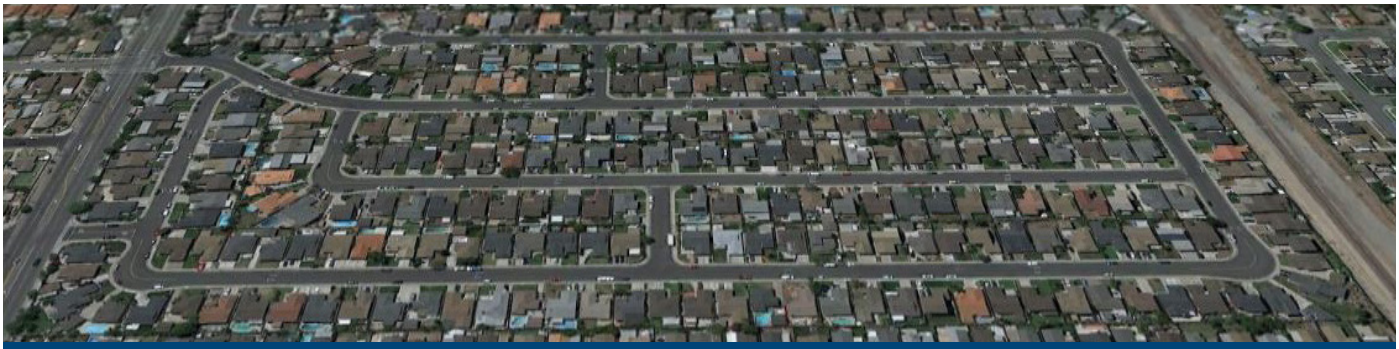
Volume I of II

DRAFT ENVIRONMENTAL IMPACT REPORT



Former Kast Property Tank Farm Site Remedial Action Plan

Carson, California

State Clearinghouse No. 2014031053

(Draft EIR to Appendix B)

Prepared for the California Regional Water Quality Control Board, Los Angeles Region by PCR Services Corporation

November 2014

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LIST OF ACRONYMS

AB	Assembly Bill
ADT	Average Daily Trip
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AHM	Acutely Hazardous Materials
AMP	Air Monitoring Plan
AMS	American Meteorological Society
amsl	above mean sea level
ANSI	American National Standard Institute
AQMP	Air Quality Management Plan
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Above Ground Storage Tank
ASTDR	Agency for Toxic Substances and Disease Registry
ASTM	American Society for Testing and Materials
ATCM	Airborne Toxic Control Measure
bgs	Below Ground Surface
BHRA	Baseline Health Risk Assessments
BMP	Best Management Practice
BAU	Business as Usual
C&D	Construction and Demolition
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CALGreen Code	California Green Building Standards Code
Cal-OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CAM	California Assessment Manual
CAPNA	California Polynuclear Aromatic Hydrocarbons
CARB	California Air Resources Board
CBC	California Building Code
CBSC	California Building Standards Commission
CCAA	California Clean Air Act
CCAT	California Climate Action Team
CCPS	Center for Chemical Process Safety
CCR	California Code of Regulations
CEC	California Energy Commission
Cal Water	California Water Service Company
CEM	Conceptual Exposure Model
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
CH_4	Methane

List of Acronyms (Continued)

CLSM	Controlled low strength material
CMA	Congestion Management Agency
CMP	Congestion Management Plan
CNRA	California Natural Resources Agency
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COC	Constituents of Concern
COPC	Chemicals of Potential Concern
CPF	Cancer potency factor
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
CY	cubic yards
DAMP	Drainage Area Management Plan
dB	Decibel
dBA	A-weighted decibel
DOSH	Division of Occupational Safety and Health
DPF	Diesel Particulate Filter
DPM	Diesel Particulate Matter
DTSC	Department of Toxic Substances Control
EDGAR	European Commission's Emissions Database for Global Atmospheric Research
EIR	Environmental Impact Report
EMSOFT	Exposure Model for Soil-Organic Fate and Transport
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
ESLs	Environmental Screening Levels
FHWA	Federal Highway Administration
FS	Feasibility Study
FTA	Federal Transit Administration
FY	Fiscal Year
GAC	Granular Activated Carbon
GAMAQI	Guideline for Assessing and Mitigating Air Quality Impacts
GHG	Greenhouse Gas
GWP	Global Warming Potential
HARP	Hotspots Analysis and Reporting Program
HASP	Health and Safety Plan
HCM	Highway Capacity Manual
HEAST	Health Effects Assessment Summary Table
HRA	Health Risk Assessment
HHRA	Human Health Risk Assessment
HSC	Health and Safety Code
HWCL	Hazardous Waste Control Law
ICU	Intersection Capacity Utilization
IIPP	Injury and Illness Prevention Program
ILCR	Incremental Lifetime Cancer Risk
IPCC	Intergovernmental Panel on Climate Change
IRIS	Integrated Risk Information System

List of Acronyms (Continued)

ISCST	Industrial Source Complex Short Term
ITE	Institute of Transportation Engineer
L/kg body weight/day	Liters Per Kilogram of Body Weight Per Day
LCFS	Low Carbon Fuel Standard
L_{eq}	Equivalent Sound Level
LID	Low Impact Development
LOS	Level of Service
L_{max}	Maximum Noise Level
LNAPL	Light non-aqueous phase liquid
LST	Localized Significance Threshold
MATES	Multiple Air Toxics Exposure Study
MCL	Maximum Contaminant Level
MEI	Maximum Exposed Individual
MEIR	Maximally Exposed Individual Residential Receptor
MEP	Maximum Extent Practicable
$\mu g/m^3$	Micrograms per Cubic Meter
µg/dL	Micrograms per Deciliter
µg/L	Micrograms per Liter
MMRP	Mitigation Monitoring and Reporting Program
MMT	Million Metric Tons
$MMTCO_2e$	Million Metric Tons Carbon Dioxide Equivalent
MM/YR	Millimeters/Year
MNA	Monitored natural attenuation
MPH	Miles per Hour
MPO	Metropolitan Planning Organization
MRF	Material Recovery Facility
MS4	Municipal Storm Water Permit
MSW	Municipal Solid Waste
MT	Metric Tons
NAAQS	National Ambient Air Quality Standards
NAPL	Non-Aqueous Phase Liquid
NCP	National Contingency Plan
NL	Notification level
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
NOA	Notice of Availability
NOC	Notice of Completion
NOP	Notice of Preparation
NPDES	National Pollution Discharge Elimination System
O_3	Ozone
OEHHA	Office of Environmental Health Hazard Assessment
O&M	Operations and Monitoring
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Administration
OSPR	Open Space, Parks and Recreation Sub-District
OVM	Organic Vapor Monitor
PAHs	Polycyclic aromatic hydrocarbons
Pb	Lead

List of Acronyms (Continued)

PCE	Passenger Car Equivalent
PCE	Tetrachloroethene
PDFs	Project Design Features
PM	Particulate Matter
PPE	Personal Protective Equipment
PPM	Parts Per Million
PPMV	Parts Per Million by Volume
PPRTV	Provisional Peer Reviewed Toxicity Value
PRC	Public Resources Code
PTC/PTO	Permit-to-Construct/Permit-to-Operate
QA/QC	Quality Assurance and Quality Control
RAO	Remedial Action Objectives
RAP	Remedial Action Plan
RBC	Risk-based Concentration
RBSL	Risk based screening level
RCRA	Resource Conservation and Recovery Act
REL	Reference Exposure Level
RFS	Revised Feasibility Study
RI	Remedial Investigation
RP	Responsible Party
RPS	Renewable Portfolio Standard
RTIP	Regional Transportation Improvement Program
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
RWQCBs	Regional Water Quality Control Board(s)
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SCAG	Southern California Association of Government
SCAQMD	South Coast Air Quality Management District
SCM	Site conceptual model
SSCG	Site-Specific Soil Cleanup Goal
SIP	State Implementation Plan
SIT	Slurry Injection Technology
SLM	Sound Level Meters
SoCAB	South Coast Air Basin
SO_2	Sulfur Dioxide
SRA	Source Receptor Area
STLC	Soluble Threshold Limit Concentration
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compound
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	Toxic Air Contaminant
TBA	Tert-butyl alcohol
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solid
TeNS	Technical Noise Supplement

List of Acronyms (Continued)

TMDL	Total Maximum Daily Load
TPD	Tons per Day
TPH	Total Petroleum Hydrocarbon
TPHd	TPH-diesel
TPHmo	TPH-motor oil
TQ	Threshold Quantity
TSCA	Toxic Substances Control Act
TTLC	Total Threshold Limit Concentration
UBC	Uniform Building Code
UCL	Upper Confidence Limit
UFC	Uniform Fire Code
URF	Unit risk factor
URMP	Urban Runoff Management Plan
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
V/C	Vehicle to Capacity
VEDC	Verified Diesel Emission Control Strategies
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
WDR	Waste Discharge Requirement
WET	Waste Extraction Test
WQMP	Water Quality Management Plan

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EXECUTIVE SUMMARY

This Draft Environmental Impact Report (Draft EIR) has been prepared pursuant to the requirements of the California Environmental Quality Act (CEQA, Public Resources Code sections 21000 et. seq.) with respect to the proposed Remedial Action Plan (RAP) ("the project" or "Responsible Party's (RP's) Proposed Remedy") for the former Kast Property (also referred to as the "site"). Upon approval of the RAP, the remediation activities would be implemented by Equilon Enterprises LLC, doing business as Shell Oil Products U.S. ("Shell" or RP). In accordance with CEQA Guidelines section15123, this Executive Summary of the EIR includes a brief description of the RP's Proposed Remedy; identification of significant impacts and proposed mitigation measures; key issues of controversy and issues to be resolved; and choices among alternatives that would potentially reduce or avoid impacts.

1. PROPOSED PROJECT

Background and Purpose of the RAP

The RAP describes the proposed remediation plan for the Carousel Tract located in the southern portion of the City of Carson, California. Historically, prior to development of many existing residential uses, the local project vicinity was primarily an industrial area inclusive of numerous oil refinery and other chemical-related facilities, many of which have documented hazardous materials releases. The site was developed in 1923 by Shell Company of California with three concrete oil storage reservoirs and was used as an active oil storage facility until the 1950s, when the site was used only on a standby reserve basis. In 1966, the oil storage reservoirs were removed from the site. Construction of existing on-site homes as part of the Carousel Tract began in 1967 and was completed by the early 1970s. The site has remained residential since that time and includes 285 single-family residences.

In 2008, environmental investigations were conducted in connection with an adjacent industrial chemical facility (former Turco Products Facility). During those investigations, contamination by petroleum hydrocarbons at sample locations was discovered within the site. The Department of Toxic Substances Control (DTSC) communicated these findings to the Los Angeles Regional Water Quality Control Board [Regional Board] in March 2008, and in April 2008 the Regional Board sent an inquiry to Shell regarding the status of any environmental investigations at the site. This inquiry was followed by the Regional Board's California Water Code (CWC) Section 13267 Order to Conduct an Environmental Investigation at the former Kast Property issued to Shell Oil Company (Shell) on May 8, 2008. Shell conducted a series of extensive site multimedia sampling and investigations, pilot studies, and other environmental evaluations of the site in response to that Order and subsequent 13267 Orders issued on October 1, 2008 and November 18, 2009, Section 13304 Order dated October 15, 2009, and Cleanup and Abatement Order R4-2011-0046 (CAO) dated March 11, 2011, as amended. All of the investigations have occurred under Regional Board approval and oversight, following work plans reviewed and approved by the Regional Board. Results of the investigations show that the site has been impacted with petroleum hydrocarbons associated with former crude oil storage during the period prior to residential redevelopment. In addition to hydrocarbon-related impacts, impacts are also locally present from chlorinated solvents related to offsite sources. Because of the impacted soils by petroleum hydrocarbons, methane gas also occurs beneath the site, although at non-hazardous levels in the shallow subsurface.

Shell prepared a RAP and Feasibility Study (FS) in March 2014 and submitted it to the Regional Board in accordance with the CAO and in response to the Regional Board letter dated January 23, 2014 directing Shell to submit a RAP and Human Health Risk Assessment (HHRA) pursuant to California Water Code Section 13304. The Regional Board reviewed the RAP, FS, and HHRA and in a letter dated April 30, 2014 provided comments and directives to Shell on these documents. On June 30, 2014 Shell submitted a revised RAP, FS, and HHRA addressing the comments and directives contained in the Regional Board's April 30, 2014 letter. In October 2014 Addenda to the RAP, FS, and HHRA were submitted to the Regional Board. The RAP, FS and HHRA are the basis for the EIR.

The FS dated June 2014 evaluates remedial action alternatives for the site and presents the rationale for selecting a preferred alternative.[1] Of the alternatives analyzed in the FS, the "preferred alternative" for remediation of the site includes:

- Excavation of site soils from both landscaped areas and beneath residential hardscape to a depth of five (5) feet below ground surface (bgs) and targeted excavation to 10 feet bgs where warranted and feasible (details provided in subsection 5 below);
- Soil vapor extraction (SVE)/bioventing;
- Sub-slab vapor mitigation;
- Removal of light non-aqueous phase liquid (LNAPL); and
- Monitored natural attenuation (MNA) to address groundwater.

The RAP has been prepared to summarize the remedial alternative evaluation process and identify and describe the proposed actions for treatment of impacted soil and other media at the site. As such, the preferred alternative proposed by Shell in the RAP is the "project" being evaluated in this EIR. The underlying purpose of the proposed RAP is to remediate the site consistent with the Regional Board's CAO R4-2011-0046 dated March 11, 2011, as amended, and applicable laws and policies. The CAO requires Shell to prepare a RAP, that at a minimum, will attain cleanup goals that are based on residential (i.e., unrestricted) land use, that will achieve applicable water quality objectives set forth in the Regional Board's Water Quality Control Plan, that will comply with State Water Resources Control Board (State Water Board) Resolution 68-16 ("Statement of Policy with Respect to Maintaining High Quality of Waters in California", i.e., the State's "Anti-degradation Policy"), and that will comply with State Water Board Resolution 92-49 ("Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304). In accordance with the provisions of the CAO and as required by Section 15124(b) of the CEQA Guidelines, the below listed objectives for the proposed RAP have been established. The objectives will aid decision makers in their review of the project and environmental impacts, and alternatives.

1. Implement a RAP that complies with the CAO and meets the media-specific (i.e. soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) developed for the site.
2. Maintain the residential land use of the site and avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community.
3. Minimize short-term disruption to residents.

[1] *Feasibility Study Report, Former Cast Property, Carson California, prepared by Geosyntec Consultants, March 10, 2014.*

4. Allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils (i.e., landscaping, hardscape, gardening, etc.) on their properties.
5. Limit or minimize environmental impacts associated with the cleanup activities.

The RAP is available for public review and comment and may be revised, as necessary, following receipt of the public comments. Upon approval of the RAP, the remediation activities would be implemented by the RP.

Project Components

The RAP consists of the following multi-media components to remediate the site. The following provides a brief overview and each of the components is described in further detail below.

- Excavation of soil would be conducted at impacted residential properties where RAOs are not met under existing conditions. Excavation would be conducted in both landscaped and hardscaped areas of residential yards, excluding beneath City sidewalks and houses, to a depth of five (5) feet bgs and targeted excavation where practicable to 10 feet bgs at properties where significant hydrocarbon mass in soil can be reduced. The excavation would also remove residual concrete slabs if encountered in excavations. Following excavation, hardscape and landscaping would be restored to like conditions.
- SVE/bioventing would be used to address petroleum hydrocarbons, VOCs, and methane in soil and soil vapor and to promote degradation of residual hydrocarbon concentrations where RAOs are not met following soil excavation activities. A SVE system with SVE wells in City streets and on residential properties would be installed and operated. Bioventing in concert with SVE would be used to increase oxygen levels in subsurface soils and promote microbial activity and degradation of longer-chain petroleum hydrocarbons. Bioventing would be integral with SVE via cyclical operation of SVE wells. After installation and startup of the SVE/bioventing system, periodic monitoring of the SVE/bioventing system would be conducted. Results of the monitoring and analyses, in conjunction with measured flow rates, field readings and time of operation, would be used to estimate the mass of VOCs removed from the subsurface, degradation of longer-chain hydrocarbons, and as a basis for optimizing and eventual shutdown of SVE operations and switching from the SVE/bioventing to bioventing mode of operations.
- Sub-slab vapor mitigation would be implemented at properties where RAOs for soil vapor would not be met based on potential exposure due to vapor intrusion of petroleum hydrocarbons or chlorinated ethenes (e.g. PCE and TCE) from soil vapor to indoor air, and where detected methane concentrations in sub-slab soil vapor probe samples exceed the upper methane site-specific cleanup goal (SSCG). In addition, the RP would install a sub-slab mitigation system at any residence at which a homeowner requests such a system.
- LNAPL recovery would continue from wells MW-3 and MW-12 on a monthly basis, and if LNAPL is detected in other wells, monthly LNAPL recovery would be initiated on these wells if they have an LNAPL thickness of greater than 0.5 feet to the extent technologically and economically feasible.
- Groundwater Source Reduction and Monitored Natural Attenuation – Chemicals of concern (COCs) in groundwater would be reduced to the extent technologically and economically feasible via source

reduction and MNA. If, based on a 5-year review following initiation of SVE system operation, groundwater plumes are not stable or declining and site COCs in groundwater do not show a reduction in concentration, an evaluation of additional groundwater treatment technologies would be conducted and implemented as needed.

For soil less than 5 feet bgs and sub-slab soil vapor, potential exposures would be addressed in the short term. Deeper soil, soil vapor, and groundwater risk reduction would be implemented over a longer period of time through SVE/bioventing and MNA. SVE/bioventing would be installed after the excavation of the soils, but before final backfill and re-landscaping for properties where both activities are scheduled to occur.

There are 12 properties for which access has not been granted and the required sampling has been completed at 86 percent of the residences including two rounds of indoor air sampling as of October 17, 2014. If access is granted to these properties during implementation of the RAP, sampling would be conducted, and the results would be analyzed consistent with the approach described above to determine what remedial measures, if any, would be taken. These additional properties are assumed to require remedial actions so as to provide a conservative or worse-case analysis of environmental impacts. While the remedial actions for these properties are still to be determined, the description of the RAP's components will not materially change by these determinations. Since these properties are included in the analyses, should all or a portion of these properties require remedial actions, the associated environmental impacts would not change.

Impacted soil would be excavated from 219 residential properties where results of the previous site assessments indicate that RAOs and the more stringent of the health risk-based or leaching to groundwater criteria are not met under existing conditions. Soils would be excavated to a depth of 5 feet bgs at 219 properties (410 yards) with targeted excavated to 10 feet bgs at 97 of the properties, including the 12 properties for which no soils data exist, at selected yards (146 yards). Excavation would occur from both landscaped areas and areas currently covered by hardscape, including walkways, driveways, patio areas, and hardscape associated with landscaping. In general, the lateral extent of the excavation would be up to the back of the City sidewalk and up to the houses, subject to required setback distances.

On average, a conservative estimate of approximately 611 cubic yards (CY) of soils would be excavated from each of the 122 properties identified for 5 foot excavation, and approximately 867 CY from each of the 97 properties identified for targeted 10-foot excavation. Approximately 161,700 CY plus a 10 percent contingency of 16,170 CY for a total of 177,870 CY of soils would be removed from residential excavations. This estimate assumes that soils would be excavated to a depth of 5 feet from the front, side, and back yards of each property; targeted deeper excavation to 10 feet would occur only in front and/or back yards of identified properties. During the preparation of the Property-Specific Remediation Plans (PSRPs), the specific excavation areas for each property would be identified. In some cases, the volume of soil to be excavated for each property would be less or more than the average value.

Implementation of remediation activities would potentially commence in Fall 2015 and would be implemented in phases of eight properties. Based on approximately eight to ten weeks to complete a cluster of eight properties, with some overlapping of remediation activities, the suite of residential remedial construction activities including excavation, installation of SVE/bioventing well and piping, backfill, installation of sub-slab vapor mitigation, and site restoration, implementation of the RAP is estimated to take approximately six years. This estimate of time needed to complete these activities is dependent upon

obtaining access to the properties in a timely manner and does not include loss of time due to inclement weather or other delays that might occur outside of the RPs control.

Expedited Implementation Option

Based on experience in the field during the initial implementation of the RAP, it is possible that the number of properties being remediated at one time could be increased. This would only occur if it is feasible and determined to be safe for residents and workers. Under the Expedited Implementation Option, the number being actively remediated could be incrementally increased with up to 16 properties active at one time, compared to up to 8 properties under the base remedy. Given the overlap in activity with the clusters there could be up to 32 properties in some stage of remediation or restoration at one time. The Expedited Implementation Option would result in an increase in the number of workers and number of properties active at one time on the site, which would reduce the overall time frame necessary for the implementation of the RAP. This approach would not modify the construction hours but rather the amount of activity occurring at one time on the site. As with the RP's Proposed Remedy (Base Remedy), remediation would begin in 2015. However, with the concentrated effort, it is anticipated that the remediation would be completed in 2019 within an approximately four-year time frame.

2. KEY ISSUES OF CONTROVERSEY AND ISSUES TO BE RESOLVED

The following summarizes the key potential environmental issues raised in response to the Notice of Preparation (NOP) and during the EIR public scoping process (the numerical reference in parenthesis is the EIR section in which the analysis is provided). The NOP comments are contained in Appendix A of this EIR.

<u>General</u>

- The extent of potential excavation and other remedial activities (refer to Chapter 2, *Project Description,* of this EIR).
- The ability of residents within the Carousel Tract to move and/or occupy their homes during the short-term remediation activities, as well during the long-term following the active remediation activities (refer to Chapter 2, *Project Description,* Section 5.4, *Hazardous Materials*, and Chapter 7, *Other Mandatory CEQA Considerations*, of this EIR).
- The ability of the City of Carson to conduct plan review and inspection services associated with permits to be issued by the City, including but not limited to the Building and Safety Division, Engineering Division, and Public Works Division (refer to Chapter 2, *Project Description,* and Chapter 7, *Other Mandatory CEQA Considerations*, of this EIR).

<u>Aesthetics</u>

- The potential for vacant or abandoned properties creating a blighted condition (refer to Chapter 7, *Other Mandatory CEQA Considerations*, of this EIR).

Air Quality

- The potential for air quality impacts during all phases (short- and long-term) of the proposed remediation activities in both the "local" and "regional" project vicinities (refer to Section 5.1, *Air Quality*, of this EIR).
- The potential for odor impacts during the activities remediation activities (refer to Section 5.1, *Air Quality*, of this EIR).

Cultural Resources

- The potential for impacts to previously unknown cultural resources, including archaeological and Native American resources (refer to Chapter 7, *Other Mandatory CEQA Considerations*, of this EIR).

Hazardous Materials

- Health effects to the public and the environment from emissions or other contaminant (especially on sensitive receptors) during the active remediation activities from sources related to excavation and grading, operation of equipment, mobile emissions, etc. (refer to Section 5.1, *Air Quality*, Section 5.4, *Hazardous Materials*, and Section 5.5, *Hydrology and Water Quality*, and of this EIR).

Public Services and Utilities

- Ability to maintain basic public services and utilities within the Carousel Tract during the remediation activities, acknowledging that some properties will be vacant during the remediation activities (refer to Chapter 2, *Project Description,* and Chapter 7, *Other Mandatory CEQA Considerations*, of this EIR).

Schools

- The potential for air quality, dust, construction vehicle traffic, noise, water quality and other impacts to nearby schools ("sensitive receptors"), namely William Middle School, as well as Broad Avenue Elementary School and Banning High School (refer to Section 5.1, *Air Quality,* Section 5.4, *Hazardous Materials*, Section 5.5, *Hydrology and Water Quality*, Section 5.6, *Noise and Vibration*, and Section 5.7, *Traffic and Circulation*, of this EIR).
- Integration of construction traffic plans and haul routes with Los Angeles Unified School District (LAUSD) Safe School Plans for the protection of student-pedestrians in the project vicinity (refer to Section 5.7, *Traffic and Circulation*, of this EIR).

3. SUMMARY OF ENVIRONMENTAL IMPACTS

This section provides a summary of impacts, mitigation measures, and impacts after implementation of the mitigation measures associated with implementation of the RAP. The summary is provided by environmental issue area below in **Table ES-1**, *Summary of Project Impacts and Mitigation Measures*. Please refer to Chapter 2, *Project Description*, for a list of the Project Design Features (PDFs) that would be implemented by the project relative to each environmental issue area. The PDFs, in many cases, would serve to reduce the extent of the project's potential for environmental impacts.

Section 15126.2(b) of the CEQA Guidelines requires that an EIR describe significant environmental impacts that cannot be avoided, including those effects that can be mitigated but not reduced to a less than significant level. As shown in Table ES-1 and as analyzed in Section 5.6, *Noise and Vibration*, even with the incorporation of all project design features and mitigation measures to reduce noise and vibration impacts of the RP's Proposed Remedy and Expedited Implementation Option, noise and vibration impacts would remain significant and unavoidable.

4. ALTERNATIVES

The CEQA Guidelines section 15126.6 requires an EIR to "describe a range of reasonable alternatives to the project, or to the location of the project, which will feasibly attain most of the basic objectives of the project but will avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." The CEQA Guidelines direct that selection of alternatives be guided by a "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice.

Chapter 3, *Description of Alternatives*, provides a description of the alternatives evaluated in this EIR. As discussed therein, the alternatives analysis includes the following three alternatives: Alternative 1, No Project; Alternative 2, Excavation Beneath Landscape and Hardscape to 10 Feet; and Alternative 3, No Excavation Beneath Hardscape –5 Feet with Targeted 10 Feet. The analysis of each alternative is provided in each technical section contained in Chapter 5. Chapter 6, Comparison of Alternatives, provides a summary comparison of the alternatives relative to the RP's Proposed Remedy.

Alternative 1 – No Project Alternative

Alternative 1, the No Project Alternative, is the baseline alternative because it represents a continuation of existing conditions. No Project Alternative would mean that the RAP is not implemented at the site. No excavation would occur and no SVE wells and SVE/bioventing system or sub-slab mitigation would be installed. Monitoring of the site and LNAPL recovery would continue. All existing site features, such as residences, landscaping, hardscape, fences, patios, and ancillary structures would remain. No relocation of residents would occur. In other words, the residential subdivision would remain as it currently exists today without remediation of site impacts.

Alternative 2 - Excavation Beneath Landscape and Hardscape to 10 Feet Alternative

Alternative 2 would include the same remedial technologies as the RP's Proposed Remedy, but would involve the excavation of soils to a depth of 10 feet bgs at 241 residential properties, compared to 5 feet with targeted excavation to 10 feet bgs at 219 residential properties under the RP's Proposed Remedy. An additional 22 properties would be excavated because, while these properties meet RAOs from 0 to 5 feet, they do not meet RAOs from 1 to 10 feet. Similar to the RP's Proposed Remedy, sub-slab vapor mitigation system would be installed at approximately 28 houses and SVE/bioventing units would be installed at 236 properties. This alternative is estimated to take approximately 8.4 years, compared to the approximately 6-year time frame under the RP's Proposed Remedy.

Excavations to 10 feet bgs would require geotechnical investigations to support excavation design and establishment of necessary setbacks from buildings. In some areas, a limited access bucket auger drilling rig

would be used in conjunction with conventional excavation equipment. Conventional excavation using slot-trenching as necessary to protect structures or other features and open bulk excavation with appropriate sloping, setbacks, and/or shoring would be used where possible as the preferred excavation method. Auger excavation using a limited access rig would allow work in relatively tight spaces adjacent to structures to remove a column of soil.

Alternative 2 would require excavation of approximately 274,700 CY of impacted soils from the residential properties and approximately 43,900 CY of impacted soils from other areas on the site. Total excavation of impacted soil would be approximately 318,600 CY, compared to a total of approximately 186,695 CY under the RP's Proposed Remedy. An equivalent volume of clean fill would be imported to the site. As with the RP's Proposed Remedy, under Alternative 2, excavation would occur around utilities, including water and gas, which are located about 3 to 3.5 feet inside the sidewalks in the front yards of approximately one-half of the properties in the Carousel Tract. These water pipes are of asbestos-cement (transite) construction and would need to be avoided during excavation. Where it is possible to excavate to 10 feet in back yards, a long-reach excavator would be used. The overhead power lines would potentially need to be removed due to the potential for the excavator to hit the overhead utility lines, which could create an electrocution hazard for workers. The overhead power lines would be restored upon completion of the excavation.

Alternative 3 – No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative

Alternative 3 would include the same remedial technologies as the RP's Proposed Remedy, but would not remove hardscape, such as sidewalks, patios, and driveways, nor excavate in those areas. As with the RP's Proposed Remedy, under Alternative 3, 219 properties would be excavated to 5 feet at the front and back yards. Of these 219 properties, 97 would be excavated from 5-10 feet, but only at selected front and back yards. Alternative 3 is estimated to take approximately four years, compared to the approximately six-year time frame for the RP's Proposed Remedy.

Alternative 3 would involve the excavation of approximately 83,930 CY, including a 10 percent excavation contingency.[2] With the addition of 8,100 CY of street trenching debris and 725 CY of well installation debris, total excavated materials would be 92,755 CY, compared to a total of approximately 186,695 CY under the RP's Proposed Remedy. An equivalent volume of clean fill would be imported to the site. As with the RP's Proposed Remedy, excavation under Alternative 3 would occur around utilities, including water and gas. Activity under Alternative 3 would be generally similar to the RP's Proposed Remedy and, as with the RP's Proposed Remedy, has the potential to increase noise levels associated with the use of heavy-duty construction equipment above existing levels. However, because concrete saws, jack hammers, and other equipment to remove hardscape would not be utilized during the residential property excavation phase, construction activity noise levels would be reduced by approximately 10 dBA during the residential remediation phase compared to the RP's Proposed Remedy. Remedial activities would also occur for a fewer number of days overall as a result of less excavated material. Similar to the RP's Proposed Remedy, peak noise impacts under Alternative 3 are predicted to result during the street trenching phase. Noise resulting from this phase would exceed the significance threshold of 65 dBA, L_{eq} at noise-sensitive receptor locations.

[2] *This number includes 76,300 CY at the residential properties plus a 10 percent contingency of 7,630 CY for unforeseen circumstances for a total of 83,930 CY of impacted soil.*

Therefore, as with the RP's Proposed Remedy, excavation activity related noise at adjacent residential uses, would be significant and unavoidable.

Residents immediately adjacent to a property with active remedial activity would experience vibration velocities in excess of the human annoyance threshold from the mini excavator. As with the RP's Proposed Remedy, impacts associated with vibration would be lessened, but would still remain significant under this Alternative.

Environmentally Superior Alternative

Section 15126.6(e)(2) of the *CEQA Guidelines* indicates that "If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives."

A comparative summary of the environmental impacts anticipated under each alternative with the environmental impacts associated with the project is provided in Table 6-1 of Chapter 6, *Comparison of Alternatives*, in this EIR. In addition, a comparative summary of the ability of the project and the Alternatives to meet the stated objectives of the project is summarized in Table 6-2 of Chapter 6 of this EIR.

Table ES-1

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
Air Quality		
Impact Statement AIR-1: Implementation of the RAP and the Expedited Implementation Option would utilize equipment meeting stringent emission standards and would be consistent with the applicable growth projections and control strategies in the AQMP. Projects that are consistent with the applicable growth projections and control strategies used in the development of the AQMP would not jeopardize attainment of the air quality levels identified in the AQMP, even if they exceed the SCAQMD's project-level recommended thresholds. Therefore, short-term and long-term impacts associated with implementation of the RAP and the Expedited Implementation Option would not conflict with or obstruct implementation of the applicable air quality plan and impacts would be less than significant.	With the implementation of existing regulations and project design features, the RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to emission standards. Therefore, no mitigation measures would be necessary.	Less than Significant
Impact Statement AIR-2: Implementation of the RAP and the Expedited Implementation Option would result in short-term emissions that would not exceed the significance threshold with regard to regional emissions. Implementation of the RAP would not result in long-term emissions that exceed the significance threshold with regard to regional emissions. Thus, implementation of the RAP and the Expedited Implementation Option would not violate air quality standards or contribute substantially to an existing or projected air quality violation and impacts related to short-term and long-term regional emissions would be less than significant.	With the implementation of existing regulations and project design features, the RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to short or long-term emissions. No mitigation measures would be necessary.	Less than Significant
Impact Statement AIR-3: Short-term emissions associated with implementation of the RAP and the Expedited Implementation Option would not exceed the thresholds of significance and would not result in a cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment. Long-term emissions associated with implementation of the RAP would not exceed the thresholds of significance and would not result in a cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment. Thus, short-term and long-term impacts would be less than significant.	With the implementation of existing regulations and project design features, the RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to a cumulatively considerable net increase of a criteria pollutant. No mitigation measures would be necessary.	Less than Significant

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
Impact Statement AIR-4: Implementation of the RAP and the Expedited Implementation Option is predicted to result in short-term emissions that would not exceed the significance threshold with regard to localized emissions of NO_X, CO, PM_{10}, and $PM_{2.5}$. Implementation of the RAP would not result in long-term emissions that exceed the significance threshold with regard to localized emissions. In addition, implementation of the RAP would not contribute to the formation of CO hotspots and would result in less than significant long-term impacts with respect to CO hotspots. Thus, implementation of the RAP and the Expedited Implementation Option would not expose sensitive receptors to substantial pollutant concentrations and impacts would be less than significant in the short-term and long-term.	With the implementation of existing regulations and project design features, the RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to localized NO_X, CO, PM_{10}, and $PM_{2.5}$ emissions. No mitigation measures would be necessary.	Less than Significant
Impact Statement AIR-5: Implementation of the RAP and the Expedited Implementation Option would not create objectionable odors affecting a substantial number of people. The potential for short-term odors would be limited and minimized through compliance with SCAQMD Rule 1166 and the use of vapor and odor control measures as described in PDF AQ-8. The potential for long-term odors would be limited and minimized through the installation of a SVE and bioventing system and SSD system. Thus, implementation of the remediation activities would have a less than significant impact.	With the implementation of existing regulations and project design features, the RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related objectionable odors. No mitigation measures would be necessary.	Less than Significant
Impact Statement AIR-6: Implementation of the RAP and the Expedited Implementation Option would be consistent with applicable policies in the City of Carson General Plan Air Quality element. Thus, implementation of the RAP and the Expedited Implementation Option would have a less than significant impact.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to applicable policies of the General Plan Air Quality Element. No mitigation measures would be necessary.	Less than Significant

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
Geology and Soils		
Impact Statement GEO-1: The project site is not located within a liquefaction-prone area and underlying soils are in a dense state or sufficiently compacted to reduce acceleration effects. Excavations would be setback from buildings and would not affect underlying geologic structures or soils beneath building foundations. Protective support would be provided for any encountered utility lines. Thus, the RP's Proposed Remedy and the Expedited Implementation Option would not increase the exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury or death, involving strong seismic ground shaking or seismic-related ground failure, including liquefaction. The impact of the RP's Proposed Remedy with respect to these geologic hazards would be less than significant. The Expedited Implementation Option, which would increase the intensity of activity on the site, would also result in a less than significant impact with respect to these geologic hazards.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to the risk of loss, injury or death, involving strong seismic ground shaking or seismic-related ground failure, including liquefaction. No mitigation measures would be necessary.	Less than Significant
Impact Statement GEO-2: The excavation of the project site would not expose or alter underlying geologic units. Surface soil would be removed to 5 to 10 feet bgs and would be replaced with appropriately compacted backfill. Observation during grading and testing for required compaction and safety of structures due to any slippage or settlement of the completed grading, would ensure that conditions in approved engineering reports are implemented. With implementation of Building Code requirements and project design features RP's Proposed Remedy and the Expedited Implementation Option would not cause on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. Therefore, the impact of the RP's Proposed Remedy with respect to these geologic hazards would be less than significant. The Expedited Implementation Option would also result in a less than significant impact with respect to these geologic hazards.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to landslide, lateral spreading, subsidence, liquefaction, or collapse. No mitigation measures would be necessary.	Less than Significant

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
Impact Statement GEO-3: With the implementation of Code-required best management practices for excavation and backfill activities, and immediate loading and covering of cut materials, the RP's Proposed Remedy would not result in substantial soil erosion. In addition, the removal of COC-containing soil would not constitute the substantial loss of top soil. Therefore, the impact with respect to erosion and loss of top soil would be less than significant. The Expedited Implementation Option would also result in a less than significant impact with respect to erosion and loss of top soil.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to loss of top soil. No mitigation measures would be necessary.	Less than Significant
Impact Statement GEO-4: The RP's Proposed Remedy and the Expedited Implementation Option would not remove existing soils under residential buildings or garages and, thus, would not change existing conditions with respect to soils currently supporting habitable structures. Expansive soils do not naturally occur on the project site and expansive soils would not be imported to the project site. Because the RP's Proposed Remedy and the Expedited Implementation Option would not change the existing soils under habitable structures, it would not cause a change in expansiveness of existing materials that would increase risks to life or property. The impact of the RP's Proposed Remedy and the Expedited Implementation Option with respect to expansive soils would be less than significant.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to expansive soil. No mitigation measures would be necessary.	Less than Significant
Greenhouse Gas Emissions		
Impact Statement GHG-1: Implementation of the RAP and the Expedited Implementation Option would result in short-term GHG emissions that would not exceed the significance threshold. Implementation of the RAP would not result in long-term emissions that exceed the significance threshold. Thus, implementation of the RAP would not generate GHG emissions, either directly or indirectly, that would have a significant impact on the environment and impacts related to short-term and long-term GHG emissions would be less than significant.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to short-term and long-term GHG emissions. No mitigation measures would be necessary.	Less than Significant

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
Impact Statement GHG-2: Implementation of the RAP and the Expedited Implementation Option would incorporate GHG reduction strategies that would be consistent with applicable GHG reduction plans. Therefore, implementation of the RAP and the Expedited Implementation Option would not conflict with plans for reducing GHG emissions and impacts relative to this threshold would be less than significant.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to consistency with applicable GHG reduction plans. No mitigation measures would be necessary.	Less than Significant
Hazardous Materials		
Impact Statement HAZ-1: Unmitigated impacts due to on-site remediation activities would result in a less than significant impact. The incremental lifetime increase in cancer risk due to implementation of the RAP would not exceed the one in one million threshold at nearby sensitive receptors. The Expedited Implementation Option would also result in a less than significant impact.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to an incremental increase in cumulative lifetime potential cancer risk from exposure to project-related TACs and COCs emitted as a direct result of implementation of the RAP. No mitigation measures would be necessary.	Less than Significant
Impact Statement HAZ-2: The RAP is intended to reduce long-term risk from potential exposure to COCs in soil, soil vapor, and indoor air. As documented in the HHRA, risks to residences and onsite construction and utility workers post-implementation of the RAP under the RP's Proposed Remedy and the Expedited Implementation Option, would be below thresholds. Therefore, implementation of the RAP and the Expedited Implementation Option would result in less than significant impacts.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to an incremental increase in cumulative lifetime potential cancer risk from long-term exposure to TACs and COCs post-implementation of the RAP. No mitigation measures would be necessary.	Less than Significant
Impact Statement HAZ-3: On-site remediation activities would result in less than significant impacts with regard to chronic and acute non-cancer risk with incorporation of PDFs. Therefore, mitigation measures would not be required. The Expedited Implementation Option would also result in a less than significant impact.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to chronic and acute non-cancer risks as a direct result of implementation of the RAP. No mitigation measures would be necessary.	Less than Significant

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
Impact Statement HAZ-4: Impacts due to on-site remediation activities would result in a less than significant impact with regard to methane concentrations. The Expedited Implementation Option would also result in a less than significant impact. Therefore, mitigation measures would not be required.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to methane concentrations as a direct result of implementation of the RAP. No mitigation measures would be necessary.	Less than Significant
Impact Statement HAZ-5: Implementation of the RAP and the Expedited Implementation Option would result in an acceptable level of risk regarding accidental release through the routine transport, use, or disposal of hazardous materials. Therefore, mitigation measures would not be required.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to the risk of accidental release through the routine transport, use, or disposal of hazardous materials as a direct result of implementation of the RAP. No mitigation measures would be necessary.	Less than Significant
Impact Statement HAZ-6: Implementation of the RAP and the Expedited Implementation Option would result in an acceptable level of risk regarding reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. Therefore, mitigation measures would not be required.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to the risk of reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment as a direct result of implementation of the RAP. No mitigation measures would be necessary.	Less than Significant
Impact Statement HAZ-7: Hazardous emissions would be emitted [A1]during the implementation of the RAP and the Expedited Implementation Option, but would result in less than significant potential health risks. Long-term use of SVE would control potential emissions from impacted materials remaining on-site long-term. Therefore, the project would result in a less than significant impact with regard to release or handling of hazardous materials within one-quarter mile of a school.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to health risks as a direct result of implementation of the RAP. Long-term use of SVE would control potential emissions from impacted materials remaining on site long-term. No mitigation measures would be necessary.	Less than Significant

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
Hydrology and Water Quality		
Impact Statement H/WQ-1: Compliance with regulatory requirements and dust control would ensure that potential surface water quality impacts associated with short-term grading activities would be adequately addressed and would meet California Water Code (CWC) requirements. As such, short-term impacts would be less than significant. Also, because the RAP would result in the removal of COC-containing soil as feasible and residual soil would be biovented to reduce COCs, the potential for discharges to surface water would be reduced. The RAP would not create pollution, contamination or nuisance as defined in Section 13050 of the CWC or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. The Expedited Implementation Option, which would increase the intensity of activity on the site, would also result in a less than significant impact with respect to surface water quality. Therefore, impacts to surface water quality from the RP's Proposed Remedy and the Expedited Implementation Option would be less than significant.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to the creation of pollution, contamination or nuisance, as defined under the CWC or cause regulatory standards to be violated. No mitigation measures would be necessary.	Less than Significant
Impact Statement H/WQ-2: Implementation of Project Design Features that would require that contaminated soil be covered and removed from the site during excavation and the monitoring and management of the groundwater plume, would ensure that the RP's Proposed Remedy would not affect the rate or change the direction of movement of existing COCs or expand the area affected by COCs. The Expedited Implementation Option would also result in a less than significant impact with respect to groundwater quality. Therefore, impacts related to short- and long-term management of the groundwater plume from the RP's Proposed Remedy and the Expedited Implementation Option would be less than significant.	With implementation of PDFs, the RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to the rate or direction of movement of existing COCs, or expansion of the area affected by COCs. No mitigation measures would be necessary.	Less than Significant

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
Impact Statement H/WQ-3: Compliance with regulations and dust control would ensure that potential groundwater quality impacts associated with short-term grading activities would be adequately addressed and would not have a significant impact on groundwater quality. With the implementation of long-term Project Design Features to reduce LNAPL, to provide continuous groundwater monitoring, and to return the Shallow Zone and the Gage Aquifer to background levels, the RP's Proposed Remedy and the Expedited Implementation Option would reduce COCs in groundwater. Because the RAP (with or without the Expedited Implementation Option) would not create pollution, contamination or nuisance as defined in Section 13050 of the CWC or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water, long-term groundwater quality impacts would be less than significant.	With implementation of PDFs, the RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to pollution, contamination or nuisance, as defined in Section 13050 of the CWC, or cause regulatory standards to be violated. No mitigation measures would be necessary.	Less than Significant
Noise		
Impact Statement NOISE-1: Impacts due to noise from on-site construction activity during the implementation of the RAP and the Expedited Implementation Option would be significant. Maximum noise associated with the project would exceed the significance threshold of 65 dBA L_{eq} at nearby on-site and off-site residential uses located in the City of Carson. However, maximum noise from on-site construction activity during the implementation of the RAP and the Expedited Implementation Option would not exceed the significance threshold of 75 dBA L_{eq} at nearby off-site residential uses located in the City of Los Angeles. Impacts due to noise from on-site construction activity would be less than significant at off-site residential uses located in the City of Los Angeles.	Noise from short-term remediation activities has the potential to result in significant noise impacts at sensitive receptors located in the City of Carson (single-family residential uses). Thus, the following mitigation measures are required to minimize construction-related noise impacts: **MM NOISE-1**: Residents of properties shall be offered relocation for the duration of nearby active remediation activities which may create ambient noise levels at their property in excess of 75 dBA, Leq. for 20 days or less or in excess of 65 dBA, Leq. for 21 days or longer. Based on the analyses presented in this EIR, this shall apply to residences located within approximately 90 feet of street trenching or 130 feet from an edge of residential	Significant and Unavoidable**:** MM NOISE-1 would offer relocation for residents of properties that would experience noise levels in excess of the specified levels due to nearby active remediation activities. MM NOISE-2 would provide temporary noise barriers that would reduce construction noise, but not below threshold levels. If relocation were accepted, exposure to high noise levels would be reduced to a less than significant level. However, because relocation is voluntary, residents may choose to remain and potentially be exposed to noise levels in excess of the thresholds. Thus, the short term noise impact is conservatively assumed to remain significant and

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
	remediation (i.e. a cluster of 4 to 8 homes); these distances may be revised by the Regional Board upon completion of additional monitoring and analysis which could be performed under the direction of an independent acoustician during the implementation of the RAP. Appendix F-8 includes 75 dBA and 65 dBA contours showing the impacted properties surrounding a hypothetical 8-property cluster. **MM NOISE-2**: To the maximum extent feasible, the project shall provide noise blanket/temporary noise barriers between the active areas and occupied residential units during street trenching.	unavoidable, even with implementation of the Mitigation Measures.
Impact Statement NOISE-2: Construction impacts from off-site construction traffic during the implementation of the RAP and the Expedited Implementation Option would be less than significant. Sound levels would not increase ambient noise levels at residential uses along the haul route by 5 dBA or more. Ambient noise impacts would be less than significant.	With implementation of PDFs, the RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to increase in ambient levels along haul routes. No mitigation measures would be necessary.	Less than Significant
Impact Statement NOISE-3: Implementation of the RAP and the Expedited Implementation Option would include stationary mechanical noise sources that may increase long-term noise levels adjacent to noise-sensitive receptors in the project vicinity. However, with the implementation of the recommended mitigation measure the noise generation would not exceed established thresholds. Therefore, long-term impacts from stationary mechanical noise sources would be mitigated to a less than significant level.	The RP's Proposed Remedy and the Expedited Implementation Option would result in potentially significant impacts related to stationary mechanical noise sources. Therefore, MM NOISE-3 is recommended .**MM NOISE-3**: The RP shall retain the services of a qualified acoustical engineer with expertise in design of sound isolations to ensure the	Less than Significant with Mitigation: Long-term impacts would be reduced to less than significant levels through the implementation of MM NOISE-3.

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
	mechanical fans and/or other related mechanical components to SVE/bioventing system installed for long-term use is designed (i.e., installation of building enclosure) so as to meet the City's exterior noise limits (55 dBA).	
Impact Statement VIB-1 Implementation of the RAP and the Expedited Implementation Option would result in sporadic, temporary vibration effects adjacent to the project area, which would exceed established thresholds. Therefore, vibration impacts would be significant and mitigation is proposed.	In addition to implementation of mitigation measures related to noise, the following mitigation measure is required to minimize construction-related vibration impacts: **MM VIB-1:** Residents of properties located within 60 feet of the use of jack hammers shall be offered relocation for the duration of jack hammer use.	Significant and Unavoidable: MM VIB-1 would reduce human annoyance vibration impacts to a less than significant level. However, since relocation is voluntary, residents may choose to remain and be potentially exposed to vibration levels in excess of the thresholds. Thus, the impact is conservatively assumed to remain significant and unavoidable even with implementation of the mitigation measure.
Transportation/Traffic		
Impact Statement TRAF-1: The RP's Proposed Remedy and Expedited Implementation Option would not exceed threshold standards related to V/C ratios at any of the study intersections Therefore, the RP's Proposed Remedy and the Expedited Implementation Option would have a less than significant impact with respect to intersection service levels.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to V/C ratios at study intersections. No mitigation measures would be necessary.	Less than Significant
Impact Statement TRAF-2: The RP's Proposed Remedy and Expedited Implementation Option would not exceed threshold standards related to CMP facilities because they do not exceed minimum volumes of peak traffic at any CMP arterial or freeway monitoring stations to warrant analysis under the CMP. In addition, the RP's Proposed Remedy and Expedited Implementation Option would not adversely impact ridership or operation of transit lines in	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to CMP arterial or freeway monitoring stations or CMP transit service levels. No mitigation measures would be necessary.	Less than Significant

Table ES-1 (Continued)

Summary of Project Impacts and Mitigation Measures

Project Impact	Mitigation Measures	Level of Significance After Mitigation
the area. Therefore, impacts related to CMP service levels would be less than significant.		
Utilities (Solid Waste)		
Impact Statement SW-1: Excavated soils would be cleaned and re-used; construction waste and inert debris would be recycled through a permitted IDEFO or similar recycling process; and green waste would be mulched and re-used. Adequate treatment and re-use and recycling capacities exist to accommodate maximum daily waste exports under the project and the Expedited Implementation Option. Because waste generated by ground clearing and excavation would be diverted from landfills, the RP's Proposed Remedy and the Expedited Implementation Option would have a less than significant impact with respect to the permitted capacity of disposal facilities.	The RP's Proposed Remedy and the Expedited Implementation Option would not result in significant impacts related to permitted capacity of disposal facilities. No mitigation measures would be necessary.	Less than Significant

1. Introduction

1.0 INTRODUCTION

This Draft Environmental Impact Report (Draft EIR) has been prepared at the direction and under the supervision of the Los Angeles Regional Water Quality Control Board (Regional Board) in accordance with the California Environmental Quality Act (CEQA) and the Guidelines for California Environmental Quality Act (CEQA Guidelines), as amended.[1,2] The Remedial Action Plan (RAP) (also referred to as the "Responsible Party's (RP's) Proposed Remedy" or "project") for the former Kast Property (also referred to as the "site") describes the proposed remediation plan for the site. A detailed discussion of the project is provided in Chapter 2, *Project Description*, of this EIR.

