance regarding the siting of sensitive land uses in the vicinity of freeways, distribution centers, rail yards, ports, refineries, chrome-plating facilities, dry cleaners, and gasoline-dispensing facilities. This guidance document was developed to assess compatibility and associated health risks when siting sensitive receptors near existing pollution sources. CARB's recommendations were based on a compilation of recent studies that evaluated data on the adverse health effects from proximity to air pollution sources. The key observation in these studies is that proximity substantially increases exposure and the potential for adverse health effects. Three carcinogenic TACs constitute the majority of the known health risks from motor vehicle traffic—DPM from trucks and benzene and 1,3 butadiene from passenger vehicles. CARB recommendations are based on data that show that localized air pollution exposures can be reduced by as much as 80 percent by following CARB minimum distance separations.

2.1.3 Air Quality Management Planning

SCAQMD is the agency responsible for improving air quality in the SoCAB and ensuring that the National and California AAQS are attained and maintained. SCAQMD is responsible for preparing the air quality management plan (AQMP) for the SoCAB in coordination with the Southern California Association of Governments (SCAG). Since 1979, a number of AQMPs have been prepared.

2.1.3.1 2016 AQMP

The 2016 AQMP was adopted by the SCAQMD Board on March 3, 2017, and serves as an update to the 2012 AQMP. The 2016 AQMP addresses strategies and measures to attain the following National AAQS:

- 2008 federal 8-hour ozone standard by 2031
- 2012 federal annual PM2.5 standard by 2025
- 2006 federal 24-hour PM2.5 standard by 2019
- 1997 federal 8-hour ozone standard by 2023
- 1979 federal 1-hour ozone standard by year 2022

It is projected that total NOx emissions in the SoCAB would need to be reduced to 150 tons per day (tpd) by year 2023 and to 100 tpd in year 2031 to meet the 1997 and 2008 federal 8-hour ozone standards. The strategy to meet the 1997 federal 8-hour ozone standard would also lead to attaining the 1979 federal 1-hour ozone standard by year 2022 (SCAQMD 2017a), which requires reducing NOx emissions in the SoCAB to 250 tpd. This is approximately 45 percent additional reductions above existing regulations for the 2023 ozone standard and 55 percent additional reductions above existing regulations to meet the 2031 ozone standard. Reducing NOx emissions would also reduce $PM_{2.5}$ concentrations within the SoCAB. However, as the goal is to meet the 2012 federal annual $PM_{2.5}$ standard no later than year 2025, SCAQMD is seeking to reclassify the SoCAB from "moderate" to "serious" nonattainment under this federal standard. A "moderate" non-attainment would require meeting the 2012 federal standard by no later than 2021.

Overall, the 2016 AQMP is composed of stationary and mobile-source emission reductions from regulatory control measures, incentive-based programs, co-benefits from climate programs, mobile-source strategies, and reductions from federal sources such as aircrafts, locomotives, and ocean-going vessels. Strategies outlined in the 2016 AQMP would be implemented in collaboration between CARB and the EPA (SCAQMD 2017a).

2.1.3.2 LEAD STATE IMPLEMENTATION PLAN

In 2008 the EPA designated the Los Angeles County portion of the SoCAB nonattainment under the federal lead (Pb) classification due to the addition of source-specific monitoring under the new federal regulation. This designation was based on two source-specific monitors in Vernon and the City of Industry exceeding the new standard. The rest of the SoCAB outside the Los Angeles County nonattainment area remains in attainment of the new standard. On May 24, 2012, CARB approved the State Implementation Plan (SIP) revision for the federal lead standard, which the EPA revised in 2008. Lead concentrations in this nonattainment area have been below the level of the federal standard since December 2011. The SIP revision was submitted to EPA for approval.

2.1.3.3 SCAQMD RULES AND REGULATIONS

All projects are subject to SCAQMD rules and regulations in effect at the time of activity, including:

- **Rule 401, Visible Emissions.** This rule is intended to prevent the discharge of visible pollutant emissions. Specifically, the rule prohibits the discharge of any air contaminant into the atmosphere by a person from any single source of emission for a period or periods aggregating more than three minutes in any one hour that is as dark as or darker than designated No. 1 on the Ringelmann Chart, as published by the U.S. Bureau of Mines.

- **Rule 402, Nuisance.** This rule is intended to prevent the discharge of pollutant emissions that result in a public nuisance. Specifically, this rule prohibits any person from discharging quantities of air contaminants or other material from any source such that it would result in an injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public. Additionally, the discharge of air contaminants would also be prohibited where it would endanger the comfort, repose, health, or safety of any number of persons or the public, or that cause, or have a natural tendency to cause, injury or damage to business or property. This rule does not apply to odors emanating from agricultural operations necessary for the growing of crops or the raising of fowl or animals.

- **Rule 403, Fugitive Dust.** This rule is intended to reduce the amount of particulate matter entrained in the ambient air as a result of anthropogenic (human-made) fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. Rule 403 applies to any activity or human-made condition capable of generating fugitive dust, and requires best available control measures to be applied to earth moving and grading activities.

- **Rule 1113, Architectural Coatings.** This rule limits the VOC content of architectural coatings used on projects in the SCAQMD. Any person who supplies, sells, offers for sale, or manufactures any architectural coating for use on projects in the SCAQMD must comply with the current VOC standards set in this rule.

2.2 GREENHOUSE GAS EMISSIONS

Scientists have concluded that human activities are contributing to global climate change by adding large amounts of heat-trapping gases, known as GHGs, to the atmosphere. The primary source of these GHGs is fossil fuel use. The Intergovernmental Panel on Climate Change (IPCC) has identified four major GHGs—water vapor, carbon dioxide (CO_2), methane (CH_4), and ozone (O_3)—that are the likely cause of an increase in global average temperatures observed within the 20th and 21st centuries. Other GHGs identified by the IPCC that contribute to global warming to a lesser extent are nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons, perfluorocarbons, and chlorofluorocarbons (IPCC 2001).[5,6] The major GHGs are briefly described below.

- **Carbon dioxide (CO_2)** enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and respiration, and also as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (sequestered) when it is absorbed by plants as part of the biological carbon cycle.

- **Methane (CH_4)** is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and from the decay of organic waste in municipal landfills and water treatment facilities.

- **Nitrous oxide (N_2O)** is emitted during agricultural and industrial activities as well as during the combustion of fossil fuels and solid waste.

- **Fluorinated gases** are synthetic, strong GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances. These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as high global-warming-potential (GWP) gases.

  - ***Chlorofluorocarbons (CFCs)*** are GHGs covered under the 1987 Montreal Protocol and used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Since they are not destroyed in the lower atmosphere (troposphere, stratosphere), CFCs drift into the upper

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[5] Water vapor (H_2O) is the strongest GHG and the most variable in its phases (vapor, cloud droplets, ice crystals). However, water vapor is not considered a pollutant, because it is considered part of the feedback loop rather than a primary cause of change.

[6] Black carbon contributes to climate change both directly, by absorbing sunlight, and indirectly, by depositing on snow (making it melt faster) and by interacting with clouds and affecting cloud formation. Black carbon is the most strongly light-absorbing component of particulate matter (PM) emitted from burning fuels such as coal, diesel, and biomass. Reducing black carbon emissions globally can have immediate economic, climate, and public health benefits. California has been an international leader in reducing emissions of black carbon, with close to 95 percent control expected by 2020 due to existing programs that target reducing PM from diesel engines and burning activities (CARB 2017a). However, state and national GHG inventories do not include black carbon yet due to ongoing work resolving the precise global warming potential of black carbon. Guidance for CEQA documents does not yet include black carbon.

atmosphere where, given suitable conditions, they break down the ozone layer. These gases are therefore being replaced by other compounds that are GHGs covered under the Kyoto Protocol.

- ***Perfluorocarbons (PFCs)*** are a group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly perfluoromethane [CF_4] and perfluoroethane [C_2F_6]) were introduced as alternatives, along with hydrofluorocarbons (HFCs), to ozone-depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they have a high GWP.

- ***Sulfur Hexafluoride (SF_6)*** is a colorless gas soluble in alcohol and ether, and slightly soluble in water. SF_6 is a strong GHG used primarily in electrical transmission and distribution systems as an insulator.

- ***Hydrochlorofluorocarbons (HCFCs)*** contain hydrogen, fluorine, chlorine, and carbon atoms. Although they are ozone-depleting substances, they are less potent than CFCs. They have been introduced as temporary replacements for CFCs.

- ***Hydrofluorocarbons (HFCs)*** contain only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone-depleting substances to serve many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are strong GHGs. (IPCC 1995; USEPA 2017b)

GHGs are dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. Some GHGs have a stronger greenhouse effect than others. These are referred to as high GWP gases. The GWP of GHG emissions are shown in Table 2, *GHG Emissions and Their Relative Global Warming Potential Compared to CO_2*. The GWP is used to convert GHGs to CO_2-equivalence (CO_2e) to show the relative potential that different GHGs have to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. For example, under IPCC's Fourth Assessment Report (AR4) GWP values for CH_4, a project that generates 10 metric tons (MT) of CH_4 would be equivalent to 250 MT of CO_2.[7]

[7] CO_2-equivalence is used to show the relative potential that different GHGs have to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. The global warming potential of a GHG is also dependent on the lifetime, or persistence, of the gas molecule in the atmosphere.

Table 2 GHG Emissions and their Relative Global Warming Potential Compared to CO_2

GHGs	Second Assessment Report Atmospheric Lifetime (Years)	Fourth Assessment Report Atmospheric Lifetime (Years)	Second Assessment Report Global Warming Potential Relative to $CO_2$1	Fourth Assessment Report Global Warming Potential Relative to $CO_2$1
Carbon Dioxide (CO_2)	50 to 200	50 to 200	1	1
Methane[2] (CH_4)	12 (±3)	12	21	25
Nitrous Oxide (N_2O)	120	114	310	298
Hydrofluorocarbons:				
HFC-23	264	270	11,700	14,800
HFC-32	5.6	4.9	650	675
HFC-125	32.6	29	2,800	3,500
HFC-134a	14.6	14	1,300	1,430
HFC-143a	48.3	52	3,800	4,470
HFC-152a	1.5	1.4	140	124
HFC-227ea	36.5	34.2	2,900	3,220
HFC-236fa	209	240	6,300	9,810
HFC-4310mee	17.1	15.9	1,300	1,030
Perfluoromethane: CF_4	50,000	50,000	6,500	7,390
Perfluoroethane: C_2F_6	10,000	10,000	9,200	12,200
Perfluorobutane: C_4F_{10}	2,600	NA	7,000	8,860
Perfluoro-2-methylpentane: C_6F_{14}	3,200	NA	7,400	9,300
Sulfur Hexafluoride (SF_6)	3,200	NA	23,900	22,800

Source: IPCC 1995, IPCC 2007.
Note: The IPCC has published updated global warming potential (GWP) values in its Fifth Assessment Report (2013) that reflect new information on atmospheric lifetimes of GHGs and an improved calculation of the radiative forcing of CO_2. However, GWP values identified in the Fourth Assessment Report are used by SCAQMD to maintain consistency in statewide GHG emissions modeling. In addition, the 2014 Scoping Plan Update was based on the GWP values in the Fourth Assessment Report.
1 Based on 100-year time horizon of the GWP of the air pollutant compared to CO_2.
2 The methane GWP includes direct effects and indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to the production of CO_2 is not included.

2.2.1 Federal GHG Emissions Laws

The EPA announced on December 7, 2009, that GHG emissions threaten the public health and welfare of the American people and that GHG emissions from on-road vehicles contribute to that threat. The EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHG emissions fit within the Clean Air Act definition of air pollutants. The findings did not themselves impose any emission reduction requirements, but allowed the EPA to finalize the GHG standards proposed in 2009 for new light-duty vehicles as part of the joint rulemaking with the Department of Transportation (USEPA 2009).

To regulate GHGs from passenger vehicles, EPA was required to issue an endangerment finding. The finding identifies emissions of six key GHGs—CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and SF_6—that have been the subject of scrutiny and intense analysis for decades by scientists in the United States and around the world. The first three are applicable to the project's GHG emissions inventory because they constitute the majority of GHG emissions and, per SCAQMD guidance, are the GHG emissions that should be evaluated as part of a project's GHG emissions inventory.

2.2.1.1 US MANDATORY REPORT RULE FOR GHGS (2009)

In response to the endangerment finding, the EPA issued the Mandatory Reporting of GHG Rule that requires substantial emitters of GHG emissions (large stationary sources, etc.) to report GHG emissions data. Facilities that emit 25,000 MT or more of CO_2e per year are required to submit an annual report.

2.2.1.2 UPDATE TO CORPORATE AVERAGE FUEL ECONOMY STANDARDS (2010/2012)

The current Corporate Average Fuel Economy standards (for model years 2011 to 2016) incorporate stricter fuel economy requirements promulgated by the federal government and California into one uniform standard. Additionally, automakers are required to cut GHG emissions in new vehicles by roughly 25 percent by 2016 (resulting in a fleet average of 35.5 miles per gallon by 2016). Rulemaking to adopt these new standards was completed in 2010. California agreed to allow automakers who show compliance with the national program to also be deemed in compliance with state requirements. The federal government issued new standards in 2012 for model years 2017–2025 that will require a fleet average of 54.5 miles per gallon in 2025. However, the EPA is reexamining the 2017–2025 emissions standards.

2.2.1.3 EPA REGULATION OF STATIONARY SOURCES UNDER THE CLEAN AIR ACT (ONGOING)

Pursuant to its authority under the Clean Air Act, the EPA has been developing regulations for new stationary sources such as power plants, refineries, and other large sources of emissions. Pursuant to the President's 2013 Climate Action Plan, the EPA will be directed to develop regulations for existing stationary sources also. However, the EPA is reviewing the Clean Power Plan under President Trump's Energy Independence Executive Order.

2.2.2 State GHG Emissions Laws

Current State of California guidance and goals for reductions in GHG emissions are generally embodied in Executive Orders S 03 05 and B 30 15, Assembly Bill 32 (AB 32), Senate Bill 32 (SB 32), and SB 375.

2.2.2.1 EXECUTIVE ORDER S-03-05

Executive Order S-03-05, signed June 1, 2005, set the following GHG reduction targets for the state:

- 2000 levels by 2010
- 1990 levels by 2020
- 80 percent below 1990 levels by 2050

2.2.2.2 ASSEMBLY BILL 32, THE GLOBAL WARMING SOLUTIONS ACT (2006)

Current State of California guidance and goals for reductions in GHG emissions are generally embodied in AB 32, the Global Warming Solutions Act. AB 32 was passed by the California state legislature on August 31, 2006, to place the state on a course toward reducing its contribution of GHG emissions. AB 32 follows the 2020 tier of emissions reduction targets established in Executive Order S-03-05.

2008 Scoping Plan

The 2008 Scoping Plan was adopted by CARB on December 11, 2008. The 2008 Scoping Plan identified that GHG emissions in California are anticipated to be approximately 596 $MMTCO_2e$ in 2020. In December 2007, CARB approved a 2020 emissions limit of 427 $MMTCO_2e$ (471 million tons) for the state (CARB 2008). In order to effectively implement the emissions cap, AB 32 directed CARB to establish a mandatory reporting system to track and monitor GHG emissions levels for large stationary sources that generate more than 25,000 $MTCO_2e$ per year, prepare a plan demonstrating how the 2020 deadline can be met, and develop appropriate regulations and programs to implement the plan by 2012.

First Update to the Scoping Plan

In 2014, CARB completed a five-year update to the 2008 Scoping Plan, as required by AB 32. The final Update to the Scoping Plan was released in May, and CARB adopted it at the May 22, 2014, board hearing. The Update to the Scoping Plan defines CARB's climate change priorities for the next five years and lays the groundwork to reach post-2020 goals in Executive Orders S-03-05 and B-16-2012. The update includes the latest scientific findings related to climate change and its impacts, including short-lived climate pollutants. The GHG target identified in the 2008 Scoping Plan is based on the IPCC GWPs from the Second and Third Assessment Reports (see Table 2). IPCC's Fourth and Fifth Assessment Reports identified more recent GWP values based on the latest available science. CARB recalculated the 1990 GHG emission levels with the updated GWPs in the Fourth Assessment Report, and the 427 $MMTCO_2e$ 1990 emissions level and 2020 GHG emissions limit, established in response to AB 32, is slightly higher, at 431 $MMTCO_2e$ (CARB 2014).

As identified in the Update to the Scoping Plan, California is on track to meeting the goals of AB 32. However, the update also addresses the state's longer-term GHG goals within a post-2020 element. The post-2020 element provides a high level view of a long-term strategy for meeting the 2050 GHG goals, including a recommendation for the state to adopt a midterm target. According to the Update to the Scoping Plan, local government reduction targets should chart a reduction trajectory that is consistent with or exceeds the trajectory created by statewide goals. CARB identified that reducing emissions to 80 percent below 1990 levels will require a fundamental shift to efficient, clean energy in every sector of the economy. Progressing toward California's 2050 climate targets will require significant acceleration of GHG reduction rates. Emissions from 2020 to 2050 will have to decline several times faster than the rate needed to reach the 2020 emissions limit (CARB 2014).

2.2.2.3 EXECUTIVE ORDER B-30-15

Executive Order B-30-15, signed April 29, 2015, sets a goal of reducing GHG emissions in the state to 40 percent of 1990 levels by year 2030. Executive Order B-30-15 also directs CARB to update the Scoping Plan to quantify the 2030 GHG reduction goal for the state and requires state agencies to implement measures to meet the interim 2030 goal of Executive Order B-30-15 as well as the long-term goal for 2050 in Executive Order S-03-05. It also requires the Natural Resources Agency to conduct triennial updates of the California adaption strategy, "Safeguarding California," in order to ensure climate change is accounted for in state planning and investment decisions.

2.2.2.4 SENATE BILL 32 AND ASSEMBLY BILL 197

In September 2016, Governor Brown signed Senate Bill 32 and Assembly Bill 197 into law, making the Executive Order goal for year 2030 into a statewide mandated legislative target. AB 197 established a joint legislative committee on climate change policies and requires the CARB to prioritize direction emissions reductions rather than the market-based cap-and-trade program for large stationary, mobile, and other sources.

2017 Climate Change Scoping Plan Update

Executive Order B-30-15 and SB 32 required CARB to prepare another update to the Scoping Plan to address the 2030 target for the state. In November 2017, CARB released the final 2017 Climate Change Scoping Plan Update, which outlines potential regulations and programs, including strategies consistent with AB 197 requirements, to achieve the 2030 target. The 2017 Scoping Plan establishes a new emissions limit of 260 $MMTCO_2e$ for the year 2030, which corresponds to a 40 percent decrease in 1990 levels by 2030 (CARB 2017b).

California's climate strategy will require contributions from all sectors of the economy, including enhanced focus on zero- and near-zero emission (ZE/NZE) vehicle technologies; continued investment in renewables, such as solar roofs, wind, and other types of distributed generation; greater use of low carbon fuels; integrated land conservation and development strategies; coordinated efforts to reduce emissions of short-lived climate pollutants (methane, black carbon, and fluorinated gases); and an increased focus on integrated land use planning, to support livable, transit-connected communities and conservation of agricultural and other lands. Requirements for GHG reductions at stationary sources complement local air pollution control efforts by the local air districts to tighten criteria air pollutants and TACs emissions limits on a broad spectrum of industrial sources. Major elements of the 2017 Scoping Plan framework include:

- Implementing and/or increasing the standards of the Mobile Source Strategy, which include increasing ZEV buses and trucks;
- Low Carbon Fuel Standard (LCFS), with an increased stringency (18 percent by 2030).
- Implementation of SB 350, which expands the Renewables Portfolio Standard (RPS) to 50 percent RPS and doubles energy efficiency savings by 2030.
- California Sustainable Freight Action Plan, which improves freight system efficiency, utilizes near-zero emissions technology, and deployment of ZEV trucks.
- Implementing the proposed Short-Lived Climate Pollutant Strategy (SLPS), which focuses on reducing methane and hydroflurocarbon emissions by 40 percent and anthropogenic black carbon emissions by 50 percent by year 2030.

2. Regulatory Setting

- Post-2020 Cap-and-Trade Program that includes declining caps.
- Continued implementation of SB 375.
- Development of a Natural and Working Lands Action Plan to secure California's land base as a net carbon sink.

In addition to the statewide strategies listed above, the 2017 Climate Change Scoping Plan also identified local governments as essential partners in achieving the State's long-term GHG reduction goals and identified local actions to reduce GHG emissions. As part of the recommended actions, CARB recommends statewide targets of no more than 6 $MTCO_2e$ or less per capita by 2030 and 2 $MTCO_2e$ or less per capita by 2050. CARB recommends that local governments evaluate and adopt robust and quantitative locally-appropriate goals that align with the statewide per capita targets and the State's sustainable development objectives and develop plans to achieve the local goals. The statewide per capita goals were developed by applying the percent reductions necessary to reach the 2030 and 2050 climate goals (i.e., 40 percent and 80 percent, respectively) to the State's 1990 emissions limit established under AB 32. For CEQA projects, CARB states that lead agencies have discretion to develop evidenced-based numeric thresholds (mass emissions, per capita, or per service population)—consistent with the Scoping Plan and the state's long-term GHG goals. To the degree a project relies on GHG mitigation measures, CARB recommends that lead agencies prioritize on-site design features that reduce emissions, especially from VMT, and direct investments in GHG reductions within the project's region that contribute potential air quality, health, and economic co-benefits. Where further project design or regional investments are infeasible or not proven to be effective, CARB recommends mitigating potential GHG impacts through purchasing and retiring carbon credits.

The Scoping Plan scenario is set against what is called the business-as-usual (BAU) yardstick—that is, what would the GHG emissions look like if the State did nothing at all beyond the existing policies that are required and already in place to achieve the 2020 limit, as shown in Table 3, *2017 Climate Change Scoping Plan Emissions Reductions Gap*. It includes the existing renewables requirements, advanced clean cars, the "10 percent" Low Carbon Fuel Standard (LCFS), and the SB 375 program for more vibrant communities, among others. However, it does not include a range of new policies or measures that have been developed or put into statute over the past two years. Also shown in the table, the known commitments are expected to result in emissions that are 50 $MMTCO_2e$ above the target in 2030. If the estimated GHG reductions from the known commitments are not realized due to delays in implementation or technology deployment, the post-2020 Cap-and-Trade Program would deliver the additional GHG reductions in the sectors it covers to ensure the 2030 target is achieved.

Table 3 2017 Climate Change Scoping Plan Emissions Reductions Gap

Modeling Scenario	2030 GHG Emissions $MMTCO_2e$
Reference Scenario (Business-as-Usual)	398
With Known Commitments	320
2030 GHG Target	260
Gap to 2030 Target	60

Source: CARB 2017b.

Table 4, *2017 Climate Change Scoping Plan Emissions Change by Sector*, provides estimated GHG emissions by sector, compared to 1990 levels, and the range of GHG emissions for each sector estimated for 2030.

Table 4 2017 Climate Change Scoping Plan Emissions Change by Sector

Scoping Plan Sector	1990 $MMTCO_2e$	2030 Proposed Plan Ranges $MMTCO_2e$	% Change from 1990
Agricultural	26	24-25	-4% to -8%
Residential and Commercial	44	38-40	-9% to -14%
Electric Power	108	30-53	-51% to -72%
High GWP	3	8-11	167% to 267%
Industrial	98	83-93	-8% to -15%
Recycling and Waste	7	8-9	14% to 29%
Transportation (including TCU)	152	103-111	-27% to -32%
Net Sink[1]	-7	TBD	TBD
Sub Total	431	294-339	-21% to -32%
Cap-and-Trade Program	NA	40-85	NA
Total	431	260	-40%

Source: CARB 2017b.
Notes: TCU = Transportation, Communications, and Utilities; TBD: To Be Determined.
[1] Work is underway through 2017 to estimate the range of potential sequestration benefits from the natural and working lands sector.

2.2.2.5 SENATE BILL 1383

On September 19, 2016, the Governor signed SB 1383 to supplement the GHG reduction strategies in the Scoping Plan to consider short-lived climate pollutants, including black carbon and CH4. Black carbon is the light-absorbing component of fine particulate matter (PM) produced during incomplete combustion of fuels. SB 1383 requires the state board, no later than January 1, 2018, to approve and begin implementing that comprehensive strategy to reduce emissions of short-lived climate pollutants to achieve a reduction in methane by 40 percent, hydrofluorocarbon gases by 40 percent, and anthropogenic black carbon by 50 percent below 2013 levels by 2030, as specified. The bill also establishes targets for reducing organic waste in landfill. On March 14, 2017, CARB adopted the Final Proposed Short-Lived Climate Pollutant Strategy, which identifies the state's approach to reducing anthropogenic and biogenic sources of short-lived climate pollutants. Anthropogenic sources of black carbon include on- and off-road transportation, residential wood burning, fuel combustion (charbroiling), and industrial processes. According to CARB, ambient levels of black carbon in California are 90 percent lower than in the early 1960s, despite the tripling of diesel fuel use (CARB 2017b). In-use on-road rules are expected to reduce black carbon emissions from on-road sources by 80 percent between 2000 and 2020. SCAQMD is one of the air districts that requires air pollution control technologies for chain-driven broilers, which reduces particulate emissions from these charbroilers by over 80 percent (CARB 2017a). Additionally, SCAQMD Rule 445, Wood-Burning Devices, limits installation of new fireplaces in the SoCAB.

2.2.2.6 SB 375, SUSTAINABLE COMMUNITIES AND CLIMATE PROTECTION ACT

In 2008, the Sustainable Communities and Climate Protection Act was adopted to connect the GHG emissions reductions targets established in the 2008 Scoping Plan for the transportation sector to local land use decisions that affect travel behavior. Its intent is to reduce GHG emissions from light-duty trucks and automobiles (excludes emissions associated with goods movement) by aligning regional long-range transportation plans, investments, and housing allocations to local land use planning to reduce vehicle miles traveled (VMT) and vehicle trips. Specifically, SB 375 required CARB to establish GHG emissions reduction targets for each of the 18 metropolitan planning organizations (MPOs). The Southern California Association of Governments (SCAG) is the MPO for the Southern California region, which includes the counties of Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial.