1. PURPOSE OF THE EIR

This EIR has been prepared in conformance with CEQA (California Public Resources Code Section 21000 et seq.) and the CEQA Guidelines (California Code of Regulations, Title 14, Section 15000 et seq.). The principal CEQA Guidelines sections governing content of this document are Sections 15120 through 15132 (Content of an EIR).

In accordance with Section 15121 of the CEQA Guidelines, the purpose of the EIR is to serve as an informational document that:

> *"…will inform public agency decision makers and the public generally of the significant environmental effect of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project."*

This Draft EIR has been prepared as a Project EIR pursuant to Section 15161 of the CEQA Guidelines. As stated in this section:

> *"This type of EIR should focus on the changes in the environment that would result from the development project. The EIR shall examine all aspects of the project including planning, construction, and operation."*

The EIR focuses on the environmental impacts associated with the implementation of the RAP and is intended to provide the environmental information necessary for the Regional Board to make a final decision on the RAP. This EIR is also intended to support discretionary reviews and decisions by other agencies.

The EIR analysis considers the actions associated with the project and determines the short-term and long-term effects associated with their implementation. This EIR discusses both the direct and indirect impacts of the project, as well as the cumulative impacts associated with other past, present, and reasonably foreseeable future projects. Where feasible, the EIR analysis identifies mitigation measures to reduce or eliminate potentially significant adverse environmental effects. Consistent with CEQA Guidelines Section

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1 *Public Resources Code Section 21000-21178.*

2 *California Code of Regulations Title 14, Chapter 3, Section 15000-15387.*

15126.6(a), the EIR also describes a range of reasonable alternatives to the project, which are intended to avoid or substantially lessen the significant effects of the project, while feasibly attaining most of the basic objectives of the project.

2. LEAD, RESPONSIBLE, TRUSTEE AGENCIES

The CEQA Guidelines define lead, responsible, and trustee agencies. The lead agency holds principal responsibility for approving a project and thus, the Regional Board is the lead agency for this EIR. A responsible agency refers to a public agency other than the lead agency that has discretionary approval over the project. The South Coast Air Quality Management District (SCAQMD) would be a responsible agency since air quality permits would be required to implement the project. In addition, the County of Los Angeles and the City of Carson would issue permits relating to construction remediation activities as part of the project. Accordingly, the SCAQMD, County of Los Angeles and City of Carson are responsible agencies under CEQA. A trustee agency refers to a state agency having jurisdiction by law over natural resources affected by a project. There are no trustee agencies for this project.

3. EIR REVIEW PROCESS

This EIR has been prepared to meet all of the substantive and procedural requirements of CEQA; California CEQA Guidelines and the rules, regulations and procedures for the implementation of CEQA as executed by the Regional Board.

In compliance with the CEQA Guidelines, the Regional Board has provided opportunities for the public to participate in the environmental review process. In September 2013, the Regional Board issued a public notice soliciting input from the community and stakeholders on the scope and content of the environmental documents to be prepared in compliance with CEQA. The public notice also advertised a "Community Open House - CEQA Scoping Meeting" to be held on September 24, 2013 at the Carson Center, Carson-Dominguez Ballroom, Hall 'A' located at 801 East Carson Street in Carson, CA 90745. This scoping meeting was intended to reach both the general public and public agencies. The Regional Board accepted written comments on the scope and content of the forthcoming CEQA documentation from September 9 through October 8, 2013.

Pursuant to the provisions of Section 15082 of the CEQA Guidelines, the Regional Board circulated an NOP (and Initial Study) to State (including the State Clearinghouse - State Clearinghouse #2014031053], regional, and local agencies, and members of the public (including all residences within the Carousel Tract and properties within the surrounding area[3]) for a 30-day period commencing March 19, 2014 and ending April 18, 2014. A copy of the NOP and Initial Study are included in Appendix A of this Draft EIR. The purpose of the NOP was to formally convey that an EIR is being prepared for the project, and to again solicit input regarding the scope and content of the environmental information to be included in the EIR. The NOP was based on the results of an Initial Study which determined that implementation of the project could result in potentially significant impacts to the environment. The Initial Study provides a detailed discussion of the potential environmental topics and the reasons that each topic is or is not analyzed further in this Draft EIR.

[3] *The surrounding area includes all properties (residential and non-residential) within the following bounded area: E. Sepulveda Boulevard on the north; S. Avalon Boulevard on the east, W R Street on the South; and Main Street on the west.*

The Regional Board also published the NOP on March 19, 2014 in two local newspapers of general circulation within the project vicinity, the Daily Breeze and the Los Angeles Times. In addition, the Regional Board mailed an "Information Bulletin" in March 2014 to all residences within the Carousel Tract informing them of the upcoming NOP.

The comments raised during the Regional Board's initial scoping outreach efforts in September 2013 and the more recent NOP comment period are contained in Appendix A of this EIR and summarized in the Executive Summary under the " Key Issues of Controversy and Issues to be Resolved" subheading.

The NOP and the CEQA Initial Study and other documents related to the proposed project were all made available for review at the following location(s):

Carson Public Library
151 E. Carson St.
Carson, CA 90745-2797

Tuesday - Thursday: 10 am - 8 pm Saturday: 8 am - 6 pm
Monday/Friday/Sunday: Closed

Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013
(213) 576-6600

Electronic copies of the documents were also available at:

- The State Water Resources Control Board's website at http://www.swrcb.ca.gov/rwqcb4/Kast/index.shtml and;
- The Regional Board's website at: http://www.waterboards.ca.gov/losangeles/ under "Announcements."

Based on the Initial Study and comments received during the CEQA scoping periods Chapter 5 of this EIR addresses the following environmental topics where the potential for significant impacts was identified: Air Quality, Geology and Soils, Greenhouse Gas Emissions, Hazardous Materials, Hydrology and Water Quality, Noise, Traffic and Circulation, and Utilities and Service Systems (Solid Waste). For each of the environmental issues described above, the project's potential to result in direct, indirect and cumulative impacts are addressed and feasible mitigation measures are provided where necessary to address significant impacts. Chapter 7, *Other Mandatory CEQA Considerations*, includes a discussion of those environmental issues (e.g., Mineral Resources, Public Services, Population and Housing, etc.) where the characteristics of the project made it clear that impacts would not be significant and further evaluation of such issues in the EIR was not necessary. Such issues were determined to be "scoped out" of the Draft EIR through the Initial Study analysis.

This Draft EIR is subject to a 45-day public review period by responsible and trustee agencies, members of the public and other interested persons. The review period commences November 7, 2014, and ends January 9, 2015. In accordance with the provision of Sections 15085(a) and 15087(a)(1) of the CEQA Guidelines, the Regional Board, serving as the Lead Agency, has circulated a Notice of Availability (NOA) of a Draft EIR to all residences within the Carousal Tract and the surrounding area (as defined above), in addition to applicable public agencies, organizations, and individuals that commented on the NOP. The NOA also indicates the Draft EIR will be available for review at the Carson Library and Regional Board office in Los

Angeles, CA (see addresses above), in addition to being available electronically at the State Water Board and Los Angeles Regional Board websites (see website addresses above).

The Regional Board will prepare and transmit a Notice of Completion (NOC) to the State Clearinghouse. Proof of publication is available at Regional Board's Los Angeles office. All comments on the EIR should be addressed to:

Regional Water Quality Control Board
Los Angeles Region
Attn: Dr. Teklewold Ayalew, PhD, PG, Project Manager
320 W. 4th Street, Suite 200
Los Angeles, CA 90013
RE: Former Kast Property Tank Farm Site Remediation Project
Or via email at: teklewold.ayalew@waterboards.ca.gov

Any agency, organization or members of the public desiring to comment on the EIR must submit their comments in writing to Dr. Teklewold Ayalew prior to the end of the public review period at 5:00 P.M. on January 9, 2015.

Upon the close of the public review period, the Regional Board will proceed to prepare a Final EIR that will consist of the Draft EIR (incorporated by reference) and responses to comments addressing issues and concerns raised by responsible agencies or reviewing parties, revisions to the Draft EIR or corrections and additions to the Draft EIR, and a mitigation monitoring and reporting program (MMRP). With regards to responses to comments, the Regional Board will evaluate and prepare written responses to all relevant written comments received during the public review period. The Regional Board's responses at this point in the process will be limited to issues relating to the adequacy of the EIR and not the relative merits of the project. With regards to the MMRP, according to PRC Section 21081.6, for projects in which significant impacts will be avoided by mitigation measures, the Lead Agency must include a MMRP. The purpose of the MMRP is to ensure compliance with required mitigation during implementation of the project. After the Final EIR is completed, and at least 10 days prior to its certification, a copy of the response to comments on the Draft EIR will be provided or made available to all commenting parties.

According to PRC Section 21081, the Lead Agency must adopt Findings of Fact (Findings) before approving a project, when the EIR identifies significant environmental impacts that may result from a project. These findings, as a result, are intended to comply with CEQA's mandate that no public agency shall approve or carry out a project for which an EIR has been certified which identifies one or more significant effects thereof unless the agency makes one or more of the following findings:

- Changes or alterations have been required in, or incorporated into, the project that avoid or substantially lessen the significant environmental effect as identified in the Final EIR.
- Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.
- Specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives identified in the Final EIR.

Environmental impacts may not always be mitigated to a less than significant level. When this occurs, impacts are considered significant and unavoidable. As evaluated in Chapter 5 of this Draft EIR, significant and unavoidable noise impacts would occur from implementation of the project. Accordingly, the Regional Board must adopt a "statement of overriding considerations" prior to approval of the project in compliance with PRC Section 21081. Such statements are intended under CEQA to provide a written means by which the Regional Board balances the benefits of the project and the significant and unavoidable environmental impacts. Where the Regional Board concludes that the economic, legal, social, technological, or other benefits outweigh the unavoidable environmental impacts, the Regional Board may find such impacts "acceptable" and approve the project.

4. ORGANIZATION OF THE EIR

The EIR includes an Executive Summary, nine chapters, and numerous appendices, which are organized as follows:

Executive Summary. This chapter presents a summary of the project and alternatives, potential impacts and mitigation measures, and impact conclusions regarding significant unavoidable adverse impacts and effects found not to be significant. This section also summarizes the issues raised in the CEQA scoping and NOP comment letters regarding the scope and content of the EIR.

1 **Introduction**. This chapter provides: a description of the purpose of the EIR; identification of the lead, responsible, and trustee agencies; an overview of the EIR review process; and an outline of the organization of the EIR.

2 **Project Description**. This chapter describes the location, objectives, and physical and operational characteristics of the project.

3 **Description of Alternatives**. This chapter contains a description of the alternatives to the project as evaluated in Chapter 5 of this EIR.

4 **Basis for Cumulative Analysis**. This chapter contains a list of related projects anticipated to be built within the project vicinity.

5 **Environmental Impact Analysis**. For each of the environmental topic areas indicated above, this chapter includes: the environmental setting; project, alternative and cumulative impact analyses; mitigation measures, where necessary; and conclusions regarding the level of significance after mitigation.

6 **Comparison of Alternatives**. This chapter includes a summary and comparison of the environmental impacts of the project and the alternatives. This chapter also identifies the environmentally superior alternative.

7 **Other Mandatory CEQA Considerations**. This chapter includes a discussion of issues required by CEQA that are not covered in other sections. This includes discussions of significant unavoidable impacts, impacts found not to be significant, irreversible environmental changes, potential secondary effects caused by the implementation of the mitigation measures for the project, and growth inducing impacts.

8 **List of Preparers**. This chapter lists the individuals involved in preparation of this EIR and organizations and persons consulted in the preparation of the EIR.

9 **References**. This chapter lists all the references used in preparation of the EIR.

The appendices present data supporting the analyses or contents of this Draft EIR. The appendices include the following:

- Appendix A – Notice of Preparation/Initial Study/NOP Comment Letters
- Appendix B – RAP and Addendum to the RAP
- Appendix C – Air Quality Worksheets
- Appendix D – Greenhouse Gas Worksheets
- Appendix E – Health Risk Assessment
- Appendix F – Noise Worksheets
- Appendix G – Traffic Study

2. Project Description

2.0 PROJECT DESCRIPTION

INTRODUCTION

This chapter of the EIR provides a description of the proposed remedy for the former Kast Property Tank Farm (also referred to as the "site") in the Revised Remedial Action Plan (RAP or the "project") dated June 2014 and Addendum dated October 2014 that is under review by the Los Angeles Regional Water Quality Control Board (Regional Board). The RAP and Addendum to the RAP are provided in Appendix B of this EIR. Upon approval of the RAP, the remediation activities would be implemented by Equilon Enterprises LLC, doing business as Shell Oil Products U.S. ("Shell" or also referred to as the "Responsible Party" or "RP"). The proposed RAP is included as Appendix B of this EIR. The proposed RAP presents the detailed componets of the proposed remediation plan for the site.

Remedial Action Plan Background

The approximately 44-acre site is developed with 285 single-family residences, referred to as the Carousel Tract (the "site"). In 2008, environmental investigations were conducted in connection with the adjacent former Turco Products Facility. During those investigations, contamination by petroleum hydrocarbons was discovered at sample locations within the site. The Department of Toxic Substances Control (DTSC) communicated these findings to the Regional Board in March 2008, and in April 2008 the Regional Board sent an inquiry to Shell regarding the status of any environmental investigations at the site. This inquiry was followed by the Regional Board's California Water Code (CWC) Section 13267 Order to Conduct an Environmental Investigation at the former Kast Property issued to Shell on May 8, 2008. Shell conducted a series of extensive multimedia sampling and investigations, pilot studies, and other environmental evaluations of the site in response to that Order and subsequent 13267 Orders issued on October 1, 2008 and November 18, 2009, Section 13304 Order dated October 15, 2009, and Cleanup and Abatement Order R4-2011-0046 (CAO) dated March 11, 2011, as amended. All of the investigations have occurred under Regional Board oversight, following work plans reviewed by the Regional Board in consultation with other governmental agencies including the Office of Environmental Health Hazard Assessment (OEHHA), the Los Angeles County Fire Department, and the Los Angeles County Department of Public Health and approved by the Regional Board. Results of the investigations show that the site has been impacted with petroleum hydrocarbons and related constituents and non-petroleum related constituents associated with former crude oil storage during the period prior to residential redevelopment, as discussed under the "Site History" subsection below.

The CAO requires Shell to prepare a RAP that at a minimum, will attain cleanup goals that are based on residential (i.e., unrestricted) land use, that will achieve applicable water quality objectives set forth in the Regional Board's Water Quality Control Plan, that will comply with State Water Resources Control Board (State Water Board) Resolution 68-16 ("Statement of Policy with Respect to Maintaining High Quality of Waters in California", i.e., the State's "Anti-degradation Policy"), and that will comply with State Water Board Resolution 92-49 ("Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304). Shell prepared a Draft RAP and Draft Feasibility Study (Draft FS) in March 2014 and submitted it to the Regional Board in accordance with the CAO and in response to the Regional Board's letter dated January 23, 2014 directing Shell to submit a RAP and Human Health Risk Assessment (HHRA) pursuant to California Water Code Section 13304. The Regional Board reviewed the RAP, FS, and HHRA and in a letter dated April 30, 2014, provided comments and directives to Shell on these

documents. On June 30, 2014, Shell submitted a revised RAP, FS, and HHRA addressing the comments and directives contained in the Regional Board's April 30, 2014 letter. The Revised RAP, Revised FS and Revised HHRA are the basis for the EIR. In addition, Addendums to the RAP, FS, and HHRA were submitted in October 2014.[1]

The Revised FS dated June 2014 evaluates remedial action alternatives for the site and presents the rationale for selecting a preferred alternative. Out of the alternatives analyzed in the FS, the "preferred alternative proposed by the RP" for remediation of the site includes:

- Excavation of site soil from both landscaped areas and beneath residential hardscape to a depth of five (5) feet below ground surface (bgs) and targeted excavation to 10 feet bgs where warranted and feasible (details provided in subsection 5 below);
- Soil vapor extraction (SVE)/bioventing;
- Sub-slab vapor mitigation;
- Removal of light non-aqueous phase liquid (LNAPL); and
- Monitored natural attenuation (MNA) to address groundwater.

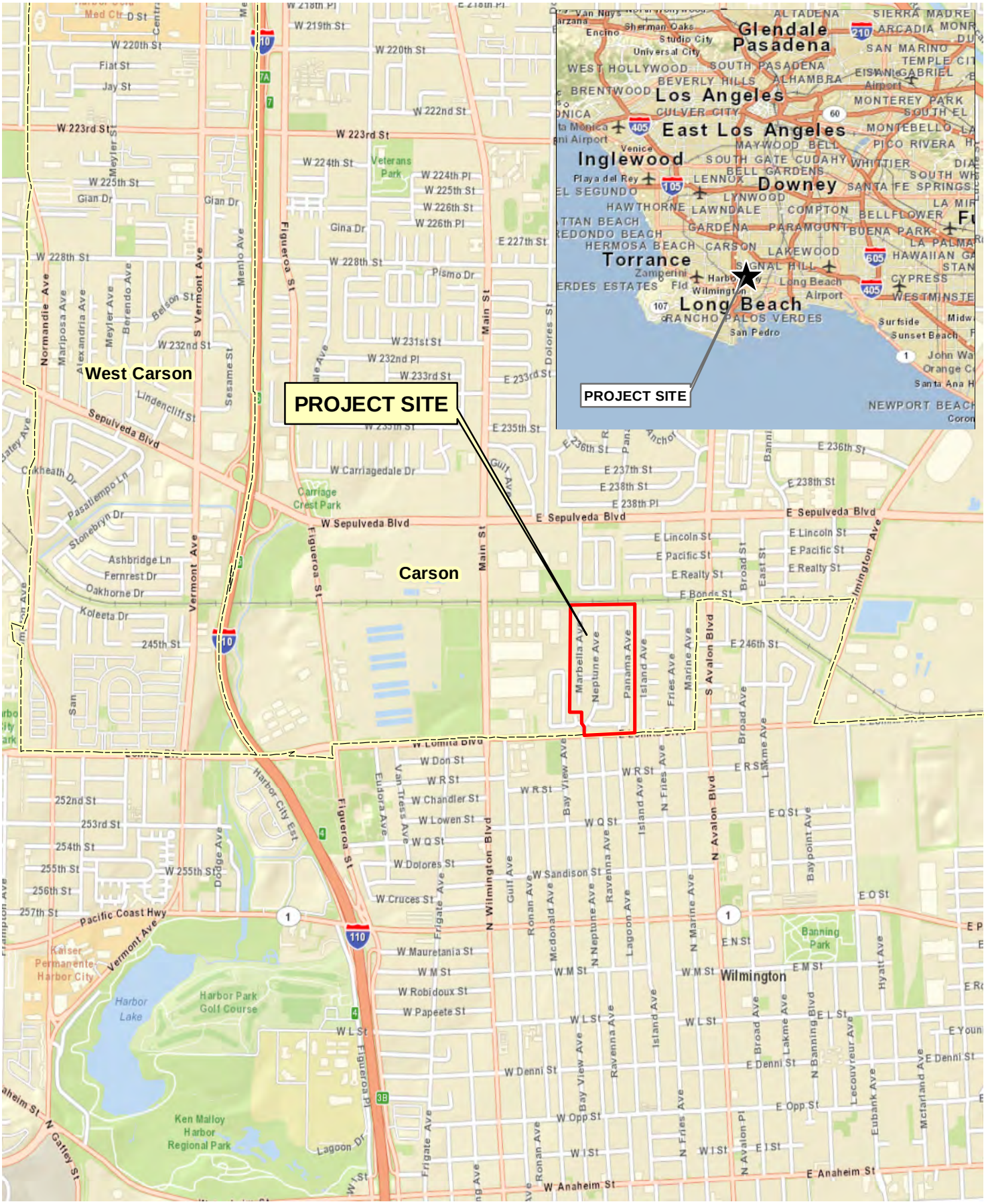
The RAP has been prepared in compliance with the CAO and summarizes the remedial alternative evaluation process and identifies and describes the proposed actions for cleanup and/or treatment of impacted soil and other media at the site. As such, the preferred alternative proposed by the RP in the RAP is the "project" being evaluated in this EIR.[2] Each of the project's components is described in detail below. The other remedial alternatives considered in the Revised FS are described in Chapter 3, *Description of Alternatives*, in this EIR.

1. PROJECT LOCATION AND SURROUNDING USES

Regional access to the site is provided via Interstate 110 (the "Harbor Freeway"), Interstate 405 (the "San Diego Freeway) and Interstate 710 (the "Long Beach Freeway) as shown in **Figure 2-1**, *Regional Location and Project Vicinity Map*. The site, which is located in the southern portion of the City of Carson, is bounded by Lomita Boulevard to the south, single-family residential properties of the Monterey Pines Community and industrial property of the former Turco Products Facility to the west, and single-family residential properties to the east (refer to **Figure 2-2**, *Project Site and Surrounding Uses).* The Los Angeles County Metropolitan Transportation Authority (MTA) railroad tracks [formerly owned by the Burlington Northern Santa Fe (BNSF) Railway Company] are located to the north of the site. The area directly south of the site across Lomita Boulevard is located within the City of Los Angeles and is designated as within a methane mitigation zone. Neighborhood streets within the Carousel Tract include Marbella Avenue, Neptune Avenue, Ravenna Avenue, Panama Avenue, E. 244th Street, E. 247th Street, E, 248th Street, and E. 249th Street.

[1] *The Revised RAP and Addendum to the RAP are provided in Appendix B of this EIR. Portions of the Revised HHRA and Addendum to the HHRA are provided in Appendix E of this EIR. The Revised HHRA and Addendum to the HHRA in its entirety and the Revised FS and Addendum to the FS are available for public review at the Regional Board's Los Angeles Office at 320 W. 4th Street, Suite 200, Los Angeles, CA 90013. These documents are also available on the Regional Board's website at: http://www.waterboards.ca.gov/losangeles/ under "Announcements".*

[2] *The project has an option that is discussed in more detail below. Thus, the project is also referred to as a base remedy and the option is referred to as the expedited implementation option.*



PCR

0 1,000 2,000 Feet

Regional Location and Project Vicinity Map

Former Kast Property Tank Farm Site Remediation Project

Source: ESRI Street Map, 2009; PCR Services Corporation, 2014.

FIGURE

2-1

PCR

N

0 600 Feet

Project Site and Surrounding Uses

Former Kast Property Tank Farm Site Remediation Project

Source: URS, 2014.

FIGURE

2-2

Historically, prior to development of many existing residential uses, the local project vicinity was primarily an industrial area inclusive of numerous oil refinery and other chemical-related facilities, many of which have documented hazardous materials releases. The RAP document discusses these facilities in detail. Surrounding industrial properties that have documented hazardous materials releases include: the former Turco Products/Purex Facility (Turco) (an industrial chemical facility) adjacent to and west of the site; the Fletcher Oil and Refining Company (FORCO) facility and associated Fletcher Oil Storage Yard to the west of the site; and the former Oil Transport Company Inc. (OTC) property (formerly included a chicken processing plant and truck washing operations) adjacent and to the southwest of the site. In the mid-1990s, the OTC property was redeveloped as the Monterey Pines community of single-family homes. Given the project area's historic industrial character and more recent inclusion of residential uses, numerous other past and present property uses and associated infrastructure (i.e., oil wells, dry cleaner facilities, and oil pipelines) are potential sources of hazardous materials in the local project vicinity.

2. SITE HISTORY

The site was purchased in 1923 by Shell Company of California and developed with three concrete oil storage reservoirs (see **Figure 2-3**, *Former Site Uses)*. Two of the reservoirs (the central and southern Reservoirs No. 5 and 6) had capacities of 750,000 barrels each, and the third reservoir (northern Reservoir No. 7) had a capacity of 2 million barrels. The reservoirs were partially in-ground and partially aboveground with earthen berms constructed using soil excavated from the belowground portions of the reservoirs. The reservoirs had wire-mesh reinforced concrete-lined floors and side walls, and were covered with wood frame roofs supported by wooden posts on concrete pedestals. The outer berms were 15 to 20 feet above surrounding grade, and the outer walls of the berms are believed to have been covered with asphalt. The oil storage reservoirs were primarily used to store crude oil. Historical records indicate that bunker oil or heavier intermediate refinery streams may also have been stored in the reservoirs at one time, but the time and quantity of bunker oil storage is unknown.

The site was used as an active oil storage facility until the 1950s, when the site was used only on a standby reserve basis. In October 1965, Shell Oil Company entered into a Purchase Option Agreement to sell the site with the oil storage reservoirs intact to Richard Barclay, a real estate developer and principal in Barclay Hollander Curci (later renamed Barclay Hollander Corporation) and Lomita Development Company.

The historic account of the site demolition and subsequent grading performed by Lomita Development Company (Lomita), as provided by Pacific Soils Engineering, Inc. (PSE) include the following: 1) Lomita emptied and demolished the reservoirs, and graded the site prior to developing the site as residential housing; 2) part of the concrete floor of the central reservoir was removed from the site by Lomita; and 3) the reservoir bottoms were left in place. The PSE report described that soil used to fill in the reservoirs and return the property to its natural grade came from the berms surrounding each reservoir and surrounding the perimeter of the site. In phases between 1967 and 1969, Lomita developed the site into one- and two-story single family residential parcels and sold the developed lots to individual homeowners. The residences are typically wood frame with concrete slab-on-grade and stucco exterior wall construction.

3. EXISTING SITE CONDITIONS

The site is relatively flat, with a gradual slope to the northwest. The elevations across the site range from approximately 30 to 40 feet above mean sea level (msl). The shallowest groundwater beneath the site occurs at a depth of approximately 53 feet below ground surface (bgs), with a groundwater flow direction to the northeast. The site is occupied by 285 single-family residential properties and City streets. Some of the

residences have walls, fences, mature landscaping, and swimming pools that extend to varying depths below the ground surface.

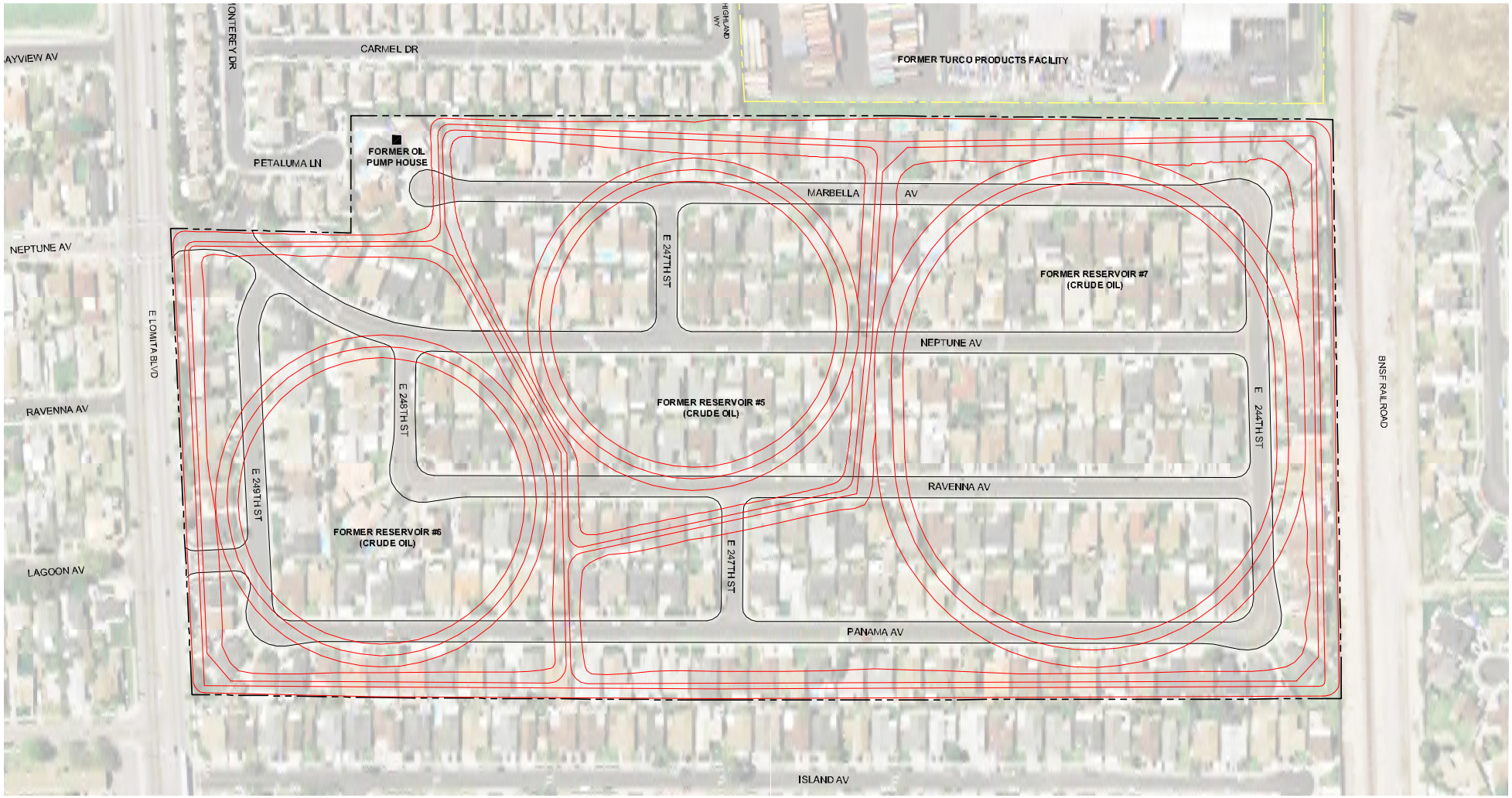
As mentioned above, extensive multimedia sampling and testing have been conducted at the site during investigations from 2008 to present. Details of the sampling and the findings of other site assessments are included in Chapter 3.0, *Previous Investigations*, of the RAP document. Also, Section 5.4, *Hazards and Hazardous Materials*, in this EIR, provides an in-depth discussion of the impacts in soil, soil vapor, indoor and outdoor air, and groundwater based on the investigations conducted at the site. As summarized in Section 5.4 of this EIR, sampling completed during site characterization confirms that there were petroleum releases consisting of crude oil at the site. In addition, chlorinated compounds were detected in all site media. Other compounds have also been detected at the site (e.g., fuel oxygenates). Petroleum hydrocarbon and related volatile organic compound (VOC) and semi-volatile organic compound (SVOC) impacts occur in shallow and deep soils; VOCs and methane resulting from degradation of petroleum hydrocarbons are present in subsurface soil vapor; dissolved-phase VOC and total petroleum hydrocarbons (TPH) impacts are present in groundwater, and light non-aqueous phase liquid (LNAPL) in the form of crude oil is locally present in the site soils at the groundwater table. LNAPL consists of petroleum hydrocarbons (crude oil inferred to have originated during site operations as a crude storage facility) that are not soluble in water and have lower density than water. Thus, once LNAPL infiltrates the ground, it will stop at the height of the water table and float on top of the water. There are also localized occurrences of residual tarry materials in the unsaturated soils.

In addition to hydrocarbon-related impacts, chlorinated solvents, such as tetrachloroethene (PCE) and trichloroethene (TCE), and from trihalomethanes (THMs) are present in all media at the site. Methane is generally present in the shallow subsurface but has not been detected in residences or enclosed areas of the site at levels that pose a hazard. Soil vapor methane has been identified as a result of biodegradation of residual petroleum hydrocarbons, leaking natural gas utility lines, and a leaking sewer line.

4. PROJECT OBJECTIVES

The underlying purpose of the proposed RAP is to remediate the site in compliance with the Regional Board's CAO R4-2011-0046 dated March 11, 2011, as amended, and applicable laws and policies. In accordance with the provisions of the CAO and as required by Section 15124(b) of the CEQA Guidelines, the below listed objectives for the proposed RAP have been established. The objectives will aid decision makers in their review of the project and environmental impacts, and alternatives.

1. Implement a RAP that complies with the CAO and meets the media-specific (i.e. soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) developed for the site. (See below for a list of the RAOs for the site.)
2. Maintain the residential land use of the site and avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community.
3. Minimize short-term disruption to residents.
4. Allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils (i.e., landscaping, hardscape, gardening, etc.) on their properties.
5. Limit or minimize environmental impacts associated with the cleanup activities.



EXPLANATION

Approximate Property Line

Approximate Location of Reservoir and Outer Berms

PCR

N

0 250 Feet

Former Site Uses

Former Kast Property Tank Farm Site Remediation Project

Source: Geosyntec Consultants, 2014.

FIGURE

2-3

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5. DESCRIPTION OF THE PROJECT

Remedial Action Objectives and Site-Specific Cleanup Goals

The Regional Board approved numerical Site Specific Cleanup Goals (SSCGs) for the constituents of concern (COCs) developed for the site and the media-specific (i.e. soil, soil vapor, and groundwater) RAOs have been developed to achieve the numerical SSCGs. These media-specific RAOs and SSCGs were used primarily to identify the recommended response actions for each impacted medium that are proposed in the RAP. The below-listed RAOs are proposed for the site. Each RAO and further explanation of its meaning as applicable to the project is provided in Section 5.4 of this EIR.

- RAO #1. Prevent human exposures to concentrations of COCs in soil, soil vapor, and indoor air such that total (i.e., cumulative) lifetime incremental carcinogenic risks are within the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) risk range of 1×10^{-6} to 1×10^{-4} and noncancer hazard indices are less than 1 or concentrations are below background, whichever is higher. Potential human exposures include on-site residents and construction and utility maintenance workers. For on-site residents, the lower end of the NCP risk range (i.e., 1×10^{-6}) and a noncancer hazard index less than 1 are used. Prevent direct contact exposure to COCs at concentrations above applicable risk-based SSCGs in soil for on-site residents and construction and utility maintenance workers.
- RAO #2. Prevent fire/explosion risks in indoor air and/or enclosed spaces (e.g., utility vaults) due to the accumulation of methane generated from the anaerobic biodegradation of petroleum hydrocarbons in soils. Eliminate methane in the subsurface to the extent technologically and economically feasible.
- RAO #3. Remove or treat LNAPL to the extent technologically and economically feasible, and where a significant reduction in current and future threat to groundwater will result.
- RAO #4. Reduce COCs in groundwater to the extent technologically and economically feasible to achieve, at a minimum, SSCGs and the water quality objectives in the Regional Board Basin Plan to protect the designated beneficial uses, including municipal supply.

The numerical SSCGs for soil, soil vapor and groundwater and the media-specific RAOs are identified in Section 5.4 of this EIR.

Proposed RAP Components

Overview

The RAP consists of the following multi-media components to remediate the site. The following provides a brief overview and each of the components is described in further detail below.

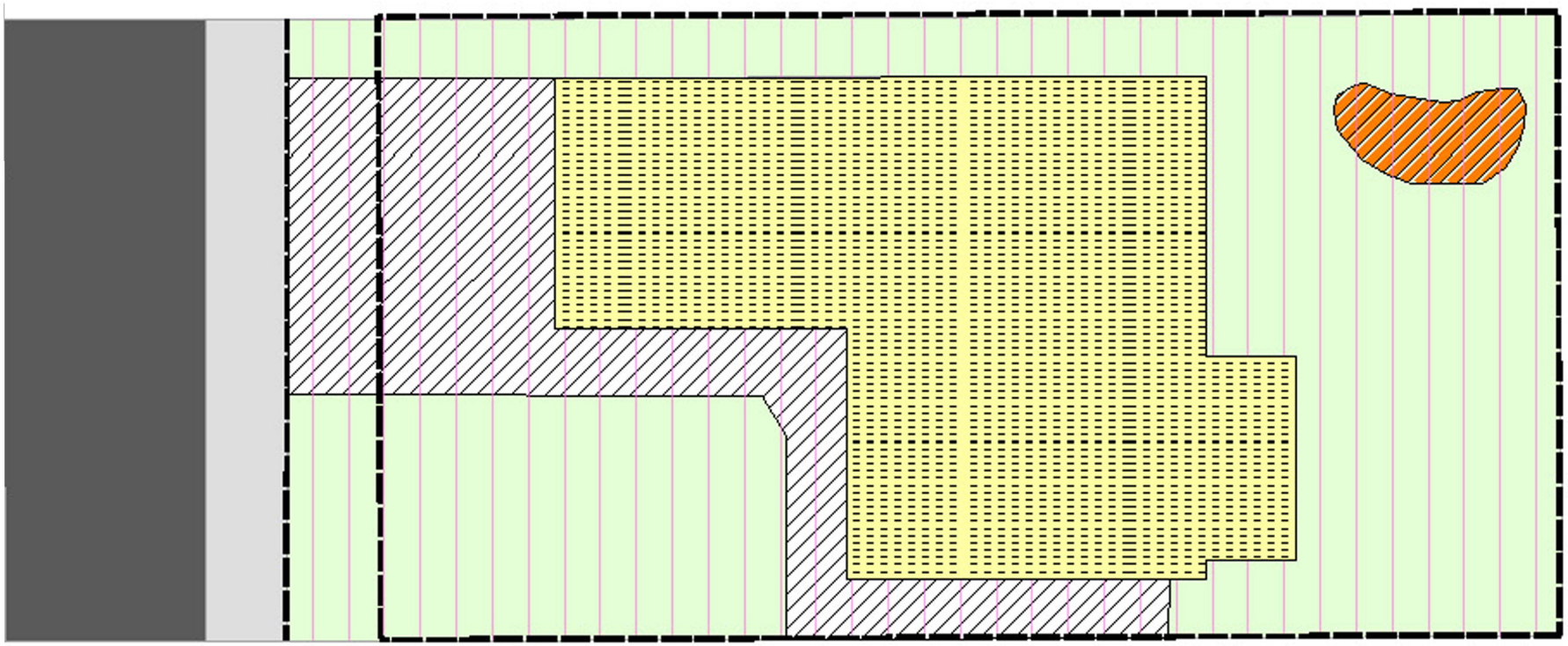
- Excavation of soil would be conducted at impacted residential properties where RAOs are not met under existing conditions. Excavation would be conducted in both landscaped and hardscaped areas of residential yards, excluding beneath City sidewalks and houses, to a depth of five (5) feet bgs and targeted excavation where practicable to 10 feet bgs at properties where residual NAPL soil concentration and significant hydrocarbon mass can be reduced based on detected TPH concentrations. The excavation would also remove residual concrete slabs if encountered in excavations. Following excavation, hardscape and landscaping would be restored to like conditions.

- SVE/bioventing would be used to address petroleum hydrocarbons, VOCs, and methane in soil and soil vapor and to promote degradation of residual hydrocarbon concentrations where RAOs are not met following soil excavation activities. A SVE system with SVE wells in City streets and on residential properties would be installed and operated. Bioventing in concert with SVE would be used to increase oxygen levels in subsurface soils and promote microbial activity and degradation of longer-chain petroleum hydrocarbons. Bioventing would be integral with SVE via cyclical operation of SVE wells. After installation and startup of the SVE/bioventing system, periodic monitoring of the SVE/bioventing system would be conducted. Results of the monitoring and analyses, in conjunction with measured flow rates, field readings and time of operation, would be used to estimate the mass of VOCs removed from the subsurface, degradation of longer-chain hydrocarbons, and as a basis for optimizing and eventual shutdown of SVE operations and switching from the SVE/bioventing to bioventing mode of operations.
- Sub-slab vapor mitigation would be implemented at properties where RAOs for soil vapor would not be met based on potential exposure due to vapor intrusion of petroleum hydrocarbons or chlorinated ethenes (e.g. PCE and TCE) from soil vapor to indoor air, and where detected methane concentrations in sub-slab soil vapor probe samples exceed the upper methane SSCG. In addition, the RP would install a sub-slab mitigation system at any residence at which a homeowner requests such a system.[3]
- LNAPL recovery would continue from wells MW-3 and MW-12 on a monthly basis, and if LNAPL is detected in other wells, monthly LNAPL recovery would be initiated on these wells if they have an LNAPL thickness of greater than 0.5 foot to the extent technologically and economically feasible.
- Groundwater Source Reduction and Monitored Natural Attenuation - COCs in groundwater would be reduced to the extent technologically and economically feasible via source reduction and MNA. If, based on a 5-year review following initiation of SVE system operation, groundwater plumes are not stable or declining and site COCs in groundwater do not show a reduction in concentration, an evaluation of additional groundwater treatment technologies would be conducted and implemented as needed.

For soil less than 5 feet bgs and sub-slab soil vapor, potential exposures would be addressed in the short term. Deeper soil, soil vapor, and groundwater risk reduction would be implemented over a longer period of time through SVE/bioventing and MNA. **Figure 2-4**, *Remedial Actions on a Given Property*, illustrates an example of the remedial actions and technologies that could be applied on a given property. The SVE/bioventing that is listed as an additional technology on Figure 2-4 would be installed after the excavation of the soil, but before final backfill and re-landscaping for properties where both activities are scheduled to occur.

There are approximately 12 properties for which access has not been granted and the required sampling has been completed at 86 percent of the residences including two rounds of indoor air sampling as of October 17, 2014. If access is granted to these properties during implementation of the RAP, sampling would be conducted, and the results would be analyzed consistent with the approach described above to determine what remedial measures, if any, would be taken. These additional properties are assumed to require remedial actions so as to provide a conservative or worse-case analysis of environmental impacts. While the

[3] *The RP has offered to install a sub-slab mitigation system at any residence within the Carousel tract at which a homeowner requests such a system. If a homeowner requests such a system, the system would be installed by the RP.*



Legend:

- Property Line
- Sub Slab Mitigation
- Excavate Exposed Soils to 5 ft./ Targeted Properties to 10 ft.
- Remove residential hardscape
- Mobile LNAPL Removal
- Road
- Sidewalk
- Driveway/Conc.Walk
- Residence
- Landscaping
- LNAPL

Additional Technologies
1) Existing Institutional Controls
2) Groundwater MNA and Contingency Remediation
3) SVE/bioventing

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Remedial Actions on a Given Property

Former Kast Property Tank Farm Site Remediation Project

Source: URS, 2014.

FIGURE

2-4

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remedial actions for these properties are still to be determined, the description of the RAP's components will not materially change by these determinations. Since these properties are included in the analyses, should all or a portion of these properties require remedial actions, the associated environmental impacts would not change.

Excavation of Soil

Impacted soil would be excavated from 219 residential properties where results of the previous site assessments indicate that RAOs and the more stringent of the health risk-based or leaching to groundwater criteria are not met under existing conditions.[4] Soil would be excavated to a depth of 5 feet below existing grade at 219 properties (410 yards) with targeted excavated to 10 feet below existing grade at 97 of the properties at selected yards (146 yards).[5] Excavation would occur from both landscaped areas and areas currently covered by hardscape, including walkways, driveways, patio areas, and hardscape associated with landscaping. In general, the lateral extent of the excavation would be up to the back of the City sidewalk and up to the houses, subject to required setback distances. For the purposes of this EIR, it is assumed that the 12 properties for which no soil data exist would be excavated to a depth of 10 feet below grade as discussed above. On average, a conservative estimate of approximately 611 cubic yards (CY) of soil would be excavated from each of the 122 properties identified for 5 foot excavation, and approximately 867 CY from each of the 97 properties identified for targeted 10-foot excavation. Approximately 161,700 CY plus a 10 percent contingency of 16,170 CY for a total of 177,870 CY of soil would be removed from residential excavations.[6] This estimate assumes that soil would be excavated to a depth of 5 feet from the front, side, and back yards of each property; targeted deeper excavation to 10 feet would occur only in front and/or back yards of identified properties. During the preparation of the Property-Specific Remediation Plans (PSRPs), the specific excavation areas for each property would be identified. In some cases, the volume of soil to be excavated for each property would be less or more than the average value.[7]

In addition to impacted soil, implementation of the RAP would result in the removal of fences, walkways, and landscaping. On average, approximately 45 CY of demolition waste (fencing, etc.) and 14 CY of green waste (landscaping plants, sod, etc.) would be removed from each of the 219 properties. Thus, there would be a total volume of approximately 177,870 CY of soil, 9,550 CY of demolition waste, and 2,300 CY of green waste removed from the residential properties on-site.

In addition, if remnants of concrete slabs from the demolished oil storage tanks are found in the upper 5 feet of the excavations or the upper 10 feet for the targeted excavation properties, these remnants would be removed to the extent practicable and where it could be done safely. If encountered, concrete extending

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[4] *The 219 properties assumes all 12 properties with no data would require excavation after data become available and are evaluated.*

[5] *The properties refer to an individual residential property and the yards refer to a front, side and/or rear yard.*

[6] *The volume estimates assume excavation of front, back and side yards to 5 feet. The estimate is based on measurements of yard areas taken from aerial photos and measurements taken in the field at the time of site investigations. This is an upper bound volume estimate, as it does not include a reduction in volume for setbacks, sloping of excavation walls, and avoidance of the transite water supply pipelines. However, a contingency of 10 percent is added to the soil excavation amount in order to account for unforeseen circumstances that might occur in the field such as a need to laterally extend excavation to remove additional impacted soil.*

[7] *The analyses contained in Chapter 5 of this EIR assume the excavation volumes with the 10 percent contingency. Should the volume of soil excavated from a particular property be less than the estimate, the daily extent and type of remedial actions and associated environmental impacts would not be greater than the impacts associated with this estimate. This approach is used to ensure that the potential environmental impacts associated with the remedy are not underrepresented. At the same time, it is believed that any variance would not be substantial, and, for this reason, the estimated environmental impacts are believed to be representative of what the actual impacts would be.*

laterally beneath a structure or beneath the sidewalk would be cut at the edge of the structure or inner edge of the sidewalk and the remaining concrete slab remnant would be left in place.

Soil samples generally were collected from multiple locations at each property sampled at depths of 0.5, 2, 5 and 10 feet bgs, where feasible. Samples were also collected at other depths when field observations or field instrument readings indicated possible impacts. Revised Table 6-1 and Revised Figure 6-1 in the Addendum to the RAP lists and illustrates the identified 219 properties that would include excavation of soil. Revised Table 6-1 and Revised Figure 6-3 in the Addendum to the RAP also lists and illustrates the identified 97 properties that would include targeted excavation to 10 feet bgs. The 12 properties with no soil data are included in the 97 properties that would be excavated to 10 feet bgs, thus providing a conservative analysis of the potential environmental impacts associated with the RAP. If data are collected from these properties in the future and less excavation were necessary, the removal of these properties for soil excavation would reduce the overall duration of the RAP implementation, which is described below.

Post-excavation soil samples would be collected to document concentrations of certain COCs remaining on properties following excavation. Post-excavation samples would be collected from the excavation bottom from each front yard and back yard adjacent to the residence excavation bottom, from each front part and back part of the side yards adjacent to the residence, and from the excavation adjacent to City sidewalks in front yards. Samples would only be collected from walls of excavations along property lines, where the adjacent property has not been or is not scheduled to be excavated. Samples would be collected from two locations at two depths along property lines in the front and back yards of properties where the adjacent property would not be excavated. Additional samples may be collected from the excavation bottom at the wall along property lines at locations where the adjacent property is not scheduled for or has not been excavated, or along the tract perimeter. Depths of sidewall samples would be established in the field based on visual observations.

Residents would be provided temporary living assistance while active excavation, backfill, and hardscape restoration work are being implemented (see Preliminary Relocation Plan, Appendix E, of the RAP for further details). In addition, the residents of the immediately adjacent properties within the Carousel Tract and properties adjacent to the perimeter of the Carousel Tract where excavation work is being conducted (i.e. properties in the Monterey Pines Tract that abut the Carousel Tract or properties on Island Avenue that abut the Carousel Tract), would be offered relocation as necessary.

Hardscape and landscaping would be removed during the initial stage of excavation and restored to like conditions following completion of excavation backfill in consultation with the homeowner. It may be necessary to remove fences and block walls between yards and ornamental or partitioning walls on individual properties, as the depth of excavation likely would exceed fence post and footing depths. As with other hardscape, fences and walls would be restored following completion of excavation backfill prior to restoration of landscaping. Exceptions to excavation beneath hardscape include patios covered by structures and roofs, swimming pools and pool decking surrounding swimming pools. These hardscape areas would not be excavated to avoid structural demolition and potential damage to swimming pools and appurtenant equipment. No excavation for the purposes of direct soil removal remediation would occur beneath City streets and sidewalks or beneath houses. However, excavation within City streets would be conducted for trenching as part the of the SVE conveyance piping installation process. In addition to treatment by the SVE/bioventing system discussed below, remaining soil in these non-excavated areas would be addressed in the Soil Management Plan (SMP) and by existing City regulatory requirements, which are also discussed further below.

PSRPs would be prepared for each property to be excavated and would define areas to be excavated, features to be removed and those that would be protected in place, and locations of underground utilities that need to be either protected in place or removed and restored. The PSRPs would also include landscape restoration plans that would be developed in consultation with the property owners/residents.

Following backfill and utility and hardscape restoration, residents would move back into their homes during landscape restoration and fence/block wall construction, or, at their option, wait to return until after the landscape restoration is completed. Residents of properties adjacent to those where excavation work is being conducted would be offered relocation as necessary.

Excavation Approach

Proposed Excavation Methods and Equipment

Table 2-1, *Typical Equipment for Implementation of Various Phases of the RAP*, provides a list of the types of equipment that would be used on the site for the different activities associated with the implementation of the RAP.[8] As can be seen in Table 2-1, excavation would be conducted using rubber track-mounted excavators or rubber-tired backhoes. Medium-sized excavator would be used for work in front yards and back yards where sufficient access is available and smaller mini-excavators would be used in back yards with narrow access via side yards. Excavation would be conducted using a front-end loader and/or Bobcat skid-steer mini-loader to move soil from back yards to front yards and vice versa to bring in clean fill soil.

Table 2-1

Typical Equipment for Implementation of Various Phases of the RAP

Activity	Equipment
Residential Properties	
Demolition	Bobcat (ex. S510), Chain Saw, 6,000 Watt Generator, Water Pump
Excavation	15,000 to 18,000 lbs Excavator, Bobcat, 6000 Watt Generator, Water Pump
SVE Well Installation	Bobcat with Auger, 6000 Watt Generator
Subslab Vent Installation	Bobcat with Auger, 6000 Watt Generator
Backfill and Compaction	Bobcat, Small Compactor (Wacker), Water Pump
Slurry Backfill	Concrete Pump
Site Restoration	6000 Watt Generator, Concrete Pump
Street Trenching	Backhoe, Compressor, Generator, Concrete Saw
Well Installation	Drill Rig
Street Paving	
Grinding	Cold Plane Grinding Machine, Street Sweeper
Paving	Paving Machine, Steam Roller, Street Sweeper
Other Activities/General Equipment	Vapor Control System, Meteorological Station, Handheld Organic Vapor Monitoring Instruments, Employee Comfort Stations

Source: URS and Geosyntec Consultants, 2014

[8] *The list of equipment is representative of the types of equipment that would be used for the various activities. The list is not all inclusive and other pieces of equipment, including hand tools, could be used.*

Conventional excavation using slot-trenching as necessary to protect structures or other features and open bulk excavation with appropriate sloping, setbacks, and/or shoring would be used where possible. Slot trenching consists of excavating an approximately 3 to 5-foot wide trench slot and then backfilling the trench before excavating the adjacent slot. This method was established to be feasible during a pilot test. However, in some areas where targeted excavation from 5 to 10 feet would be conducted, a limited access bucket auger drilling rig would be used in conjunction with conventional excavation equipment. Auger excavation using a limited access rig would allow excavation to be conducted in relatively tight spaces adjacent to structures to remove a column of soil. Using this approach, a 3-foot diameter borehole would be excavated and then backfilled with controlled low strength material (CLSM, also referred to as sand-cement slurry) and allowed to cure overnight.[9] The adjacent column would then be excavated and backfilled with CLSM the following day. If necessary, a second row of boreholes could be completed adjacent to the first row with the centers of the boreholes offset to achieve maximum soil removal. **Figure 2-5**, *Plan View and Cross Section of Conceptual Remediation at a Residence*, illustrates the approach. Use of this method would also require re-excavating the upper approximately 3 to 5 feet of CLSM fill material and replacing it with clean import soil, unless the auger excavation is in an area that would be covered with hardscape. Use of auger excavation would be slow and would therefore be used in limited application in favor of conventional excavation wherever possible.

In areas where access for equipment is severely limited, such as side yards, a mini-excavator or hand tools and wheelbarrows would be used to conduct excavations.[10]

Excavations would be made with side slopes at the horizontal to vertical ratio recommended by the Geotechnical Engineer and approved by the LACDPW and City of Carson in the Grading Permit for the particular property being excavated.[11] The basic excavation protocols would be altered as needed as excavations are conducted and to address any previously unknown utilities, concrete debris or foundations unearthed. If possible and approved by the LACDPW and the City, excavations would have vertical sidewalls to maximize removal of impacted soil to the full depth of excavation. It is anticipated that excavation sidewalls would be sloped below foundation footings of structures and block wall footings.[12]

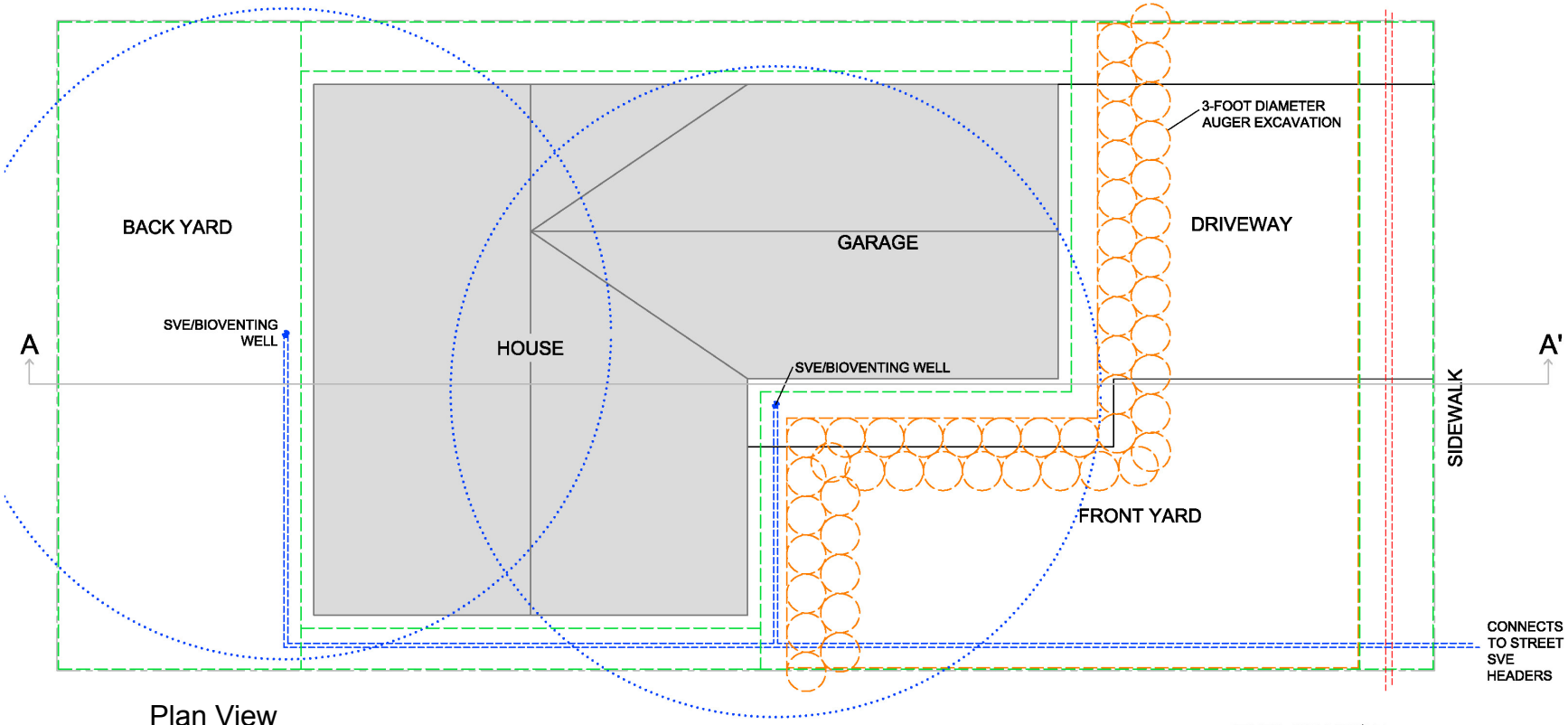
Excavation would be completed in clusters, with each cluster including approximately eight contiguous properties. Where possible, each cluster would include homes that share a common backyard property line (e.g., the east side of Marbella and west side of Neptune Avenues). This approach would be used to minimize disruption to residents and increase efficiency, in that if it is necessary to remove back fences or block walls, the fences can be removed one time and excavation and backfilling could be conducted in both yards before the fences are restored. For properties on the perimeter of the tract, work would proceed at a smaller number of properties for each phase. This phased excavation approach would require that access can be obtained and Grading Permits for the properties are available for all eight properties in a phase before work

[9] *CLSM can be designed to have low enough compressive strength to allow excavation with hand tools and a range of permeability to air and liquids. The CLSM mix would be designed to have permeability comparable to that of surrounding soils in order to effectively operate the SVE/bioventing systems.*

[10] *Depth of excavation using these methods is restricted to 5 feet bgs.*

[11] *The City of Carson follows the LACDPW Grading Guidelines and is a contract city, meaning that the LACDPW provides plan check services for the City.*

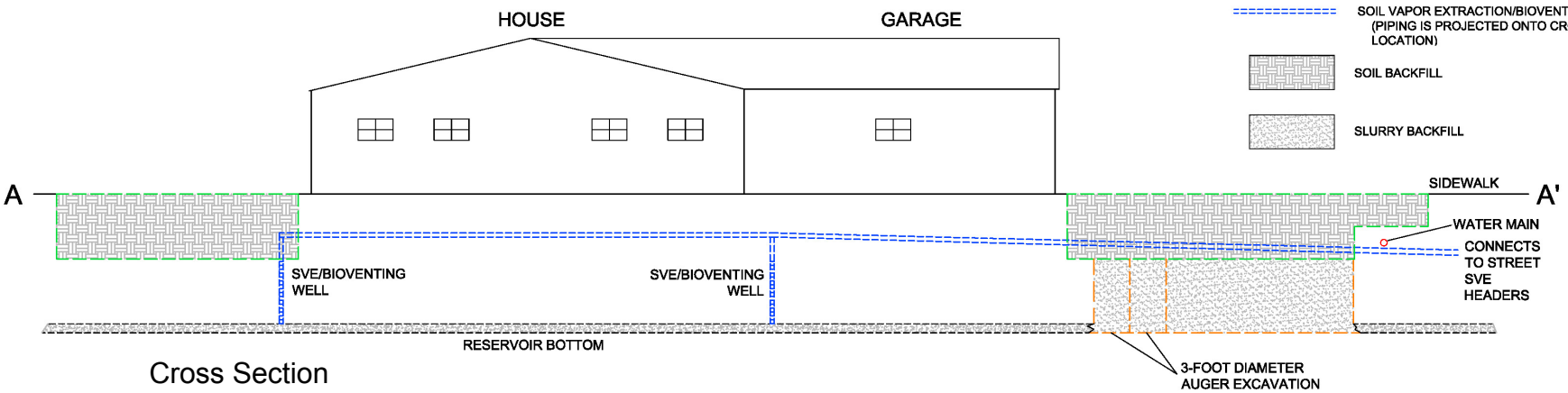
[12] *Potentially, the LACDPW and City would require setbacks from structures in accordance with appropriate elements of Sections J101, J104, J106, and J108 of the County Grading Code as amended by the City of Carson.*



Plan View

EXPLANATION

- 5-FOOT EXCAVATION
- 10-FOOT TARGETED EXCAVATION
- SOIL VAPOR EXTRACTION/BIOVENTING WELL AND SYSTEM PIPING (PIPING IS PROJECTED ONTO CROSS-SECTION FROM SIDE YARD LOCATION)
- SOIL BACKFILL
- SLURRY BACKFILL



Cross Section

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0 10 Feet

Plan View and Cross Section of Conceptual Remediation at a Residence

Former Kast Property Tank Farm Site Remediation Project

Source: URS, 2014.

FIGURE

2-5

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commences. In the event that a property does not require excavation, that property would be skipped in the sequencing of work; however, side yard and back property fences may need to be removed to allow excavation of the adjacent properties.

Backfill would begin upon completion of excavation and installation of other remedial elements. Borings from auger excavation would be backfilled with controlled low strength material (CLSM, also referred to as flowable fill or sand-cement slurry) the same day they are excavated. Where slot trenching is used for 5-foot excavations or for targeted deeper excavations to 10 feet, the lower part of the slot trenches would also be backfilled with CLSM. The upper 3 feet of excavations would be backfilled with certified clean imported soil. Backfill soil would be free of deleterious organic matter (i.e., vegetation) and cobbles larger than four inches in diameter, and would be approved by the Geotechnical Engineer. Backfill soil would be moisture conditioned to near optimal moisture content and compacted to at least 90 percent relative compaction, or as determined by the Geotechnical Engineer and approved by Los Angeles County Department of Public Works (LACDPW) and the City of Carson in the Grading Permit. The upper foot of soil backfill would be topsoil suitable for vegetation growth and would be compacted to not more than 85 percent relative compaction.

Following excavation and backfill but prior to site restoration, SVE/bioventing wells would be installed at each property where required. Additionally, for those 28 properties where a sub-slab mitigation system is proposed, the system would be installed concurrent with or following the excavation activities. As indicated previously, the RP would install a sub-slab mitigation system at any residence at which a homeowner requests such a system.

Materials Handling and Hauling

Excavated soil would be loaded directly into an awaiting transport vehicle (i.e., end-dump truck, dump truck, or covered soil bin) using the excavator, front-end loader or skid-steer mini-loader. To the extent possible, impacted soil would be direct loaded into approved waste haulers using the excavator for transport to the appropriate recycling or disposal facility. In the unlikely event that it is necessary to temporarily stockpile soil on-site before loading, soil either would be placed upon plastic sheeting and covered with plastic, or they would be temporarily placed in a covered bin. Care would be taken to ensure that all loose soil is brushed off the transporter and properly managed prior to covering with a tarp. Haul trucks would not be permitted to stage for long periods of time on public streets, including those within the Carousel Tract while waiting to be loaded. To ensure continuous pedestrian (including bicycle) and vehicular safety at the entrance and exit points of the site, a flag person would be made available during work hours to assist with truck ingress and egress, as needed.

Approximately 177,870 CY of soil would be removed from residential excavations at the site and an almost equal amount of clean soil would be imported.[13] Based on truck capacity, there would be a total of approximately 10,800 loads of export soil and 10,580 loads of import soil. The estimated truck loads per day would be on average 13 loads/day of export soil and 14 loads/day of import soil. In addition to the residential soil excavation, there would be approximately 8,100 CY of soil excavated for SVE piping

[13] *The 177,870 CY includes a contingency; soil removed from the residential properties is estimated to be 161,700 CY with a 10 percent contingency for a total of 177,870 CY.*

installation in the public rights-of-way. This would represent a total of approximately 580 loads of export soil. Impacted soil would likely be transported to Soil Safe's Thermal Desorption facility located in Adelanto, California or a closer equivalent treatment/disposal facility. The Soil Safe facility is located in the Mojave Desert approximately 100 miles from the project site. Import is assumed to be from fairly local sources, less than five miles from the site.

In addition to the excavated soil, other materials consisting of "hardscape debris" (non-hazardous landscape and other residential improvements, such as fencing material, etc.), residual concrete debris, asphalt and green waste would be removed as part of the excavation process, where necessary. **Table 2-2**, *Volumes of Material by Activity*, provides a summary of the quantities of materials anticipated to be removed during the remediation activities. There would be an estimated 740 truck loads of residential hardscape construction debris and 70 truck loads of asphalt from SVE trenching for pipe installation that would be hauled off-site for recycling or disposal. It is anticipated that approximately one truck load of green waste and two truck loads for concrete debris, on average, would be removed from each property.

Green waste likely would either be loaded into roll off bins provided by the City of Carson's contracted/franchise waste company, or placed in bins provided by the contractor and hauled to an appropriate facility. The specific recycling/disposal facility for removed asphalt would be determined by the contractor performing the work; however, it is assumed the facility would be located within the South Coast Air Basin. Hardscape debris would likely be transported to an appropriate facility, assumed to be within 30 miles of the site.

In addition, materials would need to be hauled to the site to complete the remediation. **Table 2-3**, *Average Daily Truck Trips*, provides a summary of the average truck trips that would result for the various activities at the site. As shown in Table 2-3, on average 60 trucks per day would enter and exit the site. On a peak day up to 90 truck trips could occur.[14] Haul trucks using regional freeways regardless of their origin/destination would access local streets to and from I-110 at Sepulveda Boulevard. Incoming trucks would access the site via Sepulveda Boulevard eastbound, Wilmington Avenue southbound, Lomita Boulevard westbound, and a right turn on either Neptune or Lagoon Avenues. Trucks leaving the site would then travel westbound on Lomita, northbound on Main Street, and westbound on Sepulveda to the I-110. The haul route(s) on municipal streets would be stipulated in a Construction Traffic Management Plan reviewed and approved by the City of Carson prior to project implementation.

Dust, Vapor and Odor Control

Monitoring would be performed by the RP during site remediation activities to ensure consistency with applicable South Coast Air Quality Management District (SCAQMD) rules and regulations. Applicable SCAQMD regulations are discussed and evaluated in Section 5.1, *Air Quality*, of this EIR. Dust suppression using water mist would be performed during excavation activities to minimize particulate matter emissions.

[14] *For analysis purposes in this EIR, the average of 60 truck trips is analyzed as a base case. In addition, because there could be days in which there is a greater level of activity, a peak day of 90 truck trips is also evaluated as appropriate.*

Table 2-2

Volumes of Material by Activity

Activity	Volumes of Material (cubic yards)
Demolition Export	
Residential Properties	9,550
Residential Property – Greenwaste	2,300
Street Trenching	2,060
Street Grinding	960
Subtotal	*14,870*
Soil/Waste Export	
Residential Property – Soil	177,870
Concrete Reservoir Bases	1,400
Street Trenching	8,100
Well Installation Transport to Off-site	725
Subtotal	*188,095*
Backfill Import	
Residential Properties	132,000
Slurry Backfill	
Residential Properties	38,600
Street Trenching	5,000
Subtotal	*43,600*
Restoration	
Residential Property – Concrete	8,300
Street Trenching – Asphalt	1,300
Street Paving – Asphalt	960
Subtotal	*10,560*

Source: URS and Geosyntec Consultants, 2014 and PCR Services Corporation, 2014

Care would be taken to ensure that the soil is not over-saturated which could generate runoff that would need to be managed and increase the weight of soil to be disposed. In accordance with SCAQMD requirements excavation and loading operations would cease if the wind speed is greater than 15 miles per hour (mph) averaged over a 15-minute period or instantaneous wind speeds exceed 25 mph.

Based on monitoring data or odor perception, vapor and odor control would be implemented on an as needed basis. Water mist would also provide the first level of vapor and odor control. Odor suppressants, such as Rusmar AC-565 Long Duration Foam or equivalent, and necessary support equipment, would be staged and ready for application at locations where remedial excavations are conducted.

Utilities

Prior to starting demolition of existing landscaping and hardscape and initiation of excavation, potential subsurface obstructions would be identified. Utility lines would be clearly marked in the field for removal or avoidance. Hand excavation would be used to confirm the location and depth of the transite pipe water

Table 2-3

Average Daily Truck Trips

Activity	Average Daily Truck Trips [a]
Residential Properties	46 trucks/day
Street Trenching	9 trucks/day
Well Installation	5 trucks/day
Total	60 trucks/day
Street Grinding and Paving (would occur after residential property excavation, street trenching, and well installation)	24 trucks/day

[a] *The above provides the average daily truck trips* (defined here as a one-way vehicle trip, either inbound or outbound at the site). *On a peak day up to 90 truck trips could occur, with the increase of 30 truck trips likely occurring as a result of an increase in materials at the residential properties.*

Source: URS and Geosyntec Consultants, 2014 and PCR Services Corporation, 2014

mains located in the front yards. Other underground utilities would be located, as deemed necessary, by hand excavation "potholing". Utilities within the site are summarized below.

- Water. Water service to the Carousel Tract is provided by California Water Service Company (Cal-Water). Water mains are located in the front yard of residential properties approximately 3.5 feet in from the inner edge of the sidewalk on the west side of named streets and on the south side of numbered streets at approximately 3 to 3.5 feet bgs. The water mains are of asbestos-cement (transite) pipe construction, and according to Cal-Water, these water mains will need to be avoided and not exposed in excavations. The RP and their contractor(s) would work closely with Cal-Water on this aspect of the utility location work, with setbacks to transite lines established in consultation with Cal-Water, as necessary.
- Sewer. Based on the 5-to 10-foot depth of excavation, sewer laterals at some properties may be affected. If sewer laterals are present within the 5-foot or targeted deeper 5 to 10-foot excavations, they would be capped, removed and replaced. No septic tanks or other septic systems are located within the site.
- Gas. Gas mains located in City streets would not be affected by excavation work. Gas service laterals to houses where excavations occur in front yards would be protected in place or would be capped, removed, and replaced when excavation is completed and excavations have been backfilled.
- Telephone/Cable. Telecommunications service trunk lines are located in a common trench with gas mains in the street or beneath the sidewalks and would not be affected by the work. Telecommunications lines to houses where excavation occurs in front yards may need to be removed and replaced. Replacement of telecommunications lines would be done by an AT&T contractor that routinely does telephone cable work in the Carousel Tract.
- Electrical. Electrical service is provided by overhead power lines with power drops to the rear of houses. Overhead power lines would potentially need to be removed due to the potential for the excavator to hit the overhead utility lines, which could create a hazard. The overhead power lines would be restored upon completion of the excavation.

SVE/Bioventing

SVE and bioventing are remedial technologies that would be used to address petroleum hydrocarbons, VOCs, and methane in soil vapor and to promote degradation of residual hydrocarbon concentrations remaining in soil following excavation that do not meet RAOs. The SVE process involves inducing airflow in the subsurface with an applied vacuum, enhancing in-situ volatilization of VOCs, and effecting movement of the VOCs to vapor extraction wells for removal from the subsurface. The SVE technology is also effective at removing methane from subsurface soil and has been used for this application at other hydrocarbon-impacted sites and at landfills.

Bioventing is an in-situ technology generally applicable to the remediation of petroleum hydrocarbons in soil. In this process, air is introduced into the subsurface to provide oxygen to enhance biodegradation of petroleum compounds. As summarized in Chapter 4 of the RAP and in more detail in the final Bioventing Pilot Test Summary Report,[15] bioventing was found to be effective at reducing hydrocarbon concentrations in site soil over time. SVE working in concert with bioventing would promote microbial degradation of longer-chain petroleum hydrocarbons and, over the long term, reduce concentrations of these less-volatile compounds in the subsurface.

Use of SVE/bioventing would address impacted soil beneath existing paved areas, City sidewalks, and concrete foundations of the homes, in addition to addressing reduction of COC concentrations in excavated areas below 5 feet bgs and unexcavated areas with the goal of achieving SSCGs over time. Operation of the SVE/bioventing system would also address impacted media that may be associated with residual concrete reservoir slabs left in place below the depth of excavation.

The SVE/bioventing infrastructure would consist of a system of vertical extraction/inlet wells, below ground conveyance piping, and an above ground treatment system. Findings of previous site testing regarding properties where concentrations of COCs and methane would not meet RAOs were used to identify properties that would require SVE/bioventing. Based on this data and in consideration of pilot test studies which evaluated the average effective radius of vacuum influence (ROVI) of wells at varying depths throughout the site, the RAP identifies the number and general locations of wells on-site necessary to remediate the site.[16,17] Wells would generally be placed in three zones: the "shallow zone" from approximately 5 to 10 feet bgs; the "intermediate zone" from approximately 15 to 25 feet bgs; and the "deep zone" from approximately 30 to 40 feet bgs.[18]

Within the "shallow zone," the RAP identifies 236 residential properties for which wells would be installed within front- and/or backyards.[19] There would be a total of 498 shallow wells on the residential properties.[20]

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[15] *Bioventing Pilot Test Summary Report. Former Kast Property, Carson, California. Geosyntec, December 6, 2012.*

[16] *The SVE pilot test activities and results are summarized in Chapter 4 of the RAP.*

[17] *The final locations for installation of SVE/bioventing wells would be established during the final SVE system design phase.*

[18] *Wells could potentially be placed deeper depending on depths of soil impact and depth to groundwater.*

[19] *The Addendum to the RAP provides a range of 224 to 236 properties for which wells would be installed. The 236 properties include the 12 properties for which no environmental characterization data have been collected as of October 17, 2014. For purposes of this EIR, the 12 properties for which there is no data are assumed to be included in the remediation in terms of excavation and installation of wells. The number of shallow wells on residential properties assumes two wells are installed on each of the 12 properties with no data.*

Well and piping components for SVE/bioventing wells installed on residential properties would be entirely below grade. At residential properties where remedial soil excavation would be performed, wells would be installed following backfill placement either by hand or using a small Bobcat skid-steer or similar equipment with a power auger attachment. Conveyance piping would be laid prior to final backfill and grading and would be extended to the back of sidewalks for later connection to piping in the streets. At residential properties that would not have excavation performed but that would have SVE/bioventing wells, installation of the well and piping would occur in the same general timeframe as nearby properties. At non-excavated properties, the wells would be installed by hand and piping would be laid in hand excavated trenches. Hardscape and landscaping that is affected by well and/or piping installation would be restored to like conditions following installation. Figure 2-5 shows a plan view and cross-section of a typical residence SVE/bioventing well system installation.

In addition to the 498 stand-alone shallow wells on the residential properties, there would be 65 stand-alone shallow wells in the streets. Thus, there would be a total of 563 stand-alone shallow wells on the site. **Figure 2-6**, *Typical Shallow Well Construction Detail*, provides an illustration of a typical stand-alone shallow well.

In addition to the stand-alone shallow wells in the streets, 63 "triple-nested" wells would be installed in the streets.[21] These nested wells would include shallow, intermediate, and deep zone wells (3 total wells in each nested well). The nested wells would all be constructed in the same borehole, separated by cement/bentonite seals. A typical nested well construction detail is shown of **Figure 2-7**, *Typical Nested Well Construction Detail*. Each nested well and the 65 stand-alone shallow wells in the streets would be installed within a flush-mount well vault surrounded by a concrete skirt.

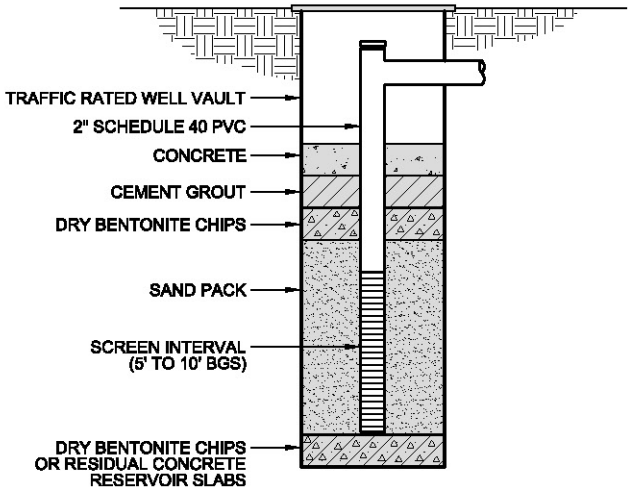
In summary, the RAP, inclusive of the stand-alone shallow wells and the nested wells, would include 626 shallow wells, 63 intermediate wells, and 63 deep wells. Thus, in total there would be 752 wells. **Table 2-4**, *Extraction/Inlet Wells Summary*, provides a tabular summary of the proposed on-site wells. The estimated vapor extraction coverage for the shallow, intermediate, and deep zones is shown on Figures 8-2, 8-3 and 8-4, respectively, in the RAP. As illustrated therein, the proposed wells would provide vapor extraction coverage in the varying zones for nearly the entire site. The wells throughout the site would be connected to the SVE system (described below) via conveyance piping, which would be installed in the streets.

The SVE equipment would consist of an entrained-moisture separator (knock-out pot), 3,000 standard cubic feet per minute (scfm) positive displacement blower with a 150 to 250 horsepower motor, control panel, and thermal/catalytic oxidizer. The system would operate using electrical power from Southern California Edison with a separate power drop and meter. The SVE system would be operated in a cyclic manner, with active extraction in different portions of the site at different times. During periods of vapor extraction from a sub-set of wells, the SVE system would remove hydrocarbon vapors and would also draw oxygen into the subsurface to enhance the biodegradation of residual petroleum hydrocarbons in soil. During periods when

[20] *Despite the shallow wells having a ROVI of 50 feet, the shallow well distribution for the site was based on a ROVI of 25 feet to conservatively account for potential short-circuiting from surface landscaping. Monitoring of the site (as discussed below) would be in place to readily identify any potential malfunction of the system. Should any malfunction be identified, the RP or its contractors would fix the problem.*

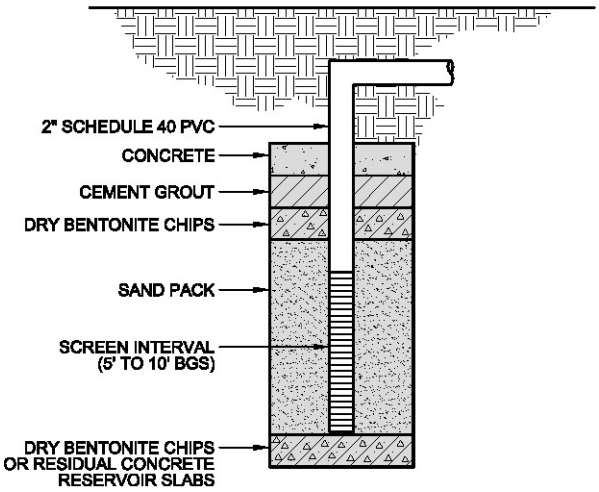
[21] *Based on the estimated ROVI of 50 feet, additional stand-alone shallow zone wells may be installed between the nested wells in the streets in select areas of the site to provide increased vapor extraction coverage within the shallow zone.*

SHALLOW STREET SOIL VAPOR EXTRACTION WELL



BORING DIAMETER: 6 3/4" MINIMUM
TOTAL DEPTH (APPROXIMATE): 11' BGS

SHALLOW RESIDENTIAL SOIL VAPOR EXTRACTION WELL



BORING DIAMETER: 6 3/4" MINIMUM
TOTAL DEPTH (APPROXIMATE): 11' BGS

NOTES:
BGS = BELOW GROUND SURFACE
PVC = POLYVINYLCHLORIDE

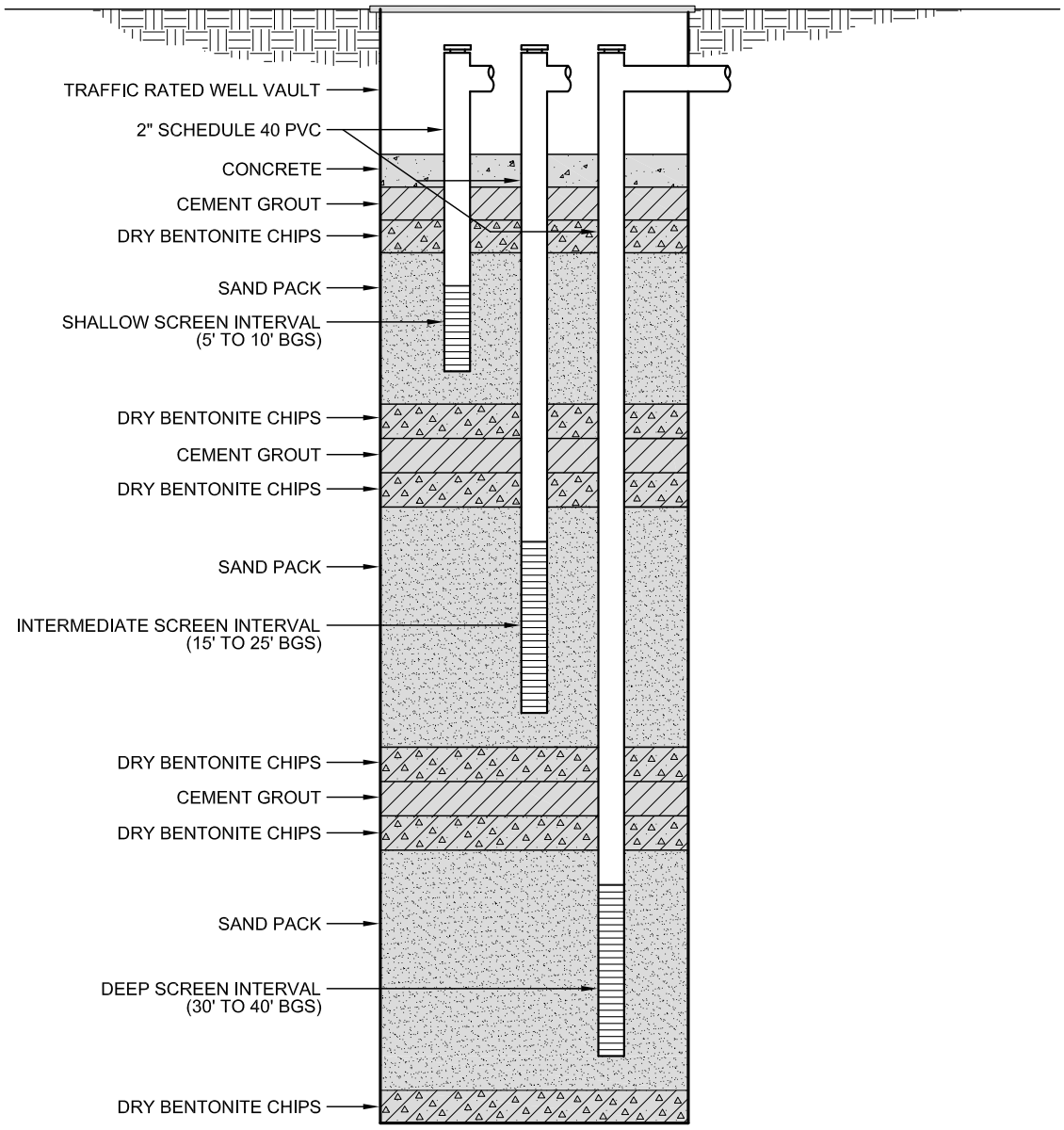
PCR

Typical Shallow Well Construction Detail

Former Kast Property Tank Farm Site Remediation Project
Source: URS, 2014

FIGURE
2-6

TRIPLE COMPLETION STREET SOIL VAPOR EXTRACTION WELL



BORING DIAMETER: 11 3/4"
TOTAL DEPTH (APPROXIMATE): 42' BGS

NOTES:
BGS = BELOW GROUND SURFACE
PVC = POLYVINYLCHLORIDE

PCR

Typical Nested Well Construction Detail

Former Kast Property Tank Farm Site Remediation Project
Source: URS, 2014.

FIGURE
2-7

Table 2-4

Extraction/Inlet Well Summary

Well Type	Shallow Zone (5-10 feet bgs)	Intermediate Zone (15-25 feet bgs)	Deep Zone (30-40 feet bgs)	Total No. of Wells
Shallow Zone Wells				
Stand Alone – 236 Residential Properties[1]	498	--	--	498
Stand Alone in City Streets	65	--	--	65
Within Nested Well in City Streets	63	--	--	63
			Total Shallow Zone Wells	**626**
Intermediate Zone Wells				
Within Nested Well in City Streets	--	63	--	63
			Total Intermediate Zone Wells	**63**
Deep Zone Wells				
Within Nested Well in City Streets	--	--	63	63
			Total Deep Zone Wells	**63**
			Total Wells	**752**

Notes: [1] The Addendum to the RAP provides a range of 224 to 236 properties for which wells would be installed. The total number of shallow zone wells for residential properties assumes the installation of two wells on each of the 12 properties for which no environmental characterization data have been collected as of October 17, 2014.
Bgs = Below ground surface

Source: Addendum to the Remedial Action Plan for the Former Kast Property, Carson, California, prepared by URS Corporation, October 2014 and PCR Services Corporation, 2014.

no extraction is occurring for a set of wells, remediation would be achieved through biodegradation alone (i.e., bioventing). The system would be designed to use the same infrastructure (i.e., extraction wells) for both SVE and bioventing, and the cyclic operating conditions would be used to implement both remedial actions. The SVE/bioventing system would be operated in a manner to achieve the soil oxygen demand estimated from the bioventing pilot tests.[22]

Oxidation equipment (thermal or catalytic) is used for destroying contaminants in the exhaust gas from SVE systems. Thermal oxidation units are typically single chamber, refractory-lined oxidizers equipped with a propane or natural gas burner and a stack. Flame arrestors are always installed between the vapor source and the thermal oxidizer. Burner capacities in the combustion chamber range from 0.5 to 2 million British thermal units (Btus) per hour. Operating temperatures range from 760 to 870 °C (1,400 to 1,600 °F), and gas residence times are typically 1 second or less.[23]

During catalytic oxidation, the addition of a catalyst accelerates the rate of oxidation by adsorbing the oxygen and the contaminant on the catalyst surface where they react to form carbon dioxide, and water. The catalyst

[22] *Ibid.*

[23] *Federal Remediation Technologies Roundtable, Remediation Technologies Screening Matrix and Reference Guide, Version 4.0, Chapter 4.57, (2002).*

enables the oxidation reaction to occur at much lower temperatures than required by a conventional thermal oxidation. VOCs are thermally destroyed at temperatures typically ranging from 320 to 540 °C (600 to 1,000 °F) by using a solid catalyst. First, the VOC-laden air is directly preheated (electrically or, more frequently, using natural gas or propane) to reach a temperature necessary to initiate the catalytic oxidation of the VOCs. Then, the preheated VOC-laden air is passed through a bed of solid catalysts where the VOCs are rapidly oxidized. Thermal oxidizers can often be converted to catalytic units after initially high influent contaminant concentrations decrease to less than 1,000 to 2,000 parts per million by volume (ppmv).

The design of the SVE system potentially would include use of multiple treatment technologies in a staged approach, depending on inlet concentrations. The remediation equipment would provide the flexibility to transition from thermal oxidation to catalytic oxidation followed by granular activated carbon (GAC) treatment, when the concentrations have decreased sufficiently.

The RP is evaluating three off-site locations for the installation of the remediation equipment. **Figure 2-8**, *Potential Soil Vapor Extraction Treatment System Locations*, shows the three locations, which are located within the developed industrial area to the immediate west or northwest of the site.[24] The SVE system would be installed in an enclosed structure constructed with sound attenuation insulation to reduce operating noise levels in accordance with City of Carson Noise Ordinance. The structure would have an approximately 320 square foot building footprint (two 8-foot by 20-foot skids), be up to approximately 12 feet high and have an effluent discharge stack with a minimum height of 13 to 15 feet extending from the top of the structure for dispersion of treated off gases. The actual stack height would be established in consultation with the SCAQMD as part of the Permit to Construct and Operate for the system. Additionally, a canopy would be attached to an outer wall of the structure to cover the header manifold (piping system from the wells to the treatment system).

The SVE/bioventing system would be operated until SSCGs are reached. The system would be operated on a continuous cyclic basis and shut down only during performance of routine maintenance. Based on data collected during the SVE and bioventing pilot tests, the estimated operating time for the SVE system is expected to be approximately 5 years.[25] Actual operating time would be dependent on monitoring data results to determine if the site's applicable RAOs and SSCGs are achieved. Bioventing to biodegrade residual hydrocarbons at concentrations of approximately 10,000 mg/kg in soil is expected to occur within approximately 30 to 40 years.[26]

Field activities associated with the system operation would include periodic site visits to record operating parameters, to monitor VOC and methane concentrations in the influent, effluent, and extraction wells using field instrumentation; and to perform routine system preventive maintenance and troubleshooting. The recorded operating parameters, and influent, effluent, and well concentrations would be used to fine tune and adjust the system and to optimize influent VOC and methane concentrations to sustain removal rates to achieve remediation with the shortest possible time frame, and to maintain compliance with the SCAQMD permit.

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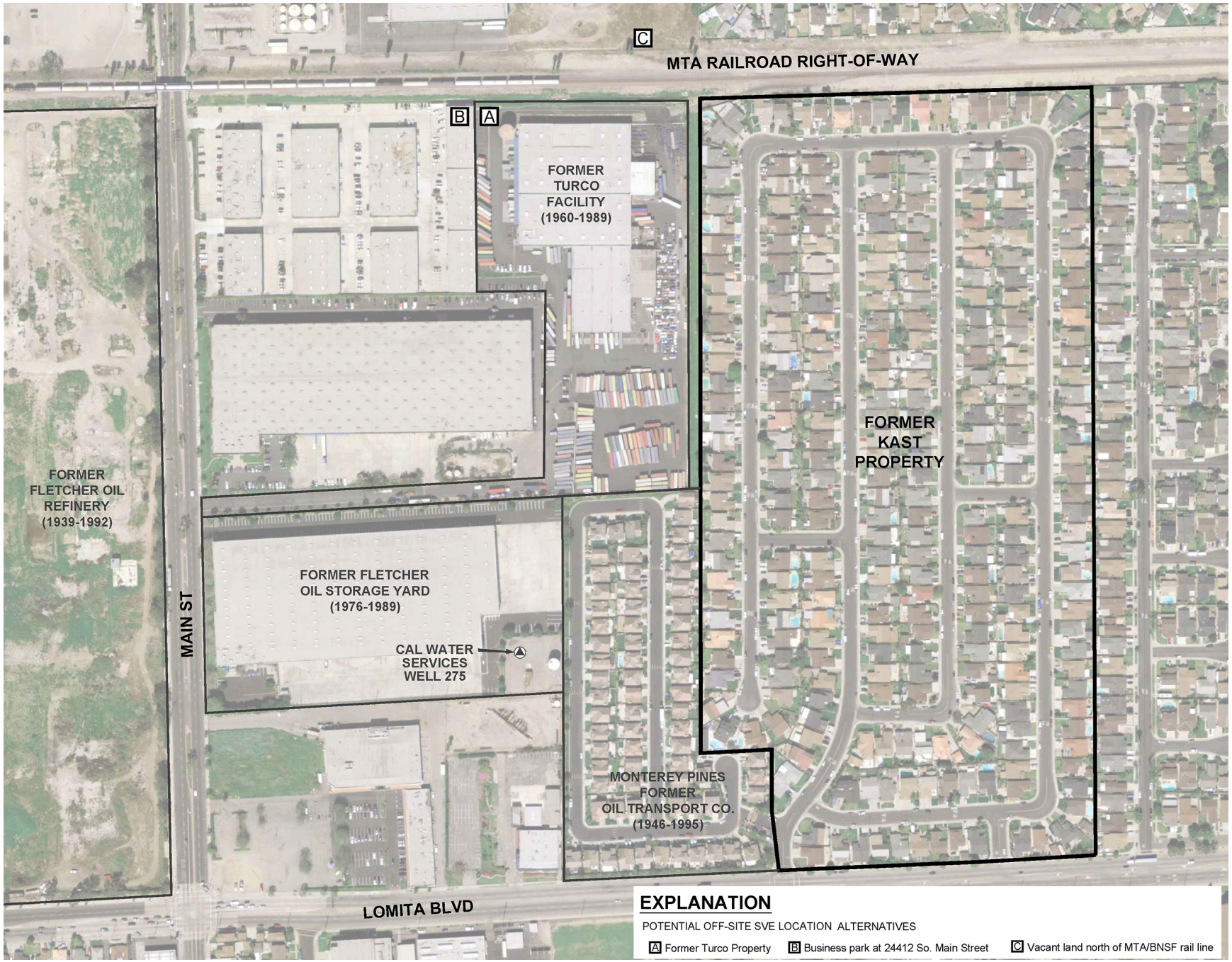
[24] *Piping would be installed from the Carousel Tract to the location of the remediation equipment. The installation of the piping would require minimal trenching and would not result in permanent or visible changes to the physical environment. The potential impacts from the trenching would be within the parameters of the project evaluated in Chapter 5 of this EIR.*

[25] *Soil Vapor Extraction Pilot Test Report, Former Kast Property, Carson, California, Site Cleanup No. 1230, Site ID 2040330. URS, September 30, 2010; and Bioventing Pilot Test Summary Report. Former Kast Property, Carson, California. Geosyntec, December 6, 2012.*

[26] *URS Corporation and Geosyntec, Revised Remedial Action Plan Former Kast Property, June 30, 2014, Appendix C, page C-3.*



N

0 600 Feet

Potential Soil Vapor Extraction Treatment System Locations

Former Kast Property Tank Farm Site Remediation Project

Source: URS, 2014.

FIGURE

2-8

PCR

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Sub-Slab Vapor Mitigation

Sub-slab vapor mitigation systems would be installed at 28 residential properties where RAOs for soil vapor would not be met based on potential exposure due to vapor intrusion of petroleum hydrocarbons or chlorinated ethenes (e.g. PCE and TCE) from soil vapor to indoor air, and at the two locations where detected methane concentrations in sub-slab soil vapor probe samples exceed the methane SSCG (0.5 percent). (See Table 6-1 and Figure 6-4 in the Addendum to the RAP for a listing of and figure showing the properties). One of these properties has already had an interim mitigation system installed, and the other only slightly exceeds the methane SSCG of 0.5 percent methane in a single measurement from a single sub-slab probe.[27] In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, an offer to install a sub-slab mitigation system to any of the homeowners in the neighborhood has been proposed by the RP. If a homeowner requests a sub-slab mitigation system, the system would be installed during the remediation of that property.

In order to keep vapors emanating from the soil below from entering a building a sub-slab depressurization (SSD) system would be used. The SSD system creates a negative pressure below the slab of the residence using a fan to remove air from below the slab and exhaust it above the building. The SSD system would include a manometer or in-line pressure gauge to provide a simple measure that the system is operating as designed. Additionally, the RP's contractors would confirm that homes with a SSD have a carbon monoxide (CO) monitor, as required in all homes by California law.

SSD design, installation, and operation would be in accordance with the DTSC Vapor Intrusion Mitigation Advisory.[28] The system would consist of creating holes in the slab or footing of the structure, removing a quantity of soil from beneath the slab to create a suction pit and installing suction pipes into the holes. The suction pipes would be directed to above the roof and a fan connected to the system to create a sub-slab vacuum.

After installation of the SSD system, based on diagnostic testing to assess the vacuum distribution beneath the building foundation, any necessary adjustments to the SSD system (e.g., larger fan or additional suction pits) would be made.

Because the SSD systems would be operated in an active mode using a fan to create a vacuum, the SSD systems would be permitted by the SCAQMD. Vapors vented by the system would be treated prior to discharge as required by the SCAQMD permit.

LNAPL Recovery

LNAPL removal would occur in localized areas through pumping at or beneath the surface of groundwater in monitoring wells. LNAPL is currently being recovered from monitoring wells MW-3 and MW-12 on a monthly basis using dedicated pneumatic total fluids pumps installed in the wells (refer to Figure 5.5-3, in

[27] *Sub-slab vapor mitigation systems would not be installed at residential properties where the vapor intrusion risk estimates are driven by trihalomethanes (i.e., chloroform, bromodichloromethane, or dibromochloromethane), because the presence of these constituents in soil vapor is believed to be due to off-gassing from municipal water (either leaking water lines or sewer lines or applied irrigation) and not a result of historical Site operations.*

[28] *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance). DTSC, October 2011.*

Section 5.5 of this EIR for a graphic showing the groundwater monitoring well locations). Recovered LNAPL is placed in drums which are immediately transported off-site for proper disposal.

As part of RAP implementation, LNAPL recovery would continue from wells MW-3 and MW-12 on a monthly basis, and, if LNAPL is detected in other wells, monthly LNAPL recovery would be initiated on these wells if LNAPL accumulates to a thickness of greater than 0.5 foot. A dedicated pump similar to the current LNAPL recovery setup in use for MW-3 and MW-12 would be used for LNAPL recovery in other wells if needed. Monitoring of LNAPL and water levels, and LNAPL recovery volume monitoring would continue during LNAPL recovery events. When LNAPL recovery shows a declining trend in wells in which LNAPL occurs, recovery trends would be evaluated, a recommendation may be made to the Regional Board to reduce the frequency of LNAPL recovery, as appropriate.

Groundwater and Monitored Natural Attenuation

There are currently 25 groundwater monitoring wells that have been installed on the site, which are monitored quarterly. Quarterly groundwater monitoring started in August 2009 after the first set of wells was installed. Groundwater occurs at a depth of approximately 53 feet beneath the site, with a groundwater flow direction to the northeast. Groundwater monitoring results have consistently indicated that groundwater is impacted with site COCs and may be impacted by discharges from upgradient sources. A detailed description of groundwater conditions including occurrence, quality, COCs, and COC sources as well as the SSCGs for groundwater are provided in Section 5.5, *Hydrology and Water Quality*, of this EIR.