Pursuant to the recommendations of the Regional Transportation Advisory Committee, CARB adopted per capita reduction targets for each of the MPOs rather than a total magnitude reduction target. SCAG's targets are an 8 percent per capita reduction from 2005 GHG emission levels by 2020 and a 13 percent per capita reduction from 2005 GHG emission levels by 2035 (CARB 2010). SB 375 requires CARB to periodically update the targets, no later than every 8 years. In August 2014, CARB staff released a preliminary draft staff report on the status of SB 375 efforts and factors that CARB could consider during development of the methodology to update the targets. In March 2017, CARB held a series of workshops regarding the SB 375 target update process, and updated targets adopted in 2017 are intended to become effective in 2018. Sustainable communities strategies adopted in 2018 would be subject to the updated targets (CARB 2015).

The 2020 targets are smaller than the 2035 targets because a significant portion of the built environment in 2020 has been defined by decisions that have already been made. In general, the 2020 scenarios reflect that more time is needed for large land use and transportation infrastructure changes. Most of the reductions in the interim are anticipated to come from improving the efficiency of the region's transportation network. The targets would result in 3 $MMTCO_2e$ of reductions by 2020 and 15 $MMTCO_2e$ of reductions by 2035. Based on these reductions, the passenger vehicle target in CARB's Scoping Plan (for AB 32) would be met (CARB 2010).

2017 Update to the SB 375 Targets

CARB is required to update the targets for the MPOs every eight years. In June 2017, CARB released updated targets and technical methodology. The updated targets consider the need to further reduce VMT, as identified in the 2017 Scoping Plan Update (for SB 32), while balancing the need for additional and more flexible revenue sources to incentivize positive planning and action toward sustainable communities. Like the 2010 targets, the updated SB 375 targets are in units of percent per capita reduction in GHG emissions from automobiles and light trucks relative to 2005; this excludes reductions anticipated from implementation of State technology and fuels strategies, and any potential future State strategies such as statewide road user pricing. The proposed targets call for greater per capita GHG emission reductions from SB 375 than are currently in place, which for 2035, translate into proposed targets that either match or exceed the emission reduction levels contained in the MPOs' currently adopted Sustainable Community Strategies (SCSs, discussed below) to achieve the SB 375 targets. As proposed, CARB staff's proposed targets would result in an additional reduction of over 10 $MMTCO_2e$ in 2035 compared to the current targets. For the next round of SCS updates, CARB's updated targets for the SCAG region are an 8 percent per capita GHG reduction in 2020 from 2005 levels (unchanged from the 2010 target) and a 21 percent per capita GHG reduction in 2035 from 2005 levels (compared to the 2010 target of 13 percent). CARB anticipates adoption of the updated targets and methodology in 2018 and subsequent SCSs adopted afterwards would be subject to these new targets (CARB 2017c).

SCAG 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy

SB 375 requires the MPOs to prepare a sustainable communities strategy in their regional transportation plan. For the SCAG region, the 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) was adopted on April 7, 2016, and is an update to the 2012 RTP/SCS (SCAG 2016). In general, the SCS outlines a development pattern for the region, which, when integrated with the transportation network and other transportation measures and policies, would reduce vehicle miles traveled from automobiles and light duty trucks and thereby reduce GHG emissions from these sources.

The 2016-2040 RTP/SCS projects that the SCAG region will meet or exceed the passenger per capita targets set in 2010 by CARB. It is projected that VMT per capita in the region for year 2040 would be reduced by 7.4 percent with implementation of the 2016-2040 RTP/SCS compared to a no-plan year-2040 scenario. Under the 2016-2040 RTP/SCS, SCAG anticipates lowering GHG emissions 8 percent below 2005 levels by 2020, 18 percent by 2035, and 21 percent by 2040. The 18 percent reduction by 2035 over 2005 levels represents an additional 2 percent of reduction compared to the 2012 RTP/SCS projection. Overall, the SCS is meant to provide growth strategies that will achieve the aforementioned regional GHG emissions reduction targets. Land use strategies to achieve the region's targets include planning for new growth around high quality transit areas and livable corridors, and creating neighborhood mobility areas to integrate land use and transportation and plan for more active lifestyles (SCAG 2016). However, the SCS does not require that local general plans, specific plans, or zoning be consistent with the SCS; instead, it provides incentives to governments and developers for consistency.

2.2.2.7 ASSEMBLY BILL 1493

California vehicle GHG emission standards were enacted under AB 1493 (Pavley I). Pavley I is a clean-car standard that reduces GHG emissions from new passenger vehicles (light-duty auto to medium-duty vehicles) from 2009 through 2016 and is anticipated to reduce GHG emissions from new passenger vehicles by 30 percent in 2016. California implements the Pavley I standards through a waiver granted to California by the EPA. In 2012, the EPA issued a Final Rulemaking that sets even more stringent fuel economy and GHG emissions standards for model year 2017 through 2025 light-duty vehicles (see also the discussion on the update to the CAFE standards under *Federal Laws*, above). In January 2012, CARB approved the Advanced

2. Regulatory Setting

Clean Cars program (formerly known as Pavley II) for model years 2017 through 2025. The program combines the control of smog, soot, and global warming gases and requirements for greater numbers of zero-emission vehicles into a single package of standards. Under California's Advanced Clean Car program, by 2025, new automobiles will emit 34 percent fewer global warming gases and 75 percent fewer smog-forming emissions.

2.2.2.8 EXECUTIVE ORDER S-01-07

On January 18, 2007, the state set a new LCFS for transportation fuels sold within the state. Executive Order S-01-07 sets a declining standard for GHG emissions measured in carbon dioxide equivalent gram per unit of fuel energy sold in California. The LCFS requires a reduction of 2.5 percent in the carbon intensity of California's transportation fuels by 2015 and a reduction of at least 10 percent by 2020. The standard applies to refiners, blenders, producers, and importers of transportation fuels, and would use market-based mechanisms to allow these providers to choose how they reduce emissions during the "fuel cycle" using the most economically feasible methods.

2.2.2.9 EXECUTIVE ORDER B-16-2012

On March 23, 2012, the state identified that CARB, the California Energy Commission (CEC), the Public Utilities Commission, and other relevant agencies to work with the Plug-in Electric Vehicle Collaborative and the California Fuel Cell Partnership to establish benchmarks to accommodate zero-emissions vehicles in major metropolitan areas, including infrastructure to support them (e.g., electric vehicle charging stations). The executive order also directs the number of zero-emission vehicles in California's state vehicle fleet to increase through the normal course of fleet replacement so that at least 10 percent of fleet purchases of light-duty vehicles are zero emission by 2015 and at least 25 percent by 2020. The executive order also establishes a target for the transportation sector of reducing GHG emissions from the transportation sector 80 percent below 1990 levels.

2.2.2.10 SENATE BILLS 1078,107, X1-2, AND EXECUTIVE ORDER S-14-08

A major component of California's Renewable Energy Program is the renewable portfolio standard established under Senate Bills 1078 (Sher) and 107 (Simitian). Under the RPS, certain retail sellers of electricity were required to increase the amount of renewable energy each year by at least 1 percent in order to reach at least 20 percent by December 30, 2010. Executive Order S-14-08 was signed in November 2008, which expanded the state's renewable energy standard to 33 percent renewable power by 2020. This standard was adopted by the legislature in 2011 (SBX1-2). The increase in renewable sources for electricity production will decrease indirect GHG emissions from development projects because electricity production from renewable sources is generally considered carbon neutral.

2.2.2.11 SENATE BILL 350

Senate Bill 350 (de Leon), signed into law September 2015, establishes tiered increases to the RPS of 40 percent by 2024, 45 percent by 2027, and 50 percent by 2030. SB 350 also set a new goal to double the energy efficiency savings in electricity and natural gas through energy efficiency and conservation measures.

2.2.2.12 CALIFORNIA BUILDING CODE: BUILDING ENERGY EFFICIENCY STANDARDS

Energy conservation standards for new residential and non-residential buildings were adopted by the California Energy Resources Conservation and Development Commission (now the CEC) in June 1977 and most recently revised in 2016 (Title 24, Part 6, of the California Code of Regulations [CCR]). Title 24 requires the design of building shells and building components to conserve energy. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods. On June 10, 2015, the CEC adopted the 2016 Building Energy Efficiency Standards, which went into effect on January 1, 2017.

The 2016 Standards continues to improve upon the previous 2013 Standards for new construction of, and additions and alterations to, residential and nonresidential buildings. Under the 2016 Standards, residential and nonresidential buildings are 28 and 5 percent more energy efficient than the 2013 Standards, respectively (CEC 2015a). Buildings that are constructed in accordance with the 2013 Building Energy Efficiency Standards are 25 percent (residential) to 30 percent (nonresidential) more energy efficient than the prior 2008 standards as a result of better windows, insulation, lighting, ventilation systems, and other features. While the 2016 standards do not achieve zero net energy, they do get very close to the state's goal and make important steps toward changing residential building practices in California. The 2019 standards will take the final step to achieve zero net energy for newly constructed residential buildings throughout California (CEC 2015b).

2.2.2.13 CALIFORNIA GREEN BUILDING CODE

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (24 CCR, Part 11, known as "CALGreen") was adopted as part of the California Building Standards Code. CALGreen established planning and design standards for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants.[8] The mandatory provisions of the California Green Building Code Standards became effective January 1, 2011, and were last updated in 2016. The 2016 Standards became effective on January 1, 2017.

2.2.2.14 2006 APPLIANCE EFFICIENCY REGULATIONS

The 2006 Appliance Efficiency Regulations (Title 20, CCR §§ 1601 through 1608) were adopted by the California Energy Commission on October 11, 2006, and approved by the California Office of Administrative Law on December 14, 2006. The regulations include standards for both federally regulated appliances and non–federally regulated appliances. Though these regulations are now often viewed as "business-as-usual," they exceed the standards imposed by all other states and they reduce GHG emissions by reducing energy demand.

2.2.2.15 SOLID WASTE REGULATIONS

California's Integrated Waste Management Act of 1989 (AB 939, Public Resources Code §§ 40050 et seq.) set a requirement for cities and counties throughout the state to divert 50 percent of all solid waste from landfills

[8] The green building standards became mandatory in the 2010 edition of the code.

by January 1, 2000, through source reduction, recycling, and composting. In 2008, the requirements were modified to reflect a per capita requirement rather than tonnage. To help achieve this, the act requires that each city and county prepare and submit a source reduction and recycling element. AB 939 also established the goal for all California counties to provide at least 15 years of ongoing landfill capacity.

AB 341 (Chapter 476, Statutes of 2011) increased the statewide goal for waste diversion to 75 percent by 2020 and requires recycling of waste from commercial and multifamily residential land uses.

The California Solid Waste Reuse and Recycling Access Act (AB 1327, California Public Resources Code §§ 42900 et seq.) requires areas to be set aside for collecting and loading recyclable materials in development projects. The act required the California Integrated Waste Management Board to develop a model ordinance for adoption by any local agency requiring adequate areas for collection and loading of recyclable materials as part of development projects. Local agencies are required to adopt the model or an ordinance of their own.

Section 5.408 of the 2013 California Green Building Standards Code (Title 24, California Code of Regulations, Part 11) also requires that at least 50 percent of the nonhazardous construction and demolition waste from nonresidential construction operations be recycled and/or salvaged for reuse.

In October of 2014 Governor Brown signed AB 1826 requiring businesses to recycle their organic waste on and after April 1, 2016, depending on the amount of waste they generate per week. This law also requires that on and after January 1, 2016, local jurisdictions across the state implement an organic waste recycling program to divert organic waste generated by businesses, including multifamily residential dwellings that consist of five or more units. Organic waste means food waste, green waste, landscape and pruning waste, nonhazardous wood waste, and food-soiled paper waste that is mixed in with food waste.

2.2.2.16 WATER EFFICIENCY REGULATIONS

The 20x2020 Water Conservation Plan was issued by the Department of Water Resources (DWR) in 2010 pursuant to Senate Bill 7, which was adopted during the 7th Extraordinary Session of 2009–2010 and therefore dubbed "SBX7-7." SBX7-7 mandated urban water conservation and authorized the DWR to prepare a plan implementing urban water conservation requirements (20x2020 Water Conservation Plan). In addition, it required agricultural water providers to prepare agricultural water management plans, measure water deliveries to customers, and implement other efficiency measures. SBX7-7 requires urban water providers to adopt a water conservation target of 20 percent reduction in urban per capita water use by 2020 compared to 2005 baseline use.

The Water Conservation in Landscaping Act of 2006 (AB 1881) requires local agencies to adopt the updated DWR model ordinance or equivalent. AB 1881 also requires the Energy Commission, in consultation with the department, to adopt, by regulation, performance standards and labeling requirements for landscape irrigation equipment, including irrigation controllers, moisture sensors, emission devices, and valves to reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy or water.

2. Regulatory Setting

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3. Environmental Setting

3.1 SOUTH COAST AIR BASIN

The project site lies within the South Coast Air Basin (SoCAB), which includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino counties. The SoCAB is a coastal plain with connecting broad valleys and low hills. The SoCAB is bounded by the Pacific Ocean in the southwest quadrant, with high mountains forming the remainder of the perimeter. The general region lies in the semi-permanent high-pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. This usually mild weather pattern is interrupted infrequently by periods of extremely hot weather, winter storms, and Santa Ana winds (SCAQMD 2005).

3.1.1 Temperature and Precipitation

The annual average temperature varies little throughout the SoCAB, ranging from the low to middle 60s, measured in degrees Fahrenheit (°F). With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. The climatological station nearest to the project site with temperature data is the Torrance Monitoring Station (ID No. 048973). The lowest average temperature is reported at 44.3°F in January, and the highest average temperature is 78.6°F in August (WRCC 2017).

In contrast to a very steady pattern of temperature, rainfall is seasonally and annually highly variable. Almost all rain falls from November through April. Summer rainfall is normally restricted to widely scattered thundershowers near the coast, with slightly heavier shower activity in the east and over the mountains. Rainfall historically averages 13.55 inches per year in the project area (WRCC 2017).

3.1.2 Humidity

Although the SoCAB has a semiarid climate, the air near the earth's surface is typically moist because of the presence of a shallow marine layer. Except for infrequent periods when dry, continental air is brought into the SoCAB by offshore winds, the "ocean effect" is dominant. Periods of heavy fog, especially along the coast, are frequent. Low clouds, often referred to as high fog, are a characteristic climatic feature. Annual average humidity is 70 percent at the coast and 57 percent in the eastern portions of the SoCAB (SCAQMD 2005).

3.1.3 Wind

Wind patterns across the south coastal region are characterized by westerly or southwesterly onshore winds during the day and by easterly or northeasterly breezes at night. Wind speed is somewhat greater during the dry summer months than during the rainy winter season.

3. Environmental Setting

Between periods of wind, periods of air stagnation may occur, both in the morning and evening hours. Air stagnation is one of the critical determinants of air quality conditions on any given day. During the winter and fall months, surface high-pressure systems over the SoCAB, combined with other meteorological conditions, can result in very strong, downslope Santa Ana winds. These winds normally continue a few days before predominant meteorological conditions are reestablished.

The mountain ranges to the east affect the transport and diffusion of pollutants by inhibiting their eastward transport. Air quality in the SoCAB generally ranges from fair to poor and is similar to air quality in most of coastal southern California. The entire region experiences heavy concentrations of air pollutants during prolonged periods of stable atmospheric conditions (SCAQMD 2005).

3.1.4 Inversions

In conjunction with the two characteristic wind patterns that affect the rate and orientation of horizontal pollutant transport, there are two similarly distinct types of temperature inversions that control the vertical depth through which pollutants are mixed. These are the marine/subsidence inversion and the radiation inversion. The combination of winds and inversions are critical determinants in leading to the highly degraded air quality in summer and the generally good air quality in the winter in the project area (SCAQMD 2005).

3.2 SOCAB AREA DESIGNATIONS

The AQMP provides the framework for air quality basins to achieve attainment of the state and federal ambient air quality standards through the SIP. Areas are classified as attainment or nonattainment areas for particular pollutants, depending on whether they meet ambient air quality standards. Severity classifications for nonattainment range in magnitude from marginal, moderate, and serious to severe and extreme.

- **Unclassified:** a pollutant is designated unclassified if the data is incomplete and does not support a designation of attainment or nonattainment.
- **Attainment:** a pollutant is in attainment if the CAAQS for that pollutant was not violated at any site in the area during a three-year period.
- **Nonattainment:** a pollutant is in nonattainment if there was at least one violation of a state AAQS for that pollutant in the area.
- **Nonattainment/Transitional:** a subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the AAQS for that pollutant.

The attainment status for the SoCAB is shown in Table 5, *Attainment Status of Criteria Pollutants in the South Coast Air Basin*. The SoCAB is designated in attainment of the California AAQS for sulfates. The SoCAB is designated nonattainment for lead (Los Angeles County only) under the National AAQS.

Table 5 Attainment Status of Criteria Pollutants in the South Coast Air Basin

Pollutant	State	Federal
Ozone – 1-hour	Extreme Nonattainment	No Federal Standard
Ozone – 8-hour	Extreme Nonattainment	Extreme Nonattainment
PM_{10}	Serious Nonattainment	Attainment/Maintenance
$PM_{2.5}$	Nonattainment	Nonattainment[1]
CO	Attainment	Attainment
NO_2	Attainment	Attainment/Maintenance
SO_2	Attainment	Attainment
Lead	Attainment	Nonattainment (Los Angeles County only)[2]
All others	Attainment/Unclassified	Attainment/Unclassified

Source: CARB 2016b.
1 SCAQMD is seeking to reclassify the SoCAB from "moderate" to "serious" nonattainment under federal $PM_{2.5}$ standard.
2 In 2010, the Los Angeles portion of the SoCAB was designated nonattainment for lead under the new federal and existing state AAQS as a result of large industrial emitters. Remaining areas within the SoCAB are unclassified.

3.3 MULTIPLE AIR TOXICS EXPOSURE STUDY (MATES)

The Multiple Air Toxics Exposure Study (MATES) is a monitoring and evaluation study on ambient concentrations of TACs and estimated the potential health risks from air toxics in the SoCAB. In 2008, SCAQMD conducted its third update to the MATES study (MATES III). The results showed that the overall risk for excess cancer from a lifetime exposure to ambient levels of air toxics was about 1,200 in a million. The largest contributor to this risk was diesel exhaust, accounting for 84 percent of the cancer risk (SCAQMD 2008a).

SCAQMD recently released another update of MATES (MATES IV). The results showed that the overall monitored risk for excess cancer decreased to approximately 418 in one million (SCAQMD 2015a). Compared to the 2008 MATES III, monitored excess cancer risks decreased by approximately 65 percent. Approximately 90 percent of the risk is attributed to mobile sources, and 10 percent is attributed to TACs from stationary sources, such as refineries, metal processing facilities, gas stations, and chrome plating facilities. The largest contributor was diesel exhaust, accounting for approximately 68 percent of the air toxics risk. Compared to MATES III, MATES IV found substantial improvement in air quality and an associated decrease in air toxics exposure. As a result, the estimated basinwide population-weighted risk decreased by approximately 57 percent compared to the analysis done for the MATES III time period (SCAQMD 2015a).

The Office of Environmental Health Hazard Assessment (OEHHA) updated the guidelines for estimating cancer risks on March 6, 2015. The new method utilizes higher estimates of cancer potency during early life exposures, which result in a higher calculation of risk. There are also differences in the assumptions on breathing rates and length of residential exposures. When combined together, SCAQMD estimates that risks for a given inhalation exposure level will be about 2.7 times higher using the proposed updated methods identified in MATES IV (e.g., 2.7 times higher than 418 in one million overall excess cancer risk) (SCAQMD 2015a).

3.4 EXISTING AMBIENT AIR QUALITY

Existing levels of ambient air quality and historical trends and projections in the vicinity of the project site and project area are best documented by measurements made by SCAQMD. The project site is in Source Receptor Area (SRA) 3 – Southwest Coastal Los Angeles County. The air quality monitoring station closest to the project site is the Compton-700 North Bullis Road Monitoring Station. This station does not have information for CO and PM10, so the information for this criteria air pollutant was obtained from the Los Angeles—Westchester Parkway Monitoring Station. Data from these stations are summarized in Table 6, *Ambient Air Quality Monitoring Summary*. The data show that the concentration levels of O_3 and $PM_{2.5}$ of the area regularly exceed the state and federal one-hour and eight-hour O3 standards as well as the federal $PM_{2.5}$ standards. The CO, SO_2, PM_{10} and NO_2 standards have not been exceeded in the last five years in the project vicinity.

Table 6 Ambient Air Quality Monitoring Summary

Pollutant/Standard	Number of Days Threshold Were Exceeded and Maximum Levels during Such Violations				
	2011	2012	2013	2014	2015
Ozone (O_3)[1]					
State 1-Hour ≥ 0.09 ppm	0	0	0	0	0
State 8-hour ≥ 0.07 ppm	0	0	1	2	0
Federal 8-Hour > 0.075 ppm	0	0	1	4	1
Max. 1-Hour Conc. (ppm)	0.082	0.086	0.090	0.094	0.091
Max. 8-Hour Conc. (ppm)	0.065	0.070	0.080	0.081	0.072
Carbon Monoxide (CO)[2]					
State 8-Hour > 9.0 ppm	0	0	*	*	*
Federal 8-Hour ≥ 9.0 ppm	0	0	*	*	*
Max. 8-Hour Conc. (ppm)	4.67	3.96	*	*	*
Nitrogen Dioxide (NO_2)[1]					
State 1-Hour ≥ 0.18 ppm	0	0	0	0	0
Federal 1-Hour ≥ 0.100 ppm	0	0	0	0	0
Max. 1-Hour Conc. (ppb)	75	79	69	68	73
Sulfur Dioxide (SO_2)[1]					
State 1-Hour ≥ 0.04 ppm	0	0	0	*	*
Federal 24-Hour ≥ 0.14 ppm	0	0	0	*	*
Max. 1-Hour Conc. (ppm)	0.002	0.002	0.002	*	*
Coarse Particulates (PM_{10})[1]					
State 24-Hour > 50 µg/m³	0	0	0	0	0
Federal 24-Hour > 150 µg/m³	0	0	0	0	0
Max. 24-Hour Conc. (µg/m³)	41	30	37	45	42
Fine Particulates ($PM_{2.5}$)[2]					
Federal 24-Hour > 35 µg/m³	0	1	1	1	3
Max. 24-Hour Conc. (µg/m³)	35.3	51.2	52.1	35.8	41.3

Source: CARB 2017d.
Notes: CO and PM_{10} were based on data from the Los Angeles—Westchester Parkway Monitoring Station. NO_2, O_3, SO_2, and $PM_{2.5}$ was based on data from the Compton – 700 North Bulls Road Monitoring Station.
ppm: parts per million; µg/m³: or micrograms per cubic meter.
* Data not available.

3.5 EXISTING EMISSIONS

The existing wells and pipelines currently do not generate criteria air pollutant and greenhouse gas emissions from daily operations.

3.6 SENSITIVE RECEPTORS

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Sensitive population groups include children, the elderly, the acutely ill, and the chronically ill, especially those with cardio-respiratory diseases.

Residential areas are considered sensitive receptors to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Schools are also considered sensitive receptors, as children are present for extended durations and engage in regular outdoor activities. Recreational land uses are considered moderately sensitive to air pollution. Although exposure periods are generally short, exercise places a high demand on respiratory functions, which can be impaired by air pollution. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial and commercial areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent, as the majority of the workers tend to stay indoors most of the time. In addition, the working population is generally the healthiest segment of the public.

The nearest sensitive receptors include the single-family residential receptors along 185th Street, 186th Street, Casimir Avenue, and Van Ness Avenue, as well as non-residential receptors adjacent to Van Ness Avenue and Border Avenue.

3. Environmental Setting

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4. Thresholds of Significance

4.1 AIR QUALITY

The analysis of the proposed project's air quality impacts follows the guidance and methodologies recommended in SCAQMD's *CEQA Air Quality Handbook* and the significance thresholds on SCAQMD's website.[9] CEQA allows the significance criteria established by the applicable air quality management or air pollution control district to be used to assess impacts of a project on air quality. SCAQMD has established thresholds of significance for regional air quality emissions for construction activities and project operation. In addition to the SCAQMD thresholds, projects are also subject to the AAQS. AAQS are addressed though an analysis of localized CO impacts and localized significance thresholds (LSTs).

4.1.1 Regional Significance Thresholds

SCAQMD has adopted regional construction and operational emissions thresholds to determine a project's cumulative impact on air quality in the SoCAB. Table 7, *SCAQMD Regional Significance Thresholds*, lists these thresholds.

Table 7 SCAQMD Regional Significance Thresholds

Air Pollutant	Construction Phase	Operational Phase
Reactive Organic Gases (ROGs)/ Volatile Organic Compounds (VOCs)	75 lbs/day	55 lbs/day
Nitrogen Oxides (NO_X)	100 lbs/day	55 lbs/day
Carbon Monoxide (CO)	550 lbs/day	550 lbs/day
Sulfur Oxides (SO_X)	150 lbs/day	150 lbs/day
Particulates (PM_{10})	150 lbs/day	150 lbs/day
Particulates ($PM_{2.5}$)	55 lbs/day	55 lbs/day

Source: SCAQMD 2015b.

Projects that exceed the regional significance threshold contribute to the nonattainment designation of the SoCAB. The attainment designations are based on the AAQS, which are set at levels of exposure that are determined to not result in adverse health. Exposure to fine particulate pollution and ozone causes myriad health impacts, particularly to the respiratory and cardiovascular systems:

- Linked to increased cancer risk ($PM_{2.5}$, TACs)
- Aggravates respiratory disease (O_3, $PM_{2.5}$)
- Increases bronchitis (O_3, $PM_{2.5}$)
- Causes chest discomfort, throat irritation, and increased effort to take a deep breath (O_3)

[9] SCAQMD's Air Quality Significance Thresholds can be found here: http://www.aqmd.gov/ceqa/hdbk.html.

4. Thresholds of Significance

- Reduces resistance to infections and increases fatigue (O_3)
- Reduces lung growth in children ($PM_{2.5}$)
- Contributes to heart disease and heart attacks ($PM_{2.5}$)
- Contributes to premature death (O_3, $PM_{2.5}$)
- Linked to lower birth weight in newborns ($PM_{2.5}$) (SCAQMD 2015c)

Exposure to fine particulates and ozone aggravates asthma attacks and can amplify other lung ailments such as emphysema and chronic obstructive pulmonary disease. Exposure to current levels of $PM_{2.5}$ is responsible for an estimated 4,300 cardiopulmonary-related deaths per year in the SoCAB. In addition, a landmark children's health study by University of Southern California scientists found that lung growth improved as air pollution declined for children aged 11 to 15 in five communities in the SoCAB (SCAQMD 2015d).