Natural attenuation is the process by which contaminant concentrations in the environment are reduced "through biological processes (aerobic and anaerobic biodegradation, plant and animal uptake), physical phenomena (advection, dispersion, dilution, diffusion, volatilization, sorption/desorption), and chemical reactions (ion exchange, complexation, abiotic transformation)."[29] It has been proven to be highly effective in reducing petroleum based contaminants. Monitoring would be necessary to determine whether natural attenuation is occurring effectively at this site.

It is assumed that groundwater remediation of non-site-related COCs (e.g., chlorinated compounds) to the extent not removed by the selected remedy may be accomplished by directing responsible parties to remediate off-site upgradient sources to achieve water quality standards.

COCs

While natural processes would reduce site-related petroleum COCs (benzene, naphthalene, TPH) over time to meet RAOs (expected to be on the order of 70 years), implementation of the RAP would accelerate the process through removal of mass above and at the groundwater table (i.e., excavation of shallow soil, SVE/bioventing, and LNAPL recovery). Section 5.5 of this EIR provides a detailed analysis of the proposed remedial actions, along with MNA, relative to groundwater remediation.

If based on the initial five years of annual MNA data following implementation of SVE/bioventing operations, the concentrations of site-related COCs are not stable or declining, (i.e., the SVE/bioventing and natural processes are not sufficient), contingency supplemental remediation of certain site-related COCs in localized areas of groundwater may be implemented. The purpose of this contingency supplemental remediation would be to further shorten the time over which the concentrations of COCs would return to background or

[29] *http://toxics.usgs.gov/definitions/natural_attenuation.html*

MCL levels. Such supplemental remediation would likely consist of in-situ treatment using injection of chemical oxidants into the localized areas. Should such supplemental groundwater treatment be warranted, a pilot test of the most appropriate in-situ technology would be conducted and the supplemental groundwater treatment implemented. A subsequent environmental analysis would be conducted for future groundwater treatment options, as necessary pursuant to applicable CEQA requirements.

Implementation Schedule

Implementation of the remediation activities would potentially commence in Fall 2015 and would be implemented in phases of eight properties. Clusters of eight properties could be completed within approximately eight to ten weeks. More specifically, it is estimated that excavation and backfill would take approximately six weeks per property and restoration would take an additional approximately two to four weeks. Work on the next cluster of properties (i.e., the next eight properties working down the block), would begin approximately at the end of week six to week eight of work on the first cluster. During the restoration activities for the properties, the installation of the SVE wells and piping in City streets would occur After excavation and backfill, property restoration and SVE installation are complete it is anticipated that the final SVE construction activities may take approximately six months. During this final phase, the streets within the tract would be repaired as required and overlaid with new asphalt.

Based on approximately eight to ten weeks to complete a cluster of eight properties, with some overlapping of remediation activities, the suite of residential remedial construction activities including excavation, onproperty SVE/bioventing well and piping installation, backfill, sub-slab vapor mitigation, and site restoration is estimated to take approximately 6 years to complete. This estimate of time needed to complete these activities is dependent upon obtaining access to the properties in a timely manner and does not include loss of time due to inclement weather or other delays that might occur outside of the RPs control.

During the most labor intensive work periods, numerous activities are likely to be occurring simultaneously. These may include air-vac borehole clearance, SVE well drilling, landscape clearance, hardscape demolition, excavation and backfill at residential properties, and trenching to install SVE piping. During these activities as many as 32 employees are expected to be on-site at any one time, excluding truck drivers. Most workers would park off-site and would be shuttled to the site, likely in a van or small bus. It is assumed that about one-half of the workers (16 workers) would park off site and that the remaining 16 workers would drive directly to the site. During the street grinding and paving up to 22 workers are expected to be on-site at any one time, excluding truck drivers. In addition to workers, it is expected that up to nine (9) visitors, which would likely be various agency staff (i.e., Regional Board, City of Carson, SCAQMD, etc.), could be at the site on a given day.

Expedited Implementation Option

Based on experience in the field during the initial implementation of the RAP, it is possible that an increase in the number of properties being remediated at one time could occur. This would only occur if it is feasible and determined to be safe for residents and workers. Rather than a cluster of up to 8 properties, the number being actively remediated could be incrementally increased with up to 16 properties active at one time. Given the overlap in activity with the clusters there could be up to 32 properties in some stage of remediation or restoration at one time. Under the Expedited Implementation Option the clusters would not be contiguous but would be located in a different area within the site. Two clusters under active remediation and restoration would be separated by a minimum distance of 64 meters (105 feet) as measured from the closest site boundary of each cluster.

The Expedited Implementation Option would result in additional workers on site at any one time, when feasible, with up to 47 workers on the site at one time. As with the project, about one-half of the workers would park off-site and would be shuttled to the site, likely in a van or small bus. For the Expedited Implementation Option it is assumed that 23 workers would park off site and that 24 workers would drive directly to the site. Truck trips would double, with an average of 104 truck trips per day to and from the site. On a peak day, it is anticipated that up to 151 truck trips could occur. As with the RP's Proposed Remedy, the street grinding and paving, which would be a less intense phase of the remediation, would occur after the completion of the excavation and restoration of properties and the installation of wells, piping, and sub-slab mitigation.

The Expedited Implementation Option would result in an increase in the number of workers and number of properties active at one time on the site, which would reduce the overall timeframe necessary for the implementation of the RAP. This approach would not modify the construction hours but rather the amount of activity occurring at one time on the site. As with the RP's Proposed Remedy, under the Expedited Implementation Option, remediation would begin in 2015. However, with the increase in implementation, it is anticipated that the remediation would be complete in 2019. For analysis purposes, the Expedited Implementation Option is evaluated in each technical section in Chapter 5 of this EIR so as to understand any potential impacts that might occur if the RAP were to be implemented more quickly.

Construction Hours

Remediation activities are expected to occur on-site Monday through Friday, starting as early as 7:00 a.m., with employee arrival, safety meetings, and work day preparations (e.g., equipment inspections), ending as late as 5:00 p.m. Powered equipment is expected to be operational from 7:30 a.m. to 4:30 p.m.; trucks for import, export, or material deliveries are expected to access the site no earlier than 8:00 a.m. and would typically depart the site no later than 4:00 p.m. The same hours would apply under the RP's Proposed Remedy and the Expedited Implementation Option.

Notification and Safety Measures

Notifications/Community Relations

The Regional Board and/or RP would implement various measures, as listed below, to notify the public and agencies of the remediation activities and to maintain open communication with residents and property owners.

- Notices, fact sheets, and similar documents intended for public/stakeholder distribution/ consumption would be made available by the Regional Board in English and in Spanish.
- Underground Service Alert (USA) would be notified at least 72 hours prior to subsurface activities, to allow marking of underground utilities that may exist in the area, as required by state law.
- Regional Board staff would continue to develop and distribute bulletins connected and timed to critical developments, and to advise of opportunities for public participation and comment.
- Pertinent documents and information are available at the Carson Public Library, located at 151 E. Carson St., Carson, CA 90745-2797 and on the State Water Resources Control Board's GeoTracker website.

- A 24-hour community information hotline (English and Spanish) would be monitored and maintained by the RP.
- Email address for stakeholders to request basic information about cleanup activities would be set up, monitored and maintained by the RP.
- A website with links to pertinent information, documents and progress updates on the cleanup would be publicized by the Regional Board to all stakeholders.
- Work notices would be prepared by the RP and posted in a timely fashion.
- Regional Board staff would hold block/community meetings connected and timed to critical developments in the cleanup process. All meetings would be held in English with headsets for Spanish available.
- Residents may call with questions or request a meeting with Regional Board project staff to discuss project status or activities by calling: (310) 576-6694.
- Regional Board staff would continue to maintain communications with key City of Carson personnel and government officials throughout the remediation process.

Health and Safety

Health and Safety Plan (HSP)

Pursuant to State of California Division of Occupational Safety and Health (Cal/OSHA) Hazardous Waste Operations Standards (Title 8, CCR Section 5192) and Code of Federal Regulations (Title 40 CFR, Section 1910.120), a project-specific site-specific Health & Safety Plan (HSP) would be prepared for remedial activities to be conducted at the site to protect the health and safety of the public and site workers. The HSP is further discussed in Section 5.4 of this EIR.

All work would be done in accordance with the HSP and Job Safety Analyses (JSAs) that would be prepared for specific work tasks and activities that would be conducted. Site field personnel conducting the work would review applicable JSAs at daily tailgate safety meetings.

Emergency Response Plan

The RP's contractors would prepare an Emergency Response Plan to provide specific information on potential hazards that may arise from the excavation program and subsequent SVE well and piping installation work that could affect the Carousel Tract and to describe the risk mitigation and emergency response procedures that would be instituted. The Plan would outline roles, responsibilities, and authorities of the RP and its subcontractors, as well as public agencies who are or may be involved in emergency preparedness, mitigation, and response activities to address potential hazards associated with soil remediation activities at the Carousel Tract. The Plan would outline existing and potential hazards associated with soil, soil vapors, and soil excavation activities, and would describe procedures, communications, and coordination processes for initiating emergency response to safeguard the community in the event of an emergency. The Plan would also provide information on emergency notification services, based on existing public resources. Finally, the Plan would provide a list of important public agency contacts and emergency preparedness resources. The Emergency Response Plan would be approved by the Regional Board and shared with Responsible Agencies.

Post-Construction Operation and Maintenance Activities

Following the completion of active remedial activities (soil excavation and SVE/bioventing system installation), operation and maintenance of the SVE/bioventing system would occur. Subsequent activities may include monthly or less frequent LNAPL recovery, quarterly or less frequent groundwater monitoring, and monitoring of utility vaults and street soil vapor probes. In addition, annual inspections to verify that the SSD systems are operating (monitoring of the vacuum and flow rate of the SSD fan) would be conducted.

In addition to the monitoring and maintenance activities referenced above, a Surface Containment and Soil Management Plan (SMP) (included as Appendix D of the RAP) would be reviewed and approved by the Regional Board as part of the RAP, and revised with more detail as part of the RDIP. The SMP provides the detailed approach to mitigate potential residential, construction, or utility worker exposure to soil that do not meet RAOs that may remain at the site following implementation of the excavation activities outlined in the RAP. These soil are referred to as "residual soil." Residual soil may be present at depths below the depth of excavation, as well as in areas not excavated such as beneath homes, City sidewalks and streets. Section 5.4 of this EIR provides an analysis of the environmental impacts from the site's residual soil and how the SMP would assist in addressing these soil.

Long-Term Regulatory Controls

Following completion of the remediation activities, the Carson Municipal Code, (enacted through City Ordinance 14-1534U passed March 18, 2014, which adopts the L.A. County Building Code as amended January 1, 2014), would limit through permitting processes contact with impacted soil below a depth of two feet by requiring issuance of a permit for excavations deeper than two feet. The City could readily inform residents and workers of other appropriate precautions necessary for excavations below three feet through existing administrative processes, and also notify the RP that monitoring and disposal may be required.

The RP would coordinate with the City of Carson to establish a process through existing building and grading permit reviews, General Plan overlay or footnote, area plan, or similar process, to ensure that if a property owner were to conduct activities involving excavations greater than three feet deep at the site (such as building renovation, installation of a pool or deeper landscape alterations), the RP would be notified so that the RP could arrange for sampling and proper handling of impacted soil.

Additionally, the RP's contractors are, and would continue to be, set up within the Underground Service Alert (USA) one-call system to receive notification of planned excavation work in the Carousel Tract. Upon notification of planned excavations, the RP or their contractors would coordinate with the entity that contacted USA (whether the homeowner or their representative, a homeowner's contractor, or utility company such as Cal-Water, Southern California Gas Company, or AT&T) to provide monitoring and management and handling of residual soil during excavation activities.

If excavation of soil is necessary for residential or utility service provider construction activities, it is likely that impacted soil would not be suitable for reuse. If requested by the property owner or utility service provider, the RP would arrange for the removal, transportation, and off-site disposal of impacted soil by a qualified waste contractor. If potentially impacted soil is observed during urgent or emergency construction activities (e.g., a gas line repair), and an authorized representative is not on-site, the RP should be notified as early as possible to allow the material to be profiled and properly disposed. If site soil are being excavated

on an urgent basis, the property owner or contractor should ensure that potentially impacted soil is segregated and stockpiled to allow for proper soil profiling and management.

To the extent possible, impacted soil would be direct-loaded into approved waste containers for transport to the appropriate recycling or disposal facility. With advance notice, the RP would provide suitable containers based on the nature of the excavation work being conducted. Excavated impacted soil would be transported off-site to appropriately licensed recycling/disposal facilities by a state-licensed waste hauler for appropriate recycling or disposal. To the extent possible, soil would be pre-profiled, and approval would be obtained from the recycling/disposal facilities before excavation activities begin. Documentation pertaining to waste disposal profiles and waste disposal acceptance would be in place prior to off-site shipments of waste.

Project Design Features

Project design features (PDFs) are specific design elements proposed as part of the project to prevent the occurrence of or to minimize the significance of potential environmental effects. Because these features have been incorporated into the project, they do not constitute mitigation measures, as defined by Section 15126.4 of the State CEQA Guidelines (Title 14 of the California Code of Regulations). However, PDFs would be included in the Mitigation Monitoring and Reporting Program (MMRP) to ensure their implementation as a part of the project. As with mitigation measures, if the project is modified through the public hearing process in a manner that would require modification(s) to the PDFs, the RP may be permitted to modify the PDFs before they are included in the MMRP proposed for adoption. The project would implement the below listed PDFs.

Air Quality

PDF AQ-1 All off-road diesel construction equipment remaining on-site for more than 15 work days will meet USEPA Tier 3 off-road emission standards, if commercially available locally. Use of Tier 3 engines results in a substantial reduction in NO_X emissions compared to similar Tier 2 or lower engines, and has been shown to increase fuel economy over similar Tier 2 engines.[30] Documentation of all off-road diesel construction equipment on-site including Tier 3 certification will be maintained and made available to the Regional Board for inspection upon request.

PDF AQ-2 All on-road waste haul trucks exporting soil to the appropriate receiver facility will be model year 2007 or newer or retrofitted to comply with USEPA Year 2007 on-road emissions standards. Documentation of all on-road trucks exporting soil will be maintained and made available to the Regional Board for inspection upon request.

PDF AQ-3 The contractor will prohibit the idling of on- and off-road heavy duty diesel vehicles for more than five minutes at a time. This project design feature is consistent with California regulations and laws as well as CARB ATCM requirements.

[30] *Komatsu Technical Report, Development of Tier 3 Engine ecot3, Vol. 52, No. 157, http://www.komatsu.com/CompanyInfo/profile/report/pdf/157-03_E.pdf. 2006. Accessed August 2014.*

PDF AQ-4 The contractor will install SVE and bioventing systems to address petroleum hydrocarbons, VOCs, and methane in soil vapor and to promote degradation of residual hydrocarbon concentrations that do not meet Remedial Action Objectives (RAOs), or are not removed by excavation. The SVE and bioventing systems will require a permit from the SCAQMD. Periodic monitoring will be conducted as specified in the SCAQMD Permit.

PDF AQ-5 Sub-slab vapor mitigation will be installed at 28 identified properties (27 based on RAO exceedance for potential vapor intrusion and 1 based on SSCG exceedance for methane). Sub-slab vapor mitigation will also be installed at any additional properties where the homeowner requests a sub-slab mitigation system. The system will use sub-slab depressurization (SSD), which will create a negative pressure below the slab of the residence using a fan to remove air from below the slab and exhausting it above the building.

PDF AQ-6 The project will comply with applicable SCAQMD rules that govern the control of air pollutant emissions from the site, including: SCAQMD Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil.

- Submit a Mitigation Plan in accordance with Attachment A of SCAQMD Rule 1166, and obtain approval from the SCAQMD. VOC suppression measures shall include water mist as a first level of vapor and odor control. Care will be taken to ensure that the soil is not over-saturated, which could generate runoff that would need to be managed and increase the weight of soil to be disposed. Based on monitoring data or odor perception, vapor and odor control will be implemented on an as needed basis. Based on experience from the excavation pilot test, Rusmar AC-565 Long Duration Foam was found to be most effective at controlling vapors and odors. This type of foam, or equivalent, and necessary support equipment will be staged and ready for application at locations where remedial excavations are conducted and there is the potential for odor releases. A copy of the approved plan will be on-site during the entire excavation period.
- Monitor for the presence of VOC, and implement the approved mitigation plan when VOC-contaminated soil, as defined in Rule 1166, is detected.
- If required, obtain a SCAQMD Permit for project activities, and provide a copy of said Permit to the Regional Board.

PDF AQ-7 The project will implement fugitive dust control measures consistent with SCAQMD rules and regulations. The dust control measures will consist of various elements including: proper maintenance and watering of internal haul roads; water spraying of soil excavated and placed for cover or soil reconsolidation; applying water on intermediate soil cover areas; and seeding/planting vegetation on the completed protective cap. This project design feature is consistent with SCAQMD Rule 403 requirements.

PDF AQ-8 Exposed surfaces and active excavation sites will be controlled with water and/or suppressants certified by CARB, the SCAQMD, or other air pollution control agency, to control fugitive dust, vapors, and odors. Such suppressants include foams (e.g., Rusmar AC-565 Long Duration Foam), nontoxic binders, or other suppressants to reduce fugitive dust emissions and to control vapors and odors. Logs of water purchase or usage and suppressant application (including brand/manufacturer, date of application, area treated

and amount applied) will be maintained by the RP and made available to the Regional Board and SCAQMD for inspection upon request.

PDF AQ-9 Prior to leaving the site, each haul truck, and other delivery trucks that come in contact with site waste, will be inspected and put through procedures, such as brushing, to remove loose debris from tire wells and on the truck exterior. Haul truck operators (drivers) will be required to have the proper training and registration by the State and as applicable to the material they will be hauling. Trucks transporting hazardous waste are required to maintain a hazardous waste manifest that describes the content of the materials. These manifests will be supplied by the waste receiver facility and prepared by the contractor or trucking company and the Kast Property RP representative(s) prior to export off-site. The contracted trucking company will be a certified hazardous waste transportation contractor, if the material is profiled as hazardous. A log of manifest data will be maintained by the RP and made available to the Regional Board for inspection upon request.

PDF AQ-10 Waste haul trucks and soil delivery trucks entering and exiting the site will be required to follow the approved traffic plan that establishes the trucking route, days and hours of truck operation, and various requirements to provide traffic, pedestrian and bicycle safety. Truck operators will be provided with a trucking route map and hours of operation allowed.

PDF AQ-11 In order to minimize traffic congestion at or near the site, construction worker parking will be provided at a nearby off-site location. Shuttles and/or vans will be provided to transport construction workers from the off-site parking location to the site.

PDF AQ-12 To the maximum practical extent, recyclable materials, including non-hazardous construction and demolition debris, will be reused or recycled.

PDF AQ-13 Under the Expedited Implementation Option, the contractors will require that two clusters under active remediation and restoration are separated by a minimum distance of 64 meters (105 feet) as measured from the closest site boundary of each cluster.

Geology and Soils

PDF GEO-1 Prior to issuance of a grading permit, a final geotechnical investigation and remedial excavation grading plan with final design recommendations applicable to every excavated area will be prepared by a California-registered geotechnical and civil engineer and submitted to the LACDPW and City of Carson for review. The geotechnical report will describe the characteristics of underlying natural or fill soils, including expansive soils, potential differential settlement and varying soils strength and the placement of backfill. The geotechnical report will contain recommendations for any needed cut slopes or compaction of fill materials. The remedial excavation grading plan will detail the excavation and backfill design details based on the findings and recommendations of the geotechnical report.

PDF-GEO-2 The geotechnical report and remedial excavation grading plans will include site-specific design criteria related to the excavation activities in proximity to foundations and footings.

PDF-GEO-3 Pre-excavation and post-excavation surveys of the existing structures and improvements at the site and at adjacent properties that have granted access will be conducted to document pre-excavation conditions and any changes in those conditions following excavation. Documentation will consist of written notes, digital photographs, and videos. Existing cracks or other distress present in structures or concrete will be documented and measured. Cracks will be monitored by direct measurement using a dial caliper capable of measuring distances to approximately ±0.001 inch, or using commercially available crack monitoring devices installed on the existing cracks, such that any potential change of crack size during implementation of the RAP can be monitored and documented.

PDF-GEO-4 Full time observation should be provided by a licensed engineer during the excavation of the vertical slot cuts. Any conditions encountered within the field that are different than those anticipated (i.e. irrigation water seepage, localized loose soils, clean sand, etc.) will be brought to the immediate attention of the geotechnical engineer for corrective measures.

PDF-GEO-5 Clean soil will be imported for backfill of excavations from an offsite source. Before importing the backfill soil to the site, samples of the proposed import soil will be submitted for laboratory geotechnical and chemical characterization analysis. Geotechnical tests include gradation, plasticity index (PI), maximum density and optimum moisture, and corrosivity tests. The geotechnical engineer will approve the backfill soil prior to its import, placement, and compaction at the site.

PDF-GEO-6 Upon completion of excavation, concrete removal and environmental sampling (as appropriate), excavated areas will be backfilled as soon as possible. Backfill soils would be moisture conditioned to near optimal moisture content and compacted to at least 90 percent relative compaction, or as determined by the Geotechnical Engineer and approved by Los Angeles County Department of Public Works (LACDPW) and the City of Carson. Borings from auger excavation would be backfilled with controlled low strength material (CLSM, also referred to as flowable fill or sand/cement slurry) the same day they are excavated. Where slot trenching is used for 5-foot excavations or for targeted deeper excavations to 10 feet, the lower part of the slot trenches would also be backfilled with CLSM. The upper 3 feet of excavations would be backfilled with certified clean imported soil. Backfill soil would be free of deleterious organic matter (i.e., vegetation) and cobbles larger than four inches in diameter, and would be approved by the Geotechnical Engineer. The upper foot of soil backfill would be topsoil suitable for vegetation growth and would be compacted to not more than 85 percent relative compaction.

PDF-GEO-7 Landscaping of backfilled properties would be restored to “like conditions” or as agreed to with the homeowners.

Greenhouse Gas Emissions

PDF GHG-1 The project will comply with the use of low carbon vehicle fuels as required under State law.

In addition, several PDFs associated with air quality would also reduce potential greenhouse gas emissions. These measures are provided above and include: PDF AQ-1, PDF AQ-2, PDF AQ-3, PDF AQ-11 and PDF AQ-12.

Hazards and Hazardous Materials

PDF HAZ-1 Remediation activities conducted at the property located at 24832 Panama Avenue shall implement additional measures to control volatile TAC emissions, due to high concentrations of vinyl chloride found on-site. These measures include applying water at least twice daily or Rusmar AC-565 foam (or similar) in accordance with manufacturer recommended specifications) to active excavation areas. Workers performing remediation activities at this address shall use appropriate Personal Protective Equipment (PPE).

Hydrology/Water Quality

PDF H/WQ-1 The Responsible Party will provide a Surface Containment and Soil Management Plan to permitting agencies prior to the start of RAP implementation. This document will provide measures for surface containment and management of residual soils containing COCs above SSCGs and will serve as part of the grading permit process. In addition, in compliance with the General Construction NPDES Permit, the Responsible Party will provide specific BMPs on proposed grading plans to reduce the potential for discharge of runoff into the storm drain system during grading. In accordance with the Los Angeles County Building Code, BMPs must demonstrate that eroded sediments and other pollutants will be retained on site and not transported from the site via sheetflow, swales, area drains, natural drainage courses, or wind; stockpiles of earth and other construction-related materials will be protected from being transported from the site by the forces of wind or water; fuels, oils, solvents, and other toxic materials will be stored in accordance with their listing and will not contaminate the soil and surface waters; spills will be cleaned up immediately and disposed of in a proper manner and not washed into the drainage system; non-stormwater runoff from equipment. Vehicles will be dry decontaminated before leaving the site to avoid water runoff. Excess or waste concrete will not be washed into the public way or any other drainage system and provisions will be made to retain concrete wastes on site until they can be disposed of as solid waste; sediments and other materials will not be tracked from the site by vehicle traffic, construction entrance roadways will be stabilized so as to inhibit sediments from being deposited into the public way, and accidental depositions will be swept up immediately and will not be washed down by rain or other means. Site-specific BMPs will be submitted to the Los Angeles County Department of Building and Safety (reviewing agency for the City of Carson) for review and approval. For areas of one-acre or greater, the RP shall prepare a SWPPP that describes all structural and non-structural BMPs. BMPs must be reviewed and approved by the Los Angeles County Department of Buliding and Safety prior to issuance of a grading permit. In accordance with Los Angeles Building Code, Appendix J, Section J111.3 a Wet Weather Erosion Control Plans (WWECP) for each storm season will be submitted for all active grading projects.

PDF H/WQ-2 Dust monitoring will be conducted for all excavations. If visible dust is encountered, periodic watering of the active excavation areas will be recommended throughout the excavation and backfill activities. Watering will be monitored to prevent off-site runoff.

PDF-H/WQ-3 Impacted soil will be directly loaded into approved waste containers (such as drums, bins, or directly into trucks) for off-site transport. The RP will provide suitable containers based on the nature of the excavation work being conducted. In the event that it is necessary to temporarily stockpile soil onsite before loading, soils will be placed upon plastic sheeting and covered with plastic until they can be loaded into approved waste containers to be provided by the RP.

PDF H/WQ-4 LNAPL will be recovered where it has accumulated in monitoring wells to the extent technologically and economically feasible, and where a reduction in current and future risk to groundwater will result.

PDF H/WQ-5 A stable or decreasing plume of site-related COCs will be maintained beneath the site. This will be achieved through reduction of COCs in soils through soil vapor extraction (SVE) and bio-venting, which would reduce COCs entering groundwater via on-site soils, removal of wastes in soil, and monitored natural attenuation (MNA) of groundwater.

PDF H/WQ-6 Periodic groundwater monitoring will continue as part of the remedial action. If, based on a five-year review following soil excavation and initiation of the SVE/bioventing system operation, the groundwater plume is not stable or declining, an evaluation of additional groundwater treatment technologies will be conducted and implemented as needed.

PDF H/WQ-7 The Shallow Zone and Gage aquifer will be returned to background levels for site-related benzene and naphthalene through natural biodegradation.

Noise and Vibration

PDF NOISE-1 The Project contractor(s) will equip all construction machinery and equipment, fixed or mobile, with properly operating and maintained noise mufflers, consistent with manufacturers' standards.

PDF NOISE-2 Engine idling from construction equipment such as excavators and haul trucks will be limited, to the extent feasible.

PDF NOISE-3 Expected hours for construction equipment use on-site will be 730 A.M. to 430 P.M. Monday through Friday, with hauling activities from 800 A.M. to 400 P.M.

PDF NOISE-4 Project-related heavy truck traffic will be limited to specific routes.

PDF NOISE-5 During excavation, acoustical attenuation blankets 12 feet in height will be installed between the excavation site and occupied houses to reduce community noise exposure from stationary sources of substantial noise, such as generators and water buffalos (trailer).

Traffic and Circulation

PDF TRAF-1 Prior to implementation of the RAP, the project contractor will submit a Haul Route Plan to the City of Carson for review and approval. The proposed haul route will be restricted to the City's designated truck route roadways and will be as shown in Figure 5.7-2 of this EIR.

PDF TRAF-2 Prior to implementation of the RAP, the project contractor will prepare a Construction Traffic Management Plan that will be submitted to the City of Carson for review and approval prior to the start of any work. This plan will comprise site traffic control plans, including but not limited to such elements as the designation of haul routes for construction-related trucks, the sequencing of construction activities, any driveway turning movement restrictions, temporary traffic control devices, travel time restrictions for construction-related traffic, consolidation of construction truck deliveries, flag control, and designated staging and parking areas for workers and equipment.

Because the construction activities occur within a public street right-of-way, the following design features would also apply

- A site-specific construction work site traffic control plan will be prepared for each construction phase and submitted to the City of Carson for review and approval prior to the start of any construction work. This plan will include such elements as the location and hours of any necessary lane closures, local traffic detours (if any), protective devices and traffic controls (such as barricades, cones, flag persons, lights, warning beacons, temporary traffic signals, warning signs), the location and hours of any necessary access limitations for abutting properties, and provisions to maintain emergency access through construction work areas.
- Generally accepted construction safety standards will be followed to separate pedestrians from construction activity through such measures as protection barriers and signage indicating alternative pedestrian access routes where existing facilities would be affected. This would include the sidewalks around the perimeter of an active excavation site.
- Advance notice of planned construction activities will be provided to any affected residents and property owners in the vicinity of the construction site.
- The project contractor will coordinate with emergency service providers (police/sheriffs, fire, ambulance and paramedic services) to provide advance notice of ongoing construction activity and construction hours.

PDF TRAF-3 One travel lane will be kept open at all times during residential property remediation, well installation and street trenching phases.

PDF TRAF-4 The project contractor will arrange for off-site parking within 5 miles of the site and will provide shuttle services to the site for approximately 50 percent of on-site workers.

Utilities and Service Systems (Solid Waste)

While there are no specific PDFs regarding solid waste, PDF AQ-12, above, requires that to the maximum practical extent, recyclable materials, including non-hazardous construction and demolition debris, will be reused or recycled.

6. REQUIRED AGENCY ACTIONS AND PERMITS

Permits and other approvals required to implement the RAP are anticipated to include, but may not be limited to, those listed in **Table 2-5**, *Subsequent Permits, Approvals, Review and Consultation Requirements*.

As referenced in Table 2-4, following approval of the RAP, the Regional Board would review and approve a site-wide Remedial Design and Implementation Plan (RDIP) and individual PSRPs. The site-wide RDIP would provide more specific detail on the design and implementation of the planned remediation activities outlined in the RAP, such as the SVE/bioventing system design including well, piping and treatment system layout. The PSRPs for each property would specifically define areas to be excavated, features to be removed and those that would be protected in place, and locations of underground utilities that need to be either protected in place or removed and restored.

As part of RDIP and PSRP preparation, the RP's contractors would meet with homeowners, and their legal representatives as appropriate, to obtain necessary information for relocation during remedial implementation and to discuss hardscape and landscape restoration. In some cases, the RP may provide alternative landscape restoration from existing conditions if desired by the homeowner. If during this meeting the homeowners express a desire that existing hardscape not be removed from their property, an option would be discussed of leaving hardscape in place with the homeowners agreeing to enter into a Land Use Covenant (LUC) (deed restriction) that would be recorded with the County Recorder's Office advising of the potential presence of impacted soil beneath hardscaped areas. If the hardscape is removed in the future and potentially impacted soils below the hardscape are exposed, they would be managed in accordance with the SMP.

While it is acknowledged that a future site-wide RDIP and individual property PSRPs would be prepared following approval of the RAP, this EIR evaluates the totality of the remedial actions to be implemented by the proposed RAP. Thus, a realistic worse-case scenario of impacts resulting from implementation of the RAP's remedial action components is disclosed in this EIR. The details to be provided in the site-wide RDIP and individual property PSRPs would not materially change the project description of the RAP or the disclosure of impacts included in this EIR.

Table 2-5

Subsequent Permits, Approvals, Review and Consultation Requirements

Agency	
Los Angeles Regional Water Quality Control Board	▪ Certification of Final EIR for RAP ▪ RAP ▪ Site-wide Remedial Design and Implementation Plan (RDIP) ▪ Individual Property-Specific Remediation Plans (PSRP) ▪ Storm Water Pollution Prevention Plan (SWPPP) ▪ Emergency Response Plan ▪ Update to Public Participation Plan
South Coast Air Quality Management District	▪ Rule 1166 permit for any necessary handling of VOC-impacted materials ▪ Permit-to-Construct/Permit-to-Operate for the SVE/bioventing equipment ▪ Permits for Sub-Slab Depressurization (SSD) Systems ▪ Asbestos Notifications/Abatement Permits
Los Angeles County Flood Control	▪ Permit for piping associated with SVE system to cross flood control channel
City of Carson	▪ Construction Traffic Management Plan ▪ Grading Permits from Department of Building and Safety[a] ▪ Excavation and Encroachment Permits for equipment staging and operations, lane closures in public streets, and for encroachment onto sidewalks and City property/easements ▪ Trash Bin/Containers Permit, as necessary ▪ Plumbing and Electrical Permits if plumbing or electrical service is removed and replaced ▪ Masonry Permit may be required for construction of replacement masonry block walls ▪ Landscaping Permit may be required for restoration of property landscaping ▪ The SVE system(s) would be installed in an enclosed structure, which may require plumbing, electrical, building, and construction permits.
Occupational Safety & Health Administration (OSHA)	▪ The contractor retained to perform the excavation work shall have a valid OSHA Trenching Permit per 29 CFR 1926.650, 29 CFR 1926.651, and 29 CFR 1926.652 and Cal/OSHA Trenching Permit CCR Title 8 Section 341.

[a] *The City of Carson follows the LACDPW Grading Guidelines and is a contract city, meaning that the LACDPW provides plan check services for the City. Ultimately, the grading permits would be issued by the City.*

Source: PCR Services Corporation, 2014

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3. Description of Alternatives

3.0 DESCRIPTION OF ALTERNATIVES

INTRODUCTION

Under CEQA, the identification and analysis of alternatives to a project is a fundamental part of the environmental review process. Public Resources Code Section 21002.1(a) establishes the need to address alternatives in an EIR by stating that in addition to determining a project's significant environmental impacts and indicating potential means of mitigating or avoiding those impacts, "the purpose of an environmental impact report is to identify the significant effects of a project on the environment, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided."

Direction regarding the definition of project alternatives is provided in the CEQA Guidelines Section 15126.6(a) as follows:

> *An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives*

The CEQA Guidelines emphasize that the selection of project alternatives should be based primarily on the ability to reduce impacts relative to the proposed project, "even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly."[1] The Guidelines further direct that the range of alternatives be guided by a "rule of reason," such that only those alternatives necessary to permit a reasonable choice need be addressed.[2]

In selecting project alternatives for analysis, potential alternatives must pass a test of feasibility. CEQA Guidelines Section 15126.6(f)(1) states that:

> *Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site . . .*

Beyond these factors, CEQA Guidelines require the analysis of a "no project" alternative and an evaluation of alternative location(s) for the project, if feasible. Based on the alternatives analysis, an Environmentally Superior Alternative is to be designated. If the Environmentally Superior Alternative is the No Project Alternative, then the EIR shall identify an Environmentally Superior Alternative among the other alternatives.[3] In addition, CEQA Guidelines Section 15126.6(c) requires that an EIR identify any alternatives that were considered for analysis but rejected as infeasible and discuss the reasons for their rejection.

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[1] *CEQA Guidelines Section 15126.6(b).*

[2] *CEQA Guidelines Section 15126.6(f).*

[3] *CEQA Guidelines Section 15126.6(e)(2).*

3.1. DEVELOPMENT OF ALTERNATIVES TO THE RP'S PROPOSED REMEDY

Development of the alternatives to the RP's Proposed Remedy by the Regional Board was based primarily on the Regional Board's independent review of information contained in the Feasibility Study Report (FS), independent review of the FS and Human Health Risk Assessment by the State Office of Environmental Health Hazard Assessment (OEHHA) and the University of California Los Angeles (UCLA) Expert Panel respectively, and information from the pilot tests that were conducted at the site.

Remedial technologies with potential applicability at the site to meet the Remedial Action Objectives (RAOs) were identified and screened using three criteria: effectiveness, ability to implement, and cost. Technologies evaluated in the FS can be placed into two categories: 1) technologies that interrupt the human health exposure pathway; and 2) technologies that remove COC mass in addition to interrupting the human health exposure pathway. The technologies considered physical removal processes, such as excavation, as well as chemical and biological processes. **Table 3-1**, *Description and Results of Initial Screening of Technologies Considered for Site Remediation*, shows the technologies evaluated by the two categories and whether or not the technology passed the initial screening.

Table 3-1

Description and Results of Initial Screening of Technologies Considered for Site Remediation

Technology	Description	Evaluation (Retained or Not Retained for Consideration in Remedial Alternatives)
Interrupt the Human Health Exposure Pathway		
Sub-Slab Vapor Intrusion Mitigation [Passive venting or Sub-slab depressurization (SSD)]	Install subsurface barriers and/or vapor control systems to mitigate soil vapor migration into buildings	SSD Retained for consideration in remedial alternatives
Capping Portions of the Site	Construct a low permeability cover or cap over the areas of impacted soils to reduce contact with impacted soils, minimize rainwater infiltration and reduce vapor migration to the surface	Retained for consideration in remedial alternatives (could be used in conjunction with excavation)
Removal of All Site Features	Remove all site features (i.e., houses, landscape, hardscape, roads, and utilities)	Retained for consideration in remedial alternatives
Institutional Controls	City of Carson Building Code requirements to obtain a permit for excavations 2 feet bgs or deeper; establish a notification process if permit is requested in order to sample and properly handle any potential impacted soils	Retained for consideration in remedial alternatives
Remove COC Mass and Interrupt the Human Health Exposure Pathway		
Excavation: *Selective Excavation*	Excavate impacted soils around existing structures; backfill excavation with imported clean soil; area and depth can vary	Retained for consideration in remedial alternatives

Table 3-1 (Continued)

Description and Results of Initial Screening of Technologies Considered for Site Remediation

Technology	Description	Evaluation (Retained or Not Retained for Consideration in Remedial Alternatives)
Excavation: *Targeted Excavation*	Excavate impacted soils to a deeper depth in targeted areas around existing structures where the potential exists for substantial hydrocarbon mass removal at greater depths; backfill excavation with imported clean soil or sand-cement slurry	Retained for consideration in remedial alternatives
Excavation: *Lifting and Cribbing of Houses*	Lifting house and cribbing to 4 ft.; cut and cap utilities; demolish drywall, cabinets, toilets, and tub/showers from ground level to 4 ft; demolish fireplaces; install beams that attach to every wall; unbolt walls from foundation; excavate impacted soils; backfill with clean soil; form and pour new foundation; place the house back down on new foundation and attach to foundation; remove cribbing materials; restore interior walls, cabinets, toilets, tub/showers; replace fireplaces; and reconnect utilities	Not Retained for consideration in remedial alternatives
Excavation: *Temporarily Moving Houses*	Similar process to lifting and cribbing a house, except the house would be loaded onto a trailer and moved to another location	Not Retained for consideration in remedial alternatives
Excavation: Removal of Residual Concrete Slabs	Removal of former tank farm reservoir side walls and/or floors beneath buildings, hardscape, or streets; removal of those site features and excavation would be required	Retained for consideration in remedial alternatives (removal of residual concrete slabs when encountered within excavation boundaries)
Soil Vapor Extraction (SVE) System	Vadose zone vacuum wells to remove volatile COCs from soil; extracted vapors would be treated and discharged	Retained for consideration in remedial alternatives
Bioventing	Induce air and oxygen flow in to the unsaturated zone to enhance the activity of indigenous bacteria and stimulate the natural in-situ biodegradation of organic COCs in soil	Retained for consideration in remedial alternatives (could be used in conjunction with SVE system/wells)
In-Situ Chemical Oxidation (ISCO);	Introduction of a chemical oxidant into the subsurface to reduce contaminant mass and concentrations in soil	Not retained for consideration in remedial alternatives

Table 3-1 (Continued)

Description and Results of Initial Screening of Technologies Considered for Site Remediation

Technology	Description	Evaluation (Retained or Not Retained for Consideration in Remedial Alternatives)
Mobile Light Non-Aqueous Phase Liquid (LNAPL) Source Removal;	Direct mobile LNAPL removal from wells where LNAPL has accumulated on top of groundwater to a measurable thickness with sorbent socks or, if LNAPL has accumulated to a thickness of greater than 0.5 foot (6 inches), with a dedicated pump, as is currently done at existing on-site monitoring wells	Retained for consideration in remedial alternatives
Groundwater Monitored Natural Attenuation (MNA);	Naturally occurring processes decrease concentrations of COCs in soil and groundwater; monitoring is performed to confirm that COC concentrations are decreasing	Retained for consideration in remedial alternatives (can be used in conjunction with other technologies)
Contingency Remediation of Groundwater (if needed): Air Sparging with SVE	Injection of air into the subsurface saturated zone to enable a transfer of hydrocarbons from a dissolved phase to a vapor phase which is then captured and treated by SVE	Not Retained for consideration in remedial alternatives
Contingency Remediation of Groundwater (if needed): Biosparging	Pulsed injection of saturated oxygen into the saturated zone to significantly elevate dissolved oxygen concentrations (up to 60 mg/L), which enhances the ability of existing indigenous microorganisms to biodegrade the organic constituents in the saturated zone	Not Retained for consideration in remedial alternatives
Contingency Remediation of Groundwater (if needed): Oxidant Injection	Oxidant injection involves the introduction of an oxidant (e.g., ORC®) that produces a controlled and continuous release of oxygen to the saturated zone which accelerates the development of existing indigenous microorganisms to biodegrade the organic constituents	Retained for consideration in remedial alternatives

Sources: Feasibility Study, 2014 and PCR Services Corporation, 2014

Each technology that was retained after the initial screening would be capable of addressing a specific issue, but none of the technologies alone would constitute a complete approach to site cleanup. Therefore, technologies were combined to create seven (7) remedial alternatives that were further evaluated in the FS. Table 3-2, *Components of Remedial Alternatives Considered & Rejected and Analyzed in this EIR*, shows the alternatives and summarizes the key components of the alternatives evaluated in the FS and discussed in this EIR. The RP's Proposed Remedy is provided in the table for comparison purposes to the alternatives.

Table 3-2

Components of Remedial Alternatives Considered & Rejected and Analyzed in this EIR

Alt.	Remove all Site Features	Cap Site	Excavation Depth (bgs)	Excavate Entire Site	Excavate Beneath Residential Hardscape and/or Landscape	# Properties Excavated/Excavation Avg. Amount per Property	SVE/Bioventing (# Properties)	LNAPL Removal, Groundwater MNA, and Supplemental Groundwater Remediation	Sub-Slab Mitigation (# of properties)	Estimated total truckloads of import and export	Slot Trenching or Bucket Auger with Slurry Backfill	Duration of Active Remediation
RP's Proposed Remedy (Base Remedy)	-	-	5 ft. with targeted 10 ft.	-	Hardscape and Landscape	219 Properties [611 CY (5 ft.) to 867 CY (10 ft.)]	236	X	28 with offer to all	23,700	X	6 years (4 years under the Expedited Implementation Option)
Alternatives Analyzed in this EIR												
Alternative 1: No Project Alternative (FS Alt 1)	-	-	-	-	-	-	-	-	-	-	-	-
Alternative 2: Excavate Beneath Landscape and Hardscape to 10 Ft (FS Alt 4E)	-	-	10 ft.	-	Hardscape and Landscape	241 Properties (1,222 CY)	236	X	28 with offer to all	42,700	X	8.4 years
Alternative 3: No Excavation Beneath Hardscape - 5 Ft. With Targeted 10 Ft. (FS Alt 5D)	-	-	5 ft. with targeted areas to 10 ft.	-	Landscape	219 Properties (330 CY)	236	X	28 with offer to all	10,900	X	4.4 years
Alternatives Considered and Rejected from Evaluation in this EIR												
Remove Site Features/Excavate Impacted Soils (FS Alt 2)	X	-	> 10 ft.	X	-	-	-	X	-	250,000	-	4.5 years
Remove Site Features/Excavate to 10 Ft. (FS Alt 3)	X	-	10 ft.	X	-	-	-	X	-	130,000	-	2.5 years
Excavate 2 Ft. (Landscape & Residential Hardscape) (FS Alt 4A)	-	-	2 ft.	-	Hardscape and Landscape	123 Properties (244 CY)	236	X	28 with offer to all	4,600	-	1.5 years

Table 3-2 (Continued)

Components of Remedial Alternatives Considered & Rejected and Analyzed in this EIR

Alt.	Remove all Site Features	Cap Site	Excavation Depth (bgs)	Excavate Entire Site	Excavate Beneath Residential Hardscape and/or Landscape	# Properties Excavated/Excavation Avg. Amount per Property	SVE/Bioventing (# Properties)	LNAPL Removal, Groundwater MNA, and Supplemental Groundwater Remediation	Sub-Slab Mitigation (# of properties)	Estimated total truckloads of import and export	Slot Trenching or Bucket Auger with Slurry Backfill	Duration of Active Remediation
Excavate Beneath Landscaped Areas - 2 Ft. (FS 5A)	-	-	2 ft.	-	Landscape	123 Properties (109 CY)	236	X	28 with offer to all	1,400	-	1.2 years
Excavate Beneath Landscaped Areas - 3 Ft. (FS Alt 5B)	--	-	3 ft.	-	Landscape	219 Properties (159 CY)	236	X	28 with offer to all	4,300	-	2.7 years
Excavate Beneath Landscaped Areas - 5 Ft. (FS Alt 5C)	-	-	5 ft.	-	Landscape	219 Properties (265 CY)	236	X	28 with offer to all	8,300	X	3.3 years
Excavate Beneath Landscaped Areas - 10 Ft. (FS Alt 5E)	-	-	10 ft.	-	Landscape	241 Properties (530 CY)	236	X	28 with offer to all	18,200	X	6.0 years
Cap Site (FS Alt 6)	X	X	-	-	-	-	--	X	-	12,500	-	4.5 years
Cap Exposed Soils (FS Alt 7)	-	X		-	-	285 Properties (No excavation)	236	X	28 with offer to all	-	-	1.1 years
Alternatives Considered in the Revised FS – Within Parameters of RP's Proposed Remedy												
Excavate Landscape & Res. Hardscape (3 ft.) (FS Alt 4B)	-	-	3 ft.	-	Hardscape and Landscape	219 Properties (367 CY)	236	X	28 with offer to all	12,000	-	3.3 years
Excavate Landscape & Res. Hardscape (5 ft.) (FS Alt 4C)	-	-	5 ft.	-	Hardscape and Landscape	219 Properties (611 CY)	236	X	28 with offer to all	19,700	X	4.4 years

bgs = below ground surface ft.^{3} = cubic feet CY = cubic yards

Notes:

"X" indicates the action would occur. "-" indicates action would not occur or is not applicable.

Source: Feasibility Study, 2014; PCR Services Corporation, 2014.

A discussion of the alternatives considered and rejected as well as the alternatives evaluated in this EIR is provided in the following subsections.

Each section in Chapter 5, *Environmental Impact Analysis*, of this EIR, contains an analysis of the alternatives analyzed in the EIR. Chapter 6, Comparison of Alternatives, provides a summary comparison of the environmental impacts of the alternatives to the RP's Proposed Remedy.

3.2 ALTERNATIVES CONSIDERED AND REJECTED FROM EVALUATION IN THIS EIR

In accordance with CEQA Guidelines Section 15126.6(c), an EIR should identify any alternatives that were considered for analysis but rejected as infeasible and briefly explain the reasons for their rejection. The following alternatives were considered but rejected as detailed below.

In addition, CEQA Guidelines Section 15126.6(f)(2) addresses alternative locations, which are generally evaluated for a project. However, the project is the remediation of a site and therefore, the consideration of alternative locations is not meaningful. Therefore, a discussion of alternative location is rejected from further evaluation.

Remove Site Features/Excavate Impacted Soils (FS Alternative 2)

This alternative would include the removal of all development on the site (i.e., houses, residential hardscape, sidewalks, roads, and utilities) and the excavation to a minimum depth of 10 feet below ground surface (bgs) of impacted soils identified based on the RAOs for protection of groundwater over the entire site. This alternative would result in the permanent relocation of all of the residents within the Carousel Tract. While the site would be remediated to residential standards, the future use of the site is speculative. Previous soil samples taken at all depths would be used to identify locations where RAOs are not met and therefore require excavation, although additional sampling may be required. Excavation likely would proceed to or near groundwater over some portions of the site but to an assumed 10 feet bgs over the entire site.[4]

Excavated soil, residual reservoir slabs, and materials from the demolition of the houses and hardscape would be removed from the site using trucks or a newly constructed rail spur**.** Hardscape demolition materials would be recycled offsite, and excavated soil and debris would be disposed of offsite or treated offsite and recycled in a similar manner as the project. The rail spur, if it were to be developed, would be used for the exportation of excavated soil. Approximately 250,000 truckloads of COC-impacted and non-impacted soil, as well as other construction debris from the demolition of structures (including asbestos), would be hauled to or from the site. As shown in Table 3-2, in addition to excavation, this alternative would implement LNAPL removal, groundwater MNA and supplemental groundwater remediation similar to the project. This alternative is estimated to take approximately 4.5 years, which is approximately 1.5 years shorter than the RP's Proposed Remedy.

Implementation of this alternative would require the permanent relocation of all of the residents from the site. If some homeowners declined to move, the presence of some residents on the site would make it untenable to remove all of the surrounding houses, streets and utilities, which would be required to excavate

[4] *The shallowest groundwater beneath the site occurs at a depth of approximately 53 feet.*

all the impacted soils from beneath the entire site. The Regional Board does not have the legal authority to require residents to relocate from their homes or to require the responsible party to remove the homes.