Mass emissions in Table 7 contribute to the cumulative air quality impacts in the SoCAB. Therefore, regional emissions from a single project do not single-handedly trigger a regional health impact, and it is speculative to identify how many more individuals in the air basin would be affected by the health effects listed above. The analysis to determine how exceeding the regional thresholds would affect the number of days the region is in non-attainment is within the scope of the AQMP and not within the scope of an individual project. SCAQMD is the primary agency responsible for ensuring the health and welfare of sensitive individuals under elevated air quality concentrations in the SoCAB. To achieve the health-based standards established by the EPA, SCAQMD prepares an AQMP that details regional programs to attain the AAQS.

CO Hotspots

Areas of vehicle congestion have the potential to create pockets of CO called hotspots. These pockets have the potential to exceed the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm. Because CO is produced in greatest quantities from vehicle combustion and does not readily disperse into the atmosphere, adherence to AAQS is typically demonstrated through an analysis of localized CO concentrations. Hotspots are typically produced at intersections, where traffic congestion is highest because vehicles queue for longer periods and are subject to reduced speeds. Typically, for an intersection to exhibit a significant CO concentration, it would operate at level of service (LOS) E or worse without improvements (Caltrans 1997). However, at the time of the 1993 SCAQMD *Handbook*, the SoCAB was designated nonattainment under the California AAQS and National AAQS for CO. With the turnover of older vehicles, introduction of cleaner fuels, and implementation of control technology on industrial facilities, CO concentrations in the SoCAB and in the state have steadily declined.

4.1.2 Localized Significance Thresholds

SCAQMD identifies localized significance thresholds (LSTs), shown in Table 8, *SCAQMD Localized Significance Thresholds. Emissions* of NO_2, CO, PM_{10}, and $PM_{2.5}$ generated at a project site (off-site mobile-source emissions are not included in the LST analysis) could expose sensitive receptors to substantial concentrations of criteria air pollutants. LSTs are based on the California AAQS, which are the most stringent AAQS that have been established to provide a margin of safety in the protection of public health and welfare. They are designated to protect those sensitive receptors most susceptible to further respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and people engaged in strenuous work or exercise. A project that generates emissions that trigger a violation of the AAQS when added to the local background concentrations would generate a significant impact.

Table 8 SCAQMD Localized Significance Thresholds

Air Pollutant (Relevant AAQS)	Concentration
1-Hour CO Standard (CAAQS)	20 ppm
8-Hour CO Standard (CAAQS)	9.0 ppm
1-Hour NO_2 Standard (CAAQS)	0.18 ppm
Annual NO_2 Standard (CAAQS)	0.03 ppm
24-Hour PM_{10} Standard – Construction (SCAQMD)[1]	10.4 µg/m^3
24-Hour $PM_{2.5}$ Standard – Construction (SCAQMD)[1]	10.4 µg/m^3
24-Hour PM_{10} Standard – Operation (SCAQMD)[1]	2.5 µg/m^3
24-Hour $PM_{2.5}$ Standard – Operation (SCAQMD)[1]	2.5 µg/m^3
Annual Average PM_{10} Standard (SCAQMD)[1]	1.0 µg/m^3

Source: SCAQMD 2015b.
ppm – parts per million; µg/m^3 – micrograms per cubic meter
1 Threshold is based on SCAQMD Rule 403. Since the SoCAB is in nonattainment for PM_{10} and $PM_{2.5}$, the threshold is established as an allowable change in concentration. Therefore, background concentration is irrelevant.

To assist lead agencies, SCAQMD developed screening-level LSTs to back-calculate the mass amount (pounds per day) of emissions generated on-site that would trigger the levels shown in Table 8 for projects under five acres. These "screening-level" LSTs tables are the localized significance thresholds for all projects of five acres and less; however, screening-level LST tables can be used as screening criteria for larger projects to determine whether dispersion modeling may be required to compare concentrations of air pollutants generated by the project to the localized concentration thresholds shown in Table 8.

In accordance with SCAQMD's LST methodology, screening-level construction LSTs are based on the acreage disturbed per day based on equipment use, the distance to the nearest receptor, and the SRA. The screening-level construction LSTs for the project site in SRA 3 are shown in Table 9, *SCAQMD Screening-Level Construction Localized Significance Thresholds*, for sensitive and non-sensitive receptors at 82 feet (25 meters).

Table 9 SCAQMD Screening-Level Localized Significance Thresholds

	Threshold (lbs/day)			
Acreage Disturbed	Nitrogen Oxides (NO_X)	Carbon Monoxide (CO)	Coarse Particulates (PM_{10})	Fine Particulates ($PM_{2.5}$)
Construction Phase				
≤1.13 acres disturbed per day	96	702	5.37	3.25
≤2.25- acres disturbed per day	137	1,034	8.58	5.25

Source: SCAQMD 2008b. SCAQMD 2011.
Note: LSTs are based on residential and non-residential receptors within 82 feet (325 meters) of the project site in SRA 3.

4.1.3 Health Risk

Whenever a project would require use of chemical compounds that have been identified in SCAQMD Rule 1401, placed on CARB's air toxics list pursuant to AB 1807, the Air Contaminant Identification and Control Act (1983), or placed on the EPA's National Emissions Standards for Hazardous Air Pollutants, a health risk assessment is required by SCAQMD. Table 10, *SCAQMD Toxic Air Contaminants Incremental Risk Thresholds*, lists SCAQMD's TAC incremental risk thresholds for operation of a project. The purpose of this environmental evaluation is to identify the significant effects of the proposed project on the environment, not the significant effects of the environment on the proposed project (California Building Industry Association v. Bay Area Air Quality Management District [2015] 62 Cal.4th 369 [Case No. S213478]). CEQA does not require an analysis of the proposed project's environmental effects on potential future sensitive receptors at a project site. However, the environmental document must analyze the impacts of environmental hazards on future users when a proposed project exacerbates an existing environmental hazard or condition. Residential, commercial, school, and office uses do not use substantial quantities of TACs, and these thresholds are typically applied to new industrial projects.

Table 10 SCAQMD Toxic Air Contaminants Incremental Risk Thresholds

Maximum Incremental Cancer Risk	≥ 10 in 1 million
Cancer Burden (in areas ≥ 1 in 1 million)	> 0.5 excess cancer cases
Hazard Index (project increment)	≥ 1.0

Source: SCAQMD 2015a.

4.2 GREENHOUSE GAS EMISSIONS

To provide guidance to local lead agencies on determining significance for GHG emissions in their CEQA documents, SCAQMD has convened a GHG CEQA Significance Threshold Working Group (Working Group). Based on the last Working Group meeting (Meeting No. 15) held in September 2010, the SCAQMD Working Group identified a tiered approach for evaluating GHG emissions for development projects where SCAQMD is not the lead agency (SCAQMD 2010):

- **Tier 1.** If a project is exempt from CEQA, project-level and cumulative GHG emissions are less than significant.

- **Tier 2.** If the project complies with a GHG emissions reduction plan or mitigation program that avoids or substantially reduces GHG emissions in the project's geographic area (i.e., city or county), project-level and cumulative GHG emissions are less than significant.

For projects that are not exempt or where no qualifying GHG reduction plans are directly applicable, SCAQMD requires an assessment of GHG emissions. SCAQMD identified a screening-level threshold of 3,000 $MTCO_2e$ annually for all land use types or the following land-use-specific thresholds: 1,400 $MTCO_2e$ for commercial projects, 3,500 $MTCO_2e$ for residential projects, or 3,000 $MTCO_2e$ for mixed-use projects.

These bright-line thresholds are based on a review of the Governor's Office of Planning and Research database of CEQA projects. Based on their review of 711 CEQA projects, 90 percent of CEQA projects would exceed the bright-line thresholds. Therefore, projects that do not exceed the bright-line threshold would have a nominal, and therefore, less than cumulatively considerable impact on GHG emissions:

- **Tier 3.** If GHG emissions are less than the screening-level threshold, project-level and cumulative GHG emissions are less than significant.
- **Tier 4.** If emissions exceed the screening threshold, a more detailed review of the project's GHG emissions is warranted.

SCAQMD has identified an efficiency target for projects that exceed the screening threshold, which is a 2020 efficiency target of 4.8 $MTCO_2e$ per year per service population ($MTCO_2e$/year/SP) for project-level analyses and 6.6 $MTCO_2e$/year/SP for plan level projects (e.g., program-level projects such as general plans) for the year 2020.[10] Service population is defined as the sum of the residential and employment population of a project. The per capita efficiency targets are based on the AB 32 GHG reduction target and 2020 GHG emissions inventory prepared for CARB's 2008 Scoping Plan.[11]

The buildout year of the project would be prior to the AB 32 year of 2020. For the purpose of this project, if project-related emissions exceed the screening threshold of 3,000 $MTCO_2e$ per year, project emissions would be compared to the per capita target of 4.8 $MTCO_2e$ per year per service population. If projects exceed the thresholds, GHG emissions would be considered potentially significant in the absence of mitigation measures.

[10] It should be noted that the Working Group also considered efficiency targets for 2035 for the first time in this meeting.

[11] SCAQMD took the 2020 statewide GHG reduction target for land use only GHG emissions sectors and divided it by the 2020 statewide employment for the land use sectors to derive a per capita GHG efficiency metric that coincides with the GHG reduction targets of AB 32 for year 2020.

4. Thresholds of Significance

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5. Environmental Impacts

5.1 AIR QUALITY IMPACTS

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?

Less Than Significant Impact. A consistency determination plays an important role in local agency project review by linking local planning and individual projects to the AQMP. It fulfills the CEQA goal of informing decision makers of the environmental efforts of the project under consideration at an early enough stage to ensure that air quality concerns are fully addressed. It also provides the local agency with ongoing information as to whether they are contributing to clean air goals in the AQMP. The most recent adopted comprehensive plan is the 2016 AQMP, adopted on March 3, 2017.

Regional growth projections are used by SCAQMD to forecast future emission levels in the SoCAB. For southern California, these regional growth projections are provided by the Southern California Association of Governments (SCAG) and are partially based on land use designations in city/county general plans. Typically, only large, regionally significant projects have the potential to affect the regional growth projections. The proposed project is not considered a regionally significant project that would warrant Intergovernmental Review by SCAG under CEQA Guidelines section 15206. The proposed project involves construction of approximately 4.0 miles of pipeline and 3 wells in the City of Torrance. It would not have the potential to substantially affect housing, employment, or population projections within the SCAG region. The regional emissions generated by the construction and operation of the proposed project would be less than the SCAQMD emissions thresholds (see 'b', below). Therefore, the project would not be considered by SCAQMD to be a substantial source of air pollutant emissions and would not conflict or obstruct implementation of the regional air quality management plans.

b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Less Than Significant Impact. The following describes project-related impacts from short-term construction activities and long-term operation of the proposed project.

Short-Term Air Quality Impacts

Construction activities would result in the generation of air pollutants. These emissions would primarily be 1) exhaust emissions from off-road diesel-powered construction equipment; 2) dust generated by grading, earthmoving, and other construction activities; and 3) exhaust emissions from on-road vehicles.

5. Environmental Impacts

Construction at the project site would involve demolition, site preparation, trenching, and construction of the proposed pipelines and wells. Overall, construction activities are anticipated to start in February 2018 and would take approximately 7 months. Construction emissions were estimated with CalEEMod based on the project's preliminary construction information. Results of the construction emission modeling in Table 11, *Maximum Daily Regional Construction Emissions*. show that air pollutant emissions from construction-related activities would be less than their respective SCAQMD regional significance threshold values.

Table 11 Maximum Daily Regional Construction Emissions

	Criteria Air Pollutants (lbs/day)[1,2]					
Source	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
2018 Demolition + Demo Haul + Site Prep	3	26	18	<1	5	2
2018 Trenching + Construction	5	50	40	<1	4	3
2018 All Phases	8	76	59	<1	8	4
Total Maximum Daily	8	76	59	<1	8	4
SCAQMD Regional Threshold	75	100	550	150	150	55
Exceeds Regional Threshold?	No	No	No	No	No	No

Source: CalEEMod, version 2016.3.1.
Notes: Totals may not equal 100 percent due to rounding. Based on highest winter or summer emissions.
1 Construction phasing and the anticipated construction equipment are based on the preliminary information provided by the Applicant. Where specific information regarding project-related construction activities was not available, construction assumptions were based on CalEEMod defaults, which are based on construction surveys conducted by SCAQMD of construction equipment and phasing for comparable projects.
2 Includes implementation of fugitive dust control measures required by SCAQMD under Rule 403, including watering disturbed areas a minimum of two times per day, reducing speed limit to 15 miles per hour on unpaved surfaces, replacing ground cover quickly, and street sweeping with Rule 1186–compliant sweepers.

Long-Term Operation-Related Air Quality Impact

The proposed project would provide infrastructure improvements that involves the installation of pipelines, wells, electric pumps, and housing structures for the pumps. Based on the planned improvements, operation of the proposed infrastructure is anticipated to generate minimal to no emissions of criteria air pollutants. Therefore, it is not anticipated that the proposed project would exceed the SCAQMD's regional emissions thresholds for operational activities.

c. **Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?**

Less Than Significant. The SoCAB is designated nonattainment for O_3 and $PM_{2.5}$ under the California and National AAQS, nonattainment for PM_{10} under the California AAQS, and nonattainment for lead under the National AAQS (CARB 2016b). According to SCAQMD methodology, any project that does not exceed or can be mitigated to less than the daily threshold values would not add significantly to a cumulative impact (SCAQMD 1993). As discussed above in Section 5.1.b, construction and operational activities associated with the proposed project would not result in emissions in excess of SCAQMD's significant thresholds. Therefore, the project would not result in a cumulatively considerable net increase in criteria pollutants.

d. Expose sensitive receptors to substantial pollutant concentrations?

Less Than Significant Impact. The proposed project could expose sensitive receptors to elevated pollutant concentrations if it would cause or contribute significantly to elevated pollutant concentration levels. Unlike regional emissions, localized emissions are typically evaluated in terms of air concentration rather than mass so they can be more readily correlated to potential health effects.

Construction

Localized Significance Thresholds

Air pollutant emissions generated by construction activities are anticipated to cause temporary increases in air pollutant concentrations at the nearby sensitive receptors. As stated, the nearest sensitive receptors include the single-family residential receptors along 185th Street, 186th Street, Casimir Avenue, and Van Ness Avenue, as well as non-residential receptors adjacent to Van Ness Avenue and Border Avenue. Table 12, *Localized Construction Emissions*, shows the maximum daily emissions (lbs. per day) generated by on-site construction activities compared with the SCAQMD's screening-level construction LSTs. As shown in the table, the maximum daily NOx, CO, PM_{10} and $PM_{2.5}$ emissions generated from on-site construction-related activities would be less than their respective SCAQMD screening-level construction LSTs. Therefore, project-related construction activities would not have the potential to expose sensitive receptors to substantial pollutant concentrations.

Table 12 Localized Construction Emissions

Source	Pollutants(lbs/day)[1,2]			
	NO_X	CO	PM_{10}	$PM_{2.5}$
2018 Demolition + Haul + Site Prep	19	12	2.78	1.31
2018 Trenching + Construction	46	31	2.32	2.18
SCAQMD ≤1.13-acre LST	96	702	5.37	3.25
Exceeds LST?	No	No	No	No
2018 All Phases Total	65	43	5.10	3.49
SCAQMD ≤2.25-acre LST	137	1,034	8.58	5.25
Exceeds LST?	No	No	No	No

Source: CalEEMod Version 2016.3.1; SCAQMD 2011; and SCAQMD 2008.
Notes: LSTs are based on residential and nonresidential receptors within 82 feet (25 meters) in SRA 3. In accordance with SCAQMD methodology, only on-site stationary sources and on-site mobile equipment are included in the analysis.
1 Air quality modeling based on construction information provided by the Applicant. Where specific construction information was not available, construction assumptions were based on CalEEMod defaults.
2 Includes implementation of fugitive dust control measures required by SCAQMD under Rule 403, including watering disturbed areas a minimum of two times per day, reducing speed limit to 15 miles per hour on unpaved surfaces, replacing ground cover quickly, and street sweeping with Rule 1186–compliant sweepers.

Health Risk

Construction activities would result in short-term emissions of diesel particulate matter (DPM), which is a TAC. The exhaust of off-road heavy-duty diesel equipment would emit diesel PM during site preparation, grading, and other construction activities. Health risk assessment is based on risk accumulated over a 70-year lifetime.

5. Environmental Impacts

SCAQMD currently does not require health risk assessments to be conducted for short-term emissions from construction equipment. Emissions from construction equipment primarily consist of DPM. The Office of Environmental Health Hazards Assessment (OEHHA) adopted guidance for the preparation of health risk assessments in March 2015. OEHHA has developed a cancer risk factor and non-cancer chronic reference exposure level for DPM, but these factors are based on continuous exposure over a 30-year time frame. No short-term acute exposure levels have been developed for DPM. Nevertheless, the proposed project would be developed in approximately 7 months, which is less than the 30-year exposure period for DPM and risk accumulated over a 70-year lifetime, and would limit the exposure to on-site and off-site receptors. In addition, construction activities would not exceed screening-level LST significance thresholds. For the reasons stated above, it is anticipated that construction emissions would not pose a threat to sensitive receptors.

Operational

Localized Significance Thresholds

Operation of the proposed project would not generate substantial emissions from on-site, stationary sources. The proposed project involves the construction of wells and water pipelines, and would generate minimal criteria air pollutant emissions associated with the operation of electric well pumps. Additionally, land uses that have the potential to generate substantial stationary-source emissions would require a permit from SCAQMD and include industrial land uses such as chemical processing and warehousing operations where substantial truck idling could occur on-site. The proposed project does not fall within this category of uses. Thus, it is anticipated that operation of the proposed infrastructure improvements would not exceed the SCAQMD LSTs and would not have the potential to expose sensitive receptors to substantial pollutant concentrations.

Carbon Monoxide Hotspots

Areas of vehicle congestion have the potential to create pockets of CO called hotspots. These pockets have the potential to exceed the state one-hour standard of 20 parts per million (ppm) or the eight-hour standard of 9.0 ppm. Because CO is produced in greatest quantities from vehicle combustion and does not readily disperse into the atmosphere, adherence to ambient air quality standards is typically demonstrated through an analysis of localized CO concentrations. Hotspots are typically produced at intersections, where traffic congestion is highest because vehicles queue for longer periods and are subject to reduced speeds.

In 2007, the SoCAB was designated in attainment for CO under both the California AAQS and National AAQS. The CO hotspot analysis conducted for the attainment by SCAQMD did not predict a violation of CO standards at the busiest intersections in Los Angeles during the peak morning and afternoon periods.[12] As identified in SCAQMD's 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak carbon monoxide concentrations in the SoCAB in previous years, prior to redesignation, were a result of unusual meteorological and topographical conditions and not of congestion at a particular

[12] The four intersections were: Long Beach Boulevard and Imperial Highway; Wilshire Boulevard and Veteran Avenue; Sunset Boulevard and Highland Avenue; and La Cienega Boulevard and Century Boulevard. The busiest intersection evaluated (Wilshire and Veteran) had a daily traffic volume of approximately 100,000 vehicles per day with LOS E in the morning peak hour and LOS F in the evening peak hour.

intersection. Under existing and future vehicle emission rates, a project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour—or 24,000 vehicles per hour where vertical and/or horizontal air do not mix—in order to generate a significant CO impact (BAAQMD 2017). Based on the nature of the proposed infrastructure improvement project, it is not anticipated that it would generate operational vehicle trips Therefore, the proposed project would not produce the volume of traffic required to generate a CO hotspot.

e. Create objectionable odors affecting a substantial number of people?

Less Than Significant Impact. The type of facilities that are considered to have objectionable odors include wastewater treatments plants, compost facilities, landfills, solid waste transfer stations, fiberglass manufacturing facilities, paint/coating operations (e.g., auto body shops), dairy farms, petroleum refineries, asphalt batch plants, chemical manufacturing, and food manufacturing facilities. The proposed project would result in the installation of water pipelines, wells, and electric pumps and would not result in the types of odors generated by the aforementioned land uses. Emissions from construction equipment, such as diesel exhaust, and volatile organic compounds from architectural coatings and paving activities may generate odors. However, these odors would be low in concentration, temporary, and are not expected to affect a substantial number of people.

5.2 GREENHOUSE GAS EMISSIONS IMPACTS

This section analyzes the project's contribution to global climate change impacts in California through an analysis of project-related GHG emissions. Information on manufacture of cement, steel, and other "life cycle" emissions that would occur as a result of the project are not applicable and are not included in the analysis.[13] Black carbon emissions are not included in the GHG analysis because CARB does not include this pollutant in the state's AB 32 inventory and treats this short-lived climate pollutant separately.[14]

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. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

[13] Life cycle emissions include indirect emissions associated with materials manufacture. However, these indirect emissions involve numerous parties, each of which is responsible for GHG emissions of their particular activity. The California Resources Agency, in adopting the CEQA Guidelines Amendments on GHG emissions found that lifecycle analyses was not warranted for project-specific CEQA analysis in most situations, for a variety of reasons, including lack of control over some sources, and the possibility of double-counting emissions (see Final Statement of Reasons for Regulatory Action, December 2009). Because the amount of materials consumed during the operation or construction of the proposed project is not known, the origin of the raw materials purchased is not known, and manufacturing information for those raw materials are also not known, calculation of life cycle emissions would be speculative. A life-cycle analysis is not warranted (OPR 2008).

[14] Particulate matter emissions, which include black carbon, are analyzed under Section 5.1, *Air Quality Impacts*. Black carbon emissions have sharply declined due to efforts to reduce on-road and off-road vehicle emissions, especially diesel particulate matter. The state's existing air quality policies will virtually eliminate black carbon emissions from on-road diesel engines within 10 years (CARB 2017a).

5. Environmental Impacts

Less Than Significant Impact. Global climate change is not confined to a particular project area and is generally accepted as the consequence of global industrialization over the last 200 years. A typical project, even a very large one, does not generate enough greenhouse gas emissions on its own to influence global climate change significantly; hence, the issue of global climate change is, by definition, a cumulative environmental impact.

The proposed project would generate GHG emissions from construction of approximately 4.0 miles of pipeline and 3 wells. GHG emissions generated from construction were calculated for the project, amortized over 30 years, and included in the emissions inventory to account for GHG emissions from the construction phase of the project. Operational emissions would be nominal, because electric pumps associated with the wells would not generate a substantial amount of greenhouse gases. Project-related GHG emissions are shown in Table 13, *Project-Related GHG Emissions*. As shown in the table, the construction activities associated with the proposed project would generate a total of 1,219 $MTCO_2e$ of GHG emissions or 41 $MTCO_2e$ per year when amortized over 30 years per SCAQMD methodology (SCAQMD 2010). Overall, the total GHG emissions generated from the proposed project would not exceed SCAQMD Working Group's bright-line threshold of 3,000 $MTCO_2e$.

Table 13 Project-Related GHG Emissions

Source	GHG MTons/Year
2018 Construction Emissions[1]	1,219
Amortized Construction Emissions[2]	41
Bright-Line Threshold	3,000
Exceeds Bright-Line Threshold	No

Source: CalEEMod, Version 2016.3.1.
Notes: MTons: metric tons
1 CalEEMod calculated emissions associated with the Well Construction phase are multiplied by three as development of the three well sites would require the same construction processes.
2 Total construction emissions are amortized over 30 years per recommended SCAQMD methodology (SCAQMD 2010).

b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less Than Significant Impact. Plans adopted for the purposes of reducing GHG emissions include CARB's Scoping Plan and SCAG's 2016-2040 RTP/SCS. CARB's Scoping Plan is California's GHG reduction strategy to achieve the state's GHG emissions reductions targets established in AB 32 and SB 32. The 2016-2040 RTP/SCS outlines an integrated approach between the development pattern for the region in addition to the transportation network to reduce vehicle miles traveled from automobiles and light duty trucks and thereby reduce GHG emissions from these sources. Due to the nature of the proposed project that would primarily involve water pipeline infrastructure improvements, it is not anticipated that it would have the potential to interfere or obstruct implementation of the CARB Scoping Plan or the 2016-2040 RTP/SCS.