If all residents were relocated and this alternative were implemented, it would not meet the project objective to "Maintain the residential land use of the site and avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community" since it would result in the displacement of residents. Therefore, this alternative has been rejected for further analysis in this EIR.

Remove Site Features/Excavate to 10 Feet (FS Alternative 3)

As shown in Table 3-2, this alternative would be similar to the Remove Site Features/Excavate Impacted Soils Alternative above in that it would include the removal of all on-site development and relocation of Carousel Tract residents, followed by site excavation up to 10 feet across the entire site. In addition to excavation, this alternative would implement SVE/bioventing, LNAPL removal, groundwater MNA, and contingency supplemental groundwater remediation similar to the RP's Proposed Remedy. The SVE/bioventing system would result in the installation of 63 nested wells in the City streets to remediate the intermediate and deeper zones. The primary difference between this alternative and the Remove Site Features/Excavate Impacted Soils Alternative is that excavation would occur to a depth of 10 feet bgs over the entire site and an SVE/bioventing system would be installed. Thus, this alternative would meet the RAOs for the upper 10 feet of site soils only following excavation activities. Long-term regulatory controls similar to the project would be required for post-remediation excavations beneath 10 feet. Approximately 130,000 truckloads of COC-impacted and non-impacted soil, as well as other construction debris from the demolished structures (including asbestos) would be hauled to or from the site. This alternative is estimated to take approximately 2.5 years, which is approximately 3.5 years shorter than the RP's Proposed Remedy.

This alternative would meet RAOs in the upper 10 feet of the on-site soils in the short term via soil excavation to 10 feet and in the soils beneath 10 bgs over the long term via SVE/bioventing operation. This alternative would not meet the project objective to "Maintain the residential land use of the site and avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community" since it would result in the displacement of all the residents. In addition, the Regional Board does not have the legal authority to require residents to relocate from their homes or to require the responsible party to remove the homes. For these reasons, this alternative has been rejected for further analysis in this EIR.

Excavate to 2 Ft. (Landscape and Residential Hardscape) Alternative (FS Alternative 4A)

FS Alternative 4 includes five variations all of which would include excavation beneath residential landscaped and hardscaped areas as the key remedial element. FS Alternative 4D is the RP's Proposed Remedy and Alternative 4E is Alternative 2 in this EIR. FS Alternatives 4A and 4B would result in reduced depths of excavation compared to the RP's Proposed Remedy and are discussed below in the subsection titled Alternative Considered in the FS – Within Parameters of RP's Proposed Remedy.

As shown in Table 3-2, this alternative (Revised FS Alternative 4A) would result in excavation to a depth of 2 feet bgs under landscape and residential hardscape areas at 123 properties on the site based on analytical data from soil samples which indicate properties that do not meet RAOs. Shoring of the excavated areas would not be required and utilities would not be affected. In addition to the excavation, SVE/bioventing would be installed at 236 properties. The remediation activities would also include backfill, sub-slab vapor mitigation, site restoration, LNAPL removal, and groundwater MNA. Under this alternative, excavation

would not occur under patios covered by structures and roofs; pool decking surrounding swimming pools; City streets; City sidewalks; or houses. Site restoration would occur after excavation. Implementation is predicted to last approximately 1.5 years.

Excavated soil, residual concrete slabs from the reservoirs (where encountered during excavation), and materials from the demolition of hardscape would be trucked from the site. Disposal and recycling of materials would be conducted in a manner similar to the project. On average, excavation of (244 CY) of soil per property would result with approximately 4,600 truckloads of impacted and non-impacted soil hauled to or from the site under this alternative.

While this alternative would remove COCs from the upper 2 feet of soils, there are no long-term regulatory controls to limit access to soils between 2 feet and 3 feet bgs. Therefore, residents would not be protected against potential exposure to impacted soils in the 2-to-3-foot depth zone unless homeowners agreed to additional land use covenants (LUCs), such as the recording of an environmental covenant. Thus, this alternative was considered but rejected as it would not result in unrestricted land use as required by the Regional Board.

Excavate Beneath Landscaped Areas Alternatives: 2 to 10 feet BGS (FS Alternatives 5A-5C and 5E)

These Alternatives would include excavation beneath residential landscaped areas as the key remedial element. There would be no excavation under residential hardscape, which differentiates this alternative from the RP's Proposed Remedy and Alternative 4 considered in the FS. Under these Excavate Beneath Landscaped Areas Alternatives, soils would be excavated to a depth of 2, 3, or 10 feet below existing grade at residential properties where RAOs are not met. Table 3-2 provides the characteristics associated with each of these alternatives, including the number of properties that would be excavated, volumes of soil excavated and truckloads associated with each alternative. At any excavation depth, this alternative would include SVE/bioventing at 236 properties, similar to the project. The duration of the remediation activities under these alternatives would range from 1.2 to 6 years.

The 2 ft. excavation alternative was not retained in the initial screening conduced in the FS due to the lack of protection that would be provided. As discussed above, while this alternative would remove COCs from the upper 2 feet of soils, there are no long-term regulatory controls to limit access to soils between 2 feet and 3 feet bgs. In addition, if residents were to remove hardscape on their property people could come into contact with the impacted soils. Therefore, this alternative was eliminated as it would not result in sufficient protection.

The 3-foot and 10-foot alternatives evaluated under this scenario would result in limited removal of impacted soils. As such the Regional Board determined that these alternatives would not provide protection to residents. Generally, under this alternative, there are no existing long-term regulatory controls restricting removal of residential hardscape after remedial action is complete. The City of Carson does not require that homeowners obtain a permit or notify the City prior to removing residential hardscape from their property. Because of the lack of a permitting or notification requirement, these alternatives, which would not include excavation of impacted soils beneath residential hardscape, would not be as protective as the remedial

alternatives that do include excavation beneath residential hardscape. Therefore, these alternatives have been considered and rejected from further analysis in this EIR.[5]

Cap Site (FS Alternative 6)

This alternative would result in the removal of all development on the site and the placement of a cap on the entire site. The cap would be hardscape or some equivalent to prevent access to impacted soils. While the site would be remediated to residential standards, the future use of the site is speculative. All of the technologies identified for the project would be included in this alternative, with the exception of the sub-slab vapor intrusion mitigation which would not be necessary because the houses would be removed. Approximately 12,500 truckloads of import fill and construction debris would be hauled to or from the site by truck. Implementation of this alternative is estimated to take approximately 4.5 years.

This alternative would meet RAOs by limiting contact with soil, but would not achieve the other soil goals. However, the exposure pathway would be eliminated because residents would not occupy the site and the site would be capped. COCs would be less likely to leach into groundwater due to the large reduction in stormwater and irrigation water passing through the soil. SVE/bioventing would be conducted to remediate COCs present in soils. LNAPL goals would be achieved through LNAPL removal and groundwater remediation would occur by MNA. Groundwater goals (MCLs) would be met in the long term, and background levels for groundwater would be achieved in the longer term, both through MNA. Supplemental groundwater remediation (i.e., where COCs exceed 100x MCLs) would be evaluated if groundwater plumes are not stable or declining after five years of operation of the SVE/bioventing system to reduce the time to achieve the cleanup goals.

While this alternative would meet RAOs by limiting contact with soil, it could also limit the ability for long-term future development to occur on the site. Since the cap would need to be maintained and protected, restrictions and limitations on construction and operation of a future use would need to be put in place that could be restrictive for development opportunities. In addition, this alternative would not meet the project objective to "Maintain the residential land use of the site and avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community" since it would result in the permanent displacement of residents. For these reasons, this alternative has been rejected from further analysis in this EIR.

Cap Exposed Soils Only (FS Alternative 7)

This alternative would involve the capping of exposed soils and landscaped areas of the site at all 285 properties with hardscape or equivalent to prevent access to impacted soils. Capping approaches could include concrete or other impervious materials. Hardscape, roads and houses would remain in place during and following the capping process. The intent of this alternative would be to allow residents to remain at the site in the long-term following capping.

This alternative would result in removal of COCs through: SVE/bioventing (236 properties and 128 locations in City streets), LNAPL removal, groundwater MNA, and contingency supplemental groundwater remediation, if necessary. The soil vapor goals would be addressed by installation of a sub-slab

[5] *However, since the RP's Proposed Remedy would result in significant noise impacts, the Regional Board determined that the evaluation of Alternative 5D would be appropriate since the Alternative would reduce noise impacts. Please see Alternative 3 in this EIR.*

depressurization system for houses where RAOs are not met for sub-slab soil vapor. Assuming sources of COCs are successfully addressed through SVE/bioventing and LNAPL removal, LNAPL goals would be achieved and groundwater goals (MCLs) would be met in the long-term. Background levels for groundwater would be achieved in the longer term, both through MNA. Supplemental groundwater remediation (i.e., where concentrations exceed 100x MCLs) would be evaluated if groundwater plumes are not stable or declining after five years of operation of the SVE/bioventing system to reduce the time to achieve the cleanup goals. This alternative is estimated to take approximately 1.1 years to implement.

Under this alternative, COCs would be less likely to leach into groundwater compared to the project due to the reduction in stormwater and irrigation water passing through the soil. Overall, in the long-term, RAOs would be met for the site. However, implementation of this alternative would take longer to meet groundwater RAOs compared to the project, as less impacted soils would be removed by excavation. A new LUC would be required to prohibit residential hardscape/cap removal.

This alternative would also result in generation of large quantities of stormwater that would need to be managed. The County may require captured stormwater to be percolated, which could exacerbate groundwater contamination issues.

Generally, the combination of technologies used for this alternative is anticipated to be effective at reducing exposure to COCs in the long-term. The difference compared to the excavation alternatives (FS Alternatives 4 and 5) is the method of exposure reduction. Excavation alternatives would remove COCs directly from the site, while for this alternative those COCs would be removed through longer-term SVE/bioventing.

While this alternative would ultimately be effective to treat COCs on the site, the long-term social impacts to residents would be increased. Residents would lose existing landscaping, and future landscaping would have to be done above the cap in planter boxes. This could result in decreased aesthetic appeal to the community. Further, an objective of the project is to "Allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into site soils (i.e., landscaping, pools, hardscape, etc.) on their properties." This objective would not be met under this alternative. For these reasons, this alternative has been considered and rejected from further analysis in this EIR.

Alternatives Considered in the FS – Within Parameters of RP's Proposed Remedy

Excavate Landscape and Residential Hardscape Alternatives: 3 ft. and 5 ft. bgs (FS Alternative 4B and 4C)

Table 3-2 provides the characteristics for alternatives similar to the RP's Proposed Remedy, which would excavate landscape areas as well as remove residential hardscape and excavate in those areas. The FS evaluated various depths, including 3 ft. and 5 ft. bgs. As with the RP's Proposed Remedy, these alternatives would result in excavation at 219 properties based on analytical data from soil samples which indicate properties that do not meet RAOs. Shoring may be required at some locations for the 5 ft. excavation but would not be necessary under the 3 ft. excavation alternative. As with the RP's Proposed Remedy, under these alternatives, excavation would not occur under patios covered by structures and roofs; pool decking surrounding swimming pools; City streets; City sidewalks; or houses. Site restoration would occur after excavation. Excavated soil, residual concrete slabs (where encountered during excavation), and materials from the demolition of hardscape and landscaping would be trucked from the site. Disposal and recycling of materials would be conducted in a manner similar to the project.

In addition to the excavation, these alternatives would include the installation of SVE/bioventing at 236 properties. The remediation activities for these alternatives would also include backfill, sub-slab vapor mitigation, site restoration, LNAPL removal, and groundwater MNA. Timeframes for implementation of these alternatives would vary and would be 3.3 years for the 3 ft. excavation and 4.4 years for the 5 ft. excavation.

These alternatives are very similar to the RP's Proposed Remedy. They differ primarily in the depth of excavation. Alternative 4B would be less likely to achieve the project cleanup goal of residential (i.e., unrestricted) land use. However, these alternatives would result in less construction activity on the site and less truck trips because of the reduced excavation compared with the RP's Proposed Remedy. Similar to the RP's Proposed Remedy, certain noise impacts would be expected to be significant without mitigation, but mitigation is feasible, but other noise impacts would be expected to remain significant and unavoidable even with the implementation of mitigation measures. (See Section 5.6, Noise, of this EIR for a detailed analysis and discussion.) However, because the project would take less time than the RP's Proposed Project, the impacts would not occur for as long. Given the similarity of the impacts for FS Alternatives 4B and 4Cas compared to the RP's Proposed Remedy, analyses conducted and presented in this EIR for the RP's Proposed Remedy would address these two alternatives. In other words, the analyses for the RP's Proposed Remedy would represent a worst case analysis if either of these alternatives were determined to be appropriate.

3.3. ALTERNATIVES ANALYZED IN THE EIR

The alternatives selected for analysis in this EIR are described below. The analyses and environmental impacts associated with each of these alternatives are provided in Chapter 5 of this EIR.

Alternative 1 – No Project Alternative

In accordance with the CEQA Guidelines, the No Project Alternative for a project consists of the circumstance under which the project does not proceed. Section 15126.6(e)(3)(B) of the Guidelines states that, "In certain instances, the no project alternative means "no build" wherein the existing environmental setting is maintained." In this case, the No Project Alternative would mean that the RAP is not implemented at the site. Therefore, no excavation would occur and no SVE wells and SVE system or sub-slab mitigation would be installed. Monitoring of the site would continue. All existing site features, such as residences, landscaping, hardscape, fences, patios, and ancillary structures would remain. No relocation of residents would occur. In other words, the residential subdivision would remain as it currently exists today without remediation of site impacts.

Alternative 2 - Excavation Beneath Landscape and Hardscape to 10 Feet (FS Alternative 4E)

The Excavation Beneath Landscape and Hardscape to 10 Feet Alternative would include the same remedial technologies as the project, but would excavate soils to a depth of 10 feet bgs (as compared to 5 feet with targeted excavation to 10 feet bgs under the project) beneath landscaped and hardscaped areas where human health or groundwater goals are exceeded. Excavation to 10 feet would occur in all the areas compared with 5 feet with targeted areas to 10 feet under the RP's Proposed Remedy.

Data from sampling that occurred at ≤10 feet bgs would be used to identify properties for excavation. If sample data indicate that soils on a given property do not meet RAOs, the residential hardscape of the

property would be removed and excavation would occur to remove exposed soils to the depth where the deepest detection took place. While the same remedial technologies implemented by the project would be included in this alternative, SVE/ bioventing infrastructure may be modified for a 10-foot excavation depth.

As shown in Table 3-2, excavation under this alternative would occur at 241 properties, or an increase of 22 properties compared with the RP's Proposed Remedy. (An additional 22 properties would be excavated because while these properties meet RAOs from 0 to 5 feet they do not meet RAOs from 1 to 10 feet.) Similar to the project, sub-slab vapor mitigation system would be installed at approximately 28 houses and SVE/bioventing units would be installed at 236 properties.

Excavations to 10 feet bgs would require geotechnical investigations to support excavation design and establishment of necessary setbacks from buildings. Excavation to 10 feet would create challenges due to shoring of structures down to 10 feet and the shoring, setback and other protections required could limit the ability to reach a depth of 10 feet throughout the site. Excavations to 10 feet bgs either could be shored or done by slot trenches with vertical sidewalls. It is possible that vertical sidewalls would not be permitted at 10 feet as a result of geotechnical stability. In addition, leaving vertical sidewalls adjacent to structures overnight could result in slope failure and structure damage.

In some areas, a limited access bucket auger drilling rig would be used in conjunction with conventional excavation equipment. Conventional excavation using slot-trenching as necessary to protect structures or other features and open bulk excavation with appropriate sloping, setbacks, and/or shoring would be used where possible as the preferred excavation method. Auger excavation using a limited access rig would allow work in relatively tight spaces adjacent to structures to remove a column of soil.

The Excavate Beneath Landscape and Hardscape to 10 Feet Alternative would require on average, excavation of 1,222 CY of soil per property [compared to 611 to 867 CY per property under the RP's Proposed Remedy]. Approximately 274,700 CY of impacted soil would be excavated from the residential properties and approximately 43,900 CY of impacted soil would be excavated from other areas on the site. This alternative would result in a total of approximately 317,600 CY of impacted soil hauled from the site in about 21,639 truckloads over the timeframe of the implementation of this alternative. Clean fill would be imported to the site in a similar quantity.

As with the RP's Proposed Remedy, under this alternative excavation would occur around utilities, including water and gas, which are located about 3 to 3.5 feet inside the sidewalks in the front yards of approximately one-half of the properties in the Carousel Tract. These water pipes are of asbestos-cement (transite) construction and would need to be avoided during excavation.

Where it is possible to excavate to 10 feet in back yards, a long-reach excavator would be used. The overhead power lines would potentially need to be removed due to the potential for the excavator to hit the overhead utility lines, which could create an electrocution hazard for workers. The overhead power lines would be restored upon completion of the excavation.

This alternative is estimated to take approximately 8.4 years, which is approximately 2.4 years longer than the project.

As with the RP's Proposed Remedy, excavation of the upper 10 feet of soil and replacement with sand-cement slurry and clean soil would prevent most contact with impacted soils. The City of Carson Building

Code Section 8105, which amends the L.A. County Building Code Section 7003.1, is an existing long-term regulatory control that would limit exposure to soils below 3 feet.

Alternative 3 – No Excavation Beneath Hardscape - 5 Feet With Targeted10 Feet (FS Alternative 5D)

The No Excavation Beneath Hardscape -5 Feet With Targeted 10 Feet Alternative would include the same remedial technologies as the project, and would excavate soils to a depth of 5 feet bgs with targeted 10 feet excavation. Alternative 3 would excavate only under landscaped areas where human health or groundwater goals are exceeded and removal of hardscape would not occur.

As shown in Table 3-2, as with the RP's Proposed Remedy, excavation under this alternative would occur at 219 properties. Similar to the project, sub-slab vapor mitigation system would be installed at approximately 28 houses and SVE/bioventing units would be installed at 236 properties.

As with the RP's Proposed Remedy and Alternative 2, excavations to 10 feet bgs would require geotechnical investigations to support excavation design and establishment of necessary setbacks from buildings. Excavation to 10 feet would create challenges due to shoring of structures down to 10 feet and the shoring, setback and other protections required could limit the ability to reach a depth of 10 feet throughout the site. Excavations to 10 feet bgs either could be shored or done by slot trenches with vertical sidewalls. It is possible that vertical sidewalls would not be permitted at 10 feet as a result of geotechnical stability. In addition, leaving vertical sidewalls adjacent to structures overnight could result in slope failure and structure damage.

In some areas where targeted excavation from 5 to 10 feet would be conducted, a limited access bucket auger drilling rig would be used in conjunction with conventional excavation equipment. Auger excavation using a limited access rig would allow excavation to be conducted in relatively tight spaces adjacent to structures to remove a column of soil. Auger excavation using a limited access rig would allow work in relatively tight spaces adjacent to structures to remove a column of soil.

The No Excavation Beneath Hardscape would require on average excavation of 330 CY of soil per property [compared to 611 to 867 CY per property under the RP's Proposed Remedy]. Approximately 76,300 CY of impacted soils would be excavated from the residential properties. With the 10 percent contingency and the 8,100 CY of soils that would be excavated from the street trenching, this alternative would result in a total of approximately 83,930 CY of impacted soil hauled from the site in about 5,450 truckloads over the timeframe of the implementation of this alternative. Clean fill would be imported to the site in a similar quantity.

As with the RP's Proposed Remedy, under this alternative excavation would occur around utilities, including water and gas, which are located about 3 to 3.5 feet inside the sidewalks in the front yards of approximately one-half of the properties in the Carousel Tract. These water pipes are of asbestos-cement (transite) construction and would need to be avoided during excavation.

As with the RP's Proposed Remedy, under this alternative where it is possible to excavate to 10 feet in back yards, a long-reach excavator would be used. The overhead power lines would potentially need to be removed due to the potential for the excavator to hit the overhead utility lines, which could create an electrocution hazard for workers. The overhead power lines would be restored upon completion of the excavation.

As indicated above, under this alternative hardscape, such as walkways and driveways, would not be removed and no excavation would occur beneath the hardscape. The City of Carson does not require that homeowners obtain a permit or notify the City prior to removing residential hardscape from their property. Therefore, this alternative would include the development of long-term regulatory controls restricting removal of residential hardscape within the Carousel Tract in order to reduce the potential contact with impacted soils.

This alternative is estimated to take approximately 4.4 years, which is approximately 1.4 years shorter than the project.

3.4 ANALYSIS FORMAT

In accordance with CEQA Guidelines Section 15126.6(d), each alternative is evaluated in Chapter 5, *Environmental Impact Analysis,* of this EIR in sufficient detail to determine whether the overall environmental impacts would be fewer, similar or greater than the corresponding impacts resulting from implementation of the project. As stated above, Chapter 6, *Comparison of Alternatives,* provides a summary of each alternative's impacts in comparison to the project. Furthermore, Chapter 6, provides a discussion of each alternative's consistency with the "project objectives," as listed in Chapter 2, *Project Description*, of this EIR. That is, a determination is made as to whether or not the alternative would substantially attain the project objectives.

The evaluation of each of the alternatives in Chapters 5 and 6 follows the process described below:

a. The net environmental impacts of the alternative after implementation of reasonable mitigation measures are determined for each environmental issue area analyzed in the EIR. (Chapter 5)

b. Post-mitigation significant and non-significant environmental impacts of the alternative and the project are compared for each environmental issue area. Where the net impact of the alternative would be clearly less adverse or more beneficial than the impact resulting from the project, the comparative impact is said to be "less." Where the alternative's net impact would be clearly more adverse or less beneficial than that of the project, the comparative impact is said to be "greater." Where the impacts of the alternative and the project would be roughly equivalent, the comparative impact is said to be "similar." (Chapter 6)

c. The comparative analysis of the impacts is followed by a general discussion of whether the underlying purpose and basic project objectives are substantially attained by the alternative. (Chapter 6)

d. Based on the alternatives analysis, a discussion regarding an Environmentally Superior Alternative is provided. (Chapter 6)

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4. Basis for Cumulative Analysis

4.0 BASIS FOR CUMULATIVE ANALYSIS

The California Environmental Quality Act (CEQA) requires that EIRs analyze cumulative impacts. As defined in *CEQA Guidelines* Section 15355, a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other foreseeable projects causing related impacts in the vicinity of the project. *CEQA Guidelines* Section 15130(a) states that an EIR must discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in Section 15065(c)(a)(3). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but must briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. However, an EIR should not discuss impacts which do not result in part from the project evaluated in the EIR. Furthermore, when the combined cumulative impact associated with the project's incremental effect and the effects of other projects is not significant, the EIR must briefly indicate why the cumulative impact is not significant and is not discussed in further detail in the EIR. A lead agency must identify facts and analysis supporting the lead agency's conclusion that the cumulative impact is less than significant.

In addition, CEQA *Guidelines* Section 15130(b) indicates that the analysis of cumulative impacts shall reflect the severity of the impacts and the likelihood of occurrence, but the discussion need not provide the same level of detail as is provided for the impacts attributable to the project alone. Instead, the discussion of cumulative impacts is guided by the standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of the other projects which do not contribute to the cumulative impact.

A project has "cumulatively considerable" impacts when its incremental effects "are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. Cal. Pub. Res. Code § 21083(b); see also CEQA *Guidelines* § 15355(b).

For an adequate discussion of significant cumulative impacts, the *CEQA Guidelines* (Section 15130(b)(1)(A) and (B)) allow an environmental impact report to determine cumulative impacts and reasonably foreseeable growth based on either of the following methods:

- A list of past, present, and probable future projects producing related or cumulative impacts; or
- A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental planning document that has been adopted or certified and described or evaluated regional or area-wide conditions contributing to the cumulative impact.

For the purposes of the cumulative impacts analysis for the project, related projects within two miles of the site were identified by the City of Carson and the Los Angeles Department of Transportation in Spring 2014. The list of identified related projects is provided in **Table 4-1,** *Related Projects List,* with the locations of each of the related projects listed in **Figure 4-1**, *Locations of Related Projects*.

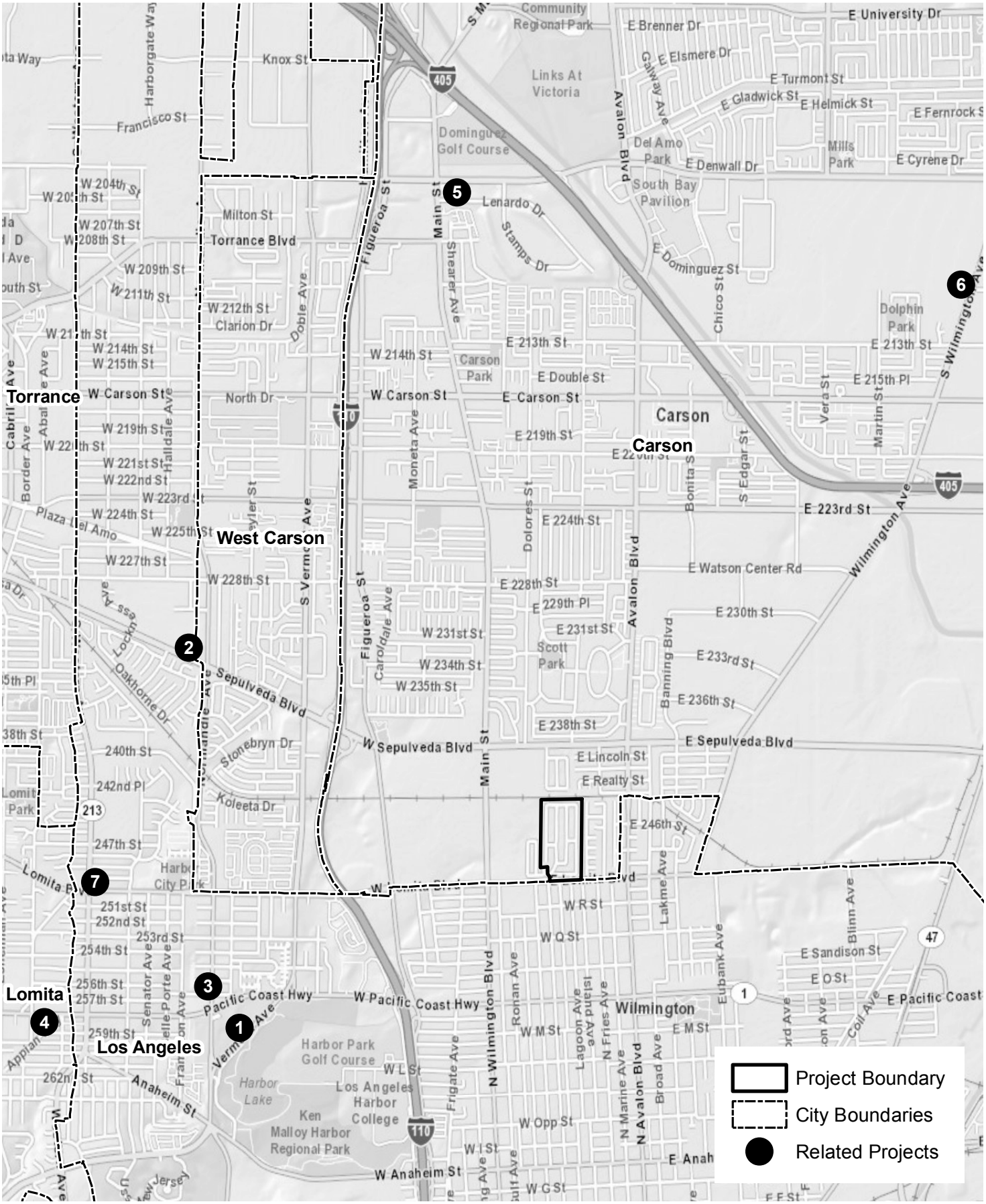
Although the projects listed below serve as the primary bases for evaluation of cumulative impacts, the approach to these analyses varies for certain environmental issues. The cumulative analyses for each environmental issue are presented in the applicable environmental issue sections in Chapter 4, *Environmental Impact Analysis*, of this EIR.

Table 4-1

Related Projects List

Map No.	Name	Location	Description
1	Kaiser South Bay Hospital Expansion	25825 Vermont Ave, Los Angeles	234.4 ksf medical office 775 ksf records/office/warehouse 286 hospital beds
2	1311 W Sepulveda Apartments	1311 W Sepulveda Blvd, Los Angeles	352 apartment units 17.9 ksf retail
3	Daycare Facility	25621 S Normandie Ave, Los Angeles	84 child daycare
4	Del Lago Apartments	1450 Pacific Coast Highway, Los Angeles	204 apartment units
5	Carson Marketplace/The Boulevards at South Bay	Del Amo Ave west of I-405, Carson	mixed-use development
6	Carson Shell Revitalization	20945 S Wilmington Ave, Carson	10 employee office 90 ksf industrial/commercial 83 ksf community retail
7	Ponte Vista Residential Project	26900 S Western Ave, Los Angeles	143 single-family residential units 600 condominium units 392 apartment units 2.8 acre park

Source: Fehr & Peers, 2014.



0 0.5 1 Miles

Locations of Related Projects

Former Kast Property Tank Farm Site Remediation Project

Source: ESRI Street Map, 2009; PCR Services Corporation, 2013.

FIGURE

4-1

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5. Environmental Impact Analysis

5.0. ENVIRONMENTAL IMPACT ANALYSIS
5.1 AIR QUALITY

1. INTRODUCTION

This section addresses the air emissions that would be generated by the implementation of the Revised RAP at the site, which is located in the South Coast Air Basin (SoCAB). The analysis addresses the consistency of the RP's Proposed Remedy with the air quality policies set forth within the South Coast Air Quality Management District's (SCAQMD) Air Quality Management Plan (AQMP), and the City of Carson General Plan. Also, because the project involves hauling impacted soils to an identified receiver facility located in the Mojave Desert Air Basin (MDAB), the project is anticipated to result in truck trips in portions of the MDAB. The analysis of project-generated air emissions therefore focuses on whether the project would cause an exceedance of an ambient air quality standard or SCAQMD or Mojave Desert Air Quality Management District (MDAQMD) significance thresholds. Calculation worksheets, assumptions, and model outputs used in the analysis are contained in Appendix C of this EIR.

2. ENVIRONMENTAL SETTING

Regulatory Framework

A number of statutes, regulations, plans, and policies address air quality issues. The site and vicinity are subject to air quality regulations developed and implemented at the federal, state, and local levels.

Federal Regulations

The Federal Clean Air Act (CAA) was first enacted in 1955 and has been amended numerous times in subsequent years, with the most recent amendments in 1990. At the federal level, the United States Environmental Protection Agency (USEPA) is responsible for implementation of some portions of the CAA (e.g., certain mobile source and other requirements). Other portions of the CAA (e.g., stationary source requirements) are implemented by state and local agencies.

The CAA establishes federal air quality standards, known as National Ambient Air Quality Standards (NAAQS) and specifies future dates for achieving compliance. The CAA requires that the NAAQS be protective of human health, including protecting the health of sensitive populations such as asthmatics, children, and the elderly, and incorporate an adequate margin of safety.[1] The CAA also mandates that the state submit and implement a State Implementation Plan for areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met. The 1990 amendments to the CAA identify specific emission reduction goals for areas not meeting the NAAQS. These amendments require both a demonstration of reasonable further progress toward attainment and incorporation of additional sanctions for failure to attain or to meet interim milestones. The sections of the

[1] *U.S. Environmental Protection Agency, "Clean Air Act, Title I – Air Pollution Control and Prevention," http://www.epa.gov/air/caa/title1.html. Accessed August 2014. Section 109 of the Clean Air Act requires standards be set at a level "requisite to protect the public health" with an "adequate margin of safety."*

CAA which are most applicable to the project include Title I (Nonattainment Provisions) and Title II (Mobile Source Provisions). Title I requirements are implemented for the purpose of attaining NAAQS for the following criteria pollutants: (1) ozone (O_3); (2) nitrogen dioxide (NO_2); (3) sulfur dioxide (SO_2); (4) particulate matter (PM_{10}); (5) carbon monoxide (CO); and (6) lead (Pb). **Table 5.1-1**, *Ambient Air Quality Standards*, shows the NAAQS currently in effect for each criteria pollutant. The NAAQS were last amended in September 2006 to include an established methodology for calculating fine particulate matter ($PM_{2.5}$) as well as revoking the annual PM_{10} threshold. The NAAQS were amended in July 1997 to include an 8-hour standard for O_3 and to adopt a NAAQS for $PM_{2.5}$.

The site is located within the SoCAB, which is an area designated as non-attainment because it does not currently meet NAAQS for certain pollutants regulated under the CAA. The CAA sets certain deadlines for meeting the NAAQS within the Air Basin including the following: (1) 1-hour O_3 by the year 2010; (2) 8-hour O_3 by the year 2024;[2] (3) PM_{10} by the year 2006; and (4) $PM_{2.5}$ by the year 2015. On June 11, 2007, the USEPA reclassified the SoCAB as a federal "attainment" area for CO and approved the CO maintenance plan.[3] The SoCAB previously exceeded the NAAQS for PM_{10}, but has met the NAAQS at all monitoring stations and the USEPA approved the request for re-designation to attainment effective July 26, 2013.[4] The SoCAB does not meet the NAAQS for O_3 and $PM_{2.5}$ and is classified as being in non-attainment for these pollutants. The Los Angeles County portion of the SoCAB is designated as non-attainment for lead; however, this is due to localized emissions from two lead-acid battery recycling facilities located in the City of Vernon and the City of Industry, which are the only two lead-acid battery recycling facilities in Los Angeles County.[5] The attainment status of the Los Angeles County portion of the SoCAB with respect to the NAAQS is summarized in **Table 5.1-2**, *South Coast Air Basin Attainment Status (Los Angeles County)*.

Since a potential receiver facility for impacted soils excavated from the site is located in the San Bernardino County portion of the MDAB, the project would result in export truck trips in portions of the MDAB. **Table 5.1-3**, *Mojave Desert Air Basin Attainment Status (San Bernardino County)*, lists the criteria pollutants and their relative attainment status for the MDAB.

Title II of the CAA pertains to mobile sources, such as cars, trucks, buses, and planes. Reformulated gasoline, automobile pollution control devices, and vapor recovery nozzles on gas pumps are a few of the mechanisms the USEPA uses to regulate mobile air emission sources. The provisions of Title II have resulted in tailpipe emission standards for vehicles, which have strengthened in recent years to improve air quality. For example, the standards for nitrogen oxide (NO_X) emissions have lowered substantially, and the specification requirements for cleaner burning gasoline are more stringent.

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[2] *The 8-hour ozone attainment deadline for the 1997 standard of 80 parts per billion is 2024. The 8-hour ozone attainment deadline for the 2008 standard of 75 parts per billion is 2032.*

[3] *Federal Register, Vol. 72, No. 91, May 11, 2007, 26718-26721, "Approval and Promulgation of Implementation Plans and Designation of Areas for Air Quality Planning Purposes: California, Final Rule."*

[4] *Federal Register, Vol. 78, No. 123, June 26, 2013, 38223-38226, "Approval and Promulgation of Implementation Plans; Designation of Areas for Air Quality Planning Purposes; California; South Coast Air Basin; Approval of PM10 Maintenance Plan and Redesignation to Attainment for the PM10 Standard."*

[5] *South Coast Air Quality Management District, Board Meeting, Agenda No. 30, Adopt the 2012 Lead State Implementation Plan for Los Angeles County, May 4, 2012.*

Table 5.1-1

Ambient Air Quality Standards

Pollutant	Average Time	California Standards [a]		National Standards [b]		
		Concentration [c]	Method [d]	Primary [c,e]	Secondary [c,f]	Method [g]
O_3	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m³)		0.075 ppm (147 µg/m³)		
NO_2 [h]	1 Hour	0.18 ppm (338 µg/m³)	Gas Phase Chemi-luminescence	100 ppb (188 µg/m³)	None	Gas Phase Chemi-luminescence
	Annual Arithmetic Mean	0.030 ppm (56 µg/m³)		53 ppb (100 µg/m³)	Same as Primary Standard	
CO	1 Hour	20 ppm (23 mg/m³)	Non-Dispersive Infrared Photometry NDIR)	35 ppm (40 mg/m³)	None	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10mg/m³)		9 ppm (10 mg/m³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	
SO_2 [i]	1 Hour	0.25 ppm (655 µg/m³)	Ultraviolet Fluorescence	75 ppb (196 µg/m³)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)[9]
	3 Hour	—		—	0.5 ppm (1300 µg/m³)	
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (for certain areas) [i]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas) [i]	—	
PM_{10}	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		—		
$PM_{2.5}$	24 Hour	No Separate State Standard		35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	12.0 µg/m³	15 µg/m³	
Lead [j,k]	30 Day Average	1.5 µg/m³	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m³ (for certain areas)[k]	Same as Primary Standard	
	Rolling 3-Month Average[k]	--		0.15 µg/m³		
Visibility Reducing Particles [l]	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		**No Federal Standards**		

Table 5.1-1 (Continued)

Ambient Air Quality Standards

Pollutant	Average Time	California Standards [a]		National Standards [b]		
		Concentration [c]	Method [d]	Primary [c,e]	Secondary [c,f]	Method [g]
Sulfates (SO_4)	24 Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride [j]	24 Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

[a] *California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, 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.*

[b] *National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone 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 micrograms/per cubic meter (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.*

[c] *Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.*

[d] *Any equivalent procedure which can be shown to the satisfaction of the California Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.*

[e] *National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.*

[f] *National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.*

[g] *Reference method as described by the USEPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the USEPA.*

[h] *To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb.*

[i] *On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated non-attainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.*

[j] *The California Air Resources Board has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.*

[k] *The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m³ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated non-attainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.*

[l] *In 1989, the California Air Resources Board converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.*

Source: California Air Resources Board, Ambient Air Quality Standards (6/4/13), http://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed August 2014.

Table 5.1-2

South Coast Air Basin Attainment Status (Los Angeles County)

Pollutant	National Standards	California Standards
O_3 (1-hour standard)	N/A [a]	Non-attainment – Extreme
O_3 (8-hour standard)	Non-attainment – Extreme	Non-attainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
PM_{10}	Attainment	Non-attainment
$PM_{2.5}$	Non-attainment	Non-attainment
Lead	Non-attainment	Attainment
Visibility Reducing Particles	N/A	Unclassified
Sulfates	N/A	Attainment
Hydrogen Sulfide	N/A	Unclassified
Vinyl Chloride	N/A	N/A [b]

N/A = not applicable

[a] *The NAAQS for 1-hour ozone was revoked on June 15, 2005, for all areas except Early Action Compact areas.*

[b] *In 1990 the California Air Resources Board identified vinyl chloride as a toxic air contaminant and determined that it does not have an identifiable threshold. Therefore, the California Air Resources Board does not monitor or make status designations for this pollutant.*

Source: U.S. Environmental Protection Agency, The Green Book Non-attainment Areas for Criteria Pollutants, http://www.epa.gov/oaqps001/greenbk/index.html. Accessed August 2014; California Air Resources Board, Area Designations Maps/State and National, http://www.arb.ca.gov/desig/adm/adm.htm. Accessed August 2014.

State Regulations

California Clean Air Act

The California Clean Air Act (CCAA), signed into law in 1988, requires all areas of the State to achieve and maintain the California Ambient Air Quality Standards (CAAQS) by the earliest practical date. The CAAQS are set at a level protective of human health, particularly that of infants and children, and incorporate an adequate margin of safety.[6] Table 5.1-1 shows the CAAQS currently in effect for each of the criteria pollutants as well as the other pollutants recognized by the State. As shown in Table 5.1-1, the CAAQS include more stringent standards than the NAAQS for most of the criteria air pollutants. In general, the California standards are more health protective than the corresponding NAAQS. In addition, the California Air Resources Board (CARB) has established standards for other pollutants recognized by the State, such as sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

Table 5.1-2 provides a summary of the attainment status of the Los Angeles County portion of the SoCAB with respect to the state standards. The SoCAB is designated as attainment for the California standards for sulfates and unclassified for hydrogen sulfide and visibility-reducing particles. Because vinyl chloride is a

[6] *California Air Resources Board, "Final Report – Adequacy of California Ambient Air Quality Standards," http://www.arb.ca.gov/research/aaqs/caaqs/ad-aaqs/ad-aaqs.htm. Accessed August 2014.*

Table 5.1-3

Mojave Desert Air Basin Attainment Status (San Bernardino County)

Pollutant	National Standards	California Standards
O_3 (1-hour standard)	N/A [a]	Non-attainment
O_3 (8-hour standard)	Non-attainment – Severe-15 [b]	Non-attainment
CO	Attainment/Unclassified	Attainment
NO_2	Attainment/Unclassified	Attainment
SO_2	Unclassified	Attainment
PM_{10}	Non-attainment	Non-attainment
$PM_{2.5}$	Attainment/Unclassified	Non-attainment [b]
Lead	Attainment/Unclassified	Attainment
Visibility Reducing Particles	N/A	Unclassified
Sulfates	N/A	Attainment
Hydrogen Sulfide	N/A	Unclassified
Vinyl Chloride	N/A	N/A [c]

N/A = not applicable

[a] *The NAAQS for 1-hour ozone was revoked on June 15, 2005, for all areas except Early Action Compact areas.*
[b] *West Mojave Desert portion of San Bernardino County.*
[c] *In 1990 the California Air Resources Board identified vinyl chloride as a toxic air contaminant and determined that it does not have an identifiable threshold. Therefore, the California Air Resources Board does not monitor or make status designations for this pollutant.*

Source: U.S. Environmental Protection Agency, The Green Book Non-attainment Areas for Criteria Pollutants, http://www.epa.gov/oaqps001/greenbk/index.html. Accessed August 2014; California Air Resources Board, Area Designations Maps/State and National, http://www.arb.ca.gov/desig/adm/adm.htm. Accessed August 2014.

carcinogenic toxic air contaminant, the CARB does not classify attainment status for this pollutant. Table 5.1-3 provides a summary of the attainment status of the MDAB with respect to the state standards.

California Air Resources Board On-Road and Off-Road Vehicle Rules

In 2004, CARB adopted an Airborne Toxic Control Measure (ATCM) to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel particulate matter and other toxic air contaminants (TACs) (Title 13 California Code of Regulations [CCR], Section 2485).[7] The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than five (5) minutes at any given time.

In 2008 CARB approved the Truck and Bus regulation to reduce NO_X, PM_{10}, and $PM_{2.5}$ emissions from existing diesel vehicles operating in California (13 CCR, Section 2025, subsection (h)).[8] The requirements were

[7] *California Air Resources Board, Final Regulation Order, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, http://www.arb.ca.gov/regact/idling/fro1.pdf. Accessed August 2014.*

[8] *California Air Resources Board, Final Regulation Order, Amendments to the Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use On-Road Diesel-Fueled Vehicles, http://www.arb.ca.gov/msprog/onrdiesel/documents/TBFinalReg.pdf. Accessed August 2014.*

amended in December 2010 and apply to nearly all diesel fueled trucks and busses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. For the largest trucks in the fleet, those with a GVWR greater than 26,000 pounds, there are two methods to comply with the requirements. The first way is for the fleet owner to retrofit or replace engines, starting with the oldest engine model year, to meet 2010 engine standards, or better. This is phased over 8 years, starting in 2015 and would be fully implemented by 2023, meaning that all trucks operating in the State subject to this option would meet or exceed the 2010 engine emission standards for NO_X and PM by 2023. The second option, if chosen, requires fleet owners, starting in 2012, to retrofit a portion of their fleet with diesel particulate filters (DPFs) achieving at least 85 percent removal efficiency, so that by January 1, 2016 their entire fleet is equipped with DPFs. However, DPFs do not lower NO_X emissions. Thus, fleet owners choosing the second option must still comply with the 2010 engine emission standards for their trucks and busses by 2020.

In addition to limiting exhaust from idling trucks, CARB recently promulgated emission standards for off-road diesel construction equipment of greater than 25 horsepower (hp) such as bulldozers, loaders, backhoes and forklifts, as well as many other self-propelled off-road diesel vehicles. The regulation adopted by the CARB on July 26, 2007, aims to reduce emissions by installation of diesel soot filters and encouraging the retirement, replacement, or repower of older, dirtier engines with newer emission controlled models. Implementation is staggered based on fleet size (which is the total of all off-road horsepower under common ownership or control), with the largest fleets to begin compliance by January 1, 2014 (13 CCR, Section 2449).[9] Each fleet must demonstrate compliance through one of two methods. The first option is to calculate and maintain fleet average emissions targets, which encourages the retirement or repowering of older equipment and rewards the introduction of newer cleaner units into the fleet. The second option is to meet the Best Available Control Technology (BACT) requirements by turning over or installing Verified Diesel Emission Control Strategies (VDECS) on a certain percentage of its total fleet horsepower. The compliance schedule requires that BACT turn overs or retrofits (VDECS installation) be fully implemented by 2023 in all equipment in large and medium fleets and across 100 percent of small fleets by 2028.

Local Regulations

South Coast Air Quality Management District

The SCAQMD has jurisdiction over air quality planning for all of Orange County, Los Angeles County except for the Antelope Valley, the non-desert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County. The SoCAB is a subregion within SCAQMD jurisdiction. While air quality in this area has improved, the SoCAB requires continued diligence to meet air quality standards.

The SCAQMD has adopted a series of AQMPs to meet the CAAQS and NAAQS. The 2012 AQMP incorporates the latest scientific and technological information and planning assumptions, including the Southern California Association of Government's (SCAG) 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), which is discussed later in the next section, and updated emission

[9] *California Air Resources Board, Final Regulation Order, Regulation for In-Use Off-Road Diesel-Fueled Fleets, http://www.arb.ca.gov/regact/2010/offroadlsi10/finaloffroadreg.pdf. Accessed August 2014.*

inventory methodologies for various source categories.[10] The Final 2012 AQMP was adopted by the AQMD Governing Board on December 7, 2012.

Since the 2012 AQMP is the most recent plan to achieve air quality attainment within the region, the 2012 AQMP is the most appropriate plan to use for consistency analysis. The AQMP builds upon other agencies' plans to achieve federal standards for air quality in the SoCAB. It incorporates a comprehensive strategy aimed at controlling pollution from all sources, including stationary sources, and on-road and off-road mobile sources. The 2012 AQMP builds upon improvements in previous plans, and includes new and changing federal requirements, implementation of new technology measures, and the continued development of economically sound, flexible compliance approaches. In addition, it highlights the significant amount of emission reductions needed and the urgent need to identify additional strategies, especially in the area of mobile sources, to meet all federal criteria pollutant standards within the timeframes allowed under the federal CAA.

The 2012 AQMP's key undertaking is to bring the SoCAB into attainment with NAAQS for 24-hour $PM_{2.5}$ by 2014. It also intensifies the scope and pace of continued air quality improvement efforts toward meeting the 2024 8-hour ozone standard deadline with new measures designed to reduce reliance on the CAA Section 182(e)(5) long-term measures for NO_X and volatile organic compound (VOC) reductions. SCAQMD expects exposure reductions to be achieved through implementation of new and advanced control technologies as well as improvement of existing technologies.

The control measures in the 2012 AQMP consist of four components: (1) SoCAB-wide and Episodic Short-term $PM_{2.5}$ Measures; (2) Contingency Measures; (3) 8-hour Ozone Implementation Measures; and (4) Transportation and Control Measures provided by the SCAG. The Plan includes eight short-term $PM_{2.5}$ control measures, 16 stationary source 8-hour ozone measures, 10 early action measures for mobile sources and seven early action measures proposed to accelerate near-zero and zero emission technologies for goods movement related sources, and five on-road and five off-road mobile source control measures. In general, the District's control strategy for stationary and mobile sources is based on the following approaches: (1) available cleaner technologies; (2) best management practices; (3) incentive programs; (4) development and implementation of zero- near-zero technologies and vehicles and control methods; and (5) emission reductions from mobile sources.

Control strategies in the AQMP with potential applicability to short-term emissions with the project include strategies denoted in the AQMP as ONRD-04 and OFFRD-01, which are intended to reduce emissions from on-road and off-road heavy-duty vehicles and equipment. Descriptions of measures ONRD-04 and OFFRD-01 are provided below:

- **ONRD-04 –** Accelerated Retirement of Older On-Road Heavy-Duty Vehicles: This proposed measure seeks to replace up to 1,000 heavy-duty vehicles per year with newer or new vehicles that at a minimum, meet the 2010 on-road heavy-duty NO_X exhaust emissions standard of 0.2 grams per brake horsepower-hour (g/bhp-hr). Given that exceedances of the 24-hour $PM_{2.5}$ air quality standard occur in the Mira Loma region, priority will be placed on replacing older diesel trucks that operate

[10] *South Coast Air Quality Management District, 2012 Air Quality Management Plan, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan. Accessed August 2014.*

primarily at the warehouse and distribution centers located in the Mira Loma area. Funding assistance of up to $35,000 per vehicle is proposed and the level of funding will depend upon the NO_X emissions certification level of the replacement vehicle. In addition, a provision similar to the Surplus Off-Road Option for NO_X (SOON) provision of the statewide In-Use Off-Road Fleet Vehicle Regulation will be sought to ensure that additional NO_X emission reduction benefits are achieved.