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Appendix. Air Quality & Greenhouse Gas Modeling

Appendix

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Regional Construction Emissions Worksheet

Demo Haul - Winter

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		2018						
	Fugitive Dust						1.6654	0.2522
	Off-Road		0	0	0	0.00E+00	0	0
	Total		**0**	**0**	**0**	**0.00E+00**	**1.6654**	**0.2522**
Offsite								
	Hauling		0.1477	4.864	1.0496	1.12E-02	0.2374	0.0774
	Vendor		0	0	0	0.00E+00	0	0
	Worker		0	0	0	0.00E+00	0	0
	Total		**0.1477**	**4.864**	**1.0496**	**1.12E-02**	**0.2374**	**0.0774**
TOTAL			***0.1477***	***4.8640***	***1.0496***	***0.0112***	***1.9028***	***0.3296***

Demo Haul - Summer

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		2018						
	Fugitive Dust						1.6654	0.2522
	Off-Road		0	0	0	0	0	0
	Total		0	0	0	0	1.6654	0.2522
Offsite								
	Hauling		0.1431	4.8231	0.964	1.14E-02	0.237	0.077
	Vendor		0	0	0	0.00E+00	0	0
	Worker		0	0	0	0.00E+00	0	0
	Total		**0.1431**	**4.8231**	**0.964**	**1.14E-02**	**0.237**	**0.077**
TOTAL			***0.1431***	***4.8231***	***0.9640***	***0.0114***	***1.9024***	***0.3292***
	Maximum		**0.1477**	**4.8640**	**1.0496**	**0.0114**	**1.9028**	**0.3296**

Demolition - Winter

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		2018						
	Off-Road		1.1293	11.7421	5.223	9.29E-03	0.6112	0.5634
	Total		**1.1293**	**11.7421**	**5.223**	**9.29E-03**	**0.6112**	**0.5634**
Offsite								
	Hauling		0	0	0	0.00E+00	0	0
	Vendor		0.0288	0.737	0.221	1.54E-03	0.0412	0.0155
	Worker		0.2854	0.2268	2.4107	6.00E-03	0.5304	0.1448
	Total		**0.3142**	**0.9638**	**2.6317**	**7.54E-03**	**0.5716**	**0.1603**
TOTAL			***1.4435***	***12.7059***	***7.8547***	***0.0168***	***1.1828***	***0.7237***

Demolition - Summer

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		2018						
	Off-Road		1.1293	11.7421	5.223	9.29E-03	0.6112	0.5634
	Total		**1.1293**	**11.7421**	**5.223**	**9.29E-03**	**0.6112**	**0.5634**
Offsite								
	Hauling		0	0	0	0.00E+00	0	0
	Vendor		0.0276	0.7354	0.2011	1.59E-03	0.0411	0.0154
	Worker		0.2534	0.2047	2.6493	6.38E-03	0.5304	0.1448
	Total		**0.281**	**0.9401**	**2.8504**	**7.97E-03**	**0.5715**	**0.1602**
TOTAL			***1.4103***	***12.6822***	***8.0734***	***0.0173***	***1.1827***	***0.7236***
	Maximum		**1.4435**	**12.7059**	**8.0734**	**0.0173**	**1.1828**	**0.7237**

Site Preparation - Winter								
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2018**						
	Fugitive Dust						0	0
	Off-Road		0.9429	7.2641	6.5879	1.06E-02	0.5041	0.4929
	Total		**0.9429**	**7.2641**	**6.5879**	**1.06E-02**	**0.5041**	**0.4929**
Offsite								
	Hauling		0	0	0	0	0	0
	Vendor		0.0288	0.737	0.221	1.54E-03	0.0412	0.0155
	Worker		0.2854	0.2268	2.4107	6.00E-03	0.5304	0.1448
	Total		**0.3142**	**0.9638**	**2.6317**	**7.54E-03**	**0.5716**	**0.1603**
TOTAL			***1.2571***	***8.2279***	***9.2196***	***0.0181***	***1.0757***	***0.6532***

Site Preparation - Summer								
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2018**						
	Fugitive Dust						0	0
	Off-Road		0.9429	7.2641	6.5879	1.06E-02	0.5041	0.4929
	Total		**0.9429**	**7.2641**	**6.5879**	**1.06E-02**	**0.5041**	**0.4929**
Offsite								
	Hauling		0	0	0	0	0	0
	Vendor		0.0276	0.7354	0.2011	1.59E-03	0.0411	0.0154
	Worker		0.2534	0.2047	2.6493	6.38E-03	0.5304	0.1448
	Total		**0.281**	**0.9401**	**2.8504**	**7.97E-03**	**0.5715**	**0.1602**
TOTAL			***1.2239***	***8.2042***	***9.4383***	***0.0186***	***1.0756***	***0.6531***
	Maximum		1.2571	8.2279	9.4383	0.0186	1.0757	0.6532

Winter 2017 Demo + Haul	***2.8483***	***25.7978***	***18.1239***	***0.0462***	***4.1613***	***1.7065***
Summer 2017 Demo + Haul	***2.7773***	***25.7095***	***18.4757***	***0.0472***	***4.1607***	***1.7059***

Utility Trenching - Winter								
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2018**						
	Off-Road		0.8611	7.5803	7.1905	1.15E-02	0.4662	0.446
	Total		**0.8611**	**7.5803**	**7.1905**	**1.15E-02**	**0.4662**	**0.446**
Offsite								
	Hauling		0	0	0	0	0	0
	Vendor		0.0288	0.737	0.221	1.54E-03	0.0412	0.0155
	Worker		0.2854	0.2268	2.4107	6.00E-03	0.5304	0.1448
	Total		**0.3142**	**0.9638**	**2.6317**	**7.54E-03**	**0.5716**	**0.1603**
TOTAL			***1.1753***	***8.5441***	***9.8222***	***0.0190***	***1.0378***	***0.6063***

Utility Trenching - Summer								
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2018**						
	Off-Road		0.8611	7.5803	7.1905	1.15E-02	0.4662	0.446
	Total		**0.8611**	**7.5803**	**7.1905**	**1.15E-02**	**0.4662**	**0.446**
Offsite								
	Hauling		0	0	0	0	0	0
	Vendor		0.0276	0.7354	0.2011	1.59E-03	0.0411	0.0154
	Worker		0.2534	0.2047	2.6493	6.38E-03	0.5304	0.1448
	Total		**0.281**	**0.9401**	**2.8504**	**7.97E-03**	**0.5715**	**0.1602**
TOTAL			***1.1421***	***8.5204***	***10.0409***	***0.0195***	***1.0377***	***0.6062***
	Maximum		1.1753	8.5441	10.0409	0.0195	1.0378	0.6063

Pipeline Construction - Winter								
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2018**						
	Off-Road		1.6264	16.0343	11.4736	1.89E-02	0.9272	0.87
	Total		**1.6264**	**16.0343**	**11.4736**	**1.89E-02**	**0.9272**	**0.87**
Offsite								
	Hauling		0	0	0	0	0	0
	Vendor		0.0575	1.474	0.442	3.09E-03	0.0824	0.031
	Worker		0.2854	0.2268	2.4107	6.00E-03	0.5304	0.1448
	Total		**0.3429**	**1.7008**	**2.8527**	**9.09E-03**	**0.6128**	**0.1757**
TOTAL			***1.9693***	***17.7351***	***14.3263***	***0.0280***	***1.5400***	***1.0457***
Pipeline Construction - Summer								
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2018**						
	Off-Road		1.6264	16.0343	11.4736	1.89E-02	0.9272	0.87
	Total		**1.6264**	**16.0343**	**11.4736**	**1.89E-02**	**0.9272**	**0.87**
Offsite								
	Hauling		0	0	0	0	0	0
	Vendor		0.0552	1.4707	0.4021	3.17E-03	0.0823	0.0308
	Worker		0.2534	0.2047	2.6493	6.38E-03	0.5304	0.1448
	Total		**0.3086**	**1.6754**	**3.0514**	**9.55E-03**	**0.6127**	**0.1756**
TOTAL			***1.9350***	***17.7097***	***14.5250***	***0.0285***	***1.5399***	***1.0456***
	Maximum		1.9693	17.7351	14.5250	0.0285	1.5400	1.0457
Well Construction - Winter*								
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2018**						
	Off-Road		1.93	22.8073	12.773	3.98E-02	0.9241	0.8667
	Total		**1.93**	**22.8073**	**12.773**	**3.98E-02**	**0.9241**	**0.8667**
Offsite								
	Hauling		0	0	0	0	0	0
	Vendor		0.0192	0.4913	0.1473	1.03E-03	0.0291	0.0107
	Worker		0.2854	0.2268	2.4107	6.00E-03	0.575	1.56E-01
	Total		**0.3046**	**0.7181**	**2.558**	**7.03E-03**	**0.6041**	**0.1664**
TOTAL			***2.2346***	***23.5254***	***15.3310***	***0.0468***	***1.5282***	***1.0331***
Well Construction - Summer*								
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2018**						
	Off-Road		1.93	22.8073	12.773	3.98E-02	0.9241	0.8667
	Total		**1.93**	**22.8073**	**12.773**	**3.98E-02**	**0.9241**	**0.8667**
Offsite								
	Hauling		0	0	0	0	0	0
	Vendor		0.0184	0.4902	0.134	1.06E-03	0.0291	0.0107
	Worker		0.2534	2.05E-01	2.6493	6.38E-03	0.575	1.56E-01
	Total		**0.2718**	**0.6949**	**2.7834**	**7.44E-03**	**0.6041**	**0.1664**
TOTAL			***2.2018***	***23.5022***	***15.5564***	***0.0472***	***1.5282***	***1.0331***
	Maximum		2.2346	23.5254	15.5564	0.0472	1.5282	1.0331
Winter 2018 Trenching + Construction			***5.3792***	***49.8046***	***39.4795***	***0.0939***	***4.1060***	***2.6851***
Summer 201 Trenching + Construction			***5.2789***	***49.7323***	***40.1223***	***0.0952***	***4.1058***	***2.6849***
Winter 2018 All Phases			***8.2275***	***75.6024***	***57.6034***	***0.1400***	***8.2673***	***4.3916***
Summer 2018 All Phases			***8.0562***	***75.4418***	***58.5980***	***0.1424***	***8.2665***	***4.3908***
MAX DAILY			**8.23**	**75.60**	**58.60**	**0.14**	**8.27**	**4.39**
Regional Thresholds			**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Thresholds?			No	No	No	No	No	No

Localized Construction Emissions Worksheet

Demo Haul - Winter

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Fugitive Dust		0	0	1.6654	0.2522
	Off-Road		0	0	0	0
	Total		**0**	**0**	**1.6654**	**0.2522**

Demo Haul - Summer

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Fugitive Dust		0	0	1.6654	0.2522
	Off-Road		0	0	0	0
	Total		**0**	**0**	**1.6654**	**0.2522**

Demo Haul Max Daily

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Fugitive Dust		0	0	1.6654	0.2522
	Off-Road		0	0	0	0
	Total		**0**	**0**	**1.6654**	**0.2522**

Demolition - Winter

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		11.7421	5.223	0.6112	0.5634
	Total		**11.7421**	**5.223**	**0.6112**	**0.5634**

Demolition - Summer

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		11.7421	5.223	0.6112	0.5634
	Total		**11.7421**	**5.223**	**0.6112**	**0.5634**

Demolition Max Daily

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		11.7421	5.223	0.6112	0.5634
	Total		**11.7421**	**5.223**	**0.6112**	**0.5634**

Site Preparation - Winter

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Fugitive Dust		0	0	0	0
	Off-Road		7.2641	6.5879	0.5041	0.4929
	Total		**7.2641**	**6.5879**	**0.5041**	**0.4929**

Site Preparation - Summer

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Fugitive Dust		0	0	0	0
	Off-Road		7.2641	6.5879	0.5041	0.4929
	Total		**7.2641**	**6.5879**	**0.5041**	**0.4929**

Site Preparation Max Daily

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		7.2641	6.5879	0.5041	0.4929
	Total		**7.2641**	**6.5879**	**0.5041**	**0.4929**

2018 Demo and Site Prep	***19.0062***	***11.8109***	***2.7807***	***1.3085***
LSTs	96	702	5.37	3.25
Exceed Thresholds?	No	No	No	No

Utility Trenching - Winter 2018

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		7.5803	7.1905	0.4662	0.446
	Total		**7.5803**	**7.1905**	**0.4662**	**0.446**

Utility Trenching - Summer 2018

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		7.5803	7.1905	0.4662	0.446
	Total		**7.5803**	**7.1905**	**0.4662**	**0.446**

Utility Trenching Max Daily

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		7.5803	7.1905	0.4662	0.446
	Total		**7.5803**	**7.1905**	**0.4662**	**0.446**

Pipeline Construction - Winter 2018

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		16.0343	11.4736	0.9272	0.87
	Total		**16.0343**	**11.4736**	**0.9272**	**0.87**

Pipeline Construction - Summer 2018

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		16.0343	11.4736	0.9272	0.87
	Total		**16.0343**	**11.4736**	**0.9272**	**0.87**

Pipeline Construction Max Daily

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		16.0343	11.4736	0.9272	0.87
	Total		**16.0343**	**11.4736**	**0.9272**	**0.87**

Well Construction - Winter

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		22.8073	12.773	0.9241	0.8667
	Total		**22.8073**	**12.773**	**0.9241**	**0.8667**

Well Construction - Summer						
			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2018**				
	Off-Road		22.8073	12.773	0.9241	0.8667
	Total		**22.8073**	**12.773**	**0.9241**	**0.8667**

Well Construction - Max Daily						
			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2017**				
	Off-Road		22.8073	12.773	0.9241	0.8667
	Total		**22.8073**	**12.773**	**0.9241**	**0.8667**

2018 Trenching and Construction	***46.4219***	***31.4371***	***2.3175***	***2.1827***
LSTs	96	702	5.37	3.25
Exceed Thresholds?	No	No	No	No

2018 Demo, Site Prep, Trenching, Const.	***65.4281***	***43.2480***	***5.0982***	***3.4912***
LSTs	137	1,034	8.58	5.25
Exceed Thresholds?	No	No	No	No

GHG Emissions Worksheet

	MTons Total	
Demolition Haul	23	
Demolition	33	
Site Preparation	34	
Utility Trenching	113	
Pipeline Construction	168	
Well Construction*	847	
Total Construction	**1,219**	
Amortized Construction Emissions*	41	100%
Total All Sectors	41	100%

**CalEEMod results multiplied by three as similar construction processes are assumed to occur at each site.*

CalEEMod Project Characteristics Inputs (Construction)

Name:	Van Ness Avenue Well Field Project
Project Location:	Van Ness Avenue, Descanso Park, Carretera Park
Project Location:	Torrance, CA
Climate Zone:	8
Land Use Setting:	Urban
Operational Year:	2020
Utility Company:	Southern California Edison
SRA:	3

General Info

Total Project Site Area 27.49 acres

Disturbed Acreage	Distance (feet)*	Width	SQFT***	Acreage
Pipeline from Well 14 to Well 12	5,600	18" Pipe	168,000	
Pipeline from Well 12 to Van Ness Ave, Border, and Plaza Del Amo	17,500	18" Pipe	962,500	
Pipe from Well 13 to Van Ness Ave	1,100	12" Pipe	33,000	
Purche Ave to Van Ness Storm Drain	700	N/A	1,400	
Well 12**			2,500	
Well 13**			2,500	
Well 14**			2,500	
La Carretera Park Modifications*			18,000	
Descanso Park Modifications*			7,000	
TOTAL	4.716		1,197,400	27.49

**Based on distance provided by applicant, verified with aerial maps*
***Acreage based on aerial photographs*
****Average roadway width used to calculate sqft for pipelines*

CalEEMod Land Use Inputs

Land Use	Land Use Type	Land Use Subtype	Unit Amount	Size Metric	Lot Acreage	Square Feet
User Defined Recreational	Recreational	User Defined Industrial	1197.40	1000 sqft	27.49	1,197,400

Demolition Haul

Phase Name	Haul Distance (miles)*	Max Total Trips Per Day*	Trips Ends/Day	Haul Days	Total Haul Trips	Estimated Haul Amount (tons)**
Demo Debris Haul	15	9	18	42	**756**	**7,646**

**Provided by the applicant*
***Based on CalEEMod assumption of 1.2641662 tons per cubic yard and the CalEEMod assumed 16 CY haul truck capacity.*

Construction - Unmitigated Run

SCAQMD Rule 403

Replace Ground Cover	PM10:	5	% Reduction
	PM25:	5	% Reduction
Water Exposed Area	Frequency:	2	per day
	PM10:	55	% Reduction
	PM25:	55	% Reduction
Unpaved Roads	Vehicle Speed:	15	mph

SCAQMD Rule 1186

Clean Paved Road 9 % PM Reduction

CalEEMod Construction Phase Inputs*

5-Day Work Week/8 hours per day

Phase Name	Phase Type	Start Date	End Date	CalEEMod Total Days
Demolition	Demolition	2/1/2018	3/31/2018	42
*Demo Debris Haul***	Demolition	2/1/2018	3/31/2018	42
Site Preparation	Site Preparation	2/1/2018	3/31/2018	42
Utility Trenching	Trenching	3/1/2018	8/31/2018	132
Pipeline Construction	Construction	3/1/2018	8/31/2018	132
Well Construction	Paving	3/1/2018	8/31/2018	132

*Based on construction schedule provided by the Applicant.

**Hauling duration based on demolition phase length

CalEEMod Construction Off-Road Equipment Inputs*

Equipment Type	CalEEMod Equipment Type	Unit Amount	Hours/Day	HP	LF	CalEEMod Vendor Trips	CalEEMod Worker Trips
Demolition							30
Dozer	Rubber Tired Dozers	1	6	247	0.4		
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	1	6	97	0.37		
End Dump	Dumper/Tender	1	6	16	0.38	2	
Water Truck*						4	
Site Preparation/Grading							30
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	1	6	97	0.37		
Hydraulic Jackhammer	Air Compressor	1	6	78	0.48		
Concrete Saw	Concrete/Industrial Saw	1	6	81	0.73		
End Dump	Dumper/Tender	1	6	16	0.38	2	
Water Truck*						4	
Utility Trenching							30
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	1	6	97	0.37		
End Dump	Dumper/Tender	1	6	16	0.38	2	
Concrete Saw	Concrete/Industrial Saw	1	6	81	0.73		
Excavator	Excavator	1	6	158	0.3819		
Water Truck*						4	
Pipeline Construction							30
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	1	6	97	0.37		
Concrete Saw	Concrete Saw	1	6	81	0.73		
Cranes	Cranes	1	6	231	0.29		
Sheepsfoot Compactor	Roller	Below					
Asphalt Paving Equipment	Paving Equipment	1	6	132	0.3551		
Steam Roller	Roller	2	6	80	0.3752		
Concrete Truck	Cement/Mortar Mixer	1	6	9	0.56	2	
Vendor Trips						10	
Well Construction							30
Drill Rig	Bore/Drill Rig	1	24	221	0.5025		
Cranes	Cranes	1	6	231	0.29		
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	1	6	97	0.37		
Pump	Pumps	1	6	84	0.74		
Support Truck						2	
End Dump						2	

*SCAQMD Rule 403 assumes 4 Water truck trips per day

Torrance Pipeline

Los Angeles-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1,197.40	User Defined Unit	27.49	1,197,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	8			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Pipelines and wells

Construction Phase - See CalEEMod Assumptions

Off-road Equipment -

Off-road Equipment - Haul Phase

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - Drill Rig, support truck, crane, tractor/loader/backhoe, pump

Trips and VMT - See CalEEMod Assumptions and Air Quality Assumptions provided by the Applicant

Demolition -

Construction Off-road Equipment Mitigation - SCAQMD Rule 1186

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	440.00	132.00
tblConstructionPhase	NumDays	440.00	132.00
tblConstructionPhase	NumDays	30.00	42.00
tblConstructionPhase	NumDays	30.00	42.00
tblConstructionPhase	NumDays	20.00	42.00
tblLandUse	BuildingSpaceSquareFeet	0.00	1,197,400.00
tblLandUse	LandUseSquareFeet	0.00	1,197,400.00
tblLandUse	LotAcreage	0.00	27.49
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblProjectCharacteristics	OperationalYear	2018	2020
tblTripsAndVMT	HaulingTripLength	20.00	15.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	196.00	12.00
tblTripsAndVMT	VendorTripNumber	196.00	4.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripNumber	8.00	30.00
tblTripsAndVMT	WorkerTripNumber	10.00	30.00

tblTripsAndVMT	WorkerTripNumber	10.00	30.00
tblTripsAndVMT	WorkerTripNumber	503.00	30.00
tblTripsAndVMT	WorkerTripNumber	503.00	30.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	8.0565	75.4416	58.5979	0.1423	7.1998	3.5038	10.7036	1.4730	3.3060	4.7791	0.0000	14,236.3660	14,236.3660	2.5131	0.0000	14,299.1927
Maximum	**8.0565**	**75.4416**	**58.5979**	**0.1423**	**7.1998**	**3.5038**	**10.7036**	**1.4730**	**3.3060**	**4.7791**	**0.0000**	**14,236.3660**	**14,236.3660**	**2.5131**	**0.0000**	**14,299.1927**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	8.0565	75.4416	58.5979	0.1423	4.9696	3.5038	8.4733	1.1354	3.3060	4.4414	0.0000	14,236.3660	14,236.3660	2.5131	0.0000	14,299.1927
Maximum	**8.0565**	**75.4416**	**58.5979**	**0.1423**	**4.9696**	**3.5038**	**8.4733**	**1.1354**	**3.3060**	**4.4414**	**0.0000**	**14,236.3660**	**14,236.3660**	**2.5131**	**0.0000**	**14,299.1927**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	30.98	0.00	20.84	22.92	0.00	7.07	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demo Haul	Demolition	2/1/2018	3/31/2018	5	42	
2	Demolition	Demolition	2/1/2018	3/31/2018	5	42	
3	Site Preparation	Site Preparation	2/1/2018	3/31/2018	5	42	
4	Utility Trenching	Trenching	3/1/2018	8/31/2018	5	132	
5	Pipeline Construction	Building Construction	3/1/2018	8/31/2018	5	132	
6	Well Construction	Building Construction	3/1/2018	8/31/2018	5	132	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demo Haul	Concrete/Industrial Saws	0	8.00	81	0.73
Demo Haul	Excavators	0	8.00	158	0.38
Demo Haul	Rubber Tired Dozers	0	8.00	247	0.40

Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Dumpers/Tenders	1	6.00	16	0.38
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	1	6.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Site Preparation	Air Compressors	1	6.00	78	0.48
Site Preparation	Concrete/Industrial Saws	1	6.00	81	0.73
Site Preparation	Dumpers/Tenders	1	6.00	16	0.38
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Utility Trenching	Concrete/Industrial Saws	1	6.00	81	0.73
Utility Trenching	Dumpers/Tenders	1	6.00	16	0.38
Utility Trenching	Excavators	1	6.00	158	0.38
Utility Trenching	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Pipeline Construction	Cement and Mortar Mixers	1	6.00	9	0.56
Pipeline Construction	Concrete/Industrial Saws	1	6.00	81	0.73
Pipeline Construction	Cranes	1	6.00	231	0.29
Pipeline Construction	Forklifts	0	8.00	89	0.20
Pipeline Construction	Generator Sets	0	8.00	84	0.74
Pipeline Construction	Paving Equipment	1	6.00	132	0.36
Pipeline Construction	Rollers	2	6.00	80	0.38
Pipeline Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Pipeline Construction	Welders	0	6.00	46	0.45
Well Construction	Bore/Drill Rigs	1	24.00	221	0.50
Well Construction	Cranes	1	6.00	231	0.29
Well Construction	Forklifts	0	8.00	89	0.20
Well Construction	Generator Sets	0	8.00	84	0.74

Well Construction	Pumps	1	6.00	84	0.74
Well Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Well Construction	Welders	0	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demo Haul	0	0.00	0.00	756.00	14.70	6.90	15.00	LD_Mix	HDT_Mix	HHDT
Demolition	3	30.00	6.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	4	30.00	6.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Utility Trenching	4	30.00	6.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Pipeline Construction	7	30.00	12.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Construction	4	30.00	4.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demo Haul - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.8956	0.0000	3.8956	0.5898	0.0000	0.5898			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**3.8956**	**0.0000**	**3.8956**	**0.5898**	**0.0000**	**0.5898**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1431	4.8231	0.9640	0.0114	0.2361	0.0169	0.2530	0.0647	0.0162	0.0809		1,234.0214	1,234.0214	0.0898		1,236.2658
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.1431**	**4.8231**	**0.9640**	**0.0114**	**0.2361**	**0.0169**	**0.2530**	**0.0647**	**0.0162**	**0.0809**		**1,234.0214**	**1,234.0214**	**0.0898**		**1,236.2658**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.6654	0.0000	1.6654	0.2522	0.0000	0.2522			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.6654**	**0.0000**	**1.6654**	**0.2522**	**0.0000**	**0.2522**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1431	4.8231	0.9640	0.0114	0.2361	0.0169	0.2530	0.0647	0.0162	0.0809		1,234.0214	1,234.0214	0.0898		1,236.2658
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.1431**	**4.8231**	**0.9640**	**0.0114**	**0.2361**	**0.0169**	**0.2530**	**0.0647**	**0.0162**	**0.0809**		**1,234.0214**	**1,234.0214**	**0.0898**		**1,236.2658**

3.3 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1293	11.7421	5.2230	9.2900e-003		0.6112	0.6112		0.5634	0.5634		925.4172	925.4172	0.2788		932.3865
Total	**1.1293**	**11.7421**	**5.2230**	**9.2900e-003**		**0.6112**	**0.6112**		**0.5634**	**0.5634**		**925.4172**	**925.4172**	**0.2788**		**932.3865**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0276	0.7354	0.2011	1.5900e-003	0.0384	5.1800e-003	0.0436	0.0111	4.9600e-003	0.0160		169.0077	169.0077	0.0111		169.2859
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.2810**	**0.9401**	**2.8504**	**7.9700e-003**	**0.6085**	**0.0101**	**0.6186**	**0.1622**	**9.5100e-003**	**0.1717**		**803.4802**	**803.4802**	**0.0345**		**804.3428**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1293	11.7421	5.2230	9.2900e-003		0.6112	0.6112		0.5634	0.5634	0.0000	925.4172	925.4172	0.2788		932.3865
Total	**1.1293**	**11.7421**	**5.2230**	**9.2900e-003**		**0.6112**	**0.6112**		**0.5634**	**0.5634**	**0.0000**	**925.4172**	**925.4172**	**0.2788**		**932.3865**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0276	0.7354	0.2011	1.5900e-003	0.0384	5.1800e-003	0.0436	0.0111	4.9600e-003	0.0160		169.0077	169.0077	0.0111		169.2859
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.2810**	**0.9401**	**2.8504**	**7.9700e-003**	**0.6085**	**0.0101**	**0.6186**	**0.1622**	**9.5100e-003**	**0.1717**		**803.4802**	**803.4802**	**0.0345**		**804.3428**

3.4 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9429	7.2641	6.5879	0.0106		0.5041	0.5041		0.4929	0.4929		1,006.2342	1,006.2342	0.1391		1,009.7116
Total	**0.9429**	**7.2641**	**6.5879**	**0.0106**	**0.0000**	**0.5041**	**0.5041**	**0.0000**	**0.4929**	**0.4929**		**1,006.2342**	**1,006.2342**	**0.1391**		**1,009.7116**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0276	0.7354	0.2011	1.5900e-003	0.0384	5.1800e-003	0.0436	0.0111	4.9600e-003	0.0160		169.0077	169.0077	0.0111		169.2859
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.2810**	**0.9401**	**2.8504**	**7.9700e-003**	**0.6085**	**0.0101**	**0.6186**	**0.1622**	**9.5100e-003**	**0.1717**		**803.4802**	**803.4802**	**0.0345**		**804.3428**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9429	7.2641	6.5879	0.0106		0.5041	0.5041		0.4929	0.4929	0.0000	1,006.2342	1,006.2342	0.1391		1,009.7116
Total	**0.9429**	**7.2641**	**6.5879**	**0.0106**	**0.0000**	**0.5041**	**0.5041**	**0.0000**	**0.4929**	**0.4929**	**0.0000**	**1,006.2342**	**1,006.2342**	**0.1391**		**1,009.7116**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0276	0.7354	0.2011	1.5900e-003	0.0384	5.1800e-003	0.0436	0.0111	4.9600e-003	0.0160		169.0077	169.0077	0.0111		169.2859
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.2810**	**0.9401**	**2.8504**	**7.9700e-003**	**0.6085**	**0.0101**	**0.6186**	**0.1622**	**9.5100e-003**	**0.1717**		**803.4802**	**803.4802**	**0.0345**		**804.3428**

3.5 Utility Trenching - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8611	7.5803	7.1905	0.0115		0.4662	0.4662		0.4460	0.4460		1,114.4745	1,114.4745	0.2337		1,120.3161
Total	**0.8611**	**7.5803**	**7.1905**	**0.0115**		**0.4662**	**0.4662**		**0.4460**	**0.4460**		**1,114.4745**	**1,114.4745**	**0.2337**		**1,120.3161**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0276	0.7354	0.2011	1.5900e-003	0.0384	5.1800e-003	0.0436	0.0111	4.9600e-003	0.0160		169.0077	169.0077	0.0111		169.2859
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.2810**	**0.9401**	**2.8504**	**7.9700e-003**	**0.6085**	**0.0101**	**0.6186**	**0.1622**	**9.5100e-003**	**0.1717**		**803.4802**	**803.4802**	**0.0345**		**804.3428**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8611	7.5803	7.1905	0.0115		0.4662	0.4662		0.4460	0.4460	0.0000	1,114.4745	1,114.4745	0.2337		1,120.3161
Total	**0.8611**	**7.5803**	**7.1905**	**0.0115**		**0.4662**	**0.4662**		**0.4460**	**0.4460**	**0.0000**	**1,114.4745**	**1,114.4745**	**0.2337**		**1,120.3161**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0276	0.7354	0.2011	1.5900e-003	0.0384	5.1800e-003	0.0436	0.0111	4.9600e-003	0.0160		169.0077	169.0077	0.0111		169.2859
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.2810**	**0.9401**	**2.8504**	**7.9700e-003**	**0.6085**	**0.0101**	**0.6186**	**0.1622**	**9.5100e-003**	**0.1717**		**803.4802**	**803.4802**	**0.0345**		**804.3428**

3.6 Pipeline Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6264	16.0343	11.4736	0.0189		0.9272	0.9272		0.8700	0.8700		1,855.7795	1,855.7795	0.4659		1,867.4271
Total	**1.6264**	**16.0343**	**11.4736**	**0.0189**		**0.9272**	**0.9272**		**0.8700**	**0.8700**		**1,855.7795**	**1,855.7795**	**0.4659**		**1,867.4271**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0552	1.4707	0.4021	3.1700e-003	0.0768	0.0104	0.0872	0.0221	9.9100e-003	0.0320		338.0153	338.0153	0.0223		338.5717
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.3086**	**1.6754**	**3.0514**	**9.5500e-003**	**0.6469**	**0.0153**	**0.6622**	**0.1733**	**0.0145**	**0.1877**		**972.4878**	**972.4878**	**0.0456**		**973.6286**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6264	16.0343	11.4736	0.0189		0.9272	0.9272		0.8700	0.8700	0.0000	1,855.7795	1,855.7795	0.4659		1,867.4271
Total	**1.6264**	**16.0343**	**11.4736**	**0.0189**		**0.9272**	**0.9272**		**0.8700**	**0.8700**	**0.0000**	**1,855.7795**	**1,855.7795**	**0.4659**		**1,867.4271**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0552	1.4707	0.4021	3.1700e-003	0.0768	0.0104	0.0872	0.0221	9.9100e-003	0.0320		338.0153	338.0153	0.0223		338.5717
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.3086**	**1.6754**	**3.0514**	**9.5500e-003**	**0.6469**	**0.0153**	**0.6622**	**0.1733**	**0.0145**	**0.1877**		**972.4878**	**972.4878**	**0.0456**		**973.6286**

3.7 Well Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9300	22.8073	12.7730	0.0398		0.9241	0.9241		0.8667	0.8667		3,970.3666	3,970.3666	1.1259		3,998.5145
Total	**1.9300**	**22.8073**	**12.7730**	**0.0398**		**0.9241**	**0.9241**		**0.8667**	**0.8667**		**3,970.3666**	**3,970.3666**	**1.1259**		**3,998.5145**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0184	0.4902	0.1340	1.0600e-003	0.0256	3.4500e-003	0.0291	7.3700e-003	3.3000e-003	0.0107		112.6718	112.6718	7.4200e-003		112.8572
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.2718**	**0.6949**	**2.7834**	**7.4400e-003**	**0.5957**	**8.3900e-003**	**0.6041**	**0.1585**	**7.8500e-003**	**0.1664**		**747.1443**	**747.1443**	**0.0308**		**747.9142**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9300	22.8073	12.7730	0.0398		0.9241	0.9241		0.8667	0.8667	0.0000	3,970.3666	3,970.3666	1.1259		3,998.5145
Total	**1.9300**	**22.8073**	**12.7730**	**0.0398**		**0.9241**	**0.9241**		**0.8667**	**0.8667**	**0.0000**	**3,970.3666**	**3,970.3666**	**1.1259**		**3,998.5145**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0184	0.4902	0.1340	1.0600e-003	0.0256	3.4500e-003	0.0291	7.3700e-003	3.3000e-003	0.0107		112.6718	112.6718	7.4200e-003		112.8572
Worker	0.2534	0.2047	2.6493	6.3800e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		634.4725	634.4725	0.0234		635.0569
Total	**0.2718**	**0.6949**	**2.7834**	**7.4400e-003**	**0.5957**	**8.3900e-003**	**0.6041**	**0.1585**	**7.8500e-003**	**0.1664**		**747.1443**	**747.1443**	**0.0308**		**747.9142**

Torrance Pipeline

Los Angeles-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1,197.40	User Defined Unit	27.49	1,197,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	8			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Pipelines and wells

Construction Phase - See CalEEMod Assumptions

Off-road Equipment -

Off-road Equipment - Haul Phase

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - Drill Rig, support truck, crane, tractor/loader/backhoe, pump

Trips and VMT - See CalEEMod Assumptions and Air Quality Assumptions provided by the Applicant

Demolition -

Construction Off-road Equipment Mitigation - SCAQMD Rule 1186

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	440.00	132.00
tblConstructionPhase	NumDays	440.00	132.00
tblConstructionPhase	NumDays	30.00	42.00
tblConstructionPhase	NumDays	30.00	42.00
tblConstructionPhase	NumDays	20.00	42.00
tblLandUse	BuildingSpaceSquareFeet	0.00	1,197,400.00
tblLandUse	LandUseSquareFeet	0.00	1,197,400.00
tblLandUse	LotAcreage	0.00	27.49
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblProjectCharacteristics	OperationalYear	2018	2020
tblTripsAndVMT	HaulingTripLength	20.00	15.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	196.00	12.00
tblTripsAndVMT	VendorTripNumber	196.00	4.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripNumber	8.00	30.00
tblTripsAndVMT	WorkerTripNumber	10.00	30.00

tblTripsAndVMT	WorkerTripNumber	10.00	30.00
tblTripsAndVMT	WorkerTripNumber	503.00	30.00
tblTripsAndVMT	WorkerTripNumber	503.00	30.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	8.2274	75.6022	57.6035	0.1399	7.1998	3.5047	10.7045	1.4730	3.3069	4.7799	0.0000	13,998.3972	13,998.3972	2.5145	0.0000	14,061.2593
Maximum	**8.2274**	**75.6022**	**57.6035**	**0.1399**	**7.1998**	**3.5047**	**10.7045**	**1.4730**	**3.3069**	**4.7799**	**0.0000**	**13,998.3972**	**13,998.3972**	**2.5145**	**0.0000**	**14,061.2593**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	8.2274	75.6022	57.6035	0.1399	4.9696	3.5047	8.4743	1.1354	3.3069	4.4422	0.0000	13,998.3972	13,998.3972	2.5145	0.0000	14,061.2593
Maximum	**8.2274**	**75.6022**	**57.6035**	**0.1399**	**4.9696**	**3.5047**	**8.4743**	**1.1354**	**3.3069**	**4.4422**	**0.0000**	**13,998.3972**	**13,998.3972**	**2.5145**	**0.0000**	**14,061.2593**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	30.98	0.00	20.83	22.92	0.00	7.06	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demo Haul	Demolition	2/1/2018	3/31/2018	5	42	
2	Demolition	Demolition	2/1/2018	3/31/2018	5	42	
3	Site Preparation	Site Preparation	2/1/2018	3/31/2018	5	42	
4	Utility Trenching	Trenching	3/1/2018	8/31/2018	5	132	
5	Pipeline Construction	Building Construction	3/1/2018	8/31/2018	5	132	
6	Well Construction	Building Construction	3/1/2018	8/31/2018	5	132	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demo Haul	Concrete/Industrial Saws	0	8.00	81	0.73
Demo Haul	Excavators	0	8.00	158	0.38
Demo Haul	Rubber Tired Dozers	0	8.00	247	0.40

Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Dumpers/Tenders	1	6.00	16	0.38
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	1	6.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Site Preparation	Air Compressors	1	6.00	78	0.48
Site Preparation	Concrete/Industrial Saws	1	6.00	81	0.73
Site Preparation	Dumpers/Tenders	1	6.00	16	0.38
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Utility Trenching	Concrete/Industrial Saws	1	6.00	81	0.73
Utility Trenching	Dumpers/Tenders	1	6.00	16	0.38
Utility Trenching	Excavators	1	6.00	158	0.38
Utility Trenching	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Pipeline Construction	Cement and Mortar Mixers	1	6.00	9	0.56
Pipeline Construction	Concrete/Industrial Saws	1	6.00	81	0.73
Pipeline Construction	Cranes	1	6.00	231	0.29
Pipeline Construction	Forklifts	0	8.00	89	0.20
Pipeline Construction	Generator Sets	0	8.00	84	0.74
Pipeline Construction	Paving Equipment	1	6.00	132	0.36
Pipeline Construction	Rollers	2	6.00	80	0.38
Pipeline Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Pipeline Construction	Welders	0	6.00	46	0.45
Well Construction	Bore/Drill Rigs	1	24.00	221	0.50
Well Construction	Cranes	1	6.00	231	0.29
Well Construction	Forklifts	0	8.00	89	0.20
Well Construction	Generator Sets	0	8.00	84	0.74

Well Construction	Pumps	1	6.00	84	0.74
Well Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Well Construction	Welders	0	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demo Haul	0	0.00	0.00	756.00	14.70	6.90	15.00	LD_Mix	HDT_Mix	HHDT
Demolition	3	30.00	6.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	4	30.00	6.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Utility Trenching	4	30.00	6.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Pipeline Construction	7	30.00	12.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Construction	4	30.00	4.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demo Haul - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.8956	0.0000	3.8956	0.5898	0.0000	0.5898			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**3.8956**	**0.0000**	**3.8956**	**0.5898**	**0.0000**	**0.5898**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1477	4.8640	1.0496	0.0112	0.2361	0.0174	0.2535	0.0647	0.0166	0.0813		1,207.6489	1,207.6489	0.0940		1,209.9995
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.1477**	**4.8640**	**1.0496**	**0.0112**	**0.2361**	**0.0174**	**0.2535**	**0.0647**	**0.0166**	**0.0813**		**1,207.6489**	**1,207.6489**	**0.0940**		**1,209.9995**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.6654	0.0000	1.6654	0.2522	0.0000	0.2522			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.6654**	**0.0000**	**1.6654**	**0.2522**	**0.0000**	**0.2522**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1477	4.8640	1.0496	0.0112	0.2361	0.0174	0.2535	0.0647	0.0166	0.0813		1,207.6489	1,207.6489	0.0940		1,209.9995
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.1477**	**4.8640**	**1.0496**	**0.0112**	**0.2361**	**0.0174**	**0.2535**	**0.0647**	**0.0166**	**0.0813**		**1,207.6489**	**1,207.6489**	**0.0940**		**1,209.9995**

3.3 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1293	11.7421	5.2230	9.2900e-003		0.6112	0.6112		0.5634	0.5634		925.4172	925.4172	0.2788		932.3865
Total	**1.1293**	**11.7421**	**5.2230**	**9.2900e-003**		**0.6112**	**0.6112**		**0.5634**	**0.5634**		**925.4172**	**925.4172**	**0.2788**		**932.3865**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0288	0.7370	0.2210	1.5400e-003	0.0384	5.2600e-003	0.0437	0.0111	5.0400e-003	0.0161		164.4899	164.4899	0.0119		164.7866
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3142**	**0.9638**	**2.6317**	**7.5400e-003**	**0.6085**	**0.0102**	**0.6187**	**0.1622**	**9.5900e-003**	**0.1718**		**761.7633**	**761.7633**	**0.0338**		**762.6093**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1293	11.7421	5.2230	9.2900e-003		0.6112	0.6112		0.5634	0.5634	0.0000	925.4172	925.4172	0.2788		932.3865
Total	**1.1293**	**11.7421**	**5.2230**	**9.2900e-003**		**0.6112**	**0.6112**		**0.5634**	**0.5634**	**0.0000**	**925.4172**	**925.4172**	**0.2788**		**932.3865**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0288	0.7370	0.2210	1.5400e-003	0.0384	5.2600e-003	0.0437	0.0111	5.0400e-003	0.0161		164.4899	164.4899	0.0119		164.7866
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3142**	**0.9638**	**2.6317**	**7.5400e-003**	**0.6085**	**0.0102**	**0.6187**	**0.1622**	**9.5900e-003**	**0.1718**		**761.7633**	**761.7633**	**0.0338**		**762.6093**

3.4 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9429	7.2641	6.5879	0.0106		0.5041	0.5041		0.4929	0.4929		1,006.2342	1,006.2342	0.1391		1,009.7116
Total	**0.9429**	**7.2641**	**6.5879**	**0.0106**	**0.0000**	**0.5041**	**0.5041**	**0.0000**	**0.4929**	**0.4929**		**1,006.2342**	**1,006.2342**	**0.1391**		**1,009.7116**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0288	0.7370	0.2210	1.5400e-003	0.0384	5.2600e-003	0.0437	0.0111	5.0400e-003	0.0161		164.4899	164.4899	0.0119		164.7866
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3142**	**0.9638**	**2.6317**	**7.5400e-003**	**0.6085**	**0.0102**	**0.6187**	**0.1622**	**9.5900e-003**	**0.1718**		**761.7633**	**761.7633**	**0.0338**		**762.6093**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9429	7.2641	6.5879	0.0106		0.5041	0.5041		0.4929	0.4929	0.0000	1,006.2342	1,006.2342	0.1391		1,009.7116
Total	**0.9429**	**7.2641**	**6.5879**	**0.0106**	**0.0000**	**0.5041**	**0.5041**	**0.0000**	**0.4929**	**0.4929**	**0.0000**	**1,006.2342**	**1,006.2342**	**0.1391**		**1,009.7116**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0288	0.7370	0.2210	1.5400e-003	0.0384	5.2600e-003	0.0437	0.0111	5.0400e-003	0.0161		164.4899	164.4899	0.0119		164.7866
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3142**	**0.9638**	**2.6317**	**7.5400e-003**	**0.6085**	**0.0102**	**0.6187**	**0.1622**	**9.5900e-003**	**0.1718**		**761.7633**	**761.7633**	**0.0338**		**762.6093**

3.5 Utility Trenching - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8611	7.5803	7.1905	0.0115		0.4662	0.4662		0.4460	0.4460		1,114.4745	1,114.4745	0.2337		1,120.3161
Total	**0.8611**	**7.5803**	**7.1905**	**0.0115**		**0.4662**	**0.4662**		**0.4460**	**0.4460**		**1,114.4745**	**1,114.4745**	**0.2337**		**1,120.3161**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0288	0.7370	0.2210	1.5400e-003	0.0384	5.2600e-003	0.0437	0.0111	5.0400e-003	0.0161		164.4899	164.4899	0.0119		164.7866
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3142**	**0.9638**	**2.6317**	**7.5400e-003**	**0.6085**	**0.0102**	**0.6187**	**0.1622**	**9.5900e-003**	**0.1718**		**761.7633**	**761.7633**	**0.0338**		**762.6093**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8611	7.5803	7.1905	0.0115		0.4662	0.4662		0.4460	0.4460	0.0000	1,114.4745	1,114.4745	0.2337		1,120.3161
Total	**0.8611**	**7.5803**	**7.1905**	**0.0115**		**0.4662**	**0.4662**		**0.4460**	**0.4460**	**0.0000**	**1,114.4745**	**1,114.4745**	**0.2337**		**1,120.3161**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0288	0.7370	0.2210	1.5400e-003	0.0384	5.2600e-003	0.0437	0.0111	5.0400e-003	0.0161		164.4899	164.4899	0.0119		164.7866
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3142**	**0.9638**	**2.6317**	**7.5400e-003**	**0.6085**	**0.0102**	**0.6187**	**0.1622**	**9.5900e-003**	**0.1718**		**761.7633**	**761.7633**	**0.0338**		**762.6093**

3.6 Pipeline Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6264	16.0343	11.4736	0.0189		0.9272	0.9272		0.8700	0.8700		1,855.7795	1,855.7795	0.4659		1,867.4271
Total	**1.6264**	**16.0343**	**11.4736**	**0.0189**		**0.9272**	**0.9272**		**0.8700**	**0.8700**		**1,855.7795**	**1,855.7795**	**0.4659**		**1,867.4271**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0575	1.4740	0.4420	3.0900e-003	0.0768	0.0105	0.0874	0.0221	0.0101	0.0322		328.9798	328.9798	0.0237		329.5732
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3429**	**1.7008**	**2.8527**	**9.0900e-003**	**0.6469**	**0.0155**	**0.6624**	**0.1733**	**0.0146**	**0.1879**		**926.2532**	**926.2532**	**0.0457**		**927.3959**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6264	16.0343	11.4736	0.0189		0.9272	0.9272		0.8700	0.8700	0.0000	1,855.7795	1,855.7795	0.4659		1,867.4271
Total	**1.6264**	**16.0343**	**11.4736**	**0.0189**		**0.9272**	**0.9272**		**0.8700**	**0.8700**	**0.0000**	**1,855.7795**	**1,855.7795**	**0.4659**		**1,867.4271**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0575	1.4740	0.4420	3.0900e-003	0.0768	0.0105	0.0874	0.0221	0.0101	0.0322		328.9798	328.9798	0.0237		329.5732
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3429**	**1.7008**	**2.8527**	**9.0900e-003**	**0.6469**	**0.0155**	**0.6624**	**0.1733**	**0.0146**	**0.1879**		**926.2532**	**926.2532**	**0.0457**		**927.3959**

3.7 Well Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9300	22.8073	12.7730	0.0398		0.9241	0.9241		0.8667	0.8667		3,970.3666	3,970.3666	1.1259		3,998.5145
Total	**1.9300**	**22.8073**	**12.7730**	**0.0398**		**0.9241**	**0.9241**		**0.8667**	**0.8667**		**3,970.3666**	**3,970.3666**	**1.1259**		**3,998.5145**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0192	0.4913	0.1473	1.0300e-003	0.0256	3.5100e-003	0.0291	7.3700e-003	3.3600e-003	0.0107		109.6599	109.6599	7.9100e-003		109.8578
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3046**	**0.7181**	**2.5580**	**7.0300e-003**	**0.5957**	**8.4500e-003**	**0.6041**	**0.1585**	**7.9100e-003**	**0.1664**		**706.9333**	**706.9333**	**0.0299**		**707.6804**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9300	22.8073	12.7730	0.0398		0.9241	0.9241		0.8667	0.8667	0.0000	3,970.3666	3,970.3666	1.1259		3,998.5145
Total	**1.9300**	**22.8073**	**12.7730**	**0.0398**		**0.9241**	**0.9241**		**0.8667**	**0.8667**	**0.0000**	**3,970.3666**	**3,970.3666**	**1.1259**		**3,998.5145**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0192	0.4913	0.1473	1.0300e-003	0.0256	3.5100e-003	0.0291	7.3700e-003	3.3600e-003	0.0107		109.6599	109.6599	7.9100e-003		109.8578
Worker	0.2854	0.2268	2.4107	6.0000e-003	0.5701	4.9400e-003	0.5750	0.1512	4.5500e-003	0.1557		597.2734	597.2734	0.0220		597.8227
Total	**0.3046**	**0.7181**	**2.5580**	**7.0300e-003**	**0.5957**	**8.4500e-003**	**0.6041**	**0.1585**	**7.9100e-003**	**0.1664**		**706.9333**	**706.9333**	**0.0299**		**707.6804**

Torrance Pipeline

Los Angeles-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1,197.40	User Defined Unit	27.49	1,197,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	8			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Pipelines and wells

Construction Phase - See CalEEMod Assumptions

Off-road Equipment -

Off-road Equipment - Haul Phase

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - Drill Rig, support truck, crane, tractor/loader/backhoe, pump

Trips and VMT - See CalEEMod Assumptions and Air Quality Assumptions provided by the Applicant

Demolition -

Construction Off-road Equipment Mitigation - SCAQMD Rule 1186

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	440.00	132.00
tblConstructionPhase	NumDays	440.00	132.00
tblConstructionPhase	NumDays	30.00	42.00
tblConstructionPhase	NumDays	30.00	42.00
tblConstructionPhase	NumDays	20.00	42.00
tblLandUse	BuildingSpaceSquareFeet	0.00	1,197,400.00
tblLandUse	LandUseSquareFeet	0.00	1,197,400.00
tblLandUse	LotAcreage	0.00	27.49
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblProjectCharacteristics	OperationalYear	2018	2020
tblTripsAndVMT	HaulingTripLength	20.00	15.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	196.00	12.00
tblTripsAndVMT	VendorTripNumber	196.00	4.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripLength	14.70	25.00
tblTripsAndVMT	WorkerTripNumber	8.00	30.00

tblTripsAndVMT	WorkerTripNumber	10.00	30.00
tblTripsAndVMT	WorkerTripNumber	10.00	30.00
tblTripsAndVMT	WorkerTripNumber	503.00	30.00
tblTripsAndVMT	WorkerTripNumber	503.00	30.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.4079	3.8365	2.9987	7.1900e-003	0.2315	0.1794	0.4110	0.0524	0.1691	0.2215	0.0000	650.9300	650.9300	0.1268	0.0000	654.1006
Maximum	**0.4079**	**3.8365**	**2.9987**	**7.1900e-003**	**0.2315**	**0.1794**	**0.4110**	**0.0524**	**0.1691**	**0.2215**	**0.0000**	**650.9300**	**650.9300**	**0.1268**	**0.0000**	**654.1006**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.4079	3.8365	2.9987	7.1900e-003	0.1847	0.1794	0.3641	0.0454	0.1691	0.2144	0.0000	650.9295	650.9295	0.1268	0.0000	654.1001
Maximum	**0.4079**	**3.8365**	**2.9987**	**7.1900e-003**	**0.1847**	**0.1794**	**0.3641**	**0.0454**	**0.1691**	**0.2144**	**0.0000**	**650.9295**	**650.9295**	**0.1268**	**0.0000**	**654.1001**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	20.23	0.00	11.40	13.52	0.00	3.20	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	2-1-2018	4-30-2018	0.7091	0.7091
2	5-1-2018	7-31-2018	0.3175	0.3175
3	8-1-2018	9-30-2018	0.1070	0.1070
		Highest	0.7091	0.7091

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demo Haul	Demolition	2/1/2018	3/31/2018	5	42	
2	Demolition	Demolition	2/1/2018	3/31/2018	5	42	
3	Site Preparation	Site Preparation	2/1/2018	3/31/2018	5	42	
4	Utility Trenching	Trenching	3/1/2018	8/31/2018	5	132	
5	Pipeline Construction	Building Construction	3/1/2018	8/31/2018	5	132	
6	Well Construction	Building Construction	3/1/2018	8/31/2018	5	132	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demo Haul	Concrete/Industrial Saws	0	8.00	81	0.73
Demo Haul	Excavators	0	8.00	158	0.38
Demo Haul	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Dumpers/Tenders	1	6.00	16	0.38
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	1	6.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Site Preparation	Air Compressors	1	6.00	78	0.48
Site Preparation	Concrete/Industrial Saws	1	6.00	81	0.73
Site Preparation	Dumpers/Tenders	1	6.00	16	0.38
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Utility Trenching	Concrete/Industrial Saws	1	6.00	81	0.73
Utility Trenching	Dumpers/Tenders	1	6.00	16	0.38
Utility Trenching	Excavators	1	6.00	158	0.38
Utility Trenching	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Pipeline Construction	Cement and Mortar Mixers	1	6.00	9	0.56
Pipeline Construction	Concrete/Industrial Saws	1	6.00	81	0.73
Pipeline Construction	Cranes	1	6.00	231	0.29
Pipeline Construction	Forklifts	0	8.00	89	0.20
Pipeline Construction	Generator Sets	0	8.00	84	0.74
Pipeline Construction	Paving Equipment	1	6.00	132	0.36
Pipeline Construction	Rollers	2	6.00	80	0.38
Pipeline Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37

Pipeline Construction	Welders	0	6.00	46	0.45
Well Construction	Bore/Drill Rigs	1	24.00	221	0.50
Well Construction	Cranes	1	6.00	231	0.29
Well Construction	Forklifts	0	8.00	89	0.20
Well Construction	Generator Sets	0	8.00	84	0.74
Well Construction	Pumps	1	6.00	84	0.74
Well Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Well Construction	Welders	0	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demo Haul	0	0.00	0.00	756.00	14.70	6.90	15.00	LD_Mix	HDT_Mix	HHDT
Demolition	3	30.00	6.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	4	30.00	6.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Utility Trenching	4	30.00	6.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Pipeline Construction	7	30.00	12.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Construction	4	30.00	4.00	0.00	25.00	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demo Haul - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0818	0.0000	0.0818	0.0124	0.0000	0.0124	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0818**	**0.0000**	**0.0818**	**0.0124**	**0.0000**	**0.0124**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0500e-003	0.1042	0.0210	2.4000e-004	4.8700e-003	3.6000e-004	5.2300e-003	1.3400e-003	3.4000e-004	1.6800e-003	0.0000	23.2982	23.2982	1.7500e-003	0.0000	23.3418
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.0500e-003**	**0.1042**	**0.0210**	**2.4000e-004**	**4.8700e-003**	**3.6000e-004**	**5.2300e-003**	**1.3400e-003**	**3.4000e-004**	**1.6800e-003**	**0.0000**	**23.2982**	**23.2982**	**1.7500e-003**	**0.0000**	**23.3418**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0350	0.0000	0.0350	5.3000e-003	0.0000	5.3000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0350**	**0.0000**	**0.0350**	**5.3000e-003**	**0.0000**	**5.3000e-003**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0500e-003	0.1042	0.0210	2.4000e-004	4.8700e-003	3.6000e-004	5.2300e-003	1.3400e-003	3.4000e-004	1.6800e-003	0.0000	23.2982	23.2982	1.7500e-003	0.0000	23.3418
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.0500e-003**	**0.1042**	**0.0210**	**2.4000e-004**	**4.8700e-003**	**3.6000e-004**	**5.2300e-003**	**1.3400e-003**	**3.4000e-004**	**1.6800e-003**	**0.0000**	**23.2982**	**23.2982**	**1.7500e-003**	**0.0000**	**23.3418**