- **OFFRD-01 –** Extension of the Soon Provision for Construction/Industrial Equipment: This measure seeks to continue the Surplus Off-Road Option for NO_X (SOON) provision of the statewide In-Use Off-Road Fleet Vehicle Regulation beyond 2014 through the 2023 timeframe. In order to implement the SOON program in this timeframe, funding of up to $30 million per year would be sought to help fund the repower or replacement of older Tier 0 and Tier 1 equipment, with reductions that are considered surplus to the statewide regulation with Tier 4 or cleaner engines.

The *CEQA Air Quality Handbook* (the Handbook) was published by the SCAQMD in November 1993 to provide local governments with guidance for analyzing and mitigating project-specific air quality impacts. The Handbook provides standards, methodologies, and procedures for conducting air quality analyses in EIRs and was used extensively in the preparation of this analysis. However, the SCAQMD is currently in the process of replacing the Handbook with the *Air Quality Analysis Guidance Handbook*. As part of this process, the SCAQMD has adopted stand-alone guidance documents. The SCAQMD has published a guidance document called the *Localized Significance Threshold Methodology* for CEQA Evaluations that is intended to provide guidance in evaluating localized effects from mass emissions during construction.[11] The SCAQMD adopted additional guidance regarding $PM_{2.5}$ in a document titled *Final Methodology to Calculate Particulate Matter $(PM)_{2.5}$ and $PM_{2.5}$ Significance Thresholds*.[12] This latter document has been incorporated by the SCAQMD into its CEQA significance thresholds and *Localized Significance Threshold Methodology*.

The SCAQMD has also adopted land use planning guidelines in the Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning (May 2005) ("Guidance Document"), which considers impacts to sensitive receptors from facilities that emit TAC. SCAQMD's distance recommendations are the same as those provided by CARB (e.g., a 500-foot siting distance for sensitive land uses proposed in proximity of freeways and high-traffic roads, and the same siting criteria for distribution centers and dry cleaning facilities). The Guidance Document introduces land use related policies that rely on design and distance parameters to minimize emissions and lower potential health risk. SCAQMD's guidelines are voluntary initiatives recommended for consideration by local planning agencies.

Several SCAQMD rules adopted to implement portions of the AQMP may apply to the implementation of the RAP. For example, SCAQMD Rule 403 requires implementation of best available fugitive dust control measures during active construction periods capable of generating fugitive dust emissions from on-site earth-moving activities, construction/demolition activities, and construction equipment travel on paved and unpaved roads. The project would be subject to the following SCAQMD rules and regulations:

[11] *South Coast Air Quality Management District, Final Localized Significance Threshold Methodology, (2008).*

[12] *South Coast Air Quality Management District, Final Methodology to Calculate Particulate Matter (PM)2.5 and PM2.5 Significance Thresholds, (2006).*

Regulation II – Permits: This regulation sets forth the requirements for permits to construction from the SCAQMD. Implementation of the RAP, which includes a soil vapor extraction (SVE)/bioventing system, would be subject to the applicable portions of this regulation as well as associated applicable rules.

Regulation IV – Prohibitions: This regulation sets forth the restrictions for visible emissions, odor nuisance, fugitive dust, various air emissions, fuel contaminants, start-up/shutdown exemptions and breakdown events. The following is a list of rules that would apply to the implementation of the RAP:

- **Rule 402 – Nuisance:** This rule states that a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.
- **Rule 403 – Fugitive Dust:** This rule requires projects to prevent, reduce or mitigate fugitive dust emissions from a site. Rule 403 restricts visible fugitive dust to the project property line, restricts the net PM_{10} emissions to less than 50 micrograms per cubic meter ($\mu g/m^3$) and restricts the tracking out of bulk materials onto public roads. Additionally, projects must utilize one or more of the best available control measures (identified in the tables within the rule). Mitigation measures may include adding freeboard to haul vehicles, covering loose material on haul vehicles, watering, using chemical stabilizers and/or ceasing all activities. Finally, a contingency plan may be required if so determined by the USEPA.

Regulation XI – Source Specific Standards: Regulation XI sets emissions standards for different specific sources. The following rule would apply to the implementation of the RAP:

- **Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil:** This rule sets requirements to control the emission of VOCs from excavating, grading, handling and treating VOC-contaminated soil as a result of leakage from storage or transfer operations, accidental spillage, or other deposition. The rule set standards for the handling of VOC-contaminated soil at or from an excavation or grading site.

Mojave Desert Air Quality Management District

The identified receiver facility for the impacted soil excavated from the site is located in the MDAB. The MDAQMD has jurisdictional control of air quality issues in the portions of the MDAB located in San Bernardino County and the eastern portion of Riverside County. Thus, emissions caused by the transport of materials from the site to a receiver facility may fall under the jurisdiction of the MDAQMD.

The MDAQMD has adopted the *Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area)* that presents the progress the MDAQMD will make towards meeting the required ozone planning milestones.[13] The MDAQMD has in place Reasonably Available Control Technology (RACT) requirements for the majority of sources (including gasoline dispensing vapor control), as well as a New

[13] *Mojave Desert Air Quality Management District, Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area), (2008), http://www.mdaqmd.ca.gov/Modules/ShowDocument.aspx?documentid=40. Accessed August 2014.*

Source Review (NSR) program with a 25 ton per year major source level and a 1.3:1 offset ratio requirement. The attainment plan recognizes that the MDAQMD is downwind of the SoCAB and to a lesser extent, the San Joaquin Valley Air Basin (SJVAB). While local MDAQMD emissions contribute to exceedances of both the NAAQS and CAAQS for ozone, photochemical ozone modeling conducted by the SCAQMD and CARB indicates that the MDAB would be in attainment of both standards without the influence of transported air pollution from upwind air basins.[14] Therefore, the attainment demonstration is based on a regional modeling effort primarily with SCAQMD and CARB staff and resources. The attainment demonstration determined that the MDAQMD portion of the MDAB will attain the federal 8-hour ozone standard (1997 standard of 0.08 ppm) by the 2020 deadline for Severe-17 areas on the basis of reduced transported air pollution from upwind areas.

The MDAQMD has jurisdiction over existing, new, and modified sources of air emissions within the majority of the MDAB. The site is not located in the MDAB; thus on-site activities and emissions would not be subject to MDAQMD rules and regulations. While implementation of the RAP would potentially result in off-site truck trips to an existing receiver facility in the MDAB, such facilities operate in accordance with their own permits, including operating conditions specified in required Permits to Construct/Permits to Operate from the MDAQMD. Thus, the activities and emissions that may occur on-site at the existing receiver facility in the MDAB due to receipt of waste from the project would already be accounted for and analyzed in its permits and are not subject to analysis, control, or mitigation in this EIR.

Southern California Association of Governments

The SCAG is the regional planning agency for Los Angeles, Orange, Ventura, Riverside, San Bernardino and Imperial Counties and addresses regional issues relating to transportation, the economy, community development and the environment. SCAG is the federally designated metropolitan planning organization (MPO) for the majority of the southern California region and is the largest MPO in the nation. With regard to air quality planning, SCAG has prepared the 2012-2035 RTP/SCS, which addresses regional development and growth forecasts and forms the basis for the land use and transportation control portions of the AQMP and are utilized in the preparation of the air quality forecasts and consistency analysis included in the AQMP. The RTP/SCS and AQMP are based on projections originating within local jurisdictions.

In 2008, SCAG released the Regional Comprehensive Plan (RCP) which addresses regional issues such as housing, traffic/transportation, water, and air quality. The RCP serves as an advisory document to local agencies in the southern California region for their information and voluntary use for preparing local plans and handling local issues of regional significance. The RCP presents a vision of how southern California can balance air quality with growth and development by including goals such as: reducing emissions of criteria pollutants to attain federal air quality standards by prescribed dates and stated ambient air quality standards as soon as practicable; reverse current trends in greenhouse gas emissions to support sustainability goals for energy, water supply, agriculture, and other resource areas; and to minimize land uses that increase the risk of adverse air pollution-related health impacts from exposure to TACs, particulates (PM_{10} and $PM_{2.5}$) and carbon monoxide.

[14] *California Air Resources Board, Ozone Transport Assessment 2001, (2002). CARB identifies the South Coast and San Joaquin Valley Air Basins as having an overwhelming and significant impact on the Mojave Desert Air Basin.*

City of Carson

Local jurisdictions, such as the City of Carson, have the authority and responsibility to reduce air pollution through its enforcement power and decision-making authority. The City of Carson is responsible for the implementation of transportation control measures as outlined in the AQMP. Examples of such measures include bus turnouts, energy-efficient streetlights, and synchronized traffic signals. In accordance with CEQA requirements and the CEQA review process, the City assesses the air quality impacts of new development projects, requires mitigation of potentially significant air quality impacts by conditioning discretionary permits and monitors and enforces implementation of such mitigation measures. The City's Air Quality Element of the General Plan includes policies applicable to implementation of the RAP. A consistency with these applicable policies is provided in subsection 4, Project Analysis.

Existing Conditions

Certain air pollutants have been recognized to cause notable health problems and consequential damage to the environment either directly or in reaction with other pollutants, due to their presence in elevated concentrations in the atmosphere. Such pollutants have been identified and regulated as part of the overall endeavor to prevent further deterioration, and facilitate improvement, of air quality. The following pollutants are regulated by the USEPA and subject to emission reduction measures adopted by federal, state and other regulatory agencies.

Ozone (O_3): Ozone is a secondary pollutant formed by the chemical reaction of volatile organic compounds and NO_X under certain meteorological conditions such as high temperature and stagnation episodes. An elevated level of ozone irritates the lungs and breathing passages, causing coughing and pain in the chest and throat, thereby increasing susceptibility to respiratory infections and reducing the ability to exercise. Effects are more severe in people with asthma and other respiratory ailments. Long-term exposure may lead to scarring of lung tissue and may lower lung efficiency.

Nitrogen Dioxide (NO_2) and Nitrogen Oxides (NO_X): NO_X is a term that refers to a group of compounds containing nitrogen and oxygen. The primary compounds of air quality concern include NO_2 and nitric oxide (NO), which can quickly oxidize in the atmosphere to form NO_2. Ambient air quality standards have been promulgated for NO_2, which is a reddish-brown, reactive gas. The principle form of NO_X produced by combustion is NO, but NO reacts quickly in the atmosphere to form NO_2, creating the mixture of NO and NO_2 referred to as NO_X. Major sources of NO_X emissions include power plants, large industrial facilities, and motor vehicles. Emissions of NO_X are a precursor to the formation of ground-level ozone. NO_2 can potentially irritate the nose and throat, aggravate lung and heart problems, and may increase susceptibility to respiratory infections, especially in people with asthma. According to CARB, "NO_2 is an oxidizing gas capable of damaging cells lining the respiratory tract. Exposure to NO_2 along with other traffic-related pollutants, is associated with respiratory symptoms, episodes of respiratory illness and impaired lung functioning. Studies in animals have reported biochemical, structural, and cellular changes in the lung when exposed to NO_2 above the level of the current state air quality standard. Clinical studies of human subjects suggest that NO_2 exposure to levels near the current standard may worsen the effect of allergens in allergic asthmatics, especially in children."[15] NO_2 also contributes to the formation of PM_{10}. The terms "NO_X" and

[15] *California Air Resources Board, "Nitrogen Dioxide – Overview," http://www.arb.ca.gov/research/aaqs/caaqs/no2-1/no2-1.htm. Accessed August 2014.*

"NO_2" are sometimes used interchangeably. However, the term "NO_X" is primarily used when discussing emissions, usually from combustion-related activities. The term "NO_2" is primarily used when discussing ambient air quality standards. More specifically, NO_2 is regulated as a criteria air pollutant under the Clean Air Act and subject to the ambient air quality standards, whereas NO_X and NO are not. In cases where the thresholds of significance or impact analyses are discussed in the context of NO_X emissions, it is based on the conservative assumption that all NO_X emissions would oxidize in the atmosphere to form NO_2.

Carbon Monoxide (CO): Carbon monoxide is primarily emitted from combustion processes and motor vehicles due to incomplete combustion of fuel. Elevated concentrations of CO weaken the heart's contractions and lower the amount of oxygen carried by the blood. It is especially dangerous for people with chronic heart disease. Inhalation of carbon monoxide can cause nausea, dizziness, and headaches at moderate concentrations and can be fatal at high concentrations.

Particulate Matter (PM_{10} and $PM_{2.5}$): The human body naturally prevents the entry of larger particles into the body. However, small particles, with an aerodynamic diameter equal to or less than ten microns (i.e., PM_{10}) and even smaller particles with an aerodynamic diameter equal to or less than 2.5 microns (i.e., $PM_{2.5}$), can enter the body and are trapped in the nose, throat, and upper respiratory tract. These small particulates could potentially aggravate existing heart and lung diseases, change the body's defenses against inhaled materials, and damage lung tissue. The elderly, children, and those with chronic lung or heart disease are most sensitive to PM_{10} and $PM_{2.5}$. Lung impairment can persist for two to three weeks after exposure to high levels of particulate matter. Some types of particulates could become toxic after inhalation due to the presence of certain chemicals on or mixed with the particulates and the chemicals' reaction with internal body fluids.

Sulfur Dioxide (SO_2): Major sources of SO_2 include power plants, large industrial facilities, diesel vehicles, and oil-burning residential heaters. Emissions of sulfur dioxide aggravate lung diseases, especially bronchitis. It also constricts the breathing passages, especially in asthmatics and people involved in moderate to heavy exercise. Sulfur dioxide can potentially cause wheezing, shortness of breath, and coughing. High levels of particulates appear to worsen the effect of sulfur dioxide, and long-term exposure to both pollutants leads to higher rates of respiratory illness.

Lead (Pb): Lead is emitted from industrial facilities and from the sanding or removal of old lead-based paint. Smelting or processing the metal is the primary source of lead emissions, which is primarily a regional pollutant. Lead affects the brain and other parts of the body's nervous system. Exposure to lead in very young children impairs the development of the nervous system, kidneys, and blood forming processes in the body.

Regional – South Coast Air Basin

The site is located within the SoCAB, which is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The SoCAB includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties, in addition to the San Gorgonio Pass area in Riverside County. The terrain and geographical location create the distinctive climate of the SoCAB, as the SoCAB is a coastal plain with connecting broad valleys and low hills.

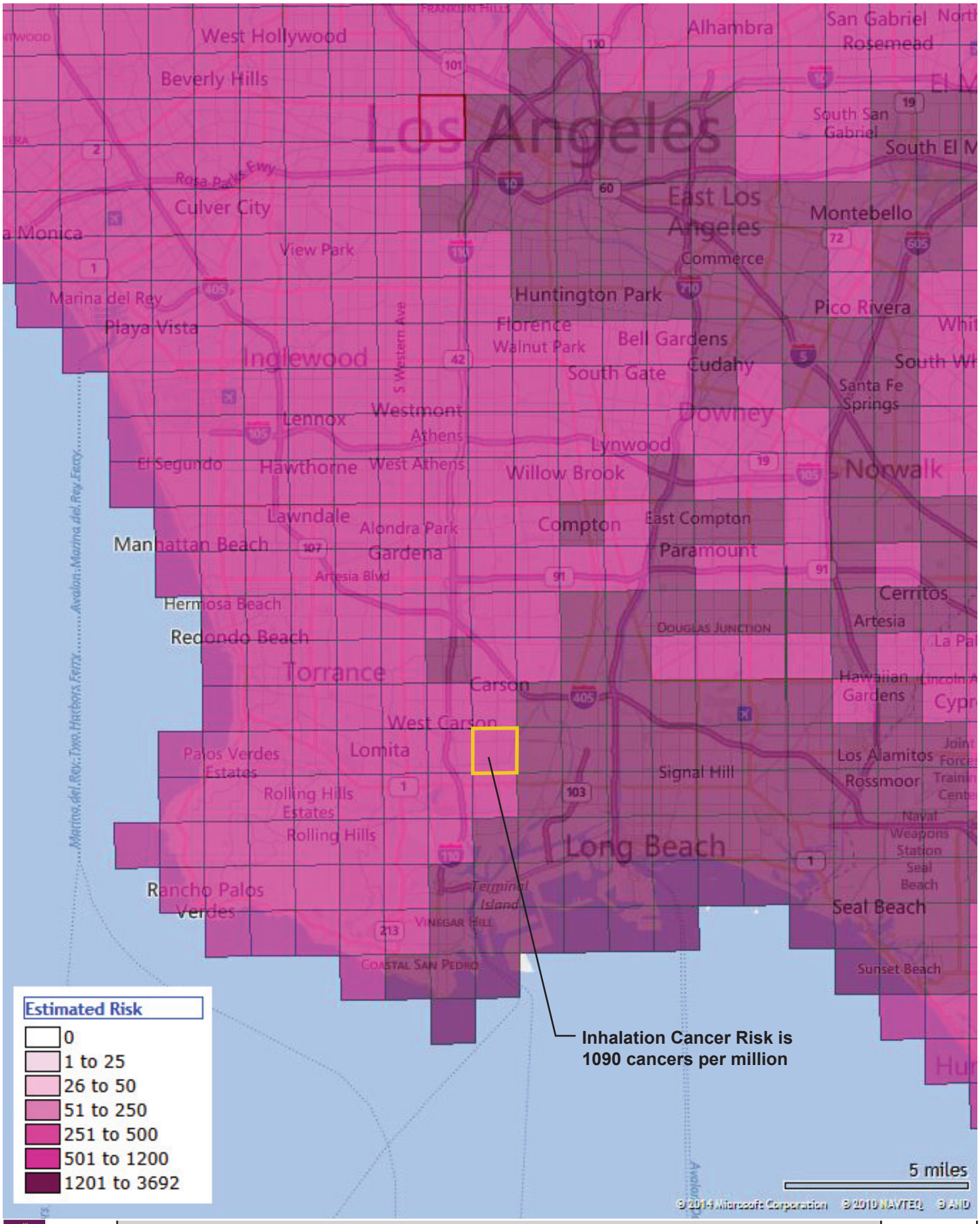
The southern California region lies in the semi-permanent high-pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. The usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds. The extent and severity of the air pollution problem in the SoCAB is a function of the area's natural physical characteristics (weather and topography), as well as man-made influences (development patterns and lifestyle). Factors such as wind, sunlight, temperature, humidity, rainfall, and topography all affect the accumulation and dispersion of pollutants throughout the SoCAB, making it an area of high pollution potential.

The greatest air pollution impacts throughout the SoCAB occur from June through September. This condition is generally attributed to the large amount of pollutant emissions, light winds, and shallow vertical atmospheric mixing. This frequently reduces pollutant dispersion, thus causing elevated air pollution levels. Pollutant concentrations in the SoCAB vary with location, season, and time of day. Ozone concentrations, for example, tend to be lower along the coast, higher in the near inland valleys, and lower in the far inland areas and adjacent desert. Over the past 30 years, substantial progress has been made in reducing air pollution levels in southern California.

The SCAQMD has conducted South Coast Air Basin-wide air toxics studies called the Multiple Air Toxics Exposure Study (MATES), which are aimed at estimating the cancer risk from toxic air emissions throughout the air basin by conducting a comprehensive monitoring program, an updated emissions inventory of toxic air contaminants, and a modeling effort to fully characterize health risks for those living in the air basin. The final draft of the third update of the study, MATES III, was released in September 2008. The study concluded that the average carcinogenic risk from air pollution in the SoCAB is approximately 1,200 in one million. Mobile sources (e.g., cars, trucks, trains, ships, aircraft, etc.) represent the greatest contributors. Approximately 85 percent of the risk is attributed to diesel particulate matter (DPM) emissions, approximately 10 percent to other toxics associated with mobile sources (including benzene, butadiene, and formaldehyde), and approximately 5 percent of all carcinogenic risk is attributed to stationary sources (which include industries and other certain businesses, such as dry cleaners and chrome plating operations).

As part of the MATES III study, the SCAQMD has prepared a series of maps that show regional trends in estimated outdoor inhalation cancer risk from toxic emissions, as part of an ongoing effort to provide insight into relative risks. The maps are generated using a 2-kilometer (1.24-mile) grid over the SoCAB and reports carcinogenic risk within each grid space (each covering an area of 4 square kilometers or 1.54 square miles). The MATES III cancer risk map estimates represent the estimated number of additional cancers in a population of one million individuals that are exposed over a 70-year lifetime (incremental cancer risk). The MATES III map, which is the most recently available map to represent existing conditions near the site, is provided in **Figure 5.1-1**, *Total Cancer Risk from Regional Toxic Emissions in the Area around the Kast Property*. As shown, the estimated cancer risk for that location is estimated at 1,090 cancers per million.[16] Generally, the risk from air toxics is lower near the coastline: it increases inland, with higher risks concentrated near large diesel sources (e.g., freeways, airports, and ports).

[16] *South Coast Air Quality Management District, MATES III, Multiple Air Toxics Exposure Study, MATES III Carcinogenic Risk Interactive Map, http://www.aqmd.gov/home/library/air-quality-data-studies/health-studies/mates-iii. Accessed August 2014.*



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Total Cancer Risk from Regional Toxic Emissions in the Area around the Kast Property

Former Kast Property Tank Farm Site Remediation Project

Source: SCAQMD MATES III Carcinogenic Risk Interactive Map. http://www3.aqmd.gov/webappl/matesiii/ Accessed October 2014.

FIGURE

5.1-1

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Regional – Mojave Desert Air Basin

The MDAB includes eastern Kern County, the Antelope Valley portion of Los Angeles County, the majority of San Bernardino County (does not include the urbanized southwestern portion of the County), and eastern Riverside County. The MDAB is an assemblage of mountain ranges interspersed with long broad valleys that often contain dry lakes. Many of the lower mountains rise from 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB are out of the west and southwest, which are due to its proximity to coastal and central regions and the blocking nature of the Sierra Nevada mountains to the north. During the summer, the MDAB is generally influenced by the Pacific Subtropical High cell that sits off the California coast, inhibiting cloud formation and encouraging daytime solar heating. Most desert moisture arrives from infrequent warm, moist and unstable air masses from the south. The MDAB averages between three and seven inches of precipitation per year. The MDAB is classified as a dry-hot desert climate, with portions classified as dry-very hot desert, and at least three months out of a year typically have maximum average temperatures over 100 degrees Fahrenheit. Due to the hot and dry climate, ozone and particulate matter pollution are of concern in the region.

Local

Existing Pollutant Levels at Nearby Monitoring Stations

The SCAQMD maintains a network of air quality monitoring stations located throughout the SoCAB and has divided the SoCAB into air monitoring areas. The monitoring station that collects data most representative of the site is the Long Beach Monitoring Station (South Los Angeles County Coastal). Criteria pollutants monitored at this station include O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The most recent data available from the SCAQMD encompass the years 2009 to 2013.[17] The data, shown in **Table 5.1-4**, *Pollutant Standards and Ambient Air Quality Data*, indicate the following pollutant trends:

Ozone (O_3): During the 2009 to 2013 reporting period, the maximum 1-hour ozone concentration was recorded in 2010 at 0.101 ppm. During this period, the California standard of 0.09 ppm was exceeded one time during 2010. The maximum eight-hour ozone concentration recorded during the reporting period was 0.084 ppm, reported in 2010. During the reporting period, the California 8-hour average standard of 0.070 ppm was exceeded between zero and seven times annually, with the highest number of exceedances in 2010. The National 8-hour average standard of 0.075 ppm was exceeded one time in 2010.

Nitrogen Dioxide (NO_2): The highest 1-hour concentration of NO_2 was recorded in 2009 and 2011 and was 0.11 ppm. The highest annual arithmetic mean was 0.0212 ppm, recorded in reporting year 2009. Neither the California nor the National NO_2 standards were exceeded during the reporting period.

Carbon Monoxide (CO): The highest 1-hour CO concentration was 3 ppm, reported in 2009, and 2010 and the highest 8-hour CO concentration was 2.6 ppm, reported in 2011. Neither the California nor the National CO standards were exceeded during the 2009-2013 reporting period.

[17] *South Coast Air Quality Management District, Historical Data by Year, http://www.aqmd.gov/home/library/air-quality-data-studies/historical-data-by-year. Accessed August 2014.*

Table 5.1-4

Pollutant Standards and Ambient Air Quality Data[a,c]

Pollutant/Standard[a,b]	2009	2010	2011	2012	2013
Ozone					
O_3 (1-hour)					
Maximum Concentration (ppm)	0.089	0.101	0.073	0.084	0.092
Days > CAAQS (0.09 ppm)	0	1	0	0	0
O_3 (8-hour)					
Maximum Concentration (ppm)	0.068	0.084	0.061	0.067	0.070
4th High 8-hour Concentration (ppm)	0.064	0.057	0.059	0.060	0.060
Days > CAAQS (0.070 ppm)	0	7	0	0	0
Days > NAAQS (0.075 ppm)	0	1	0	0	0
Nitrogen Dioxide					
NO_2 (1-hour)					
Maximum Concentration (ppm)	0.11	0.09	0.11	0.08	0.07
Days > CAAQS (0.18 ppm)	0	0	0	0	0
NO_2 (Annual)					
Annual Arithmetic Mean (0.030 ppm)	0.0212	0.0198	0.0177	0.02	0.01
Carbon Monoxide					
CO (1-hour)					
Maximum Concentration (ppm)	3	3	------	------	------
Days > CAAQS (20 ppm)	0	0	------	------	------
Days > NAAQS (35 ppm)	0	0	------	------	------
CO (8-hour)					
Maximum Concentration (ppm)	2.2	2.1	2.6	2.2	2.0
Days > CAAQS (9.0 ppm)	0	0	0	0	0
Days > NAAQS (9 ppm)	0	0	0	0	0
Sulfur Dioxide					
SO_2 (1-hour)					
Maximum Concentration (ppm)	0.02	0.04	0.01	0.022	0.02
Days > CAAQS (0.25 ppm)	0	0	0	0	0
SO_2 (24-hour)					
Maximum Concentration (ppm)	0.005	0.006	------	------	------
Days > CAAQS (0.04 ppm)	0	0	------	------	------
SO_2 (Annual)					
Annual Arithmetic Mean (0.030 ppm)	------	------	------	------	------
Particulate Matter (PM_{10})					
PM_{10} (24-hour)					
Maximum Concentration (μg/m³)	62	44	43	45	37
Samples > CAAQS (50 μg/m³)	3	0	0	0	0
Samples > NAAQS (150 μg/m³)	0	0	0	0	0
PM_{10} (Annual Average)					
Annual Arithmetic Mean (20 μg/m³)	30.5	22.0	24.2	23.3	23.2

Table 5.1-4 (Continued)

Pollutant Standards and Ambient Air Quality Data[a,c]

Pollutant/Standard[a,b]	2009	2010	2011	2012	2013
Particulate Matter ($PM_{2.5}$)					
$PM_{2.5}$ (24-hour)					
Maximum Concentration (μg/m³)	63.0	63.4	39.7	49.8	47.2
Samples > NAAQS (35 μg/m³)	6	6	1	4	2
$PM_{2.5}$ (Annual)					
Annual Arithmetic Mean (12.0 μg/m³)	13.0	10.5	11.0	10.4	11.34
Lead					
Maximum 30-day average (μg/m³)	0.01	0.01	0.01	0.005	0.005
Maximum calendar quarter (μg/m³)	0.01	0.01	0.01	0.005	0.004

ppm = parts per million; μg/m³= micrograms per cubic meter; -- = Data not available

[a] *Monitoring data from the South Los Angeles County Coastal station (Station No. 072) was used for O_3, NO_2, CO, SO_2 , PM_{10}, and $PM_{2.5}$ concentrations.*

[b] *An exceedance does not necessarily constitute a violation of an ambient air quality standard. Violations are defined in 40 CFR 50 for NAAQS and 17 CCR 70200 for CAAQS.*

[c] *Statistics may include data that are related to an exceptional event.*

Source: South Coast Air Quality Management District, Historical Data by Year, 2009-2013, http://aqmd.gov/smog/historicaldata.htm. Accessed August 2014.

Sulfur Dioxide (SO_2): The highest 1-hour concentration of SO_2 was 0.04 ppm, recorded in 2010. The highest 24-hour concentration was 0.006 ppm recorded in 2010. No exceedances of the California or National SO_2 standards were recorded during the reporting period.

Particulate Matter (PM_{10}): The highest recorded concentration during the period of 2009 to 2013 was 62 micrograms per cubic meter (μg/m³), which was recorded in 2009. During this same time period, the California PM_{10} standard was exceeded between zero and three times annually, with the highest number of exceedances in 2009. The National PM_{10} standard was not exceeded during this period. PM_{10} is monitored every six days coincident to a national schedule; thus, PM_{10} exceedances are based on the number of days that sampling occurred. The maximum recorded arithmetic mean (i.e., average) concentration of 30.5 μg/m³ was recorded in 2009.

Particulate Matter ($PM_{2.5}$): Maximum 24-hour $PM_{2.5}$ concentrations varied between 39.7 μg/m³ and 63.4 μg/m³ between 2009 and 2013. During these years the National standard was exceeded between one and eight times per year with the maximum number of exceedances occurring in 2009 and 2010. The highest annual arithmetic mean was 13.0 μg/m³, recorded in 2009.

Lead (Pb): The highest 30-day average concentration of lead was 0.01 μg/m³ recorded in 2009 through 2013, below the California 1.5 μg/m³ standard. The highest calendar quarter concentration was 0.01 μg/m³, in 2009 through 2013, below the National 1.5 μg/m³ standard. The data demonstrate that the area is currently in compliance with California and National standards for Pb, as no exceedances were recorded.

Sulfates: The maximum 24-hour concentration of sulfates was 13.6 μg/m^3 recorded in 2009, below the 25 μg/m^3 California standard. These data confirm that the SoCAB is currently designated as attainment with respect to the State standard for sulfates.

Visibility Reducing Particles: The SoCAB is currently designated as "unclassified" with respect to the California standard for visibility reducing particles. Continuous monitoring is not currently performed within the SoCAB for this standard.

Hydrogen Sulfide: The SoCAB is currently designated as "unclassified" with respect to the California standard for hydrogen sulfide. The CARB does not perform or require ambient monitoring of this pollutant.

Vinyl Chloride: The SoCAB is currently designated as "unclassified" with respect to the State standard for vinyl chloride. In 1990, the CARB identified vinyl chloride as a toxic air contaminant and determined that it does not have an identifiable threshold. Therefore, the CARB does not perform or require ambient monitoring for this pollutant.

Existing Emissions

The site is relatively flat, with a gradual slope to the northwest. The elevations across the site range from approximately 30 to 40 feet above mean sea level (msl). The site is occupied by 285 single-family residential properties and City streets. Some of the residences have walls, fences, mature landscaping, and swimming pools that extend varying depths below the ground surface. The existing site generates operational air pollutant emissions from the 285 single-family residential properties. Sources of emissions include natural gas combustion from residential heating and cooking, fossil fuel combustion from landscaping equipment, and VOC emissions from use of consumer products and architectural coatings. In addition, motor vehicles traveling to and from the site generate emissions from fossil fuel combustion and road dust. These emissions would occur after implementation of the RAP; therefore, no long-term change in these operational emissions is anticipated.

Sensitive Receptors and Locations

Some population groups, including children, elderly, and acutely and chronically ill persons (especially those with cardio-respiratory diseases), are considered more sensitive to air pollution than others. Off-site sensitive land uses close to the site are shown in **Figure 5.1-2**, *Closest Off-Site Sensitive Receptors*, and include the following:

- Off-Site Single-Family Residential Dwellings: Off-site residential neighborhoods including those located along Carmel Drive, Mill Valley Way, Monterey Drive, and Highland Way, residences located on Island Avenue and eastward, residences on Realty Street and northwards, and south of Lomita Boulevard.
- School: Wilmington Middle School is located southwest of the site across from Lomita Boulevard.

In addition to the closest off-site sensitive receptors described above, this EIR also considers on-site residences as sensitive receptors. As described in Chapter 2, Project Description, excavation associated with implementation of the RAP would be completed in clusters, with each cluster including approximately eight contiguous properties. Based on approximately eight to ten weeks to complete a cluster of eight properties, with some overlapping of remediation activities between clusters, the suite of residential

Closest Sensitive Receptors

PCR

N

0 600 Feet

Closest Off-Site Sensitive Receptors

Former Kast Property Tank Farm Site Remediation Project

Source: URS, 2014 and PCR Services Corporation, 2014.

FIGURE

5.1-2

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remedial construction activities including excavation, onproperty SVE/bioventing well and piping installation, backfill, sub-slab vapor mitigation, and site restoration is estimated to take approximately 6 years to complete. On-site properties that are not being remediated or restored and that are not vacated but that are near to the cluster of properties in some stage of remediation and/or restoration would be treated as a sensitive receptor for air quality purposes. This would provide for a conservative and health protective analysis. On-site sensitive land uses are shown in **Figure 5.1-3**, *On-Site Sensitive Receptors*, and include the following:

- On- Site Single-Family Residential Dwellings: The residences within the Carousel Tract, located along Marbella Avenue, Neptune Avenue, Ravenna Avenue, Panama Avenue, East 244th Street, East 247th Street, East 248th Street, and East 249th Street, are part of the Site.

3. METHODOLOGY AND THRESHOLDS

Methodology

The evaluation of potential impacts to local and regional air quality that may result from the short- and long-term implementation of the RAP is conducted as follows:

Consistency with Air Quality Plan

The 2012 AQMP was prepared to accommodate growth, reduce the high levels of pollutants within the areas under the jurisdiction of SCAQMD, return clean air to the region, and minimize the impact on the economy. Projects that are consistent with the assumptions used in the AQMP do not interfere with attainment because the growth is included in the projections utilized in the formulation of the AQMP. Thus, projects, uses, and activities that are consistent with the applicable growth projections and control strategies used in the development of the AQMP would not jeopardize attainment of the air quality levels identified in the AQMP, even if they exceed the SCAQMD's recommended numeric emissions thresholds. The project was evaluated with the applicable control strategies used in the development of the AQMP to determine if implementation of the RAP would be consistent with those AQMP strategies.

The only sources of increased air pollutant emissions resulting from implementation of the RAP that are expected to occur in the MDAB and subject to CEQA review are truck trips to the soil treatment facility in Adelanto. However, emission standards for haul trucks are regulated at the state and federal level by CARB and USEPA, respectively, and are therefore not subject to control measures adopted by local air agencies. Thus, the MDAQMD air quality plans are not relevant to the project.

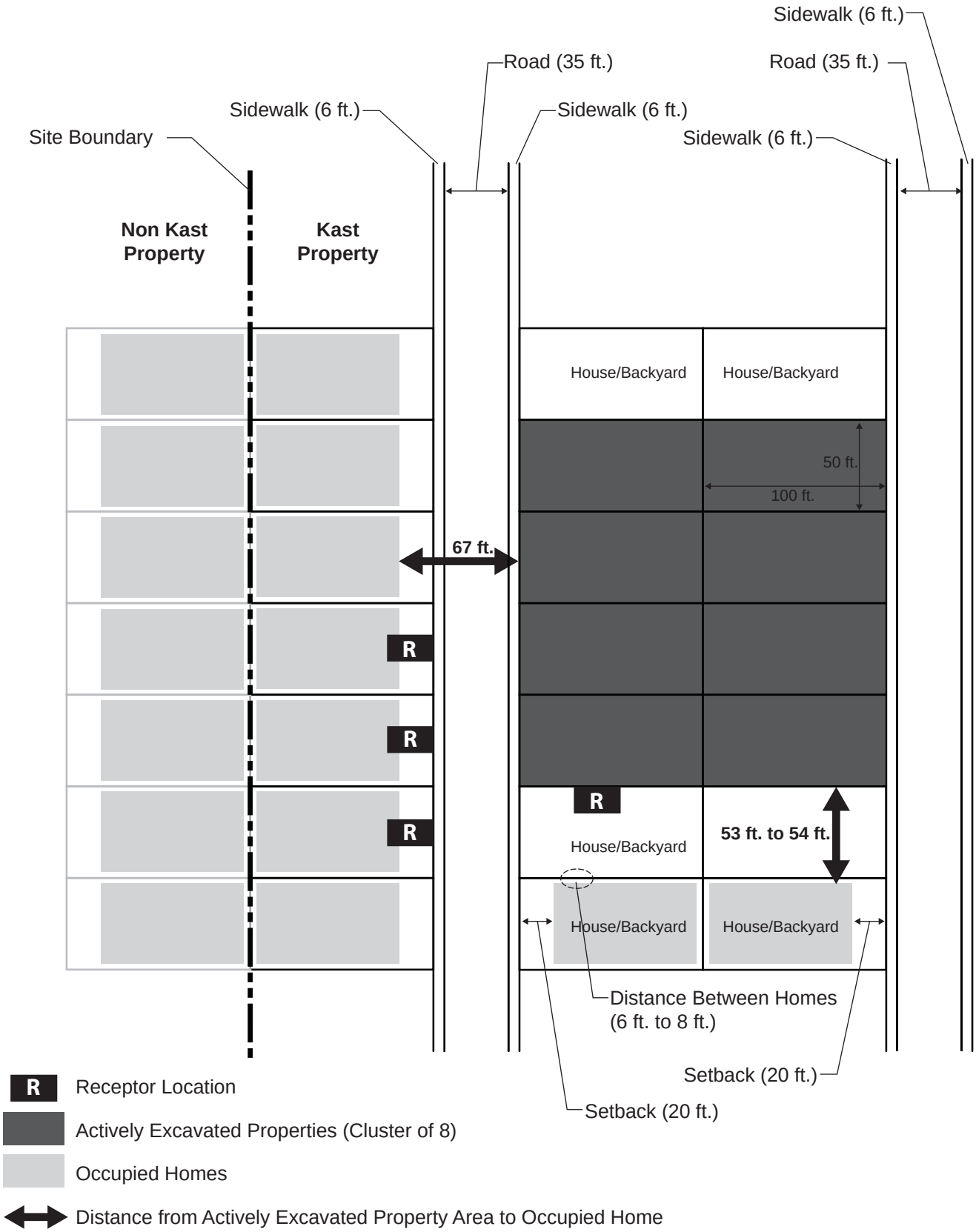
Short-Term Emissions

Regional Emissions

Implementation of the RAP has the potential to generate short-term criteria pollutant emissions through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and workers traveling to and from the site. Site remediation, including installation of the SVE/bioventing system and street paving, is expected to take approximately 6 years. Up to 16 properties could be in some stage of remediation and/or restoration at one time. Exhaust emissions would result from the use of construction equipment, such as dozers and loaders, and from on-road vehicle, such as haul trucks and worker vehicles. Fugitive dust emissions would result from various soil handling activities and unpaved

road dust from on-site vehicle travel. Fugitive VOC emissions would occur from exposing VOC contaminated material to the ambient air due to excavation and soil handling. Construction emissions can vary substantially from day-to-day, depending on the level of activity, the specific type of operation and, for dust, the prevailing weather conditions. The assessment of construction air quality impacts considers each of these potential sources. A summary of the construction activities and equipment that would be used during implementation of the RAP is provided below (see Section 2.0, *Project Description*, of this Draft EIR for additional details):

- Residential Properties: Implementation of the RAP would involve a number of activities as described below.
    - Demolition: Implementation of the RAP would require demolition at residential properties including landscaped areas, fencing, and areas currently covered by hardscape, such as walkways, driveways, patio areas, and hardscape associated with landscaping. Demolition debris and greenwaste (e.g., landscaping) would be removed from the site. Heavy-duty construction equipment would include the following representative types of equipment: Bobcat, generator, chain saw, water pump, and haul trucks to transport the debris and greenwaste to off-site facilities.
    - Excavation: Soil would be excavated from residential properties. Heavy-duty construction equipment would include the following representative types of equipment: Bobcat, excavator, generator, water pump, and haul trucks to transport the soil material to off-site facilities.
    - SVE/Well Piping: Shallow wells on the residential properties. Well and piping components for SVE/bioventing wells installed on residential properties would be entirely below grade. At residential properties where remedial soil excavation would be performed, wells would be installed following backfill placement either by hand or using a small Bobcat or similar equipment with a power auger attachment. At residential properties that would not have excavation performed but that would have SVE/bioventing wells, installation of the well and piping would occur in the same general timeframe as nearby properties. At non-excavated properties, the wells would be installed by hand and piping would be laid in hand excavated trenches. A generator would also be used during this activity, as well as delivery trucks to transport the equipment to the site.
    - Sub-Slab Ventilation: Sub-slab vapor mitigation systems would be installed at 28 identified residential properties as well as any additional properties where the homeowner requests a sub-slab mitigation system. Construction equipment would include the following representative types of equipment: electric drills, reciprocating saw, concrete saw, shop vacuums, miscelleous hand tools, and delivery trucks to transport the equipment to the site.
    - Backfill: Backfill soils and concrete slurry would be imported to the site. Backfill would begin upon completion of excavation and installation of remedial elements. Heavy-duty construction equipment would include the following representative types of equipment: Bobcat, small compactor, concrete pump, water pump, and haul trucks to import the backfill and slurry to the site.
    - Site Restoration: Hardscape, landscaping, fences, and walls would be restored to like conditions following completion of excavation, installation of remedial elements, and backfilling in consultation with the homeowner. Heavy-duty construction equipment would include the following representative types of equipment: generator, concrete pump, and



Note: This figure provides a conceptual diagram of remediation activities at a representative "cluster of eight" properties at the site. Distances shown above are estimated typical distances at the site.

PCR

On-Site Sensitive Receptors

Former Kast Property Tank Farm Site Remediation Project

Source: PCR Services Corporation, 2014.

FIGURE

5.1-3

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delivery trucks to transport hardscape, landscaping, fencing, and wall components and materials, including concrete, to the site.

- Street Trenching/Pipe Installation: The SVE conveyance and piping would require trenching of City streets during the installation process. Trenching of streets would result in asphalt and soil that would be removed. Heavy-duty construction equipment would include the following representative types of equipment: backhoe, compressor, generator, concrete saw, and delivery trucks to transport the equipment to the site.
- Well Installation: Well and piping components for SVE/bioventing wells installed on City streets would be entirely below grade. Heavy-duty construction equipment would include the following representative types of equipment: drill rig and delivery trucks to transport the equipment to the site.
- Street Paving: After completion of the remediation on the properties and the installation of the SVE/bioventing piping through the public rights-of-way, street grinding and street paving would be completed to restore the streets to existing conditions or better. This activity would occur after excavation, trenching/pipe installation, and well installation is complete. Asphalt would be removed from the street surface during grinding and new asphalt would be applied to the surface during paving. Heavy-duty construction equipment would include the following representative types of equipment: cold plane grinding machine, street sweeper, paving machine, steam roller, and haul trucks to transport the grinded asphalt from the site to an appropriate off-site disposal facility and to transport new asphalt material to the site.

Residential excavation and related activities could occur at the same time as street trenching/pipe installation and well installation. Street Paving would occur after excavation, trenching/pipe installation, and well installation. Haul trucks and vendor trucks would be used to transport materials to and from the site.

As the project would handle large amounts of soil, fugitive dust would be generated through various activities such as excavation, traversing on-site roads, grading activities, stockpile wind erosion, and concrete breaking. Emissions from each of these individual activities were calculated based on emission factors obtained from USEPA AP-42 emission factors derived for soil handling activities and the SCAQMD CEQA Handbook for concrete breaking. In addition to fugitive dust emissions, volatile compounds contained within the site have the potential to volatilize during soil excavation and handling. Emissions of VOCs were calculated based on soil chemical sampling data and the USEPA Exposure Model for Soil-Organic Fate and Transport (EMSOFT) model.[18]

Exhaust from anticipated on-site equipment and on-road truck engines also have the potential to generate criteria pollutant emissions. Equipment emission factors were based on USEPA Tier 3 emission standards and emission factors in the California Emissions Estimator Model (CalEEMod). In addition, horsepower, hours and days of operation, and engine load factor were also included in the exhaust emissions calculations. Horsepower and load factors were based on the OFFROAD2011 emissions model. On-road truck emissions

[18] *U.S. Environmental Protection Agency, EMSOFT User's Guide and Modeling Software (2002 Update), http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=241704. Accessed August 2014.*

were calculated based on EMFAC2011 emission factors for vehicle class T7 (Heavy-Heavy Duty Trucks). Road dust emissions from on-road trucks were calculated using the most recent USEPA AP-42 emission factor equation for paved roads.[19] Criteria pollutant engine emissions from trucks exporting waste to an appropriate receiver facility was calculated separately for the SoCAB and the MDAB based on travel distance within each respective air basin. Trucks importing soil and supplies were assumed to originate within the SoCAB. Trucks exporting soil would likely travel to a receiver facility located outside of the SoCAB. Truck travel emissions were calculated separately for the SoCAB (project site location to the SoCAB boundary) and the MDAB (SoCAB boundary to an appropriate receiver facility in the MDAB).

The analysis of regional air quality impacts also considers an Expedited Implementation Option. Under the Expedited Implementation Option, rather than a cluster of up to 8 properties, the number being actively remediated could be incrementally increased with up to 16 properties active at one time. Given the overlap in activity with the clusters there could be up to 32 properties in some stage of remediation at one time. Under the Expedited Implementation Option the clusters would not be contiguous but would be located in a different area within the site. Two clusters under active remediation and restoration would be separated by a minimum distance of 64 meters (105 feet) as measured from the closest site boundary of each cluster. The total amount of demolished materials and excavated soils would be the same as under the project. The Expedited Implementation Option would result in a greater level of activity within the community on a given day but would not change the level of activity at an individual property. An average of approximately 120 trucks per day would be used to transport materials during residential excavation and related activities, street trenching/pipe installation, and well installation. On a peak excavation day, approximately 150 trucks per day would be used. During street paving, approximately 24 trucks per day would be used. Project Design Features (PDFs) would be the same under the Expedited Implementation Option as under the project. Regional short-term emissions would be assessed based on the methodology as described for the project, but accounting for the increase in the number of properties actively remediated at one time.

A complete listing of the equipment by phase, approximate RAP phase durations, emission factors, and calculation parameters used in this analysis is included within the emissions calculation worksheets that are provided in Appendix C of this EIR.

Localized Emissions

The localized effects from the on-site portion of daily emissions are evaluated at nearby sensitive receptor locations potentially impacted by the project consistent with the SCAQMD's Localized Significance Thresholds (LST) methodology, which provides guidance on analyzing localized emissions for comparison to state and federal AAQS. LSTs are only applicable to the following criteria pollutants: NO_X, CO, PM_{10}, and $PM_{2.5}$. LSTs represent the maximum emissions from a project that are not expected to cause or contribute to an exceedance of the most stringent applicable state or federal AAQS, and are developed based on the ambient concentrations of that pollutant for each source receptor area (SRA) and distance to the nearest sensitive receptor. For PM_{10} and $PM_{2.5}$, LSTs were derived based on requirements in SCAQMD Rule 403, Fugitive Dust.

[19] *U.S. Environmental Protection Agency, AP-42, Chapter 13.2.1, (January 2011).*

The SCAQMD LST methodology provides screening criteria that can be used to determine the maximum allowable daily emissions that would satisfy the localized significance thresholds and therefore not cause or contribute to an exceedance of the applicable ambient air quality standards without project-specific dispersion modeling. The screening criteria depend on: (1) the area in which the project is located, (2) the size of the project site, and (3) the distance between the project site and the nearest sensitive receptor (e.g., residences, schools, hospitals). As the project would actively disturb less than five acres per day, the mass rate look-up tables were used for this assessment. The project site is located in the South Los Angeles County Coastal area and the size of actively disturbed area at any one time would be about 2 acres (16 properties).[20] Under the Expedited Implementation Option, the size of actively disturbed area would be about 4 acres. A distance of 25 meters was used for LSTs.[21]

The analysis of localized air quality impacts also considers the Expedited Implementation Option. The Option would result in a greater level of activity within the community on a given day but would not change the level of activity at an individual property. Under the Expedited Implementation Option, the two clusters actively remediated would not be located adjacent to each other due to traffic and parking considerations. The two clusters would be located at different areas of the Carousel Tract. PDFs would be the same under the Expedited Implementation Option as under the project. Localized short-term emissions would be assessed based on the methodology as described for the project, but accounting for the increase in the number of properties actively remediated at one time and the geographic separation of the two clusters each located at different areas of the Carousel Tract. These factors were taken into account by using the LSTs for a 2 acre site even though the Expedited Implementation Option would actively disturb approximately 4 acres from remediation and restoration activities. This method would essentially evaluate potential LST impacts at sensitive receptors from emissions generated from the geographically separated two clusters.