3.3 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0237	0.2466	0.1097	2.0000e-004		0.0128	0.0128		0.0118	0.0118	0.0000	17.6300	17.6300	5.3100e-003	0.0000	17.7628
Total	**0.0237**	**0.2466**	**0.1097**	**2.0000e-004**		**0.0128**	**0.0128**		**0.0118**	**0.0118**	**0.0000**	**17.6300**	**17.6300**	**5.3100e-003**	**0.0000**	**17.7628**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.9000e-004	0.0158	4.4400e-003	3.0000e-005	7.9000e-004	1.1000e-004	9.0000e-004	2.3000e-004	1.0000e-004	3.3000e-004	0.0000	3.1836	3.1836	2.2000e-004	0.0000	3.1891
Worker	5.4100e-003	4.9000e-003	0.0520	1.3000e-004	0.0117	1.0000e-004	0.0118	3.1200e-003	1.0000e-004	3.2100e-003	0.0000	11.5687	11.5687	4.3000e-004	0.0000	11.5793
Total	**6.0000e-003**	**0.0207**	**0.0565**	**1.6000e-004**	**0.0125**	**2.1000e-004**	**0.0127**	**3.3500e-003**	**2.0000e-004**	**3.5400e-003**	**0.0000**	**14.7523**	**14.7523**	**6.5000e-004**	**0.0000**	**14.7684**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0237	0.2466	0.1097	2.0000e-004		0.0128	0.0128		0.0118	0.0118	0.0000	17.6300	17.6300	5.3100e-003	0.0000	17.7628
Total	**0.0237**	**0.2466**	**0.1097**	**2.0000e-004**		**0.0128**	**0.0128**		**0.0118**	**0.0118**	**0.0000**	**17.6300**	**17.6300**	**5.3100e-003**	**0.0000**	**17.7628**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.9000e-004	0.0158	4.4400e-003	3.0000e-005	7.9000e-004	1.1000e-004	9.0000e-004	2.3000e-004	1.0000e-004	3.3000e-004	0.0000	3.1836	3.1836	2.2000e-004	0.0000	3.1891
Worker	5.4100e-003	4.9000e-003	0.0520	1.3000e-004	0.0117	1.0000e-004	0.0118	3.1200e-003	1.0000e-004	3.2100e-003	0.0000	11.5687	11.5687	4.3000e-004	0.0000	11.5793
Total	**6.0000e-003**	**0.0207**	**0.0565**	**1.6000e-004**	**0.0125**	**2.1000e-004**	**0.0127**	**3.3500e-003**	**2.0000e-004**	**3.5400e-003**	**0.0000**	**14.7523**	**14.7523**	**6.5000e-004**	**0.0000**	**14.7684**

3.4 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0198	0.1526	0.1384	2.2000e-004		0.0106	0.0106		0.0104	0.0104	0.0000	19.1697	19.1697	2.6500e-003	0.0000	19.2359
Total	**0.0198**	**0.1526**	**0.1384**	**2.2000e-004**	**0.0000**	**0.0106**	**0.0106**	**0.0000**	**0.0104**	**0.0104**	**0.0000**	**19.1697**	**19.1697**	**2.6500e-003**	**0.0000**	**19.2359**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.9000e-004	0.0158	4.4400e-003	3.0000e-005	7.9000e-004	1.1000e-004	9.0000e-004	2.3000e-004	1.0000e-004	3.3000e-004	0.0000	3.1836	3.1836	2.2000e-004	0.0000	3.1891
Worker	5.4100e-003	4.9000e-003	0.0520	1.3000e-004	0.0117	1.0000e-004	0.0118	3.1200e-003	1.0000e-004	3.2100e-003	0.0000	11.5687	11.5687	4.3000e-004	0.0000	11.5793
Total	**6.0000e-003**	**0.0207**	**0.0565**	**1.6000e-004**	**0.0125**	**2.1000e-004**	**0.0127**	**3.3500e-003**	**2.0000e-004**	**3.5400e-003**	**0.0000**	**14.7523**	**14.7523**	**6.5000e-004**	**0.0000**	**14.7684**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0198	0.1526	0.1384	2.2000e-004		0.0106	0.0106		0.0104	0.0104	0.0000	19.1696	19.1696	2.6500e-003	0.0000	19.2359
Total	**0.0198**	**0.1526**	**0.1384**	**2.2000e-004**	**0.0000**	**0.0106**	**0.0106**	**0.0000**	**0.0104**	**0.0104**	**0.0000**	**19.1696**	**19.1696**	**2.6500e-003**	**0.0000**	**19.2359**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.9000e-004	0.0158	4.4400e-003	3.0000e-005	7.9000e-004	1.1000e-004	9.0000e-004	2.3000e-004	1.0000e-004	3.3000e-004	0.0000	3.1836	3.1836	2.2000e-004	0.0000	3.1891
Worker	5.4100e-003	4.9000e-003	0.0520	1.3000e-004	0.0117	1.0000e-004	0.0118	3.1200e-003	1.0000e-004	3.2100e-003	0.0000	11.5687	11.5687	4.3000e-004	0.0000	11.5793
Total	**6.0000e-003**	**0.0207**	**0.0565**	**1.6000e-004**	**0.0125**	**2.1000e-004**	**0.0127**	**3.3500e-003**	**2.0000e-004**	**3.5400e-003**	**0.0000**	**14.7523**	**14.7523**	**6.5000e-004**	**0.0000**	**14.7684**

3.5 Utility Trenching - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0568	0.5003	0.4746	7.6000e-004		0.0308	0.0308		0.0294	0.0294	0.0000	66.7283	66.7283	0.0140	0.0000	67.0780
Total	**0.0568**	**0.5003**	**0.4746**	**7.6000e-004**		**0.0308**	**0.0308**		**0.0294**	**0.0294**	**0.0000**	**66.7283**	**66.7283**	**0.0140**	**0.0000**	**67.0780**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.8500e-003	0.0496	0.0139	1.0000e-004	2.4900e-003	3.4000e-004	2.8400e-003	7.2000e-004	3.3000e-004	1.0500e-003	0.0000	10.0056	10.0056	6.9000e-004	0.0000	10.0228
Worker	0.0170	0.0154	0.1636	4.0000e-004	0.0369	3.3000e-004	0.0372	9.8000e-003	3.0000e-004	0.0101	0.0000	36.3588	36.3588	1.3400e-003	0.0000	36.3922
Total	**0.0188**	**0.0650**	**0.1775**	**5.0000e-004**	**0.0394**	**6.7000e-004**	**0.0401**	**0.0105**	**6.3000e-004**	**0.0112**	**0.0000**	**46.3644**	**46.3644**	**2.0300e-003**	**0.0000**	**46.4150**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0568	0.5003	0.4746	7.6000e-004		0.0308	0.0308		0.0294	0.0294	0.0000	66.7282	66.7282	0.0140	0.0000	67.0779
Total	**0.0568**	**0.5003**	**0.4746**	**7.6000e-004**		**0.0308**	**0.0308**		**0.0294**	**0.0294**	**0.0000**	**66.7282**	**66.7282**	**0.0140**	**0.0000**	**67.0779**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.8500e-003	0.0496	0.0139	1.0000e-004	2.4900e-003	3.4000e-004	2.8400e-003	7.2000e-004	3.3000e-004	1.0500e-003	0.0000	10.0056	10.0056	6.9000e-004	0.0000	10.0228
Worker	0.0170	0.0154	0.1636	4.0000e-004	0.0369	3.3000e-004	0.0372	9.8000e-003	3.0000e-004	0.0101	0.0000	36.3588	36.3588	1.3400e-003	0.0000	36.3922
Total	**0.0188**	**0.0650**	**0.1775**	**5.0000e-004**	**0.0394**	**6.7000e-004**	**0.0401**	**0.0105**	**6.3000e-004**	**0.0112**	**0.0000**	**46.3644**	**46.3644**	**2.0300e-003**	**0.0000**	**46.4150**

3.6 Pipeline Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1073	1.0583	0.7573	1.2500e-003		0.0612	0.0612		0.0574	0.0574	0.0000	111.1133	111.1133	0.0279	0.0000	111.8107
Total	**0.1073**	**1.0583**	**0.7573**	**1.2500e-003**		**0.0612**	**0.0612**		**0.0574**	**0.0574**	**0.0000**	**111.1133**	**111.1133**	**0.0279**	**0.0000**	**111.8107**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.7100e-003	0.0992	0.0279	2.1000e-004	4.9900e-003	6.9000e-004	5.6800e-003	1.4400e-003	6.6000e-004	2.1000e-003	0.0000	20.0112	20.0112	1.3700e-003	0.0000	20.0455
Worker	0.0170	0.0154	0.1636	4.0000e-004	0.0369	3.3000e-004	0.0372	9.8000e-003	3.0000e-004	0.0101	0.0000	36.3588	36.3588	1.3400e-003	0.0000	36.3922
Total	**0.0207**	**0.1146**	**0.1915**	**6.1000e-004**	**0.0419**	**1.0200e-003**	**0.0429**	**0.0112**	**9.6000e-004**	**0.0122**	**0.0000**	**56.3700**	**56.3700**	**2.7100e-003**	**0.0000**	**56.4377**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1073	1.0583	0.7573	1.2500e-003		0.0612	0.0612		0.0574	0.0574	0.0000	111.1132	111.1132	0.0279	0.0000	111.8106
Total	**0.1073**	**1.0583**	**0.7573**	**1.2500e-003**		**0.0612**	**0.0612**		**0.0574**	**0.0574**	**0.0000**	**111.1132**	**111.1132**	**0.0279**	**0.0000**	**111.8106**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.7100e-003	0.0992	0.0279	2.1000e-004	4.9900e-003	6.9000e-004	5.6800e-003	1.4400e-003	6.6000e-004	2.1000e-003	0.0000	20.0112	20.0112	1.3700e-003	0.0000	20.0455
Worker	0.0170	0.0154	0.1636	4.0000e-004	0.0369	3.3000e-004	0.0372	9.8000e-003	3.0000e-004	0.0101	0.0000	36.3588	36.3588	1.3400e-003	0.0000	36.3922
Total	**0.0207**	**0.1146**	**0.1915**	**6.1000e-004**	**0.0419**	**1.0200e-003**	**0.0429**	**0.0112**	**9.6000e-004**	**0.0122**	**0.0000**	**56.3700**	**56.3700**	**2.7100e-003**	**0.0000**	**56.4377**

3.7 Well Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1274	1.5053	0.8430	2.6200e-003		0.0610	0.0610		0.0572	0.0572	0.0000	237.7225	237.7225	0.0674	0.0000	239.4078
Total	**0.1274**	**1.5053**	**0.8430**	**2.6200e-003**		**0.0610**	**0.0610**		**0.0572**	**0.0572**	**0.0000**	**237.7225**	**237.7225**	**0.0674**	**0.0000**	**239.4078**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2400e-003	0.0331	9.2900e-003	7.0000e-005	1.6600e-003	2.3000e-004	1.8900e-003	4.8000e-004	2.2000e-004	7.0000e-004	0.0000	6.6704	6.6704	4.6000e-004	0.0000	6.6818
Worker	0.0170	0.0154	0.1636	4.0000e-004	0.0369	3.3000e-004	0.0372	9.8000e-003	3.0000e-004	0.0101	0.0000	36.3588	36.3588	1.3400e-003	0.0000	36.3922
Total	**0.0182**	**0.0485**	**0.1729**	**4.7000e-004**	**0.0386**	**5.6000e-004**	**0.0391**	**0.0103**	**5.2000e-004**	**0.0108**	**0.0000**	**43.0292**	**43.0292**	**1.8000e-003**	**0.0000**	**43.0741**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1274	1.5053	0.8430	2.6200e-003		0.0610	0.0610		0.0572	0.0572	0.0000	237.7222	237.7222	0.0674	0.0000	239.4075
Total	**0.1274**	**1.5053**	**0.8430**	**2.6200e-003**		**0.0610**	**0.0610**		**0.0572**	**0.0572**	**0.0000**	**237.7222**	**237.7222**	**0.0674**	**0.0000**	**239.4075**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2400e-003	0.0331	9.2900e-003	7.0000e-005	1.6600e-003	2.3000e-004	1.8900e-003	4.8000e-004	2.2000e-004	7.0000e-004	0.0000	6.6704	6.6704	4.6000e-004	0.0000	6.6818
Worker	0.0170	0.0154	0.1636	4.0000e-004	0.0369	3.3000e-004	0.0372	9.8000e-003	3.0000e-004	0.0101	0.0000	36.3588	36.3588	1.3400e-003	0.0000	36.3922
Total	**0.0182**	**0.0485**	**0.1729**	**4.7000e-004**	**0.0386**	**5.6000e-004**	**0.0391**	**0.0103**	**5.2000e-004**	**0.0108**	**0.0000**	**43.0292**	**43.0292**	**1.8000e-003**	**0.0000**	**43.0741**

Torrance Pipeline

Los Angeles-South Coast, Summary Report

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1,197.40	User Defined Unit	27.49	1,197,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	8			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments

Only CalEEMod defaults were used.

Project Characteristics -

Land Use - Pipelines and wells

Construction Phase - See CalEEMod Assumptions

Off-road Equipment -

Off-road Equipment - Haul Phase

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - See CalEEMod Assumptions

Off-road Equipment - Drill Rig, support truck, crane, tractor/loader/backhoe, pump

Trips and VMT - See CalEEMod Assumptions and Air Quality Assumptions provided by the Applicant

Demolition -

Construction Off-road Equipment Mitigation - SCAQMD Rule 1186

2.0 Peak Daily Emissions

Peak Daily Construction Emissions

Peak Daily Construction Emissions

		Unmitigated						Mitigated					
		ROG	NOX	CO	SO2	PM10	PM2.5	ROG	NOX	CO	SO2	PM10	PM2.5
Year	Phase	lb/day											
2018	Demolition	1.4435 W	12.7059 W	8.0734 S	0.0173 S	1.2299 W	0.7352 W	1.4435 W	12.7059 W	8.0734 S	0.0173 S	1.2299 W	0.7352 W
2018	Site Preparation	1.2571 W	8.2279 W	9.4383 S	0.0185 S	1.1228 W	0.6647 W	1.2571 W	8.2279 W	9.4383 S	0.0185 S	1.1228 W	0.6647 W
2018	Trenching	1.1753 W	8.5440 W	10.0408 S	0.0194 S	1.0849 W	0.6178 W	1.1753 W	8.5440 W	10.0408 S	0.0194 S	1.0849 W	0.6178 W
	Peak Daily Total	1.4435 W	12.7059 W	10.0408 S	0.0194 S	1.2299 W	0.7352 W	1.4435 W	12.7059 W	10.0408 S	0.0194 S	1.2299 W	0.7352 W
	Air District Threshold												
	Exceed Significance?												

3.0 Annual GHG Emissions

Annual GHG

Annual GHG

		Unmitigated				Mitigated			
		CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
GHG Activity	Year	MT/yr							
Construction	2018	650.9300	0.1268	0.0000	654.1006	650.9295	0.1268	0.0000	654.1001
	Total								
	Significance Threshold								
	Exceed Significance?								

Torrance Pipeline

Los Angeles-South Coast County, Mitigation Report

Construction Mitigation Summary

Phase	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Demo Haul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Demolition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pipeline Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Site Preparation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utility Trenching	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

OFFROAD Equipment Mitigation

Equipment Type	Fuel Type	Tier	Number Mitigated	Total Number of Equipment	DPF	Oxidation Catalyst
Air Compressors	Diesel	No Change	0	1	No Change	0.00
Bore/Drill Rigs	Diesel	No Change	0	1	No Change	0.00
Cement and Mortar Mixers	Diesel	No Change	0	1	No Change	0.00
Concrete/Industrial Saws	Diesel	No Change	0	3	No Change	0.00
Cranes	Diesel	No Change	0	2	No Change	0.00
Dumpers/Tenders	Diesel	No Change	0	3	No Change	0.00
Excavators	Diesel	No Change	0	1	No Change	0.00
Forklifts	Diesel	No Change	0	0	No Change	0.00
Generator Sets	Diesel	No Change	0	0	No Change	0.00

Paving Equipment	Diesel	No Change	0	1	No Change	0.00
Pumps	Diesel	No Change	0	1	No Change	0.00
Rollers	Diesel	No Change	0	2	No Change	0.00
Rubber Tired Dozers	Diesel	No Change	0	1	No Change	0.00
Tractors/Loaders/Backhoes	Diesel	No Change	0	5	No Change	0.00
Welders	Diesel	No Change	0	0	No Change	0.00

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Unmitigated tons/yr							Unmitigated mt/yr					
Air Compressors	6.27000E-003	4.21200E-002	3.89400E-002	6.00000E-005	3.16000E-003	3.16000E-003	0.00000E+000	5.36184E+000	5.36184E+000	5.10000E-004	0.00000E+000	5.37458E+000
Bore/Drill Rigs	5.96400E-002	8.30830E-001	4.14160E-001	1.86000E-003	2.34800E-002	2.16000E-002	0.00000E+000	1.69627E+002	1.69627E+002	5.28100E-002	0.00000E+000	1.70947E+002
Cement and Mortar Mixers	2.91000E-003	1.82300E-002	1.52600E-002	4.00000E-005	7.20000E-004	7.20000E-004	0.00000E+000	2.26847E+000	2.26847E+000	2.40000E-004	0.00000E+000	2.27436E+000
Concrete/Industrial Saws	5.96000E-002	4.49240E-001	4.27340E-001	7.20000E-004	3.06400E-002	3.06400E-002	0.00000E+000	6.16961E+001	6.16961E+001	4.78000E-003	0.00000E+000	6.18155E+001
Cranes	5.65000E-002	6.75260E-001	2.49660E-001	5.70000E-004	2.92300E-002	2.68900E-002	0.00000E+000	5.21443E+001	5.21443E+001	1.62300E-002	0.00000E+000	5.25501E+001
Dumpers/Tenders	5.96000E-003	3.77800E-002	2.03200E-002	6.00000E-005	1.47000E-003	1.47000E-003	0.00000E+000	4.47801E+000	4.47801E+000	4.80000E-004	0.00000E+000	4.49003E+000
Excavators	1.43100E-002	1.53250E-001	1.62140E-001	2.60000E-004	7.43000E-003	6.84000E-003	0.00000E+000	2.33323E+001	2.33323E+001	7.26000E-003	0.00000E+000	2.35139E+001
Forklifts	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Generator Sets	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Paving Equipment	1.17700E-002	1.31600E-001	1.25540E-001	2.00000E-004	6.44000E-003	5.93000E-003	0.00000E+000	1.84115E+001	1.84115E+001	5.73000E-003	0.00000E+000	1.85548E+001
Pumps	2.63200E-002	2.06650E-001	1.88360E-001	3.30000E-004	1.36800E-002	1.36800E-002	0.00000E+000	2.79778E+001	2.79778E+001	2.12000E-003	0.00000E+000	2.80307E+001
Rollers	2.55300E-002	2.46850E-001	1.91610E-001	2.60000E-004	1.69900E-002	1.56300E-002	0.00000E+000	2.37018E+001	2.37018E+001	7.38000E-003	0.00000E+000	2.38862E+001
Rubber Tired Dozers	1.83700E-002	1.97820E-001	6.89300E-002	1.30000E-004	9.62000E-003	8.85000E-003	0.00000E+000	1.22903E+001	1.22903E+001	3.83000E-003	0.00000E+000	1.23860E+001
Tractors/Loaders/Backhoes	4.79000E-002	4.73350E-001	4.20610E-001	5.60000E-004	3.35300E-002	3.08500E-002	0.00000E+000	5.10742E+001	5.10742E+001	1.59000E-002	0.00000E+000	5.14717E+001
Welders	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Mitigated tons/yr							Mitigated mt/yr					
Air Compressors	6.27000E-003	4.21200E-002	3.89400E-002	6.00000E-005	3.16000E-003	3.16000E-003	0.00000E+000	5.36184E+000	5.36184E+000	5.10000E-004	0.00000E+000	5.37457E+000

Bore/Drill Rigs	5.96400E-002	8.30830E-001	4.14160E-001	1.86000E-003	2.34800E-002	2.16000E-002	0.00000E+000	1.69627E+002	1.69627E+002	5.28100E-002	0.00000E+000	1.70947E+002
Cement and Mortar Mixers	2.91000E-003	1.82300E-002	1.52600E-002	4.00000E-005	7.20000E-004	7.20000E-004	0.00000E+000	2.26847E+000	2.26847E+000	2.40000E-004	0.00000E+000	2.27435E+000
Concrete/Industrial Saws	5.96000E-002	4.49240E-001	4.27340E-001	7.20000E-004	3.06400E-002	3.06400E-002	0.00000E+000	6.16960E+001	6.16960E+001	4.78000E-003	0.00000E+000	6.18154E+001
Cranes	5.65000E-002	6.75260E-001	2.49660E-001	5.70000E-004	2.92300E-002	2.68900E-002	0.00000E+000	5.21442E+001	5.21442E+001	1.62300E-002	0.00000E+000	5.25500E+001
Dumpers/Tenders	5.96000E-003	3.77800E-002	2.03200E-002	6.00000E-005	1.47000E-003	1.47000E-003	0.00000E+000	4.47801E+000	4.47801E+000	4.80000E-004	0.00000E+000	4.49003E+000
Excavators	1.43100E-002	1.53250E-001	1.62140E-001	2.60000E-004	7.43000E-003	6.84000E-003	0.00000E+000	2.33323E+001	2.33323E+001	7.26000E-003	0.00000E+000	2.35139E+001
Forklifts	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Generator Sets	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Paving Equipment	1.17700E-002	1.31600E-001	1.25540E-001	2.00000E-004	6.44000E-003	5.93000E-003	0.00000E+000	1.84115E+001	1.84115E+001	5.73000E-003	0.00000E+000	1.85548E+001
Pumps	2.63200E-002	2.06650E-001	1.88360E-001	3.30000E-004	1.36800E-002	1.36800E-002	0.00000E+000	2.79777E+001	2.79777E+001	2.12000E-003	0.00000E+000	2.80307E+001
Rollers	2.55300E-002	2.46850E-001	1.91610E-001	2.60000E-004	1.69900E-002	1.56300E-002	0.00000E+000	2.37017E+001	2.37017E+001	7.38000E-003	0.00000E+000	2.38862E+001
Rubber Tired Dozers	1.83700E-002	1.97820E-001	6.89300E-002	1.30000E-004	9.62000E-003	8.85000E-003	0.00000E+000	1.22903E+001	1.22903E+001	3.83000E-003	0.00000E+000	1.23859E+001
Tractors/Loaders/Backhoes	4.79000E-002	4.73350E-001	4.20610E-001	5.60000E-004	3.35300E-002	3.08500E-002	0.00000E+000	5.10741E+001	5.10741E+001	1.59000E-002	0.00000E+000	5.14716E+001
Welders	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Air Compressors	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.86061E-006
Bore/Drill Rigs	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.17906E-006	1.17906E-006	0.00000E+000	0.00000E+000	1.22845E-006
Cement and Mortar Mixers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	4.39684E-006
Concrete/Industrial Saws	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.13459E-006	1.13459E-006	0.00000E+000	0.00000E+000	1.13240E-006
Cranes	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.15065E-006	1.15065E-006	0.00000E+000	0.00000E+000	1.14177E-006
Dumpers/Tenders	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Excavators	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.28577E-006	1.28577E-006	0.00000E+000	0.00000E+000	8.50561E-007
Forklifts	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Generator Sets	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Paving Equipment	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.08628E-006	1.08628E-006	0.00000E+000	0.00000E+000	1.07789E-006
Pumps	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.07228E-006	1.07228E-006	0.00000E+000	0.00000E+000	1.07026E-006

Rollers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.26573E-006	1.26573E-006	0.00000E+000	0.00000E+000	1.25595E-006
Rubber Tired Dozers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	8.13650E-007	8.13650E-007	0.00000E+000	0.00000E+000	1.61473E-006
Tractors/Loaders/Backhoes	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.17476E-006	1.17476E-006	0.00000E+000	0.00000E+000	1.35997E-006
Welders	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000

Fugitive Dust Mitigation

Yes/No	Mitigation Measure	Mitigation Input		Mitigation Input		Mitigation Input	
No	Soil Stabilizer for unpaved Roads	PM10 Reduction	0.00	PM2.5 Reduction	0.00		
Yes	Replace Ground Cover of Area Disturbed	PM10 Reduction	5.00	PM2.5 Reduction	5.00		
Yes	Water Exposed Area	PM10 Reduction	55.00	PM2.5 Reduction	55.00	Frequency (per day)	2.00
No	Unpaved Road Mitigation	Moisture Content %	0.00	Vehicle Speed (mph)	15.00		
No	Clean Paved Road	% PM Reduction	9.00				

		Unmitigated		Mitigated		Percent Reduction	
Phase	Source	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Demo Haul	Fugitive Dust	0.08	0.01	0.03	0.01	0.57	0.57
Demo Haul	Roads	0.00	0.00	0.00	0.00	0.00	0.00
Demolition	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Demolition	Roads	0.01	0.00	0.01	0.00	0.00	0.00
Pipeline Construction	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Pipeline Construction	Roads	0.04	0.01	0.04	0.01	0.00	0.00
Site Preparation	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Site Preparation	Roads	0.01	0.00	0.01	0.00	0.00	0.00
Utility Trenching	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Utility Trenching	Roads	0.04	0.01	0.04	0.01	0.00	0.00
Well Construction	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Well Construction	Roads	0.04	0.01	0.04	0.01	0.00	0.00

Construction Localized Significance Thresholds: Demolition and Site Prep

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)
3	1.13	25	82

Source Receptor	Southwest Coastal LA County	Equipment	Acres/8-hr Day	Acres/Hr	Equipment Used	Number of Hrs	Acres
Distance (meters)	25	Tractors	0.5	0.0625	2	6	0.75
NOx	**96**	Graders	0.5	0.0625			0
CO	**702**	Dozers	0.5	0.0625	1	6	0.375
PM10	**5.37**	Scrapers	1	0.125			0
PM2.5	**3.25**					**Acres**	1.13

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	91	93	107	139	218
	2	131	128	139	165	233
		96	97	111	142	220
CO	1	664	785	1156	2228	7269
	2	967	1158	1597	2783	7950
		702	832	1211	2297	7354
PM10	1	5	14	28	56	140
	2	8	23	37	65	148
		5	15	29	57	141
PM2.5	1	3	5	9	21	75
	2	5	7	12	25	81
		3	5	9	22	76

Southwest Coastal LA County

1.13 Acres

	25	**50**	**100**	**200**	**500**
NOx	96	97	111	142	220
CO	702	832	1211	2297	7354
PM10	5	15	29	57	141
PM2.5	3	5	9	22	76

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
3	1	3	2
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Utility Trenching, Pipeline Construction, and Well Construction

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)
3	1.13	25	82

Source Receptor	**Southwest Coastal LA County**	**Equipment**	**Acres/8-hr Day**	**Acres/Hr**	**Equipment Used**	**Number of Hrs**	**Acres**
Distance (meters)	25	Tractors	0.5	0.0625	3	6	1.125
NOx	**96**	Graders	0.5	0.0625			0
CO	**702**	Dozers	0.5	0.0625			0
PM10	**5.37**	Scrapers	1	0.125			0
PM2.5	**3.25**					**Acres**	1.13

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	91	93	107	139	218
	2	131	128	139	165	233
		96	97	111	142	220
CO	1	664	785	1156	2228	7269
	2	967	1158	1597	2783	7950
		702	832	1211	2297	7354
PM10	1	5	14	28	56	140
	2	8	23	37	65	148
		5	15	29	57	141
PM2.5	1	3	5	9	21	75
	2	5	7	12	25	81
		3	5	9	22	76

Southwest Coastal LA County

1.13 Acres

	25	**50**	**100**	**200**	**500**
NOx	96	97	111	142	220
CO	702	832	1211	2297	7354
PM10	5	15	29	57	141
PM2.5	3	5	9	22	76

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
3	1	3	2
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Utility Trenching, Pipeline Construction, and Well Construction

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)
3	2.25	25	82

Source Receptor	Southwest Coastal LA County	Equipment	Acres/8-hr Day	Acres/Hr	Equipment Used	Number of Hrs	Acres
Distance (meters)	25	Tractors	0.5	0.0625	5	6	1.875
NOx	**137**	Graders	0.5	0.0625			0
CO	**1034**	Dozers	0.5	0.0625	1	6	0.375
PM10	**8.58**	Scrapers	1	0.125			0
PM2.5	**5.25**					**Acres**	2.25

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	2	131	128	139	165	233
	3	153	148	160	184	248
		137	133	144	170	237
CO	2	967	1158	1597	2783	7950
	3	1234	1433	1934	3228	8584
		1034	1227	1681	2894	8109
PM10	2	8	23	37	65	148
	3	10	31	45	73	156
		9	25	39	67	150
PM2.5	2	5	7	12	25	81
	3	6	8	14	28	86
		5	7	13	26	82

Southwest Coastal LA County

2.25 Acres

	25	**50**	**100**	**200**	**500**
NOx	137	133	144	170	237
CO	1034	1227	1681	2894	8109
PM10	9	25	39	67	150
PM2.5	5	7	13	26	82

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
3	2	3	3
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

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October 2, 2017

Doug McPherson
Environmental Protection Specialist
Bureau of Reclamation, Southern California Area Office
277008 Jefferson Avenue, Suite 202
Temecula, CA 92590

Subject: Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project

Dear Mr. McPherson:

The following letter report documents the results of cultural resources tasks conducted by Environmental Science Associates (ESA) in support of the Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project (Project). The City of Torrance (City) is seeking funding from the U.S. Bureau of Reclamation (BOR) for the Project. As such, BOR is the lead federal agency responsible for compliance with Section 106 of the National Historic Preservation Act of 1966 (Section 106). This letter report was prepared to assist BOR in completing cultural resources identification efforts required by Section 106 and provides the methods and results of Native American outreach and an archaeological resources survey conducted for the Project.

ESA personnel involved in the preparation of this letter report include Candace Ehringer, M.A., RPA, Principal Investigator; Michael Vader B.A., report author; and Vanessa Ortiz M.A., RPA and Henry Chodsky B.A., surveyors. Ms. Ehringer and Ms. Ortiz meet the Secretary of the Interior's (SOI) Professional Qualification Standards (PQS) for Archaeology.

Project Understanding and Location

The Project would enhance local and regional drought resiliency and water emergency preparedness within the City and neighboring jurisdictions.

The Project would construct three new groundwater wells, which can produce an average 4,500 acre-feet-year of local, drought-resilient groundwater. The three new groundwater wells (Well No. 12, 13, and 14) would be installed at three separate locations: Well No. 12 would be located within a vacant lot (APN 409-501-9901); Well No. 13 would be located within La Carretera Park (APN 409-600-3901); and Well No. 14 would be located within Descanso Park (APN 409-503-5900). A 4-mile municipal water main would be constructed to connect the wells to the City's currently-unused, existing Border Avenue water treatment and storage reservoir facility.

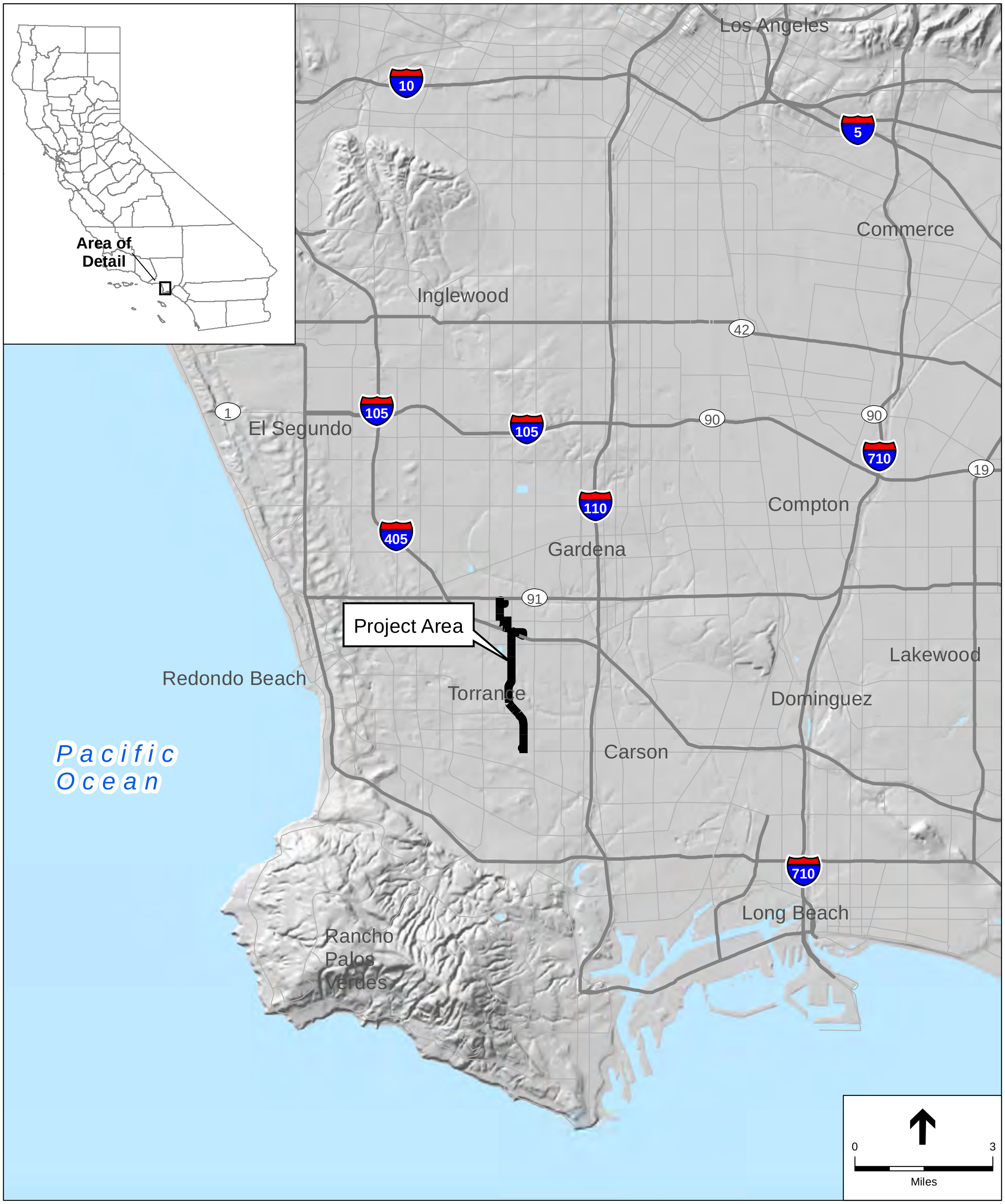
The Project is located within the City of Torrance situated in the southern portion of Los Angeles County approximately 16 miles southwest of downtown Los Angeles (**Figure 1**). Specifically, the Project is located within unsectioned portions of Township 3 and 4 South, Range 14 West on the Torrance 7.5-minute U.S. Geological Survey (USGS) topographic map (**Figure 2**). The horizontal Area of Potential Effects (APE) for the

Project includes 5.96 acres and 4 linear miles and encompasses the Project components listed below (**Figure 3**). The vertical APE would include the maximum depth of ground disturbance, which is currently unknown.

1. The three parcels in which the proposed wells would be installed (APNs 409-501-9901, 409-600-3901, and 409-503-5900);

2. The footprint of the water main, which would be constructed within the existing right-of-ways of Casimir Avenue, West 182nd Street, Purche Avenue, 185th Street, Van Ness Avenue, and Border Avenue; and

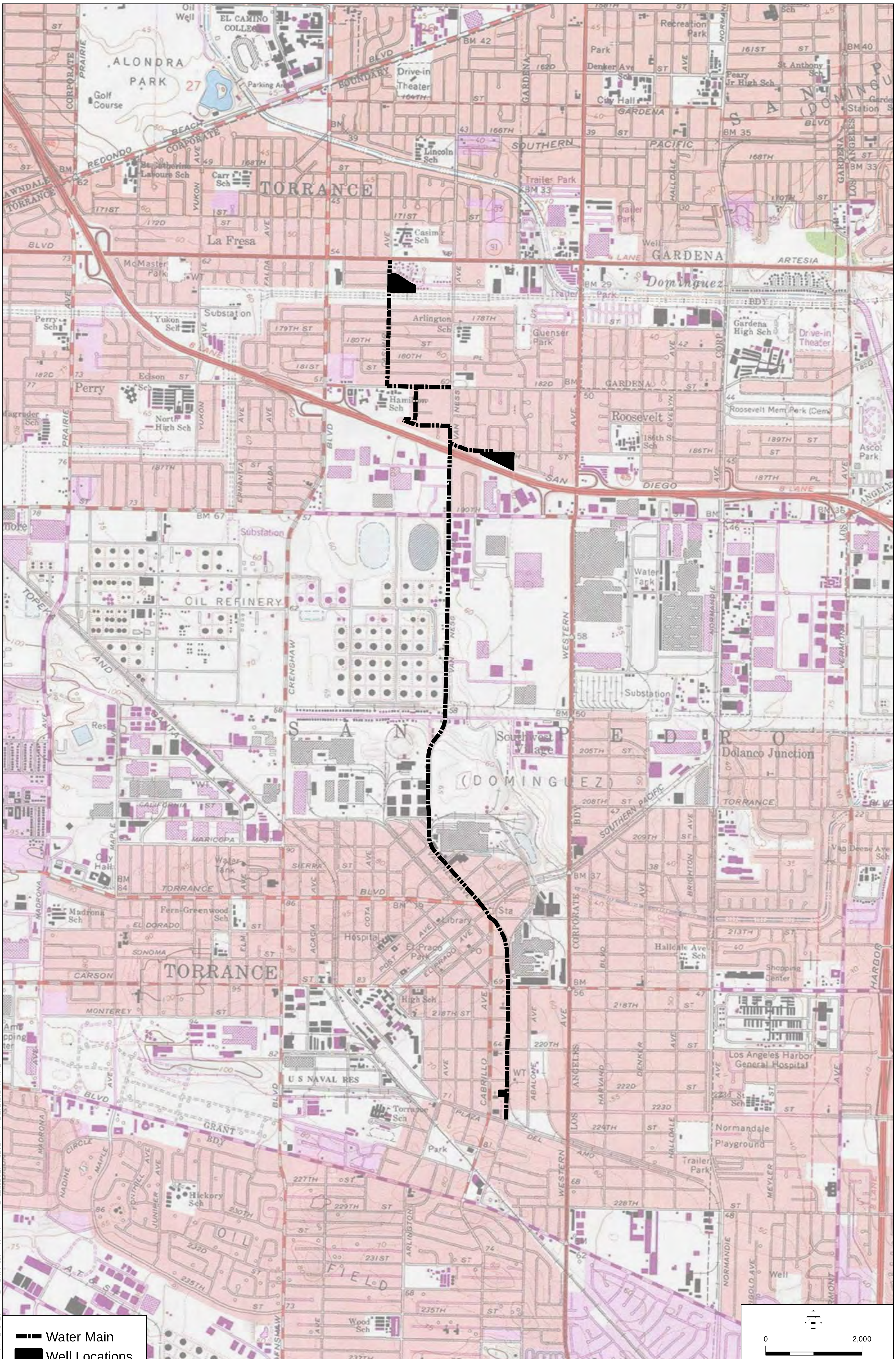
3. The Border Avenue water treatment facility located on the east side of Border Road approximately 515 north of the intersection of Border Road and West 223rd Street.



SOURCE: ESRI.

Torrance Van Ness Well Project. 170877.0

Figure 1
Project Vicinity

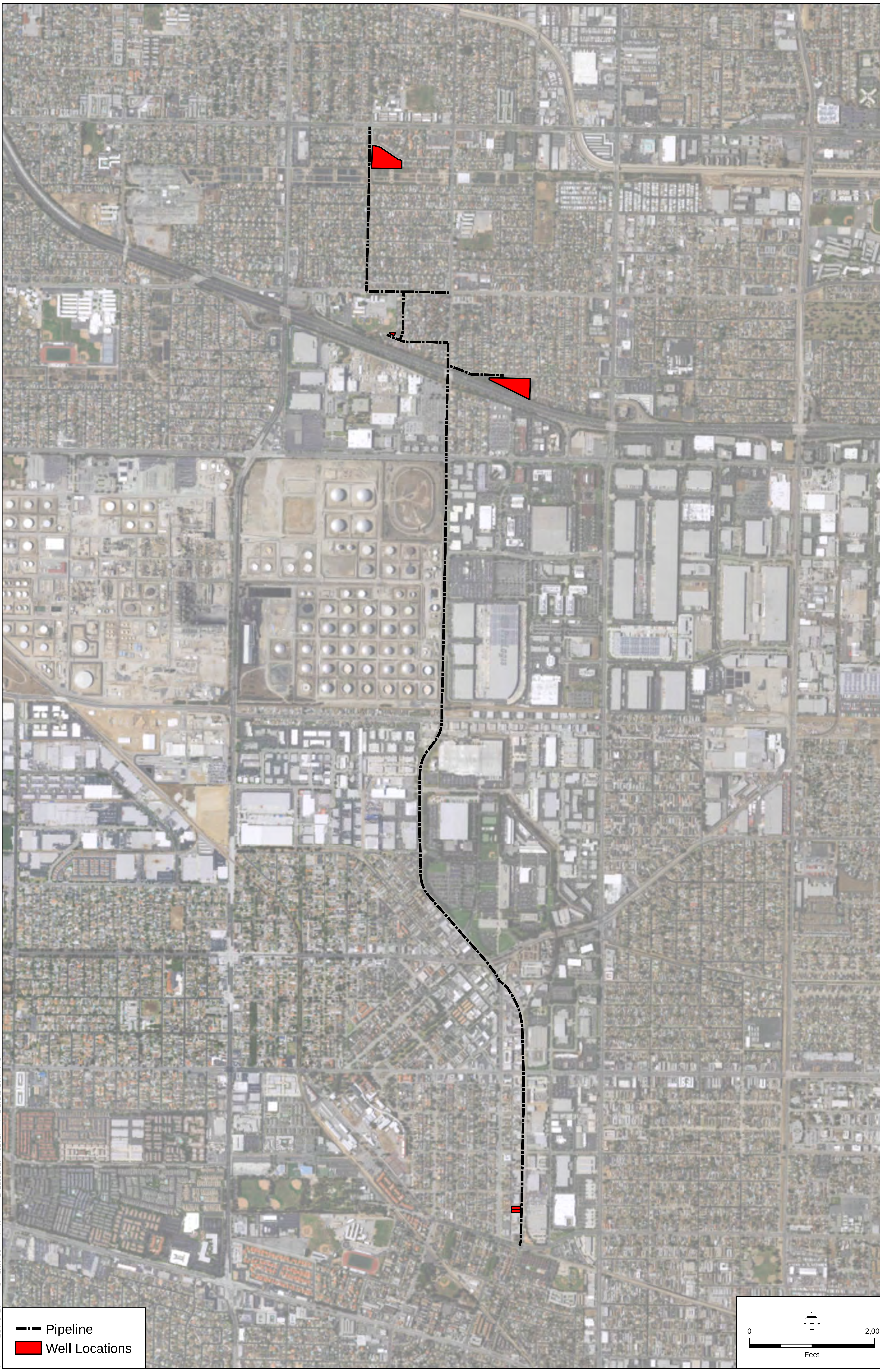


SOURCE: City of Oceanside 2016

Torrance Van Ness Well Project. 170877.00

Figure 2

Project Location



SOURCE: City of Oceanside 2016

Torrance Van Ness Well Project. 170877.00

Figure 3

Area of Potential Effects

Archival Research

A records search for the Project was conducted by staff at the California Historical Resources Inventory System (CHRIS) South Central Coastal Information Center (SCCIC) on August 10, 2017. The records search included a review of all recorded cultural resources within a ½-mile radius of the APE, as well as a review of cultural resource reports on file. The California Points of Historical Interest (PHI), the California Historical Landmarks (SHL), the California Register of Historical Resources (CRHR), the National Register of Historic Places (NRHP), the California State Historic Properties Directory (HPD), and the City of Los Angeles Historic-Cultural Monuments (LAHCM) listings were also reviewed. The SCCIC records search indicates that no archaeological resources have been previously recorded within the APE or the ½-mile records search radius, and that the APE has not been previously surveyed for archaeological resources (Galaz, 2017).

Native American Outreach

The California Native American Heritage Commission (NAHC) maintains a confidential Sacred Lands File (SLF) that contains sites of traditional, cultural, or religious value to the Native American community. The NAHC was contacted on September 11, 2017 to request a search of the SLF. The NAHC responded to the request in a letter dated September 14, 2017. The results of the SLF search indicate that Native American cultural resources are not known to be located within or in the vicinity of the APE. The NAHC also provided a list of Native American groups and individuals who are culturally and traditionally affiliated with the region in which the APE is located.

Outreach letters were sent via certified mail on September 18, 2017 to the Native American groups and individual identified by the NAHC as being affiliated with the APE. The letters described the Project and included a map depicting the location of the APE. Recipients were requested to reply with any information concerning Native American cultural resources that might be affected by the Project. **Table 3** provides a summary of ESA's outreach efforts. To date, one response has been received from Andrew Salas, Chairperson of the Gabrieleno Band of Mission Indians –Kizh Nation. In a letter dated September 21, 2017, Chairperson Salas stated that the Project is located within a sensitive area and requested consultation regarding the Project. All correspondence conducted as part of the Native American outreach is included in **Appendix A**.

TABLE 3

NATIVE AMERICAN OUTREACH SUMMARY

Contact	Tribe/Organization	Date Letter Mailed	Response
Andrew Salas, Chairperson	Gabrieleno Band of Mission Indians - Kizh Nation	9/18/2017	Requested consultation on 9/21/2017
Anthony Morales, Chairperson	Gabrieleno/Tongva San Gabriel Band of Mission Indians	9/18/2017	No response to date
Sandonne Goad, Chairperson	Gabrielino/Tongva Nation	9/18/2017	No response to date
Robert Dorame, Chairperson	Gabrielino Tongva Indians of California Tribal Council	9/18/2017	No response to date
Charles Alvarez	Gabrielino-Tongva Tribe	9/18/2017	No response to date

Archaeological Resources Survey

An archaeological resources survey of the APE was conducted by ESA archaeologists Vanessa Ortiz, M.A., RPA, and Henry Chodsky, B.A., on September 12, 2017. The three parcels where the proposed wells would be installed were subject to a systematic pedestrian survey with transects intervals spaced no greater than 10 meters (approx. 33 feet) apart. Because the water main and water treatment facility portions of the APE are paved with no visible ground surfaces, they were subject to a reconnaissance-level windshield survey and any unpaved ground surfaces were inspected for the presence of archaeological resources.

The parcel where Well No. 12 (APN 409-501-9901) would be installed consists of a vacant lot with 100 percent ground surface visibility (**Figure 4**). The entire lot was surveyed using transects spaced at 2 meter intervals. No archaeological resources were encountered during survey of this parcel.

The parcel where Well No. 13 (APN 409-600-3901) would be installed consists of La Carretera Park. The park is largely composed of manicured grass lawns, which were surveyed using transects spaced at 5-10 meter intervals. The ground surface was obscured by the grass resulting in approximately 30 percent ground surface visibility (Figure 4). A basketball court and playground are located within the south-central portion of the park and were not subject to survey due to lack of ground surface visibility. No archaeological resources were encountered during survey of this parcel.

The parcel where Well No. 14 (APN 409-503-5900) would be installed consists of Descanso Park. The park is composed primarily of manicured grass lawns, which were surveyed using transects spaced at 5-10 meter intervals. The lawns had 7-inch tall grasses which reduced ground surface visibility to 10 percent (**Figure 5**). A playground is located within the eastern portion of the park and was not surveyed due to lack of ground surface visibility. No archaeological resources were encountered during survey of this parcel.

The water main portion of the APE is located within paved street right-of-ways and was subject to a reconnaissance-level survey and no unpaved ground surfaces were identified (Figure 4). Similarly, the Border Avenue water treatment facility was entirely paved and no unpaved surfaces were identified. No archaeological resources were encountered during survey of these Project components.


Overview of vacant lot (view to west)


Overview of La Carretera Park (view to NW)

SOURCE: ESA, 2017

Figure 4
Survey Photos

Overview of Descanso Park (view to SE)

Overview of water main alignment on Van Ness Ave (view to SW)

SOURCE: ESA, 2017

Figure 5
Survey Photos

Summary

No archaeological resources were identified as a result of the survey carried out for the Project. To date, one Native American representative (Chairperson Salas of the Gabrieleno Band of Mission Indians – Kizh Nation) has responded indicating that the Project is in a sensitive area and requesting consultation.

If you have any questions concerning the results of this letter report, please do not hesitate to contact me via email cehringer@esassoc.com, or via phone at 831-737-7438.

Sincerely,

Candace Ehringer

Candace Ehringer, M.A., RPA
Senior Cultural Resources Specialist

References

Galaz, Michelle
2017 Records Search Results for the Van Ness Ave Well Field Project. Prepared for the City of Torrance by the South Central Coastal Information Center.

Appendix A Native American Outreach

ESA

550 West C Street
Suite 750
San Diego, CA 92101
619.719.4200 phone
619.719.4201 fax

www.esassoc.com

September 11, 2017

Native American Heritage Commission
1550 Harbor Boulevard, Suite 100
West Sacramento, CA 95691
FAX- 916-373-5471

Subject: **SLF search request for the Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project (D170877.00)**

To whom it may concern:

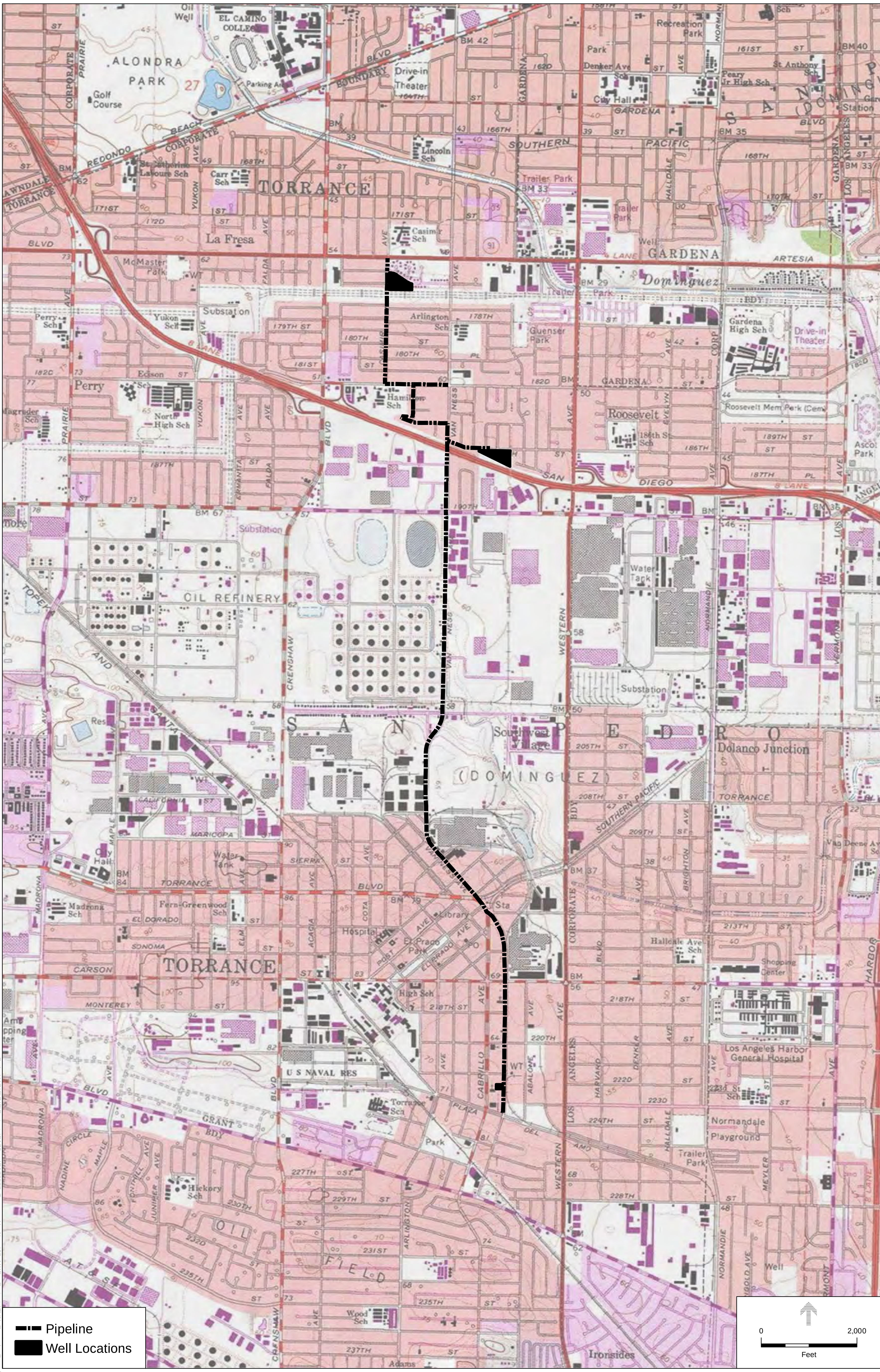
ESA has been retained by the U.S. Bureau of Reclamation (BOR) to conduct an archaeological resources survey and Native American outreach for the Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project (Project). The City of Torrance (City) is seeking funding from the BOR in support of the Project, which would enhance local and regional drought resiliency and water emergency preparedness by constructing new groundwater wells, which can produce an average 4,500 acre-feet-year of local, drought-resilient groundwater, to serve the City of Torrance (City) and neighboring jurisdictions. The Project would include construction of three new groundwater wells (Well No. 12, 13, and 14) at three separate locations: Well No. 12 would be located within a vacant lot; Well No. 13 would be located within La Carretera Park; and Well No. 14 would be located within Descanso Park. A 4-mile municipal water main would be constructed to connect the wells to the City's currently-unused, existing Border Avenue water treatment and storage reservoir facility. The enclosed map shows the Project area located within unsectioned portions of Township 3 and 4 South, Range 14 West, on the Torrance USGS 7.5-minute topographic quadrangle.