Long-Term Emissions

Long-term implementation of the RAP would entail periodic maintenance and monitoring as needed. Thus, long-term emissions would be caused by stationary (SVE/bioventing) and mobile (on-road and off-road) sources. The long-term net increase in emissions from new sources are expected to be minimal. Maintenance and housekeeping trips to support long-term RAP activities would occur on a monthly or less frequent basis. Stationary-source emissions from SVE/bioventing would also be minimal. Therefore, the potential for long-term impacts are discussed qualitatively.

Odors (Short-Term and Long-Term)

Odors are defined by chemicals in a gas phase which are detected through the sense of smell. Certain odors may be declared a nuisance if a considerable number of people exposed find the smell objectionable. Classification of odors as a nuisance is typically subjective in nature and will vary from person to person. Each odor-causing chemical has a unique odor detection threshold which means that compounds, even if present at the same concentration, may have markedly different odor impacts.[22] Due to the difficulties of

[20] *As described in Section 2.0, Project Description, work on the next cluster of properties (i.e., the next eight properties working down the block), would begin approximately at the end of week six to week eight of work on the first cluster. Therefore, up to 16 properties, or approximately two acres, would be undergoing remediation and restoration at a time.*

[21] *The SCAQMD Final Localized Significance Threshold Methodology states that "projects with boundaries located closer than 25 meters to the nearest receptor should use the LSTs for receptors located at 25 meters."*

[22] *Overview of Odor Measurement Techniques. Brewer and Cadwallader. University of Illinois. 2003.*

measuring odor using monitoring equipment, nuisance odors are usually defined based on the potential for a considerable number of people to find the smell objectionable rather than a quantitative modeling analysis. The determination of odor impacts is based on the potential to result in short-term or long-term nuisance odors affecting a considerable number of persons in violation of SCAQMD Rule 402. The analysis of short-term odor impacts also considers the Expedited Implementation Option, which accounts for the increase in the number of properties actively remediated at one time.

Consistency with City of Carson General Plan Air Quality Element (Short-Term and Long-Term)

The City of Carson General Plan Air Quality Element contains policies that are relevant to air quality. Several of these policies would be applicable to implementation of the RAP. The project was evaluated with the applicable policies in the Air Quality Element to determine if implementation of the RAP would be consistent with those policies.

Thresholds of Significance

For purposes of this EIR, the Regional Board has utilized the checklist questions in Appendix G of the *CEQA Guidelines* as significance criteria to determine whether a project would have a significant environmental impact regarding air quality. Based on the size and scope of the project and the potential for air quality impacts, the criteria identified below are included for evaluation in this EIR.

Would the Project:

a) Conflict with or obstruct implementation of the applicable air quality plan (refer to Impact Statement AIR-1);

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation (refer to Impact Statement AIR-2);

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors) (refer to Impact Statement AIR-3);

d) Expose sensitive receptors to substantial pollutant concentrations (refer to Impact Statement AIR-4); or

e) Create objectionable odors affecting a substantial number of people (refer to Impact Statement AIR-5).

In addition to the checklist questions in Appendix G of the State CEQA Guidelines, this EIR also considers whether implementation of the RAP would not conflict with the City's applicable General Plan Air Quality Element policies. The following criterion is added for evaluation in this EIR:

f) Conflict with or obstruct implementation of the applicable policies in the City of Carson General Plan Air Quality Element (refer to Impact Statement AIR-6).

The State CEQA Guidelines (Section 15064.7) provide that, when available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make determinations of significance. The potential air quality impacts of the project are, therefore, evaluated according to thresholds developed by the SCAQMD in the *CEQA Air Quality Handbook*, *Air Quality Analysis Guidance Handbook*, and subsequent SCAQMD guidance, discussed below. The potential air quality impacts are also evaluated according to thresholds developed by the MDAQMD in the *California Environmental Quality Act (CEQA) and Federal Conformity Guidelines*.[23] These thresholds generally incorporate the checklist questions contained in Appendix G of the State CEQA Guidelines.

The air quality management district's thresholds are used to evaluate the projects air quality impacts as follows:

Short-Term Emissions

Regional Emissions (South Coast Air Basin) (Impact Statement 5.1-2)

Based on criteria set forth in the SCAQMD Handbook, the project would have a significant impact with regard to short-term emissions if the following would occur:

- Regional short-term emissions from both direct and indirect sources would exceed any of the following SCAQMD prescribed threshold levels: (1) 75 pounds a day for VOC; (2) 100 pounds per day for NO_X; (3) 550 pounds per day for CO; (4) 150 pounds per day for sulfur oxides (SO_X); (5) 150 pounds per day for PM_{10}; or (6) 55 pounds per day $PM_{2.5}$.[24]

Regional Emissions (Mojave Desert Air Basin) (Impact Statement 5.1-2)

Based on recommended criteria set forth in the MDAQMD Guidelines, the project would have a significant impact with regard to short-term emissions if the following were to occur:

- Regional short-term emissions from both direct and indirect sources would exceed any of the following MDAQMD prescribed threshold levels: (1) 137 pounds a day for VOC; (2) 137 pounds per day for NO_X; (3) 548 pounds per day for CO; (4) 137 pounds per day for sulfur oxides (SO_X); (5) 82 pounds per day for PM_{10}; or (6) 82 pounds per day $PM_{2.5}$.[25]

Localized Emissions (Impact Statement 5.1-4)

In addition, the SCAQMD has developed methodology to assess the potential for localized emissions to cause an exceedance of applicable ambient air quality standards. Impacts would be considered significant if the following were to occur:

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[23] *Mojave Desert Air Quality Management District, California Environmental Quality Act (CEQA) and Federal Conformity Guidelines, (2009).*

[24] *South Coast Air Quality Management District, SCAQMD Air Quality Significance Thresholds, March 2011, http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2. Accessed August 2014.*

[25] *Mojave Desert Air Quality Management District, California Environmental Quality Act (CEQA) and Federal Conformity Guidelines, (2009).*

- Maximum daily localized short-term emissions are greater than the applicable LST, resulting in predicted ambient concentrations in the vicinity of the site greater than the most stringent ambient air quality standards for CO or NO_2;[26] or
- Maximum localized short-term PM_{10} or $PM_{2.5}$ emissions during construction are greater than the applicable LSTs, resulting in predicted ambient concentrations in the vicinity of the site to exceed 50 $\mu g/m^3$ over five hours (SCAQMD Rule 403 control requirement).[27]

Long-Term Emissions (Impact Statement 5.1-2 and Impact Statement 5.1-4)

Based on criteria set forth in the SCAQMD *CEQA Air Quality Handbook*, the project would have a significant impact with regard to operational emissions if the following were to occur:

- Long-term emissions exceed 10 tons per year of volatile organic gases or any of the following SCAQMD prescribed threshold levels: (1) 55 pounds a day for VOC; (2) 55 pounds per day for NO_X; (3) 550 pounds per day for CO; (4) 150 pounds per day for SO_X; (5) 150 pounds per day for PM_{10}; or (6) 55 pounds per day for $PM_{2.5}$;[28] or
- Long-term emissions cause or contribute to an exceedance of the California 1-hour or 8-hour CO standards of 20 or 9.0 parts per million (ppm), respectively, at an intersection or roadway within one-quarter mile of a sensitive receptor.

Odors (Impact Statement 5.1-5)

The SCAQMD *CEQA Air Quality Handbook* contains thresholds consistent with Appendix G CEQA guidelines regarding odors. Based on these guidelines, the project would have a significant impact from odors, if:

- Short-term emissions create objectionable odors, which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public; or
- Long-term emissions create objectionable odors, which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public.

4. PROJECT ANALYSIS

Project Design Features

The following PDFs would result in a reduction in air pollutant emissions and are considered as part of the project in the analysis.

[26] *South Coast Air Quality Management, Localized Significance Thresholds Methodology, http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2. Accessed August 2014.*

[27] *South Coast Air Quality Management, Localized Significance Thresholds Methodology, http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2. Accessed August 2014.*

[28] *South Coast Air Quality Management District. SCAQMD Air Quality Significance Thresholds. http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2. Accessed August 2014.*

PDF AQ-1 All off-road diesel construction equipment remaining on-site for more than 15 work days will meet USEPA Tier 3 off-road emission standards, if commercially available locally. Use of Tier 3 engines results in a substantial reduction in NO_X emissions compared to similar Tier 2 or lower engines, and has been shown to increase fuel economy over similar Tier 2 engines.[29] Documentation of all off-road diesel construction equipment on-site including Tier 3 certification will be maintained and made available to the Regional Board for inspection upon request.

PDF AQ-2 All on-road waste haul trucks exporting soil to the appropriate receiver facility will be model year 2007 or newer or retrofitted to comply with USEPA Year 2007 on-road emissions standards. Documentation of all on-road trucks exporting soil will be maintained and made available to the Regional Board for inspection upon request.

PDF AQ-3 The contractor will prohibit the idling of on- and off-road heavy duty diesel vehicles for more than five minutes at a time. This project design feature is consistent with California regulations and laws as well as CARB ATCM requirements.

PDF AQ-4 The contractor will install SVE and bioventing systems to address petroleum hydrocarbons, VOCs, and methane in soil vapor and to promote degradation of residual hydrocarbon concentrations that do not meet Remedial Action Objectives (RAOs), or are not removed by excavation. The SVE and bioventing systems will require a permit from the SCAQMD. Periodic monitoring will be conducted as specified in the SCAQMD Permit.

PDF AQ-5 Sub-slab vapor mitigation will be installed at 28 identified properties (27 based on RAO exceedance for potential vapor intrusion and 1 based on SSCG exceedance for methane). Sub-slab vapor mitigation will also be installed at any additional properties where the homeowner requests a sub-slab mitigation system. The system will use sub-slab depressurization (SSD), which will create a negative pressure below the slab of the residence using a fan to remove air from below the slab and exhausting it above the building.

PDF AQ-6 The project will comply with applicable SCAQMD rules that govern the control of air pollutant emissions from the site, including: SCAQMD Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil.

- Submit a Mitigation Plan in accordance with Attachment A of SCAQMD Rule 1166, and obtain approval from the SCAQMD. VOC suppression measures shall include water mist as a first level of vapor and odor control. Care will be taken to ensure that the soil is not over-saturated, which could generate runoff that would need to be managed and increase the weight of soil to be disposed. Based on monitoring data or odor perception, vapor and odor control will be implemented on an as needed basis. Based on experience from the excavation pilot test, Rusmar AC-565 Long Duration Foam was found to be most effective at controlling vapors and odors. This type of foam, or equivalent, and necessary support equipment will be staged and ready for application at locations where remedial excavations are

[29] *Komatsu Technical Report, Development of Tier 3 Engine ecot3, Vol. 52, No. 157, http://www.komatsu.com/CompanyInfo/profile/report/pdf/157-03_E.pdf. 2006. Accessed August 2014.*

conducted and there is the potential for odor releases. A copy of the approved plan will be on-site during the entire excavation period.

- Monitor for the presence of VOC, and implement the approved mitigation plan when VOC-contaminated soil, as defined in Rule 1166, is detected.
- If required, obtain a SCAQMD Permit for project activities, and provide a copy of said Permit to the Regional Board.

PDF AQ-7 The project will implement fugitive dust control measures consistent with SCAQMD rules and regulations. The dust control measures will consist of various elements including: proper maintenance and watering of internal haul roads; water spraying of soil excavated and placed for cover or soil reconsolidation; applying water on intermediate soil cover areas; and seeding/planting vegetation on the completed protective cap. This project design feature is consistent with SCAQMD Rule 403 requirements.

PDF AQ-8 Exposed surfaces and active excavation sites will be controlled with water and/or suppressants certified by CARB, the SCAQMD, or other air pollution control agency, to control fugitive dust, vapors, and odors. Such suppressants include foams (e.g., Rusmar AC-565 Long Duration Foam), nontoxic binders, or other suppressants to reduce fugitive dust emissions and to control vapors and odors. Logs of water purchase or usage and suppressant application (including brand/manufacturer, date of application, area treated and amount applied) will be maintained by the RP and made available to the Regional Board and SCAQMD for inspection upon request.

PDF AQ-9 Prior to leaving the site, each haul truck, and other delivery trucks that come in contact with site waste, will be inspected and put through procedures, such as brushing, to remove loose debris from tire wells and on the truck exterior. Haul truck operators (drivers) will be required to have the proper training and registration by the State and as applicable to the material they will be hauling. Trucks transporting hazardous waste are required to maintain a hazardous waste manifest that describes the content of the materials. These manifests will be supplied by the waste receiver facility and prepared by the contractor or trucking company and the Kast Property RP representative(s) prior to export off-site. The contracted trucking company will be a certified hazardous waste transportation contractor, if the material is profiled as hazardous. A log of manifest data will be maintained by the RP and made available to the Regional Board for inspection upon request.

PDF AQ-10 Waste haul trucks and soil delivery trucks entering and exiting the site will be required to follow the approved traffic plan that establishes the trucking route, days and hours of truck operation, and various requirements to provide traffic, pedestrian and bicycle safety. Truck operators will be provided with a trucking route map and hours of operation allowed.

PDF AQ-11 In order to minimize traffic congestion at or near the site, construction worker parking will be provided at a nearby off-site location. Shuttles and/or vans will be provided to transport construction workers from the off-site parking location to the site.

PDF AQ-12 To the maximum practical extent, recyclable materials, including non-hazardous construction and demolition debris, will be reused or recycled.

PDF AQ-13 Under the Expedited Implementation Option, the contractors shall require that two clusters under active remediation and restoration are separated by a minimum distance of 64 meters (105 feet) as measured from the closest site boundary of each cluster.

Analysis of Project Impacts

Air Quality Plan Conflicts

Threshold 5.1-1: Would the project conflict with or obstruct implementation of the applicable air quality plan?

Impact Statement AIR-1: *Implementation of the RAP and the Expedited Implementation Option would utilize equipment meeting stringent emission standards and would be consistent with the applicable growth projections and control strategies in the AQMP. Projects that are consistent with the applicable growth projections and control strategies used in the development of the AQMP would not jeopardize attainment of the air quality levels identified in the AQMP, even if they exceed the SCAQMD's project-level recommended thresholds. Therefore, short-term and long-term impacts associated with implementation of the RAP and the Expedited Implementation Option would not conflict with or obstruct implementation of the applicable air quality plan and impacts would be less than significant.*

Short-Term Impacts

Under this criterion, the SCAQMD's guidance recommends that a Lead Agency demonstrate that a project would not directly obstruct implementation of an applicable air quality plan and that a project be consistent with the assumptions (typically land-use related, such as resultant employment or residential units) upon which the air quality plan are based. Implementation of the RAP would result in an increase in short-term employment as compared to existing conditions. Being relatively small in number and temporary in nature, construction jobs under this the project are generally not considered inconsistent with the assumptions upon which the AQMP are based. Control strategies in the AQMP with potential applicability to short-term emissions from construction activities include ONRD-04 and OFFRD-01, which are intended to reduce emissions from on-road and off-road heavy-duty vehicles and equipment by accelerating replacement of older, emissions-prone engines with newer engines meeting more stringent emission standards. Implementation of the RAP would incorporate a number of PDFs that are designed to reduce short-term emissions from construction equipment. Construction equipment that meet or exceed stringent Tier 3 emission standards for off-road equipment (PDF AQ-1) and 2007 or better standards for on-road waste haul trucks (PDF AQ-2), which would comply with anti-idling restrictions pursuant to CARB's ATCM (PDF AQ-3), would be used for the implementation of the RAP. The RAP would comply with SCAQMD regulations and permitting requirements for controlling fugitive dust and volatile emissions from the site (see SCAQMD Rules 403 and 1166) (PDF AQ-6 and PDF AQ-7). The PDFs listed above, in addition to the other PDFs discussed previously, are generally consistent with the 2012 AQMP control strategies intended to reduce emissions from construction equipment and operations. Because implementation of the RAP would not be inconsistent with the growth projections (jobs and housing) used in the development of the AQMP and would be consistent with the control strategies intended to reduce emissions from construction equipment, the project would not conflict with or obstruct implementation of the AQMP, and impacts would be less than significant.

The only sources of increased air pollutant emissions resulting from implementation of the RAP that are expected to occur in the MDAB and subject to CEQA review are short-term haul truck trips. Emission standards for haul trucks are regulated at the state and federal level by CARB and USEPA, respectively, and are therefore not subject to control measures adopted by local air agencies. Thus, hauling of soil, debris, and other materials into the MDAB is not inconsistent with applicable MDAQMD air quality plans. Nonetheless, it should be noted that implementation of the RAP would be required to use on-road waste haul trucks that meet or exceed Year 2007 emission standards, which would minimize emissions in the MDAB.

Expedited Implementation Option

Under the Expedited Implementation Option, the number of properties being remediated at one time would increase. PDFs would be the same under the Expedited Implementation Option as under the project. With implementation of the PDFs and compliance with applicable SCAQMD rules, the Expedited Implementation Option would not conflict with or obstruct implementation of the AQMP, and impacts would be less than significant.

Long-Term Impacts

Implementation of the RAP would result in restoration of affected properties and infrastructure (e.g., yards, landscaping, hardscape, fencing, streets) to like conditions. Following implementation of the RAP, long-term emissions would result from the SVE/bioventing system, sub-slab vapor mitigation system, and from periodic monitoring and maintenance activities. However, these emissions would be negligible (see detailed discussion under Impact Statement AIR-2). The project would not result in a change in long-term population as compared to existing conditions. The project would also not result in a substantial change in long-term employment as compared to existing conditions. Being relatively small in number, the continuation of monitoring and maintenance jobs is generally not considered inconsistent with the assumptions upon which the AQMP was based. Because the project would not be inconsistent with the growth projections (jobs and housing) used in the development of the AQMP and emissions associated with periodic monitoring and maintenance activities would be negligible (see detailed discussion under Impact Statement AIR-2), the project would not conflict with or obstruct implementation of the AQMP, and impacts would be less than significant.

Violation of Air Quality Standards

Threshold 5.1-2:	Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Impact Statement AIR-2: *Implementation of the RAP and the Expedited Implementation Option would result in short-term emissions that would not exceed the significance threshold with regards to regional emissions. Implementation of the RAP would not result in long-term emissions that exceed the significance threshold with regards to regional emissions. Thus, implementation of the RAP and the Expedited Implementation Option would not violate air quality standards or contribute substantially to an existing or projected air quality violation and impacts related to short-term and long-term regional emissions would be less than significant.*

Short-Term Impacts

Implementation of the RAP has the potential to create short-term air quality impacts through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and construction workers and visitors traveling to and from the site. In order to provide a conservative analysis, emissions associated with average daily and peak daily activity were estimated. Assumptions for each construction phase and the equipment that would be used during RAP implementation are provided in Appendix C of this EIR.

Criteria pollutant emissions were calculated for the activities described previously (i.e., residential excavation and associated activities, street trenching/pipe installation, well installation, and street paving) and include exhaust, fugitive dust, and fugitive VOC emissions. However, as residential excavation and associated activities, street trenching/pipe installation, and well installation has the potential to overlap with one another, the maximum daily emissions in the SoCAB from these activities are presented in **Table 5.1-5** *Unmitigated Regional Maximum Short-Term Emissions, South Coast Air Basin*. The emissions levels in Table 5.1-5 represent the highest daily emissions projected to occur on any one day during implementation of the RAP. The assumptions used to calculate emissions contained in Table 5.1-5 include PDFs to reduce NO_X , PM_{10}, and $PM_{2.5}$ emissions. Such features include using Model Year 2007 or newer trucks for material and soil transport and USEPA Tier 3 emissions complaint equipment on-site. As presented in Table 5.1-5, short-term daily maximum regional emissions would not exceed the SCAQMD daily significance thresholds. Thus, regional construction emissions resulting from the project would result in a less than significant short-term impact.

Regional emissions were also calculated for trucks travelling to a likely material receiver facility within the MDAB. As shown in **Table 5.1-6**, *Unmitigated Regional Maximum Short-term Emissions, Mojave Desert Air Basin*, emissions from trucks would be less than the MDAB CEQA significance thresholds. Therefore, implementation of the RAP would result in a less than significant impact with regard to regional emissions within the MDAB.

Expedited Implementation Option

Under the Expedited Implementation Option, the number of properties being remediated at one time could increase. Therefore, daily regional emissions would increase as a result of the use of additional heavy-duty construction equipment, increased excavation amounts, and increased numbers of haul trucks, vendor trucks, and construction worker trips. Criteria pollutant emissions were calculated for the activities described previously (i.e., residential excavation and associated activities, street trenching/pipe installation, well installation, and street paving) and include exhaust, fugitive dust, and fugitive VOC emissions. The maximum daily emissions in the SoCAB from these activities under the Expedited Implementation Option are presented in **Table 5.1-7,** *Unmitigated Regional Maximum Short-Term Emissions – Expedited Implementation Option, South Coast Air Basin*. The emissions levels in Table 5.1-7 represent the highest daily emissions projected to occur on any one day. The assumptions used to calculate emissions contained in Table 5.1-7 include PDFs to reduce NO_X , PM_{10}, and $PM_{2.5}$ emissions. Such features include using Model Year 2007 or newer trucks for material and soil transport and USEPA Tier 3 emissions complaint equipment on-site. As presented in Table 5.1-7, short-term daily maximum regional emissions would not exceed the SCAQMD daily significance thresholds. Thus, regional construction emissions resulting from the project would result in a less than significant short-term impact.

Table 5.1-5

Unmitigated Regional Maximum Short-Term Emissions [a]
(pounds per day)
South Coast Air Basin

Activity	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Average Daily Emissions						
Residential Excavation and Related	2	21	17	<1	10	3
Street Trenching/Pipe Installation	<1	8	10	<1	2	1
Well Installation	<1	7	13	<1	1	1
Subtotal	*3*	*36*	*40*	*<1*	*13*	
Peak Daily Emissions						
Residential Excavation and Related	2	28	20	<1	14	4
Street Trenching/Pipe Installation	1	9	11	<1	3	1
Well Installation	1	8	13	<1	2	1
Subtotal	*4*	*45*	*44*	*<1*	*19*	*6*
Street Paving	2	39	34	<1	9	5
Maximum Regional Emissions	**4**	**45**	**44**	**<1**	**19**	**6**
SCAQMD Significance Thresholds	75	100	550	150	150	55
Over/(Under)	(71)	(55)	(506)	(150)	(131)	(49)
Exceed Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

[a] *The "unmitigated" scenario includes emissions reductions from implementation of the voluntary PDFs described throughout this EIR. PDFs will be enforceable by the Regional Board. Emission quantities are rounded to "whole number" values. As such, the "total" values presented herein may be one unit more or less than actual values. Exact values (i.e., non-rounded) are provided in the model printout sheets and/or calculation worksheets that are presented in Appendix C.*

Source: URS Corporation, 2014; PCR Services Corporation, 2014

Regional emissions for the Expedited Implementation Option were also calculated for trucks travelling to a likely material receiver facility within the MDAB. As shown in **Table 5.1-8**, *Unmitigated Regional Maximum Short-term Emissions – Expedited Implementation Option, Mojave Desert Air Basin*, emissions from trucks would be less than the MDAB CEQA significance thresholds. Therefore, implementation of the RAP would result in a less than significant impact with regard to regional emissions within the MDAB.

Long-Term Impacts

Regional air pollutant emissions associated with long-term operations would be generated by long-term activities, including operation of the SVE/bioventing system and worker commute trips to support monitoring and maintenance activities. As described in Section 2.0, Project Description, long-term activities may include monthly or less frequent LNAPL recovery, quarterly or less frequent groundwater monitoring, and monitoring of utility vaults and street soil vapor probes. In addition, annual inspections to verify that the SSD systems are operating (monitoring of the vacuum and flow rate of the SSD fan) would be conducted. Therefore, the number of daily vehicle trips to the site would be negligible. Criteria pollutant emissions from the SVE/bioventing system would consist of small amounts of VOCs that would not exceed the VOC emission levels determined under the short-term impacts. As a result, long-term emissions would not exceed the

Table 5.1-6

Unmitigated Regional Maximum Short-Term Emissions [a]
(pounds per day)
Mojave Desert Air Basin

Activity	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Average Daily Emissions						
Residential Excavation and Related	<1	4	2	<1	2	<1
Street Trenching/Pipe Installation	<1	1	<1	<1	<1	<1
Well Installation	<1	<1	<1	<1	<1	<1
Subtotal	*<1*	*5*	*1*	*<1*	*2*	*<1*
Peak Daily Emissions						
Residential Excavation and Related	<1	5	2	<1	2	<1
Street Trenching/Pipe Installation	<1	1	<1	<1	<1	<1
Well Installation	<1	<1	<1	<1	<1	<1
Subtotal	*<1*	*7*	*3*	*<1*	*3*	*1*
Street Paving	—	—	—	—	—	—
Maximum Regional Emissions	**<1**	**7**	**3**	**<1**	**3**	**1**
MDAQMD Significance Thresholds	137	137	548	137	82	82
Over/(Under)	(137)	(130)	(545)	(137)	(79)	(81)
Exceed Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

[a] *The "unmitigated" scenario includes emissions reductions from implementation of the voluntary PDFs described throughout this EIR. PDFs will be enforceable by the Regional Board. Emission quantities are rounded to "whole number" values. As such, the "total" values presented herein may be one unit more or less than actual values. Exact values (i.e., non-rounded) are provided in the model printout sheets and/or calculation worksheets that are presented in Appendix C.*

Source: URS Corporation, 2014; PCR Services Corporation, 2014

thresholds and impacts related to regional emissions from long-term operations of the proposed RAP would be less than significant. Implementation of the RAP would not result in long-term emissions in the MDAB.

Cumulative Pollutant Increases

Threshold 5.1-3: Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Impact Statement AIR-3: *Short-term emissions associated with implementation of the RAP and the Expedited Implementation Option would not exceed the thresholds of significance and would not result in a cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment. Long-term emissions associated with implementation of the RAP would not exceed the thresholds of significance and would not result in a cumulatively considerable net increase of a criteria pollutant for*

Table 5.1-7

Unmitigated Regional Maximum Short-Term Emissions – Expedited Implementation Option [a]
(pounds per day)
South Coast Air Basin

Activity	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Average Daily Emissions						
Residential Excavation and Related	2	33	25	<1	16	4
Street Trenching/Pipe Installation	1	11	15	<1	4	2
Well Installation	1	8	17	<1	2	1
Subtotal	*4*	*52*	*57*	*<1*	*22*	*7*
Peak Daily Emissions						
Residential Excavation and Related	3	41	26	<1	21	5
Street Trenching/Pipe Installation	1	13	14	<1	4	2
Well Installation	1	8	15	<1	2	1
Subtotal	*5*	*62*	*55*	*<1*	*27*	*8*
Street Paving	2	39	34	<1	9	5
Maximum Regional Emissions	**5**	**62**	**57**	**<1**	**27**	**8**
SCAQMD Significance Thresholds	75	100	550	150	150	55
Over/(Under)	(70)	(38)	(607)	(150)	(73)	(47)
Exceed Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

[a] *The "unmitigated" scenario includes emissions reductions from implementation of the voluntary PDFs described throughout this EIR. PDFs will be enforceable by the Regional Board. Emission quantities are rounded to "whole number" values. As such, the "total" values presented herein may be one unit more or less than actual values. Exact values (i.e., non-rounded) are provided in the model printout sheets and/or calculation worksheets that are presented in Appendix C.*

Source: URS Corporation, 2014; PCR Services Corporation, 2014

which the region is nonattainment. Thus, short-term and long-term impacts would be less than significant.

Short-Term Impacts

Implementation of the RAP would result in short-term emissions of criteria pollutants for which the region is in nonattainment. As summarized in Table 5.1-2, the Los Angeles County portion of the SoCAB is designated nonattainment for ozone, PM_{10} (state only), and $PM_{2.5}$. However, as shown in Table 5.1-5, worst-case emissions from the short-term implementation of the RAP would not exceed the applicable mass emission thresholds for regional NO_X, PM_{10}, and $PM_{2.5}$ in the SoCAB. Therefore, since short-term emissions would not exceed the applicable mass emission thresholds, implementation of the RAP would not result in a short-term cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment and impacts would be less than significant.

Table 5.1-8

Unmitigated Regional Maximum Short-Term Emissions – Expedited Implementation Option [a]
(pounds per day)
Mojave Desert Air Basin

Activity	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Average Daily Emissions						
Residential Excavation and Related	<1	6	2	<1	2	1
Street Trenching/Pipe Installation	<1	1	1	<1	1	<1
Well Installation	<1	<1	<1	<1	<1	<1
Subtotal	*<1*	*8*	*3*	*<1*	*3*	*1*
Peak Daily Emissions						
Residential Excavation and Related	1	8	3	<1	3	1
Street Trenching/Pipe Installation	<1	2	1	<1	1	<1
Well Installation	<1	1	<1	<1	<1	<1
Subtotal	*1*	*11*	*4*	*<1*	*4*	*1*
Street Paving	—	—	—	—	—	—
Maximum Regional Emissions	**<1**	**11**	**4**	**<1**	**4**	**<1**
MDAQMD Significance Thresholds	137	137	548	137	82	82
Over/(Under)	(137)	(126)	(544)	(137)	(78)	(82)
Exceed Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

[a] *The "unmitigated" scenario includes emissions reductions from implementation of the voluntary PDFs described throughout this EIR. PDFs will be enforceable by the Regional Board. Emission quantities are rounded to "whole number" values. As such, the "total" values presented herein may be one unit more or less than actual values. Exact values (i.e., non-rounded) are provided in the model printout sheets and/or calculation worksheets that are presented in Appendix C.*

Source: URS Corporation, 2014; PCR Services Corporation, 2014

Emissions resulting from haul truck trips in the MDAB would result in short-term emissions of criteria pollutants for which the region is in nonattainment. As summarized in Table 5.1-3, San Bernardino County is designated nonattainment for ozone, PM_{10}, and $PM_{2.5}$ (state only). However, as shown in Table 5.1-6, worst-case emissions from the short-term implementation of the RAP would not exceed the applicable mass emission thresholds for regional NO_X, PM_{10}, and $PM_{2.5}$ in the MDAB. Therefore, since short-term emissions would not exceed the applicable mass emission thresholds, implementation of the RAP would not result in a short-term cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment and impacts would be less than significant.

Expedited Implementation Option

Under the Expedited Implementation Option, as summarized in Table 5.1-7, worst-case emissions from the short-term activities would not exceed the applicable mass emission thresholds for regional NO_X, PM_{10}, and $PM_{2.5}$ in the SoCAB. Therefore, short-term emissions would not result in a cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment and impacts would be less than significant.

Under the Expedited Implementation Option, as summarized in Table 5.1-3, San Bernardino County is designated nonattainment for ozone, PM_{10}, and $PM_{2.5}$ (state only). However, as shown in Table 5.1-8, worst-case emissions from the short-term implementation of the RAP would not exceed the applicable mass emission thresholds for regional NO_X, PM_{10}, and $PM_{2.5}$ in the MDAB. Therefore, short-term emissions would not result in a cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment and impacts would be less than significant.

Long-Term Impacts

Implementation of the RAP would not result in emissions that would exceed the applicable mass emission thresholds for regional NO_X, PM_{10}, and $PM_{2.5}$. Therefore, since long-term emissions would not exceed the applicable mass emission thresholds, implementation of the RAP would not result in a long-term cumulatively considerable net increase of a criteria pollutant for which the region is non-attainment, and impacts would be less than significant.

Exposure to Substantial Pollutant Concentrations

Threshold 5.1-4: Would the project expose sensitive receptors to substantial pollutant concentrations?

Impact Statement AIR-4: *Implementation of the RAP and the Expedited Implementation Option are predicted to result in short-term emissions that would not exceed the significance threshold with regards to localized emissions of NO_X, CO, PM_{10}, and $PM_{2.5}$. Implementation of the RAP and the Expedited Implementation Option would not contribute to the formation of CO hotspots and would result in less than significant long-term impacts with respect to CO hotspots. Thus, implementation of the RAP and the Expedited Implementation Option would not expose sensitive receptors to substantial pollutant concentrations and impacts would be less than significant in the short-term and long-term.*

Short-Term Impacts

During implementation of the RAP, active areas undergoing demolition, excavation, trenching, equipment installation, and restoration would occur on up to 16 properties. Emissions of NO_X are generated by the combustion of diesel fuel in the equipment needed to implement the RAP. The particulate matter emissions resulting in the PM_{10} and $PM_{2.5}$ emissions are a combination of dust created by the earthmoving and associated activities needed to remove materials and the exhaust of DPM from the combustion of fuel in the equipment on-site. Equipment associated with the SVE/bioventing system could be located off-site; however, impacts associated with off-site equipment installation would be similar to or less than the impacts described below. As discussed previously, PDFs would be implemented to reduce emissions of NO_X, PM_{10}, and $PM_{2.5}$, which includes USEPA Tier 3 complaint off-road equipment (PDF AQ-1), dust suppressants (PDFs AQ-7 and AQ-8), and enhanced track-out prevention devices (PDF AQ-10).

Off-Site Sensitive Receptors

The localized air quality analysis was conducted using the methodology described in the SCAQMD *Localized Significance Threshold Methodology* (June 2003, revised July 2008).[30] The maximum daily localized

[30] *South Coast Air Quality Management District, Localized Significance Thresholds, (2003, revised 2008), http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds. Accessed August 2014.*

emissions during implementation of the RAP are summarized in **Table 5.1-9**, *Unmitigated Localized Maximum Short-Term Emissions*. The analysis is based on the most conservative screening criteria using the closest sensitive receptor distance provided in the *Localized Significance Threshold Methodology*. As shown therein, maximum localized emissions would not exceed the localized thresholds for NO_X, CO, PM_{10}, and $PM_{2.5}$. Therefore, with respect to localized short-term emissions, implementation of the RAP would not expose sensitive receptors to short-term emissions that exceed the localized thresholds and impacts would be less than significant.

Table 5.1-9

Unmitigated Localized Maximum Short-Term Emissions [a]
(pounds per day)

Activity	NO_X	CO	PM_{10}	$PM_{2.5}$
Average Daily Emissions				
Residential Excavation and Related	5	7	4	1
Street Trenching/Pipe Installation	4	4	<1	1
Well Installation	5	8	<1	<1
Subtotal	*14*	*19*	*5*	*2*
Peak Daily Emissions				
Residential Excavation and Related	5	7	5	1
Street Trenching/Pipe Installation	4	4	<1	1
Well Installation	6	8	<1	<1
Subtotal	*15*	*19*	*6*	*2*
Street Paving	29	26	4	3
Maximum Localized Emissions	**29**	**26**	**6**	**3**
SCAQMD Significance Thresholds	82	842	7	5
Over/(Under)	(53)	(816)	(1)	(2)
Exceed Threshold?	**No**	**No**	**No**	**No**

[a] *The "unmitigated" scenario includes emissions reductions from implementation of the voluntary PDFs described throughout this EIR. PDFs will be enforceable by the Regional Board. Emission quantities are rounded to "whole number" values. As such, the "total" values presented herein may be one unit more or less than actual values. Exact values (i.e., non-rounded) are provided in the model printout sheets and/or calculation worksheets that are presented in Appendix C.*

Source: URS Corporation, 2014; PCR Services Corporation, 2014

On-Site Sensitive Receptors

The localized air quality analysis was conducted using the methodology described in the SCAQMD *Localized Significance Threshold Methodology*. The maximum daily localized emissions during implementation of the RAP are summarized in Table 5.1-9. Since the analysis is based on the most conservative screening criteria using the closest sensitive receptor distance provided in the *Localized Significance Threshold Methodology*, the potential impacts to on-site sensitive receptors, using the same distance, would be the same as off-site receptors as shown in Table 5.1-9. As shown therein, maximum localized emissions would not exceed the localized thresholds for NO_X, CO, PM_{10}, and $PM_{2.5}$. Therefore, with respect to localized short-term emissions,

implementation of the RAP would not expose sensitive receptors to short-term emissions that exceed the localized thresholds and impacts would be less than significant.

Expedited Implementation Option

Under the Expedited Implementation Option, the number of properties being remediated at one time could increase as two clusters would be remediated and restored at the same time. Therefore, daily localized emissions would increase as a result of the use of additional heavy-duty construction equipment and increased excavation amounts. However, as per PDF AQ-13, the two clusters would be separated by a minimum of at least 64 meters (105 feet), which would minimize pollutant concentrations at any common sensitive receptor. The maximum daily localized emissions under the Expedited Implementation Option are presented in **Table 5.1-10,** *Unmitigated Localized Maximum Short-Term Emissions – Expedited Implementation Option*. As shown therein, maximum localized emissions would not exceed the localized thresholds for NO_X, CO, PM_{10}, and $PM_{2.5}$. Therefore, with respect to localized short-term emissions, implementation of the RAP under the Expedited Implementation Option would not expose sensitive receptors to short-term emissions that would exceed the localized thresholds and impacts would be less than significant.

Long-Term Impacts

The site is not expected to generate long-term on-site NO_X, CO, PM_{10}, or $PM_{2.5}$ emissions. Therefore, implementation of the RAP would not result in a long-term increase in localized ambient air quality pollutant levels for NO_X, CO, PM_{10}, and $PM_{2.5}$. As a result, the project would result in a less than significant impact with regard to localized long-term impacts.

Traffic congestion has the potential to expose sensitive receptors to high levels of CO. Traffic-congested roadways and intersections with idling or slow moving vehicles have the potential to generate localized high levels of CO.[31] The SCAQMD recommends an evaluation of potential localized CO impacts when vehicle to capacity (V/C) ratios are increased by two percent or more at intersections with a level of service (LOS) of C or worse. However, the project would not result in a large number of vehicle trips after the excavation and installation of the SVE/bioventing system, and long-term operation of the project would not likely result in a CO hotspot. As a result, the project would result in a less than significant long-term impact with regard to CO hotspots.

Odors

Threshold 5.1-5: Would the project create objectionable odors affecting a substantial number of people?

Impact Statement AIR-5: *Implementation of the RAP and the Expedited Implementation Option would not create objectionable odors affecting a substantial number of people. The potential for short-term odors would be limited and minimized through compliance with SCAQMD Rule 1166 and the use of vapor and odor control measures as described in PDF AQ-8. The potential for long-term odors would be limited and minimized through the installation of a SVE and bioventing system and SSD system. Thus, implementation of the remediation activities would have a less than significant impact.*

[31] *South Coast Air Quality Management District, CEQA Air Quality Handbook, (1993) 5-1.*

Table 5.1-10

Unmitigated Localized Maximum Short-Term Emissions – Expedited Implementation Option [a]
(pounds per day)

Activity	NO_X	CO	PM_{10}	$PM_{2.5}$
Average Daily Emissions				
Residential Excavation and Related	5	7	6	1
Street Trenching/Pipe Installation	4	4	1	<1
Well Installation	6	8	<1	1
Subtotal	*15*	*19*	*7*	*2*
Peak Daily Emissions				
Residential Excavation and Related	5	7	8	1
Street Trenching/Pipe Installation	4	4	1	<1
Well Installation	6	8	<1	1
Subtotal	*15*	*19*	*10*	*2*
Street Paving	29	26	4	3
Maximum Localized Emissions	**29**	**36**	**10**	**3**
SCAQMD Significance Thresholds [b]	81	930	11	6
Over/(Under)	(52)	(894)	(1)	(3)
Exceed Threshold?	**No**	**No**	**No**	**No**

[a] *The "unmitigated" scenario includes emissions reductions from implementation of the voluntary PDFs described throughout this EIR. PDFs will be enforceable by the Regional Board. Mitigation measures are discussed separately. Emission quantities are rounded to "whole number" values. As such, the "total" values presented herein may be one unit more or less than actual values. Exact values (i.e., non-rounded) are provided in the model printout sheets and/or calculation worksheets that are presented in Appendix C.*

[b] *Under the Expedited Implementation Option, the two clusters undergoing active remediation and restoration would be separated by a minimum of 64 meters. The localized thresholds for the Expedited Implementation Option are determined for a common sensitive receptor located between the two clusters. Thus, the localized thresholds are calculated based on linear interpolation between the 25 meter and 50 meter thresholds for a 2 acre site in South Los Angeles County Coastal Source Receptor Area at a distance of 32 meters.*

Source: URS Corporation, 2014; PCR Services Corporation, 2014

Short-Term Impacts

Odor generating compounds may be released during excavation when soils containing petroleum hydrocarbons are exposed during excavation. The detection of odors does not necessarily equate to a health risk (refer to Section 4.6, *Hazards and Hazardous Materials*, of this EIR for a discussion of health risks associated with implementation of the RAP). Odor-based screening levels have been developed, based on the levels for soil vapor published in the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) Environmental Screening Levels (ESL) documentation,[32] and were considered in the

[32] *San Francisco Bay Regional Water Quality Control Board, User's Guide: Derivation and Application of Environmental Screening Levels, Interim Final, (2013).*

preparation of the RAP. Based on the comparison of the risk based SSCGs and odor based screening levels corrective action planning to address risk-based SSCGs would also address odor concerns. Nonetheless, implementation of the RAP would include several measures to minimize the release of odorous compounds. Water mist would be used to provide the first level of vapor and odor control. Care would be taken to ensure that the soil is not over-saturated, which could generate runoff. Based on excavation pilot testing[33] that was conducted to evaluate the feasibility of excavating impacted soils to a depth of 10 feet bgs, additional odor and vapor control was determined to be achievable during excavation activities by using long-acting vapor suppressant foam (e.g., Rusmar foam) when odorous soils are encountered. Thus, based on monitoring data or odor perception during implementation of the RAP, additional vapor and odor control would be implemented using foam or equivalent on an as needed basis. Implementation of the measures identified above is anticipated to effectively minimize odor impacts. Emissions and odors would be controlled to the maximum extent possible and odor-related impacts would be less than significant.

Expedited Implementation Option

Under the Expedited Implementation Option, the same measures as described above would be used to minimize the release of odorous compounds. Monitoring and/or odor perception during implementation of the RAP would be performed and additional vapor and odor control would be implemented using foam or equivalent on an as needed basis. Furthermore, compliance with SCAQMD Rule 1166 would control VOC emissions, including odorous compounds, during the Expedited Implementation Option. Emissions and odors would be controlled to the maximum extent possible and odor-related impacts would be less than significant.

Long-Term Impacts

According to the SCAQMD CEQA Handbook, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, municipal landfills, dairies, and fiberglass molding. The proposed RAP does not include any uses identified by the SCAQMD as being associated with odors. Implementation of the RAP would result in restoration of affected properties and infrastructure (e.g., yards, landscaping, hardscape, fencing, streets) to like conditions. The remediation equipment would employ thermal oxidation, catalytic oxidation, and/or GAC treatment, as appropriate as concentrations decrease over time, to treat lighter volatile-range petroleum hydrocarbons and VOCs before discharge to the atmosphere. Therefore, the long-term activities of the proposed RAP would not be a substantial source of odors, and potential odor impacts would be less than significant.

[33] *The excavation pilot tests were conducted in accordance with the Pilot Test Work Plan (URS and Geosyntec, 2011).*

Consistency with City of Carson General Plan Goals and Policies (Short-Term and Long-Term)

Threshold 5.1-6:	Would the project conflict with or obstruct implementation of the applicable policies in the City of Carson General Plan Air Quality Element?

Impact Statement AIR-6: *Implementation of the RAP and the Expedited Implementation Option would be consistent with applicable policies in the City of Carson General Plan Air Quality element. Thus, implementation of the RAP and the Expedited Implementation Option would have a less than significant impact.*

The City's General Plan contains goals, objectives, and policies that are relevant to air quality and are presented in the General Plan Air Quality Element. As discussed in **Table 5.1-11**, *Comparison of the Project to the Applicable Policies of the Carson General Plan Air Quality Element*, implementation of the RAP would be consistent with the applicable goals and policies of the City of Carson General Plan pertaining to air quality. The Expedited Implementation Option would implement the same PDFs and would comply with the same applicable regulations and permitting requirements as the project. Therefore, the Expedited Implementation Option would be consistent with the applicable goals and policies of the City of Carson General Plan pertaining to air quality as generally described in Table 5.1-11.

Table 5.1-11

Comparison of the Project to the Applicable Policies of the Carson General Plan Air Quality Element

Policy	Project Consistency Analysis
AQ 2.1: Coordinate with other agencies in the region, particularly SCAQMD and SCAG, to implement provisions of the regions' AQMP, as amended.	**Consistent:** Control strategies in the AQMP with potential applicability to short-term emissions from construction activities include ONRD-04 and OFFRD-01, which are intended to reduce emissions from on-road and off-road heavy-duty vehicles and equipment by accelerating replacement of older, emissions-prone engines with newer engines meeting more stringent emission standards. Implementation of the RAP would incorporate a number of PDFs that are designed to reduce short-term emissions from construction equipment. Implementation of the RAP would be done using construction equipment that meet or exceed stringent Tier 3 emission standards for off-road equipment (PDF AQ-1) and 2007 or better standards for on-road waste haul trucks (PDF AQ-2), and would comply with anti-idling restrictions pursuant to CARB's ATCM (PDF AQ-3). The RAP would comply with SCAQMD regulations and permitting requirements for controlling fugitive dust and volatile emissions from the site (see SCAQMD Rules 403 and 1166) (PDF AQ-6 and PDF AQ-7). The PDFs listed above, in addition to the other PDFs discussed previously, are generally consistent with the 2012 AQMP control strategies intended to reduce emissions from construction equipment and operations. Therefore, the RP's Proposed Remedy would be consistent with this policy.
AQ 2.3: Cooperate and participate in regional air quality management plans, programs and enforcement measures.	**Consistent:** The RAP would use construction equipment that meet or exceed stringent Tier 3 emission standards for off-road equipment (PDF AQ-1) and 2007 or better standards for on-road waste haul trucks (PDF AQ-2), and would comply with anti-idling restrictions pursuant to CARB's ATCM (PDF AQ-3). The RAP would comply with SCAQMD

Table 5.1-11 (Continued)

Comparison of the Project to the Applicable Policies of the Carson General Plan Air Quality Element

Policy	Project Consistency Analysis
	regulations and permitting requirements for controlling fugitive dust and volatile emissions from the site (see SCAQMD Rules 403 and 1166) (PDF AQ-6 and PDF AQ-7). The PDFs listed above, in addition to the other PDFs discussed previously, are generally consistent with the 2012 AQMP control strategies intended to reduce emissions from construction equipment and operations. In addition, implementation of the RAP would require Permits to Construct/Operate from the SCAQMD. The PDFs will be enforced by the Regional Board through Conditions of Approval and the conditions in the Permits to Construct/Operate by the SCAQMD. Therefore, the RP's Proposed Remedy would be consistent with this policy.
AQ 2.4: Continue to work to relieve congestion on major arterials and thereby reduce emissions.	**Consistent:** The majority of vehicle trips associated with the project are during the short-term (construction) implementation phase. Haul trucks entering and exiting the site would be required to follow a City-approved traffic plan that establishes the trucking route, days and hours of truck operation, and various requirements to provide traffic, pedestrian and bicycle safety, and truck operators will be provided with a trucking route map and hours of operation allowed (PDF AQ-10). In order to minimize traffic congestion at or near the site, construction worker parking would be provided at a nearby off-site location and shuttles and/or vans would be provided to transport construction workers to the site (PDF AQ-11). Therefore, the RP's Proposed Remedy would be consistent with this policy.
AQ 2.7: Reduce air pollutant emissions by mitigating air quality impacts associated with development projects to the greatest extent possible.	**Consistent:** The RAP would use construction equipment that meet or exceed stringent Tier 3 emission standards for off-road equipment (PDF AQ-1) and 2007 or better standards for on-road waste haul trucks (PDF AQ-2), and would comply with anti-idling restrictions pursuant to CARB's ATCM (PDF AQ-3). The RAP would comply with SCAQMD regulations and permitting requirements for controlling fugitive dust and volatile emissions from the site (see SCAQMD Rules 403 and 1166) (PDF AQ-6 and PDF AQ-7). The PDFs listed above, in addition to the other PDFs discussed previously, would reduce emissions from construction equipment and operations. SVE and bioventing systems would be installed as the selected remedial technologies to address petroleum hydrocarbons, VOCs, and methane in soil vapor and to promote degradation of residual hydrocarbon concentrations (PDF AQ-4). The remediation equipment would provide the flexibility to employ thermal oxidation, catalytic oxidation, and/or granulated activated carbon (GAC) treatment, as appropriate as concentrations decrease over time. Therefore, the RP's Proposed Remedy would be consistent with this policy.
AQ 5.1: Coordinate with other agencies in the region, particularly SCAQMD and SCAG, to implement provisions of the regions' AQMP, as amended.	**Consistent:** Control strategies in the AQMP with potential applicability to short-term emissions from construction activities include ONRD-04 and OFFRD-01, which are intended to reduce emissions from on-road and off-road heavy-duty vehicles and equipment by accelerating replacement of older, emissions-prone engines with newer engines meeting more stringent emission standards. Implementation of the RAP would incorporate a number of PDFs that are designed to reduce short-term emissions from construction equipment. The RAP would

Table 5.1-11 (Continued)

Comparison of the Project to the Applicable Policies of the Carson General Plan Air Quality Element

Policy	Project Consistency Analysis
	use construction equipment that meet or exceed stringent Tier 3 emission standards for off-road equipment (PDF AQ-1) and 2007 or better standards for on-road waste haul trucks (PDF AQ-2), and would comply with anti-idling restrictions pursuant to CARB's ATCM (PDF AQ-3). The RAP would comply with SCAQMD regulations and permitting requirements for controlling fugitive dust and volatile emissions from the site (see SCAQMD Rules 403 and 1166) (PDF AQ-6 and PDF AQ-7). The PDFs listed above, in addition to the other PDFs discussed previously, are generally consistent with the 2012 AQMP control strategies intended to reduce emissions from construction equipment and operations.
AQ 5.4: Work with the SCAQMD to better monitor emissions.	**Consistent:** Implementation of the RAP would require Permits to Construct/Operate from the SCAQMD. Monitoring and reporting would be conducted in accordance with the permit conditions and data would be provided to the SCAQMD as required. Therefore, the RP's Proposed Remedy would be consistent with this policy.