In an effort to provide an adequate appraisal of all potential impacts that may result from the Project, ESA is requesting that a Sacred Lands File search be conducted for sacred lands or traditional cultural properties that may exist within the Project area.

Thank you for your time and cooperation regarding this matter. To expedite the delivery of search results, please e-mail them to mvader@esassoc.com, or fax them to 619.719.4201. Please contact me at 619.241.9238 or e-mail me at mvader@esassoc.com if you have any questions.

Sincerely,

Michael Vader
Cultural Resources



SOURCE: City of Oceanside 2016

Torrance Van Ness Well and Pipeline Project. P170877.00

Figure 1

Records Search Map

STATE OF CALIFORNIA Edmund G. Brown, Jr., *Governor*

NATIVE AMERICAN HERITAGE COMMISSION
Environmental and Cultural Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710

September 14, 2017

Michael Vader
ES Associates

Sent by E-mail: mvader@esa.com

RE: Proposed Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency (D170877.00) Project, City of Torrance; Torrance USGS Quadrangle, Los Angeles County, California

Dear Mr. Vader:

A record search of the Native American Heritage Commission (NAHC) *Sacred Lands File* was completed for the area of potential project effect (APE) referenced above with negative results. Please note that the absence of specific site information in the *Sacred Lands File* does not indicate the absence of Native American cultural resources in any APE.

Attached is a list of tribes culturally affiliated to the project area. I suggest you contact all of the listed Tribes. If they cannot supply information, they might recommend others with specific knowledge. The list should provide a starting place to locate areas of potential adverse impact within the APE. By contacting all those on the list, your organization will be better able to respond to claims of failure to consult. If a response has not been received within two weeks of notification, the NAHC requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact via email: gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Toff

Gayle Totton, M.A., PhD.
Associate Governmental Program Analyst
(916) 373-3714

Native American Heritage Commission
Native American Contact List
Los Angeles County
9/14/2017

Gabrieleno Band of Mission Indians - Kizh Nation
Andrew Salas, Chariperson
P.O. Box 393
Covina, CA, 91723
Phone: (626) 926 - 4131
gabrielenoindians@yahoo.com
Gabrieleno

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693
San Gabriel, CA, 91778
Phone: (626) 483 - 3564
Fax: (626) 286-1262
GTTribalcouncil@aol.com
Gabrieleno

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St., #231
Los Angeles, CA, 90012
Phone: (951) 807 - 0479
sgoad@gabrielino-tongva.com
Gabrielino

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490
Bellflower, CA, 90707
Phone: (562) 761 - 6417
Fax: (562) 761-6417
gtongva@gmail.com
Gabrielino

Gabrielino-Tongva Tribe
Charles Alvarez,
23454 Vanowen Street
West Hills, CA, 91307
Phone: (310) 403 - 6048
roadkingcharles@aol.com
Gabrielino

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project, Los Angeles County.

ESA

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September 15, 2017

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693
San Gabriel, CA 91778

Subject: Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project

Dear Mr. Morales:

ESA has been retained by the U.S. Bureau of Reclamation (BOR) to conduct an archaeological resources survey and Native American outreach for the Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project (Project). The City of Torrance (City) is seeking funding from the BOR in support of the Project, which would enhance local and regional drought resiliency and water emergency preparedness by constructing new groundwater wells. The Project would include construction of three new groundwater wells (Well No. 12, 13, and 14) at three separate locations: Well No. 12 would be located within a vacant lot; Well No. 13 would be located within La Carretera Park; and Well No. 14 would be located within Descanso Park. A 4-mile municipal water main would be constructed to connect the wells to the City's currently-unused, existing Border Avenue water treatment and storage reservoir facility. Because the Project is seeking BOR funding, it must comply with Section 106 of the National Historic Preservation Act of 1966 (Section 106). The enclosed map shows the Project area located within unsectioned portions of Township 3 and 4 South, Range 14 West, on the Torrance USGS 7.5-minute topographic quadrangle.

A records search for the Project was conducted at the South Central Coastal Information Center (SCCIC). The records search did not identify archaeological resources within the Project area or 0.5-mile radius. On September 12, 2017 ESA archaeologists conducted an archaeological resources survey of the entire Project area. No archaeological resources were identified as a result of the survey.

The NAHC has identified you as being culturally affiliated with the Project area, and as someone who may have knowledge of resources in the area or an interest in the Project. We are writing to request your input on resources that may be within the Project and to solicit any concerns you may have.

Thank you for your cooperation on this matter. If you have any questions or comments, please contact Michael Vader by phone at 619. 719.4195 or by email at mvader@esassoc.com.

Sincerely,

Michael Vader, ESA Cultural Resources

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Los Angeles, CA 90017
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213.599.4301 fax

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September 15, 2017

Gabrieleno Band of Mission Indians – Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393
Covina, CA 91723

Subject: Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project

Dear Mr. Salas:

ESA has been retained by the U.S. Bureau of Reclamation (BOR) to conduct an archaeological resources survey and Native American outreach for the Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project (Project). The City of Torrance (City) is seeking funding from the BOR in support of the Project, which would enhance local and regional drought resiliency and water emergency preparedness by constructing new groundwater wells. The Project would include construction of three new groundwater wells (Well No. 12, 13, and 14) at three separate locations: Well No. 12 would be located within a vacant lot; Well No. 13 would be located within La Carretera Park; and Well No. 14 would be located within Descanso Park. A 4-mile municipal water main would be constructed to connect the wells to the City's currently-unused, existing Border Avenue water treatment and storage reservoir facility. Because the Project is seeking BOR funding, it must comply with Section 106 of the National Historic Preservation Act of 1966 (Section 106). The enclosed map shows the Project area located within unsectioned portions of Township 3 and 4 South, Range 14 West, on the Torrance USGS 7.5-minute topographic quadrangle.

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Sincerely,

Michael Vader, ESA Cultural Resources

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September 15, 2017

Gabrielino-Tongva Tribe
Charles Alvarez
23454 Vanowen Street
West Hills, CA 91307

Subject: Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project

Dear Mr. Alvarez:

ESA has been retained by the U.S. Bureau of Reclamation (BOR) to conduct an archaeological resources survey and Native American outreach for the Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project (Project). The City of Torrance (City) is seeking funding from the BOR in support of the Project, which would enhance local and regional drought resiliency and water emergency preparedness by constructing new groundwater wells. The Project would include construction of three new groundwater wells (Well No. 12, 13, and 14) at three separate locations: Well No. 12 would be located within a vacant lot; Well No. 13 would be located within La Carretera Park; and Well No. 14 would be located within Descanso Park. A 4-mile municipal water main would be constructed to connect the wells to the City's currently-unused, existing Border Avenue water treatment and storage reservoir facility. Because the Project is seeking BOR funding, it must comply with Section 106 of the National Historic Preservation Act of 1966 (Section 106). The enclosed map shows the Project area located within unsectioned portions of Township 3 and 4 South, Range 14 West, on the Torrance USGS 7.5-minute topographic quadrangle.

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Sincerely,

Michael Vader, ESA Cultural Resources

ESA

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Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

www.esassoc.com

September 15, 2017

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490
Bellflower, CA 90707

Subject: Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project

Dear Mr. Dorame:

ESA has been retained by the U.S. Bureau of Reclamation (BOR) to conduct an archaeological resources survey and Native American outreach for the Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project (Project). The City of Torrance (City) is seeking funding from the BOR in support of the Project, which would enhance local and regional drought resiliency and water emergency preparedness by constructing new groundwater wells. The Project would include construction of three new groundwater wells (Well No. 12, 13, and 14) at three separate locations: Well No. 12 would be located within a vacant lot; Well No. 13 would be located within La Carretera Park; and Well No. 14 would be located within Descanso Park. A 4-mile municipal water main would be constructed to connect the wells to the City's currently-unused, existing Border Avenue water treatment and storage reservoir facility. Because the Project is seeking BOR funding, it must comply with Section 106 of the National Historic Preservation Act of 1966 (Section 106). The enclosed map shows the Project area located within unsectioned portions of Township 3 and 4 South, Range 14 West, on the Torrance USGS 7.5-minute topographic quadrangle.

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Sincerely,

Michael Vader, ESA Cultural Resources

ESA

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September 15, 2017

Gabrieleno/Tongva Nation
Sandonne Goad, Chairperson
106 ½ Judge John Aiso Street #231
Los Angeles, CA 90012

Subject: Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project

Dear Ms. Goad:

ESA has been retained by the U.S. Bureau of Reclamation (BOR) to conduct an archaeological resources survey and Native American outreach for the Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project (Project). The City of Torrance (City) is seeking funding from the BOR in support of the Project, which would enhance local and regional drought resiliency and water emergency preparedness by constructing new groundwater wells. The Project would include construction of three new groundwater wells (Well No. 12, 13, and 14) at three separate locations: Well No. 12 would be located within a vacant lot; Well No. 13 would be located within La Carretera Park; and Well No. 14 would be located within Descanso Park. A 4-mile municipal water main would be constructed to connect the wells to the City's currently-unused, existing Border Avenue water treatment and storage reservoir facility. Because the Project is seeking BOR funding, it must comply with Section 106 of the National Historic Preservation Act of 1966 (Section 106). The enclosed map shows the Project area located within unsectioned portions of Township 3 and 4 South, Range 14 West, on the Torrance USGS 7.5-minute topographic quadrangle.

A records search for the Project was conducted at the South Central Coastal Information Center (SCCIC). The records search did not identify archaeological resources within the Project area or 0.5-mile radius. On September 12, 2017 ESA archaeologists conducted an archaeological resources survey of the entire Project area. No archaeological resources were identified as a result of the survey.

The NAHC has identified you as being culturally affiliated with the Project area, and as someone who may have knowledge of resources in the area or an interest in the Project. We are writing to request your input on resources that may be within the Project and to solicit any concerns you may have.

Thank you for your cooperation on this matter. If you have any questions or comments, please contact Michael Vader by phone at 619. 719.4195 or by email at mvader@esassoc.com.

Sincerely,

Michael Vader, ESA Cultural Resources

Los Angeles
626 Wilshire Blvd
Suite 1100
Los Angeles, CA 90017

Re: Section 106 Torrance Van Ness Well Field for Water Sufficiency and Drought Resiliency Project

Dear Michael Vader,

Please find this letter as a written request for consultation regarding the City of Torrance Project in Los Angeles County. Your project lies within our ancestral tribal territory, meaning descending from, a higher degree of kinship than traditional or cultural affiliation. Your project is located within a sensitive area and may cause a substantial adverse change in the significance of our tribal cultural resources. Most often, a records search for our tribal cultural resources will result in a “no records found” for the project area. The Native American Heritage Commission, ethnographers, historians, and professional archaeologists can only provide limited information that has been previously documented about California Native Tribes. This is the reason the Native American Heritage Commission (NAHC) will always refer the lead agency to the respective Native American Tribe of the area because the NAHC is only aware of general information and are not the experts on each California Tribe. Our Elder Committee & tribal historians are the experts for our Tribe and are able to provide a more complete history (both written and oral) regarding the location of historic villages, trade routes, cemeteries and sacred/religious sites in the project area. Therefore, to avoid adverse effects to our potential tribal cultural resources on your project site, at the consultation, we will be providing information pertaining to the significance of tribal cultural resources and the significance of the project’s impacts to these resources. We will provide a variety of resources including, but not limited to; ethnography notes, maps, and oral history. We will also be prepared to discuss mitigation measures we feel are appropriate to protect our tribal cultural resources from substantial adverse change to their significance.

Consultation appointments are available during standard business hours on Wednesdays and Thursdays at our offices at 901 N. Citrus Ave. Covina, CA 91722 or over the phone. Please call toll free 1-844-390-0787 or email gabrielenoindians@yahoo.com to schedule an appointment.

With Respect,

Andrew Salas, Chairman

South Central Coastal Information Center
California State University, Fullerton
Department of Anthropology MH-426
800 North State College Boulevard
Fullerton, CA 92834-6846
657.278.5395 / FAX 657.278.5542
sccic@fullerton.edu
California Historical Resources Information System
Orange, Los Angeles, and Ventura Counties

8/10/2017 SCCIC File #: 17945.4022

Danny Santana
City of Torrance
3031 Torrance Blvd
Torrance, CA 90503

Re: Records Search Results for the Van Ness Ave Well Field Project (Case No. EAS17-00001)

The South Central Coastal Information Center received your records search request for the project area referenced above, located on the Inglewood and Torrance, CA USGS 7.5’ quadrangles. The following summary reflects the results of the records search for the project area and a ½-mile radius. The search includes a review of all recorded archaeological and built-environment resources as well as a review of cultural resource reports on file. In addition, the California Points of Historical Interest (SPHI), the California Historical Landmarks (SHL), the California Register of Historical Resources (CAL REG), the National Register of Historic Places (NRHP), the California State Historic Properties Directory (HPD), and the City of Los Angeles Historic-Cultural Monuments (LAHCM) listings were reviewed for the above referenced project site. Due to the sensitive nature of cultural resources, archaeological site locations are not released.

RECORDS SEARCH RESULTS SUMMARY

Archaeological Resources	Within project area: 0 Within project radius: 0
Built-Environment Resources	Within project area: 0 Within project radius: 3
Reports and Studies	Within project area: 4 Within project radius: 26
OHP Historic Properties Directory (HPD)	Within project area: 4 Within project radius: 107
California Points of Historical Interest (SPHI)	Within project area: 0 Within project radius: 0
California Historical Landmarks (SHL)	Within project area: 0 Within project radius: 0
California Register of Historical Resources (CAL REG)	Within project area: 0 Within project radius: 8

National Register of Historic Places (NRHP)	Within project area: 0 Within project radius: 12
City of Los Angeles Historic-Cultural Monuments (LAHCM)	Within project area: 0 Within project radius: 0

HISTORIC MAP REVIEW – The Redondo, CA (1896, 1944) 1:62,500 scale historic maps indicated that in 1896, there were several improved roads throughout the ½-mile radius. Portions of some of these roads fell within the project area. Approximately five buildings and two intermittent streams were also present within the search radius. In 1944, the area was highly developed with many improved roads and buildings present. These included two schools, Oil Tanks, the Columbia Steel Corporation Building, and the Pacific Electric Car Shops. The Atchison Topeka & Santa Fe Railroad as well as the Pacific Electric Railroad both ran through the ½-mile radius. Additionally, one unmarked railroad could be seen running through the project area. There was a transmission line that ran through the north portion of the project area as well. One of the streams mentioned above was channelized and named the Dominguez Channel.

RECOMMENDATIONS

There are 4 reports that fall within the boundaries of the project activities, yet, none of these reports were for cultural resources surveys. Consequently, the archaeological sensitivity of the project area remains unknown. The recommendation for this project area has 4 parts:
(1) Most, if not all, of the natural ground surface within the project area is obscured by urban development. Therefore, it is recommended that a qualified consultant be retained to monitor ground-disturbing activities on all city property that does not fall within the existing streets right-of-way. In the event that cultural resources are observed, all work within the vicinity of the find should be diverted until the archaeologist can assess and record the find and make recommendations.
(2) A halt-work condition should be in place for all project activities within the existing streets right-of-way. In the event that any evidence of cultural resources is discovered, all work within the vicinity of the find should stop until a qualified archaeological consultant can be brought in to assess the find and make recommendations. Excavation of potential cultural resources should not be attempted by project personnel.
(3) Refer to the enclosed pages from the OHP Historic Properties Directory to see which high-lighted resources may be within or adjacent to the project area. Project areas that contain or are adjacent to these recorded resources may be potentially sensitive for buried resources.
(4) It is also recommended that the Native American Heritage Commission should be consulted to identify if any additional traditional cultural properties or other sacred sites are known to be in the area.

For your convenience, you may find a professional consultant* at www.chrisinfo.org. Any resulting reports by the qualified consultant should be submitted to the South Central Coastal Information Center as soon as possible.
*The SCCIC does not endorse any particular consultant and makes no claims about the qualifications of any person listed. Each consultant on this list self-reports that they meet current professional standards.

If you have any questions regarding the results presented herein, please contact the office at 657.278.5395 Monday through Thursday 9:00 am to 3:30 pm. Should you require any additional information for the above referenced project, reference the SCCIC number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Thank you for using the California Historical Resources Information System,

Michelle Galaz
Assistant Coordinator

Enclosures:

(X) Invoice #17945.4022

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the California Historical Resources Information System (CHRIS) Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

The California Office of Historic Preservation (OHP) contracts with the California Historical Resources Information System's (CHRIS) regional Information Centers (ICs) to maintain information in the CHRIS inventory and make it available to local, state, and federal agencies, cultural resource professionals, Native American tribes, researchers, and the public. Recommendations made by IC coordinators or their staff regarding the interpretation and application of this information are advisory only. Such recommendations do not necessarily represent the evaluation or opinion of the State Historic Preservation Officer in carrying out the OHP's regulatory authority under federal and state law.

Kizh Gabrieleno Band of Mission Indians

Re: Archaeological and Tribal Cultural Resources Mitigation Measures within Kizh Gabrieleño Tribal Territory.

***Note:**, In order to avoid non-compliance issues with The Native American Graves Protection and Repatriation Act (NAGPRA), Pub. L. 101-601, 25 U.S.C. 3001 et seq., 104 Stat. 3048, CEQA Guidelines Section15064.5, PRC 5097.98 (d)(1), and United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), all Native American Monitoring shall only be conducted by a documented lineal descendant from the Tribe of the project area. The Gabrieleño Band of Mission Indians Kizh -Nation ONLY replies to projects within their ANCESTRAL territory, meaning they are the direct lineal descendants of your project area. Therefore, to help all lead agencies protect and preserve our irreplaceable and last remaining Tribal Cultural Resources within the soils of our ancestral tribal territory, monitoring activities shall be conducted by a lineal descendant approved by the Gabrieleño Band of Mission Indians Kizh -Nation because the ancestral Tribe will be the only Tribe to possess Oral History and documented information pertaining to village areas, commerce areas, recreation areas, and burial locations that need to be protected and preserved during any ground disturbing activities.*

Retain a Native American Monitor: The project Applicant will be required to retain the services of a tribal monitor approved by the Gabrieleño Band of Mission Indians-Kizh Nation and will be present on-site during the construction phases that involve any ground disturbing activities to a depth of 15 feet, provided that if certain soil conditions are discovered, a farther depth may be required. Ground disturbance is defined by the Gabrieleño Band of Mission Indians-Kizh Nation as activities that include, but are not limited to, pavement removal, pot-holing or auguring, grubbing, weed abatement, boring, grading, excavation, drilling, and trenching, within the project area. The Tribal Monitor will complete monitoring logs on a daily basis that will provide descriptions of the daily activities, including construction activities, locations, soil, and any cultural materials identified. The on-site monitoring shall end when the project site grading and excavation activities are completed, or when the Tribal Representatives and monitor have indicated that the site has a low potential for archeological resources.

Unanticipated Discovery of Tribal Cultural and Archaeological Resources: Upon discovery of any archaeological resources, cease construction activities in the immediate vicinity of the find until the find can be assessed. All archaeological resources unearthed by project construction activities shall be evaluated by the qualified archaeologist and tribal monitor approved by the Gabrieleño Band of Mission Indians-Kizh Nation. If the resources are Native American in origin, the Gabrieleño Band of Mission Indians-Kizh Nation shall coordinate with the landowner regarding treatment and curation of these resources. Typically, the Tribe will request reburial or preservation for educational purposes. Work may continue on other parts of the project while evaluation and, if necessary, mitigation takes place (CEQA Guidelines Section15064.5 [f]). If a resource is determined by the qualified archaeologist to constitute a "historical resource" or "unique archaeological resource", time allotment and funding sufficient to allow for implementation of avoidance measures, or appropriate mitigation, must be available. The treatment plan established for the resources shall be in accordance with CEQA Guidelines Section 15064.5(f) for historical resources and Public Resources Code Sections 21083.2(b) for unique archaeological resources. Preservation in place (i.e., avoidance) is the preferred manner of treatment. If preservation in place is not feasible, treatment may include implementation of archaeological data recovery excavations to remove the resource along with subsequent laboratory processing and analysis. Any historic archaeological material that is not Native American in origin shall be curated at a public, non-profit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County or the Fowler Museum, if such an institution agrees to accept the material. If no institution accepts the archaeological material, they shall be offered to a local school or historical society in the area for educational purposes.

Gabrieleño Band of Mission Indians
Kizh Nation

Unanticipated Discovery of Human Remains and Associated Funerary Objects:
Native American human remains are defined in PRC 5097.98 (d)(1) as an inhumation or cremation, and in any state of decomposition or skeletal completeness. Funerary objects, called associated grave goods in PRC 5097.98, are also to be treated according to this statute. Health and Safety Code 7050.5 dictates that any discoveries of human skeletal material shall be immediately reported to the County Coroner and excavation halted until the coroner has determined the nature of the remains. If the coroner recognizes the human remains to be those of a Native American or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the Native American Heritage Commission (NAHC) and PRC 5097.98 shall be followed.

Resource Assessment & Continuation of Work Protocol:
Upon discovery, the tribal and/or archaeological monitor will immediately divert work at minimum of 50 feet and place an exclusion zone around the burial. The monitor(s) will then notify the Tribe, the qualified lead archaeologist, and the construction manager who will call the coroner. Work will continue to be diverted while the coroner determines whether the remains are Native American. The discovery is to be kept confidential and secure to prevent any further disturbance. If the finds are determined to be Native American, the coroner will notify the NAHC as mandated by state law who will then appoint a Most Likely Descendent (MLD).

Kizh-Gabrieleno Procedures for burials and funerary remains:
If the Gabrieleno Band of Mission Indians – Kizh Nation is designated MLD, the following treatment measures shall be implemented. To the Tribe, the term "human remains" encompasses more than human bones. In ancient as well as historic times, Tribal Traditions included, but were not limited to, the burial of funerary objects with the deceased, and the ceremonial burning of human remains. These remains are to be treated in the same manner as bone fragments that remain intact. Associated funerary objects are objects that, as part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later; other items made exclusively for burial purposes or to contain human remains can also be considered as associated funerary objects.

Treatment Measures:
Prior to the continuation of ground disturbing activities, the land owner shall arrange a designated site location within the footprint of the project for the respectful reburial of the human remains and/or ceremonial objects. In the case where discovered human remains cannot be fully documented and recovered on the same day, the remains will be covered with muslin cloth and a steel plate that can be moved by heavy equipment placed over the excavation opening to protect the remains. If this type of steel plate is not available, a 24-hour guard should be posted outside of working hours. The Tribe will make every effort to recommend diverting the project and keeping the remains in situ and protected. If the project cannot be diverted, it may be determined that burials will be removed. The Tribe will work closely with the qualified archaeologist to ensure that the excavation is treated carefully, ethically and respectfully. If data recovery is approved by the Tribe, documentation shall be taken which includes at a minimum detailed descriptive notes and sketches. Additional types of documentation shall be approved by the Tribe for data recovery purposes. Cremations will either be removed in bulk or by means as necessary to ensure completely recovery of all material. If the discovery of human remains includes four or more burials, the location is considered a cemetery and a separate treatment plan shall be created. Once complete, a final report of all activities is to be submitted to the Tribe and the NAHC. The Tribe does NOT authorize any scientific study or the utilization of any invasive diagnostics on human remains.

Each occurrence of human remains and associated funerary objects will be stored using opaque cloth bags. All human remains, funerary objects, sacred objects and objects of cultural patrimony will be removed to a secure container on site if possible. If not, such items will be stored at a mutually agreeable off-site location that provides appropriate security. These items should be retained and reburied within six months of recovery. The site of reburial/repatriation shall be on the project site but at a location agreed upon between the Tribe and the landowner at a site to be protected in perpetuity. There shall be no publicity regarding any cultural materials recovered.

Professional Standards: Archaeological and Native American monitoring and excavation during construction projects will be consistent with current professional standards. All feasible care to avoid any unnecessary disturbance, physical modification, or separation of human remains and associated funerary objects shall be taken. Principal personnel must meet the Secretary of Interior standards for archaeology and have a minimum of 10 years of experience as a principal investigator working with Native American archaeological sites in southern California. The Qualified Archaeologist shall ensure that all other personnel are appropriately trained and qualified.