Source: PCR Services Corporation, 2014

5. ALTERNATIVES ANALYSIS

Analysis of Impacts Associated with Alternative 1 (No Project Alternative)

The No Project Alternative would not involve any excavation of soils or change to existing conditions that would require new sources of emissions or emissions controls and air quality impact analysis of activities at the site. The No Project Alternative would avoid any potential excavation-related impacts associated with air pollutant emissions, which were determined to be less than significant under the RAP with the implementation of PDFs. Thus, the No Project Alternative would avoid the less-than-significant air pollutant emissions that would result from the implementation of the RAP.

Analysis of Impacts Associated with Alternative 2 (Excavation Beneath Landscape and Hardscape to 10 Feet Alternative)

This Alternative would entail excavation of soils from landscaped and beneath residential hardscape to a depth of 10 feet bgs at all affected properties. Unlike the RP's Proposed Remedy, which would require approximately 6 years, this Alternative would require proportionately additional years in order to excavate the additional materials. Daily demolition and excavation volumes, truck trips, and worker commutes are anticipated to be the same as the project. This Alternative would also implement the same PDFs as described previously.

Air Quality Plan Conflicts

Short-Term Impacts

This Alternative would result in an increase in short-term employment as compared to existing conditions. Being relatively small in number and temporary in nature, construction jobs are generally not considered inconsistent with the assumptions upon which the AQMP are based. This Alternative would incorporate the same PDFs as the project to reduce short-term emissions from construction equipment. The PDFs include the use of construction equipment that meet or exceed stringent Tier 3 emission standards for off-road equipment (PDF AQ-1), 2007 or better standards for on-road waste haul trucks (PDF AQ-2), and compliance with anti-idling restrictions pursuant to CARB's ATCM (PDF AQ-3). This Alternative would also comply with SCAQMD regulations and permitting requirements for controlling fugitive dust and volatile emissions from the site (see SCAQMD Rules 403 and 1166) (PDF AQ-6 and PDF AQ-7). The PDFs listed above, in addition to the other PDFs discussed previously, are generally consistent with the 2012 AQMP control strategies intended to reduce emissions from construction equipment and operations. Therefore, this Alternative would not conflict with or obstruct implementation of the AQMP, and impacts would be less than significant.

The only sources of increased air pollutant emissions resulting from implementation of the RAP that are expected to occur in the MDAB and subject to CEQA review are short-term haul truck trips. Emission standards for haul trucks are regulated at the state and federal level by CARB and USEPA, respectively, and are therefore not subject to control measures adopted by local air agencies. Thus, hauling of soil, debris, and other materials into the MDAB is not inconsistent with applicable MDAQMD air quality plans. Nonetheless, it should be noted that this Alternative would be required to use on-road waste haul trucks that meet or exceed Year 2007 emission standards, which would minimize emissions in the MDAB.

Long-Term Impacts

Implementation of the RAP would result in restoration of affected properties and infrastructure (e.g., yards, landscaping, hardscape, fencing, streets) to like conditions. Following implementation of the RAP, long-term emissions would result from the SVE/bioventing system, sub-slab vapor mitigation system, and from periodic monitoring and maintenance activities. However, these emissions would the same as the project and would be negligible (see detailed discussion under Impact Statement AIR-2). This Alternative would not result in a change in long-term population as compared to existing conditions and would also not result in a substantial change in long-term employment as compared to existing conditions. Being relatively small in number, the continuation of monitoring and maintenance jobs is generally not considered inconsistent with the assumptions upon which the AQMP was based. Therefore, this Alternative would not conflict with or obstruct implementation of the AQMP, and impacts would be less than significant.

Violation of Air Quality Standards

Short-Term Impacts

This Alternative has the potential to create short-term air quality impacts through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and construction workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the same as the project. Remedial activities would occur for a greater number of days overall to account for the additional excavated material. The maximum daily emissions in the SoCAB would be the

same under this Alternative as the project (see Table 5.1-5). Thus, regional construction emissions under this Alternative would result in a less than significant short-term impact.

Regional emissions from trucks travelling to likely material receiver facilities within the MDAB would also be the same under this Alternative as the project (see Table 5.1-6). Therefore, this Alternative would result in a less than significant impact with regard to regional emissions within the MDAB.

Long-Term Impacts

Regional air pollutant emissions associated with long-term operations under this Alternative would be the same as the project. As a result, impacts related to regional emissions from long-term operations under this Alternative would be less than significant. This Alternative would not result in long-term emissions in the MDAB.

Cumulative Pollutant Increases

Short-Term Impacts

This Alternative would result in short-term emissions of criteria pollutants for which the region is in nonattainment. Daily activity levels under this Alternative would be the same as the project. Remedial activities would occur for a greater number of days overall to account for the additional excavated material. The maximum daily emissions in the SoCAB would be the same under this Alternative as the project (see Table 5.1-5). Therefore, short-term emissions would not result in a cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment and impacts would be less than significant.

Emissions resulting from haul truck trips in the MDAB would result in short-term emissions of criteria pollutants for which the region is in nonattainment. Regional emissions from trucks travelling to likely material receiver facilities within the MDAB would also be the same under this Alternative as the project (see Table 5.1-6). Therefore, short-term emissions would not result in a cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment and impacts would be less than significant.

Long-Term Impacts

Regional air pollutant emissions associated with long-term operations under this Alternative would be the same as the project. Therefore, this Alternative would result in a less than cumulatively considerable net increase of a criteria pollutant for which the region is non-attainment, and impacts would be less than significant.

Exposure to Substantial Pollutant Concentrations

Short-Term Impacts

Similar to the project, this Alternative would result in localized emissions from demolition, excavation, trenching, equipment installation, and restoration activities. The maximum daily localized emissions under this Alternative would be the same as the project (see Table 5.1-9). As shown therein, maximum localized emissions would not exceed the localized thresholds for NO_X, CO, PM_{10}, and $PM_{2.5}$. Therefore, similar to the RP's Proposed Remedy, this Alternative would not expose sensitive receptors to short-term emissions that would exceed the localized thresholds and impacts would be less than significant.

Long-Term Impacts

Similar to the project, this Alternative is not expected to generate long-term on-site NO_X, CO, PM_{10}, or $PM_{2.5}$ emissions. Therefore, this Alternative would not result in a long-term increase in localized ambient air quality pollutant levels for NO_X, CO, PM_{10}, and $PM_{2.5}$. Similar to the project, this Alternative would result in a less than significant impact with regard to localized long-term impacts.

Traffic congestion has the potential to expose sensitive receptors to high levels of CO. Traffic-congested roadways and intersections with idling or slow moving vehicles have the potential to generate localized high levels of CO.[34] The SCAQMD recommends an evaluation of potential localized CO impacts when V/C ratios are increased by two percent or more at intersections with a LOS of C or worse. However, similar to the project, this Alternative would not result in a large number of vehicle trips, and long-term operation of the project will not likely result in a CO hotspot. As a result, this Alternative would result in a less than significant impact with regard to CO hotspots.

Odors

Short-Term Impacts

Under this Alternative, odor generating compounds may be released during excavation. This Alternative would implement the same odor control measures as described for the project to minimize the release of odorous compounds. Furthermore, this Alternative would comply with SCAQMD Rule 1166 to control VOC emissions, including odorous compounds. Emissions and odors would be controlled to the maximum extent possible and odor-related impacts would be less than significant.

Long-Term Impacts

According to the SCAQMD CEQA Handbook, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, municipal landfills, dairies, and fiberglass molding. Similar to the project, this Alternative does not include any uses identified by the SCAQMD as being associated with odors. Also, similar to the project, this Alternative would result in restoration of affected properties and infrastructure (e.g., yards, landscaping, hardscape, fencing, streets) to like conditions. The remediation equipment would employ thermal oxidation, catalytic oxidation, and/or GAC treatment, as appropriate as concentrations decrease over time, to treat lighter volatile-range petroleum hydrocarbons and VOCs before discharge to the atmosphere. Therefore, the long-term activities under this Alternative would not be a substantial source of odors, and potential odor impacts would be less than significant.

Consistency with City of Carson General Plan Goals and Policies

The City's General Plan contains goals, objectives, and policies that are relevant to air quality and are presented in the General Plan Air Quality Element. Similar to the project, this Alternative would implement PDFs that would be consistent with applicable General Plan Air Quality Element policies (see Table 5.1-11). Therefore, similar to the project, this Alternative would be consistent with the applicable goals and policies of the City of Carson General Plan pertaining to air quality.

[34] *South Coast Air Quality Management District, CEQA Air Quality Handbook, (1993) 5-1.*

Analysis of Impacts Associated with Alternative 3 (No Excavation Beneath Hardscape – 5 Feet-to Targeted 10-Feet)

Alternative 3 would not remove hardscape features or entail excavation of soils from beneath residential hardscape. As with the RP's Proposed Remedy, excavation would be to a depth of 5 feet with targeted 10 feet excavations where needed. Because excavations would not occur beneath hardscape features and no hardscape features would be removed, less excavation of COC-containing soils and inert debris would occur over individual residential properties. Total remediation would occur over an approximately 4-year period compared to approximately 6 years under the RP's Proposed Alternative. Daily demolition and excavation volumes, truck trips, and worker commutes are anticipated to be the same as the project. This Alternative would also implement the same PDFs described above.

Air Quality Plan Conflicts

Short-Term Impacts

Alternative 3 would result in an increase in short-term employment compared to existing conditions. Such construction jobs are not inconsistent with the growth assumptions of the AQMP. This Alternative would incorporate the same PDFs the RP's Proposed Remedy, including PDF AQ-1, PDF AQ-2, PDF AQ-3, PDF AQ-6 and PDF AQ-7, to reduce short-term emissions from construction equipment and comply with SCAQMD regulations and permitting requirements for controlling fugitive dust and volatile emissions from the site (SCAQMD Rules 403 and 1166) The PDFs, in addition to the other PDFs are generally consistent with the 2012 AQMP control strategies intended to reduce emissions from construction equipment and operations. Therefore, this Alternative would not conflict with or obstruct implementation of the AQMP, and impacts would be less than significant.

The only sources of increased air pollutant emissions resulting from implementation of the RAP that are expected to occur in the MDAB and subject to CEQA review are short-term haul truck trips. Emission standards for haul trucks are regulated at the state and federal level by CARB and USEPA, respectively, and are therefore not subject to control measures adopted by local air agencies. Thus, hauling of soil, debris, and other materials into the MDAB is not inconsistent with applicable MDAQMD air quality plans. Nonetheless, it should be noted that this Alternative would be required to use on-road waste haul trucks that meet or exceed Year 2007 emission standards, which would minimize emissions in the MDAB.

Long-Term Impacts

Implementation of the RAP would result in restoration of affected properties and infrastructure, including yards, landscaping, and streets. Following implementation of the RAP, long-term emissions would result from the SVE/bioventing system, sub-slab vapor mitigation system, and from periodic monitoring and maintenance activities. However, these emissions would the same would be negligible, as under the RP's Proposed Remedy. This Alternative would not result in a change in long-term population and would not cause a substantial change in long-term employment. Being relatively small in number, the continuation of monitoring and maintenance jobs would not be inconsistent with the assumptions upon which the AQMP is based. Therefore, Alternative 3 would not conflict with or obstruct implementation of the AQMP, and impacts would be less than significant.

Violation of Air Quality Standards

Short-Term Impacts

Alternative 3 has the potential to create short-term air quality impacts through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and construction workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the same as under the RP's Proposed Remedy. Remedial activities would occur for a fewer number of days because of less excavated material. However, the maximum daily emissions in the SoCAB would be the same under this Alternative as under the RP's Proposed Remedy, shown in Table 5.1-5, above. Thus, regional construction emissions under this Alternative would result in a less than significant short-term impact.

Regional emissions from trucks travelling to likely material receiver facilities within the MDAB would also be the same under Alternative 3 as the RP's Proposed Alternative (see Table 5.1-6). Therefore, regional emission impacts within the MDAB under Alternative 3 would result in a less than significant.

Long-Term Impacts

Regional air pollutant emissions associated with long-term operations under this Alternative would be the same as the RP's Proposed Remedy. Therefore, impacts related to regional emissions from long-term operations under Alternative 3 would be less than significant. Alternative 3 would not result in long-term emissions in the MDAB.

Cumulative Pollutant Increases

Short-Term Impacts

Alternative 3 would result in short-term emissions of criteria pollutants for which the region is in nonattainment. Daily activity levels under this Alternative would be the same as under the RP's Proposed Remedy. Remedial activities, however, would occur for fewer days overall to account for the additional excavated material. However, the maximum daily emissions in the SoCAB, shown in Table 5.1-5, above, would be the same as under the RP's Proposed Remedy. Therefore, short-term emissions would not result in a cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment and impacts would be less than significant.

Emissions resulting from haul truck trips in the MDAB would result in short-term emissions of criteria pollutants for which the region is in nonattainment. Regional emissions, , above from trucks travelling to likely material receiver facilities within the MDAB, as shown in Table 5.1-6, would also be the same under this Alternative. Therefore, short-term emissions would not result in a cumulatively considerable net increase of a criteria pollutant for which the region is nonattainment and impacts would be less than significant.

Long-Term Impacts

Regional air pollutant emissions from long-term operations under this Alternative would be the same as the RP's Proposed Remedy. Therefore, Alternative 3 would result in a less than cumulatively considerable net

increase of a criteria pollutant for which the region is non-attainment, and impacts would be less than significant.

Exposure to Substantial Pollutant Concentrations

Short-Term Impacts

Similar to the RP's Proposed Remedy, Alternative 3 would result in localized emissions from demolition, excavation, trenching, equipment installation, and restoration activities. The maximum daily localized emissions under this Alternative would be the same as the RP's Proposed Remedy (see Table 5.1-9, above). As shown therein, maximum localized emissions would not exceed the localized thresholds for NO_X, CO, PM_{10}, and $PM_{2.5}$. Therefore, similar to the RP's Proposed Remedy, Alternative 3 would not expose sensitive receptors to short-term emissions that would exceed the localized thresholds and impacts would be less than significant.

Long-Term Impacts

Similar to the RP's Proposed Remedy, Alternative 3 is not expected to generate long-term on-site NO_X, CO, PM_{10}, or $PM_{2.5}$ emissions. Therefore, Alternative 3 would not result in a long-term increase in localized ambient air quality pollutant levels for NO_X, CO, PM_{10}, and $PM_{2.5}$. Localized long-term impacts would be less than significant.

Similar to the RP's Proposed Remedy, Alternative 3 would not result in a large number of vehicle trips, and long-term operation of the project would not likely result in a CO hotspot. Impacts with regard to CO hotspots would be less than significant.

Odors

Short-Term Impacts

Under Alternative 3, odor generating compounds may be released during excavation. This Alternative would implement the same odor control measures as described for the project to minimize the release of odorous compounds. Furthermore, Alternative 3 would comply with SCAQMD Rule 1166 to control VOC emissions, including odorous compounds. Emissions and odors would be controlled to the maximum extent possible and odor-related impacts would be less than significant.

Long-Term Impacts

Similar to the RP's Proposed Alternative, Alternative 3 would not include any uses identified by the SCAQMD as being associated with odors. Also, similar to the RP's Proposed Remedy, Alternative 3 would result in restoration of affected properties and infrastructure (e.g., yards, landscaping, hardscape, fencing, streets) to like conditions. The remediation equipment would employ thermal oxidation, catalytic oxidation, and/or GAC treatment, as appropriate as concentrations decrease over time, to treat lighter volatile-range petroleum hydrocarbons and VOCs before discharge to the atmosphere. Therefore, the long-term activities under Alternative 3 would not be a substantial source of odors, and potential odor impacts would be less than significant.

Consistency with City of Carson General Plan Goals and Policies

The City's General Plan contains goals, objectives, and policies that are relevant to air quality and are presented in the General Plan Air Quality Element. Similar to the RP's Proposed Remedy, Alternative 3 would implement PDFs that would be consistent with applicable General Plan Air Quality Element policies (see Table 5.1-11, above). Therefore, similar to the project, Alternative 3 would be consistent with the applicable goals and policies of the City of Carson General Plan pertaining to air quality.

6. CUMULATIVE IMPACTS

Short-Term Impacts

Of the seven related projects that have been identified within the project site area, there are a number of related projects that have not yet been built or are currently under construction. Since the RPs have no control over the timing or sequencing of the related projects, any quantitative analysis to ascertain daily construction emissions that assumes multiple, concurrent construction projects would be entirely speculative. For this reason, the SCAQMD's methodology to assess a project's cumulative impact differs from the cumulative impacts methodology employed elsewhere in this Draft EIR.

With respect to the short-term air quality emissions and cumulative SoCAB-wide conditions, the SCAQMD has developed strategies to reduce criteria pollutant emissions outlined in the AQMP pursuant to Federal CAA mandates. As such, implementation of the RAP would comply with SCAQMD Rule 403 and Rule 1166 requirements. In addition, implementation of the RAP would comply with applicable AQMP emissions control measures. Per SCAQMD rules and mandates as well as the CEQA requirement that significant impacts be mitigated to the extent feasible, these same requirements (i.e., Rule 403 compliance, the implementation of all feasible mitigation measures, and compliance with adopted AQMP emissions control measures) would also be imposed on construction projects SoCAB-wide, which would include each of the related projects mentioned above. As discussed under *Impact Statement AIR-2*, implementation of the RAP would result in short-term regional emissions that would not exceed the significance thresholds and impacts would be less than significant. As such, cumulative short-term impacts to regional air quality during proposed RAP implementation would also be less than significant.

Potential sources that may emit odors during short-term construction activities would include the use of architectural coatings and solvents. Implementation of the RAP would include several measures to minimize the release of odorous compounds such as water mist and long-acting vapor suppressant foam (e.g., Rusmar foam) when odorous soils are encountered. Based on monitoring data or odor perception during implementation of the RAP, additional vapor and odor control would be implemented using foam or equivalent on an as needed basis. SCAQMD Rule 1166 is designed to control VOC emissions, including odorous compounds, during implementation of the RAP. Mandatory compliance with SCAQMD rules would also control short-term odorous emissions. Thus, odor impacts from the related projects are anticipated to be less than significant individually, as well as cumulatively in conjunction with the proposed RAP.

Long-Term Impacts

The SCAQMD's approach for assessing cumulative impacts related to operations or long-term implementation is based on attainment of ambient air quality standards in accordance with the

requirements of the Federal and State Clean Air Acts. As discussed earlier, the SCAQMD has developed a comprehensive plan, the AQMP, which addresses the region's cumulative air quality condition.

A significant impact may occur if a project would add a cumulatively considerable contribution of a federal or state non-attainment pollutant. Because the SoCAB is currently in nonattainment for ozone, PM_{10} and $PM_{2.5}$, related projects could exceed an air quality standard or contribute to an existing or projected air quality exceedance. Cumulative impacts to air quality are evaluated under two sets of thresholds for CEQA and the SCAQMD. In particular, CEQA Guidelines Sections 15064(h)(3) provides guidance in determining the significance of cumulative impacts. Specifically, Section 15064(h)(3) states in part that:

> *"A lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program which provides specific requirements that will avoid or substantially lessen the cumulative problem (e.g., water quality control plan, air quality plan, integrated waste management plan) within the geographic area in which the project is located. Such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency…"*

For purposes of the cumulative air quality analysis with respect to CEQA Guidelines Section 15064(h)(3), the proposed RAP's incremental contribution to cumulative air quality impacts is determined based on compliance with the SCAQMD adopted 2012 AQMP. Implementation of the RAP would not conflict with or obstruct implementation of the applicable air quality plan, which in this case is the AQMP. As discussed previously, implementation of the RAP would be consistent with the growth projections in the AQMP and the control strategies intended to reduce emissions from construction equipment and operations. Thus, given the RAP's consistency with the AQMP, the project's incremental contribution to cumulative air quality effects is not cumulatively considerable, per CEQA Section 15064(h)(3).

Nonetheless, SCAQMD no longer recommends relying solely upon consistency with the AQMP as an appropriate methodology for assessing cumulative air quality impacts. The SCAQMD recommends that project-specific air quality impacts be used to determine the potential cumulative impacts to regional air quality. As discussed above, long-term emissions would not exceed the SCAQMD regional significance thresholds. Therefore, the long-term emissions of non-attainment pollutants and ozone precursors would be cumulatively less than significant.

With respect to potential odor impacts, neither the project nor any of the related projects (which are primarily institutional, general office, mixed-use, residential, industrial/commercial uses) have a high potential to generate odor impacts.[35] Furthermore, any related project that may have a potential to generate objectionable odors would be required by SCAQMD Rule 402 (Nuisance) to implement BACT to limit potential objectionable odor impacts to a less than significant level. Thus, potential odor impacts from the project and related projects are anticipated to be less than significant individually and cumulatively.

[35] *According to the SCAQMD CEQA Air Quality Handbook, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding.*

7. MITIGATION MEASURES

With the implementation of existing regulations and PDFs described above, the RP's Proposed Remedy would result in less-than-significant impacts with respect to regional and localized air quality. Therefore, no mitigation measures would be necessary for the RP's Proposed Remedy. The Expedited Implementation Option would also result in less-than-significant impacts with respect to regional and localized air quality. Therefore, no mitigation measures would be necessary for the Expedited Implementation Option.

With regard to the alternatives, the No Project Alternative would not involve any excavation or other physical activity and would not result in any net new air pollutant emissions. Therefore, mitigation measures would not be required for this Alternative. Alternative 2 and Alternative 3 would not result in significant impacts with respect to air quality impacts. Therefore, no mitigation measures would be necessary for Alternative 2 and Alternative 3.

8. LEVEL OF SIGNIFICANCE AFTER MITIGATION

Short-Term Impacts

Implementation of the RAP and the Expedited Implementation Option are not expected to conflict with or obstruct implementation of an applicable air quality plan, and no mitigation is needed in regards to this criterion. Implementation of the RAP and the Expedited Implementation Option would result in emissions that would not exceed the applicable regional emission significance thresholds. Therefore, implementation of the RAP and the Expedited Implementation Option would not cause or contribute to a violation of an air quality standard and no mitigation is needed in regards to this criterion. Implementation of the RAP and the Expedited Implementation Option would not result in a cumulative net increase of a criteria pollutant for which the region is nonattainment under applicable federal or state AAQS (including releasing emissions which exceed quantitative thresholds for ozone precursors) and no mitigation is needed in regards to this criterion. Implementation of the RAP and the Expedited Implementation Option would result in emissions that would not exceed the applicable localized emission significance thresholds. Implementation of the RAP and the Expedited Implementation Option would not result in the formation of CO hotspots at sensitive receptor locations. Therefore, implementation of the RAP and the Expedited Implementation Option would not expose sensitive receptors to substantial pollutant concentrations and no mitigation is needed in regards to this criterion. Implementation of the PDFs would reduce odor impacts to less than significant levels.

With respect to the alternatives, Alternative 1, the No Project Alternative, would not involve any physical activity or result in any net new air pollutant emissions. Therefore, no impacts are associated with Alternative 1. Alternative 2 and Alternative 3 would implement the same PDFs as the RP's Proposed Remedy. Similar to the RP's Proposed Remedy, Alternative 2 and Alternative 3 would result in less than significant air quality impacts without mitigation.

Long-Term Impacts

Implementation of the RAP would result in the restoration of affected properties and infrastructure (e.g., yards, landscaping, hardscape, fencing, streets) to like conditions and would not conflict with or obstruct implementation of an applicable air quality plan. Implementation of the RAP would generate negligible long-term emissions that would result in less than significant regional and localized impacts. Implementation of

the PDFs would reduce odor impacts to less than significant levels. Thus, long-term impacts would be less than significant and no mitigation measures are needed.

With respect to the alternatives, Alternative 1, the No Project Alternative, would not involve any physical activity or result in any net new air pollutant emissions. Therefore, no impacts are associated with Alternative 1. Alternative 2 and Alternative 3 would result in the same long-term daily emissions as the RP's Proposed Remedy. Similar to the RP's Proposed Remedy, Alternative 2 and Alternative 3 would result in less than significant air quality impacts without mitigation.

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5.2 GEOLOGY AND SOILS

1. INTRODUCTION

This section describes existing geologic conditions at the project site and applicable regulations related to geology and soils. The evaluation describes geologic hazards such as liquefaction, unstable soils, lateral spreading, soil erosion, water table conditions and activities associated with the implementation of the RAP with respect to such hazards. The analysis in this section is based on information provided in the City of Carson General Plan, Los Angeles County Building Code, and studies prepared for the Former Kast Site, including the Final Phase I Site Characterization Report, Excavation Pilot Tests, Assessment of Environmental Impact and Feasibility of Removal of Residual Concrete Reservoir Slabs, Plume Delineation Report, and a Subsurface Drainage Study. These reports are referenced in Chapter 9 of this EIR and on file with the Regional Board.

2. ENVIRONMENTAL SETTING

Regulatory Framework

Federal Regulations

There are no applicable federal regulations. Geological conditions and soils-related effects, such as liquefaction, ground shaking, settlement, and earth movement are addressed through regulations set forth in State of California, Los Angeles County, and City of Carson codes and adopted plans.

State Regulations

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code Section 2621) was enacted by the State of California in 1972 to reduce the risk to life and property from surface fault rupture during earthquakes.[1] The Alquist-Priolo Earthquake Fault Zoning Act prohibits the location of most types of structures intended for human occupancy across the traces of active faults. The act requires that development permits for projects in "Earthquake Fault Zones" be withheld until geologic investigations demonstrate that the sites are not threatened by surface displacement from future fault rupture. To be zoned under the Alquist-Priolo Earthquake Fault Zoning Act, a fault must be considered active, or both sufficiently active and well-defined. The California Geological Survey (CGS) defines an active fault as one that has had surface displacement within Holocene time (about the last 11,000 years); and a sufficiently active fault as one that has evidence of Holocene surface displacement along one or more of its segments or branches. The CGS considers a fault to be well defined if its trace is clearly detectable as a physical feature at or just below the ground surface.[2] The site is developed with residential uses and while no new habitable

[1] *The Act was originally entitled the Alquist-Priolo Geologic Hazards Zone Act.*

[2] *California Department of Conservation, California Geological Survey, Special Publication 42, Fault-Rupture Hazard Zones in California, Alquist-Priolo Special Studies Zone Act of 1972 with Index to Special Studies Zones Maps, 2007.*

structures are proposed by the project, the "Earthquake Fault Zones" maps help identify areas in the site vicinity where potential surface fault rupture hazards may exist.

Seismic Hazards Mapping Act

In order to address the effects of strong ground shaking, liquefaction, landslides, and other ground failures due to seismic events, the State of California passed the Seismic Hazards Mapping Act of 1990 (Public Resources Code Section 2690-2699). Under the Seismic Hazards Mapping Act, the State Geologist is required to delineate "seismic hazard zones." Cities and counties must regulate certain development projects within these zones until the geologic and soil conditions are investigated and appropriate mitigation measures, if any, are incorporated into development plans. The State Mining and Geology Board provides additional regulations and policies to assist municipalities in preparing the Safety Element of their General Plan and encourages land use management policies and regulations to reduce and mitigate those hazards to protect public health and safety. Under Public Resources Code Section 2697, cities and counties shall require, prior to the approval of a project located in a seismic hazard zone, a geotechnical report defining and delineating any seismic hazard. Each city or county shall submit one copy of each geotechnical report, including mitigation measures, to the State Geologist within 30 days of its approval. Under Public Resources Code Section 2698, nothing is intended to prevent cities and counties from establishing policies and criteria which are stricter than those established by the Mining and Geology Board.

State publications supporting the requirements of the Seismic Hazards Mapping Act include the California Geological Survey SP 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*, and SP 118, *Recommended Criteria for Delineating Seismic Hazard Zones in California*. The objectives of SP 117 are to assist in the evaluation and mitigation of earthquake-related hazards for projects within designated zones of required investigations and to promote uniform and effective statewide implementation of the evaluation and mitigation elements of the Seismic Hazards Mapping Act. SP 118 implements the requirements of the Seismic Hazards Mapping Act in the production of Probabilistic Seismic Hazard Maps for the State.

The California Geological Survey (CGS) is responsible for geologic hazard characterization, public education, the development of partnerships aimed at reducing risk, and exceptions (based on science-based refinement of tsunami inundation zone delineation) to state mandated tsunami zone restrictions. In California, each earthquake is followed by revisions and improvements in the Building Codes. The 1933 Long Beach Earthquake resulted in the Field Act, affecting school construction. The 1971 Sylmar Earthquake brought another set of increased structural standards. Similar re-evaluations occurred after the 1989 Loma Prieta Earthquake and 1994 Northridge Earthquake. These code changes have resulted in stronger and more earthquake resistant structures statewide.

In addition to the CGS, the State's Seismic Safety Commission, the Applied Technology Council, California Emergency Management Agency, United States Geological Survey, Cal Tech, the California Geological Survey as well as a number of universities and private foundations have undertaken a rigorous program to identify seismic hazards and risks including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake induced landslides. Seismic hazard maps have been published and are available for many communities in California through the CGS.

Regional Regulations

Los Angeles County Manual for Preparation of Geotechnical Reports

The Los Angeles County Department of Public Works (LACDPW) Manual for Preparation of Geotechnical Reports ("Manual") (July 1, 2013) presents the requirements for geotechnical work within the County. Geotechnical reports that are required for grading plans must be coordinated with the LACDPW. The purpose of the Manual is to provide geotechnical consultants with the information necessary to prepare adequate and acceptable reports consistent with the County Code. Geotechnical reports must include recommendations and conclusions based on soil data, records, geologic conditions, and analysis of geotechnical hazards in relation to site development or remediation.

It is the responsibility of the soils engineer to review the project and determine what items must be covered (e.g. slope stability, collapsible soils, liquefaction, pile design, construction constraints, mitigation of effects to offsite property, etcetera) in the preparation of a geotechnical report. The report must demonstrate that property and public welfare will be safeguarded in accordance with current County Codes and policies. Provisions of the County Building Code Section 110.2 requires that the building site will be free of geotechnical hazards, such as landslide, settlement, or slippage, and that the proposed work will not adversely affect offsite property. County Building Code Section 111 requires the report contain a finding to show compliance with County Building Code Section 110.2. The County Building Code Section 111 statement must clearly make a finding regarding the safety of the site against hazard from landslide, settlement or slippage and a finding regarding the effect that the proposed work will have on the geotechnical stability of the area outside of the proposed work. The finding must be substantiated by appropriate data and analyses.

The County Building Code Section 111 statement is mandatory for all geotechnical reports except for reports prepared for tentative subdivisions and environmental impact reports. Although the 111 Statement is optional for these specific types of reports, there must be sufficient supporting information that demonstrates to the satisfaction of the Building Official or Public Works Land Development Division Subdivision Mapping Section (Subdivision Mapping Section) that the sites will be developable and that the required Building Code Section 111 Statement can be provided at a later stage of development.

Section 3.3.1.2 of the Manual specifically applies to geotechnical reports prepared for EIR's. According to this section, if a proposed development is identified to have potentially significant impacts and an EIR is required, impacts due to soils or geology issues must be addressed in an appropriate report (engineering geology, soils engineering, or geotechnical report). The report must be prepared to address all geotechnical issues that may affect the proposed development and its surroundings, including those identified in the Initial Study. The soils report must have sufficient data and analyses to support the recommendations provided by the soils engineer.

The findings in soils engineering and geotechnical reports submitted to the LACDPW must be based on the boring logs, trenches, pits, cone penetration test soundings (CPTs) and other subsurface explorations utilized to characterize the soil data, soil properties, and subsurface conditions. Descriptions of the subsurface conditions should be clear and consistent with the subsurface exploration and soil data collected. The logs of all subsurface explorations and subsurface data should be included within or appended to the report.

Los Angeles County Grading Guidelines

The Los Angeles County Grading Guidelines ("Guidelines") (January 1, 2008) provide information for the preparation and processing of grading permit applications. Portions of the grading code that are commonly encountered during the planning, permitting, and construction of grading work are presented therein in order to reduce unnecessary plan review time and construction delays. Also provided are referrals to other governmental agencies that may have an influence on the design and approval of a project. The information presented in the Guidelines does not presume to cover all the possible Code and ordinance requirements. The prospective owner and contractor may find it necessary to confer directly with the staff of Building and Safety Division or Land Development Division, of the LACDPW, for a specific project.

Los Angeles County Building Code

The Los Angeles County Building Code (LACBC) (Code of Ordinances Title 26), Appendix J, which is incorporated by reference in the City of Carson Municipal Code, sets forth regulations specific to grading. Section J101.5, Protection of Utilities, requires protection of utilities and Section J101.6, Protection of Adjacent Property, requires protection of adjacent property during excavation. Under this provision, no person shall excavate on land sufficiently close to the property line to endanger any public or private property without taking measures to support such property from settling, cracking, or other damage. Section J101.7, Storm Water Control Measures, requires that all precautionary measures necessary to protect adjacent water courses and public or private property from damage by erosion, flooding, and deposition of mud, debris, and construction-related pollutants originating from the site during grading and related construction activities shall be put into effect and maintained.

Under Section J103.1, Permits Required, no grading shall be performed without a permit from the Building Official. A separate permit shall be obtained for each site and may cover both excavations and fills and may cover both excavations and fills. Regular grading less than 5,000 cubic yards (CY) may require a licensed contractor if the Building Official determines that special conditions or hazards exist. Under Section J103.2, Exemptions, a grading permit is not required for excavations that do not exceed 2 feet in depth or 50 CY. Section J104.1, Submittal Requirements, requires that the grading plan show existing and finished grades, limits and depths of cut and fill, location of any buildings or structures within 15 feet of the proposed grading, contours, flow areas, and storm water provisions.

.Section J104.2.1 requires that grading in excess of 5,000 cubic yards (CY) shall be designated as "engineered grading." All engineered grading shall be performed in accordance with an approved grading plan and specifications prepared by a civil engineer, unless otherwise required by the Building Official. Section J104.1, Submittal Requirements, requires that the grading plan show existing and finished grades, limits and depths of cut and fill, location of any buildings or structures within 15 feet of the proposed grading, contours, flow areas, and storm water provisions.

Under Section J104.4, Liquefaction Study, a liquefaction study is not required where the Building Official determines from established local data that the liquefaction potential is low.

Sections J105.3, Field Engineer Inspection, and J105.4, Soils Engineer Inspection, require that the field engineer or soils engineer, respectively, provide on-site inspection of those parts of the grading within the engineer's area of technical specialty, which include setting of stakes, observation during grading, testing for

required compaction and safety of structures due to any slippage or settlement of the completed grading, and ensure that conditions in approved engineering reports are implemented. Under Section J106.1, Maximum Cut Slope, the slope of cut surfaces shall be no steeper than safe for the intended use, and shall be no steeper than 2 units horizontal to 1 unit vertical (50 percent) unless the applicant furnishes a soils engineering report justifying a steeper report. The report must contain a statement by the soils engineer that the site was investigated and an opinion that a steeper slope will be stable and will not cause a hazard to public or private property, in conformance with the requirements of Section J111. Exceptions include a cut surface of 67 percent provided it is not intended to support structures, it is adequately protected against erosion, it is no more than 8 feet in height, and it is approved by the Building Official.

Section J107.4, Fill Material, provides standards for fill material and requires that fill shall not contain organic, frozen, or other deleterious materials. Section 107.5, Compaction, requires that all fill materials must be compacted to a maximum of 90 percent maximum density as determined by American Society for Testing and Materials (ASTM) D-1557, Modified Proctor, unless a lower relative compaction (not less than 90 percent of maximum dry density) is justified by the soils engineer and approved by the Building Official. Where ASTM D-1557, Modified Proctor, is not applicable, a test acceptable to the Building Official shall be used. Not less than 10 percent of the required density tests, uniformly distributed, shall be obtained by the Sand Code Method.

Section J108.1, Setbacks, requires that cut and fill slopes be set back from the property lines , a minimum of 2 feet and maximum of 20 feet unless substantiating data is submitted justifying reduced setbacks and if recommended in a soils engineering report approved by the Building Official. Under Section J108.4, Alternate Setbacks, the Building Official may approve alternate setbacks if it is determined that no hazard to life or property will be created or increased.

Under Section J111, National Pollution Discharge Elimination System (NPDES) Compliance, plans for all best management practices (BMPs) shall be provided and BMPs shall be installed before grading begins. As grading progresses, all best management practices shall be updated as necessary to prevent erosion and to control construction related pollutants from discharging from the site. Section J111.2, Storm Water Pollution Prevention Plan (SWPPP), if required, this plan details best management practices, including temporary drainage or control measures, or both, as necessary to control construction-related pollutants. Section J111.3, Wet Weather Erosion Control Plans (WWECP) is required if grading is not completed prior to November 1. The WWECP shall include specific best management practices to minimize the transport of sediment and protect public and private property from the effects of erosion, flooding, or the deposition of mud, debris or construction-related pollutants.

Section 1805.3.2, Footing Setback from Descending Slope Surface, requires that footings on or adjacent to slope surfaces shall be founded in firm materials with an embedment or setback from the slope surface sufficient to provide vertical and lateral support for the footing without detrimental settlement. Footing shall be places into firm natural material and located a minimum of 5 feet from the slope surface. Section 1805.3.5, Alternate Setback and Clearance, allows the Building Official to approve alternate setbacks and clearances if safety consistent with the Code is demonstrated by a soils engineer. Such investigation shall include the type of material, height of slope, slope-gradient, load intensity, and erosion characteristics of the slope materials. Where adverse geological, soil, and drainage conditions exist, the Building Official may require increases in setbacks and clearances.

Local Regulations

City of Carson Natural Hazards Mitigation Plan

The City of Carson Natural Hazards Mitigation Plan (adopted July 5, 2012) includes resources and information to assist City residents, public and private sector organizations, and others interested in participating in planning for natural, man-made, and technological hazards. The Mitigation Plan provides a list of activities that may assist the City of Carson in reducing risk and preventing loss from future hazard events.

The action items address multi-hazard issues, as well as activities for Earthquake, Flood, and Windstorm. The mission of the City of Carson Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the City in creating a more sustainable community. Policies applicable to geologic hazards include EQ-1 and EQ-12, which are to integrate mapping of existing and new earthquake hazards to and improve technical analysis of earthquake hazards.

Implementation through existing programs: The City of Carson addresses statewide planning goals and legislative requirements through its General Plan, Capital Improvement Plans, and City Building and Safety Codes. The Natural Hazards Mitigation Plan provides a series of recommendations, many of which are closely related to the goals and objectives of existing planning programs. The City of Carson will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

Some of the goals and action items in the Mitigation Plan may be achieved through activities recommended in the City's Capital Improvement Program (CIP). Various city departments develop the CIP and review it on an annual basis. Upon annual review of the CIP, the Public Safety Commission will work with the city departments to identify areas that the Mitigation Plan action items are consistent with CIP goals and integrate them where appropriate.

City of Carson General Plan Safety Element

City of Carson General Plan Safety Element (adopted October 11, 2004) evaluates natural and man-made hazards that have the potential to endanger the welfare and safety of the general public and aims to reduce the potential risk of death, injuries, property damage and the economic and social dislocation resulting from them. The potential threat from natural and man-made hazards can pose significant danger to a community. The Safety Element identifies flooding, seismic activity, geology, soils and wind as natural hazards for the City. Man-made hazards involve hazardous materials, transportation, oil production facilities, civil unrest, national security emergencies and terrorism. The concerns identified in the Safety Element are subsequently incorporated into goals, policies and implementation actions to reduce the impacts of hazards. The Safety Element addresses the existing conditions of these hazards and programs currently in place to address them (Safety Element, page 4).

Goal SAF-1: Minimize the risk of injury, loss of life, and property damage caused by earthquake hazards.

- Policy SAF-1.1 Continue to require all new development to comply with the most recent City Building Code seismic design standards.
- Policy SAF-1.2 Work with the City's Public Information Office and Public Safety Division to:
  - Educate residents in earthquake safety at home,
  - Educate the public in self-sufficiency practices necessary after a major earthquake (e.g., alternative water sources, food storage, first aid, family disaster plans, and the like), and
  - Identify locations where information is available to the public for planning self-sufficiency.
- Policy SAF-1.3 Examine the potential to create a commercial loan program to subsidize the cost of retro-fitting buildings to meet seismic safety regulations. To this end, pursue all sources of state and federal funding in order to retro-fit buildings to meet seismic requirements.

Implementation Measure SAF-IM-1.1: Apply City Building Code consistently to all development. *(Implements SAF-1.1)*

City of Carson Municipal Code

The City of Carson Municipal Code (CMC) primarily incorporates by reference the building requirements of the Los Angeles County Code (Title 26, Appendix J) regarding grading, soils, and geologic issues. However, additions to Title 26, Appendix J under the Municipal Code are also applicable to grading operations. These include Division 6, Project Grading, Sections 9166.1 and 9166.2. Under these code sections, a project requiring the removal of more than 10,000 CY of soil and if more than 20 occupied dwelling units are located within a parallel corridor 300 feet wide on each side from the edge of a transport route, grading shall not be permitted unless either of the following is provided:

A. A Conditional Use Permit is obtained, or

B. A plot plan is submitted to the director, who shall approve the plan upon finding that the proposed project grading will comply with the requirements of this Division.

Section 9166.2 sets forth specific conditions for grading, including the following:

A. A grading permit, when required, shall first be obtained as provided in the Building Code before the commencement of any project grading.

B. The application to the Director or for a Conditional Use Permit, as the case may be, shall contain statements setting forth the following information:

1. The names and addresses of all persons owning all or any part of the property from which such material is proposed to be removed and to which such material is proposed to be transported.

2. The names and addresses of the person or persons who will be conducting the operations proposed.

3. The proposed ultimate use of the lot.

4. Such other information as the Director finds necessary in order to determine whether the application should be granted.

5. In the case of an application for a Conditional Use Permit, the information required pursuant to CMC 9172.21(A) and 9173.1.

C. The applicant shall submit a map showing in sufficient detail the location of the site from which such material is proposed to be removed, the proposed route over streets, and the location to which such material is to be imported.

D. All hauling as approved under this Section shall be restricted to a route approved by the Director of Public Works.

E. Compliance shall be made with all applicable requirements of the City and other governmental agencies.

F. If any condition of this Section is violated, or if any law, statute or ordinance is violated, the privileges granted herein shall lapse and such approval shall be suspended.

G. Neither the provisions of this Section nor the granting of any permit provided for in this Division authorizes or legalizes the maintenance of a public or private nuisance.

Existing Conditions

Regional Geological Setting

The City of Carson is situated in the northern part of the physiographic basin known as the Los Angeles Basin, or the Coastal Plain of Los Angeles and is located within the northerly end of the Peninsular Ranges geomorphic province. The Peninsular Ranges province extends from the Los Angeles Basin south of the Santa Monica Mountains to the tip of Baja California.

Geologically, the Basin consists of a very thick sequence of unconsolidated marine and continental sediments overlying consolidated sedimentary rocks that range in age from a few thousand years to tens of million years. Geologic units of the northern Peninsula Ranges province consist of Jurassic and Cretaceous age basement rocks overlain by as much as 32,000 feet of marine and non-marine sedimentary strata ranging in age from the late Cretaceous to Holocene epochs. The north, west, and southern portions of Carson is underlain by stream Quaternary Non-marine Terrace Deposits (Qt). The central and southeastern portion of the City of Carson is directly underlain by Holocene age alluvial (Qal) deposits of the Downey Plain and Dominguez Gap. The alluvial deposits are composed of poorly consolidated sand, silt, clay, and gravel.

This geomorphic province is characterized by elongated northwest trending mountain ranges separated by straight-sided sediment floored valleys. The most prominent landforms features within the City are the Dominguez Hills, which represents the central portion of the Newport-Inglewood fault zone (or uplift), and the Dominguez Gap, which characterize the area's northwest-trending faults and folds. The latter include the Newport-Inglewood fault zone, the Paramount syncline, the Dominguez anticline, the Gardena syncline, the Wilmington anticline, and the Wilmington syncline.

Earthquake Fault Zones

Several major faults that could affect the greater Los Angeles region and the Carson area are identified in the City of Carson General Plan Safety Element and Natural Hazards Mitigation Plan. Fault zones in the region are illustrated in **Figure 5.2-1,** *Southern California Earthquake Faults.* These include the following fault zones that are identified in the Safety Element and Natural Hazards Mitigation Plan as having the greatest potential effect on the City of Carson:

- Avalon-Compton/ Newport Inglewood Fault Zone
- San Andreas Fault Zone
- Palos Verdes Fault Zone
- Whittier Fault Zone
- Santa Monica Fault Zone

The Avalon-Compton Fault Zone, which is part of the Newport-Inglewood Fault Zone, is the only active fault in the City of Carson. The Avalon-Compton fault is located immediately east of Avalon Boulevard and north of the Artesia Freeway (SR-91), approximately five miles to the north of the site. Historically, the Avalon-Compton fault and regional shear zone has moderate to high seismic activity with numerous earthquakes greater than Richter magnitude four. The Newport-Inglewood fault extends from the southern edge of the Santa Monica Mountains southeastward to an area offshore of Newport Beach. This zone commonly referred to as the Newport-Inglewood uplift zone, can be traced at the surface by following a line of geomorphically young anticlinal hills and mesas. These hills and mesas include the Baldwin Hills, Dominguez Hills, Signal Hill, Huntington Beach Mesa and Newport Mesa.

Earthquake focal mechanisms (seismic locaters) for 39 small earthquakes (1977 to 1985) show faulting along the north segment (north of Dominguez Hills) and along the south segment (south of Dominguez Hills to Newport Beach). The 1933 Long Beach earthquake has been attributed to movement on the Newport-Inglewood fault zone. Based on historic earthquakes, the fault zone is considered active. The Newport-Inglewood fault zone (outside of the Avalon-Compton Fault Zone) is considered capable of generating a maximum credible earthquake of a magnitude 7.0 on the Richter Scale.

The San Andreas Fault Zone is California's most prominent structural feature, trending in a general northwest direction for almost the entire length of the state. The southern segment is approximately 280 miles long. It extends from the Mexican border into the transverse ranges west of Tejon Pass. Along this segment, there is no single traceable fault line; rather, the fault is composed of several branches. The fault is considered capable of generating a maximum credible earthquake of magnitude 8.25 on the Richter Scale.

The Palos Verdes Fault Zone is located southwest of the City of Carson and is traceable in the subsurface along the northern front of the Palos Verdes Hills. Offshore data, consisting of acoustic and reflection profiles, suggests very recent movement along the Palos Verdes Fault.

The Whittier Fault Zone (Elysian Park Structure) is the source of the 1987 Whittier Narrows earthquake (Richter magnitude 5.9). The earthquake has been attributed to subsurface thrust faults (a low angle reverse fault) that are reflected at the earth's surface by a west-northwest trending anticline known as the Elysian Park Anticline, or the Elysian Park structure. The subsurface faults that create the structure are not exposed at the surface, and do not present a potential surface rupture hazard. However, as demonstrated by the 1987 earthquake and two smaller earthquakes on June 12, 1989, the faults are a source of future seismic activity. As such, the structure should be considered an active feature capable of generating future earthquakes.

The Santa Monica Fault Zone is an east-west trending left reverse fault that extends approximately 24 kilometers within the immediate vicinity of Pacific Palisades, Westwood, Beverly Hills and Santa Monica. Annual slip rate is estimated between 0.27 mm and 0.39 mm per year along the fault. The fault is considered capable of generating an earthquake between a 6.0 to 7.0 on the Richter scale.

The Uniform California Earthquake Rupture Forecast (UCERF) published in 2007 estimated that California has a 99.7 percent chance of having a magnitude 6.7 or larger earthquake during the next 30 years.[3] The likelihood of an even more powerful quake of magnitude 7.5 or greater in the next 30 years is 46 percent. Based on the UCERF, the probability of a magnitude 6.7 or larger earthquake over the next 30 years striking the greater Los Angeles area is 67 percent. For the entire California region, the fault with the highest probability of generating at least one magnitude 6.7 quake or larger is the southern San Andreas Fault.

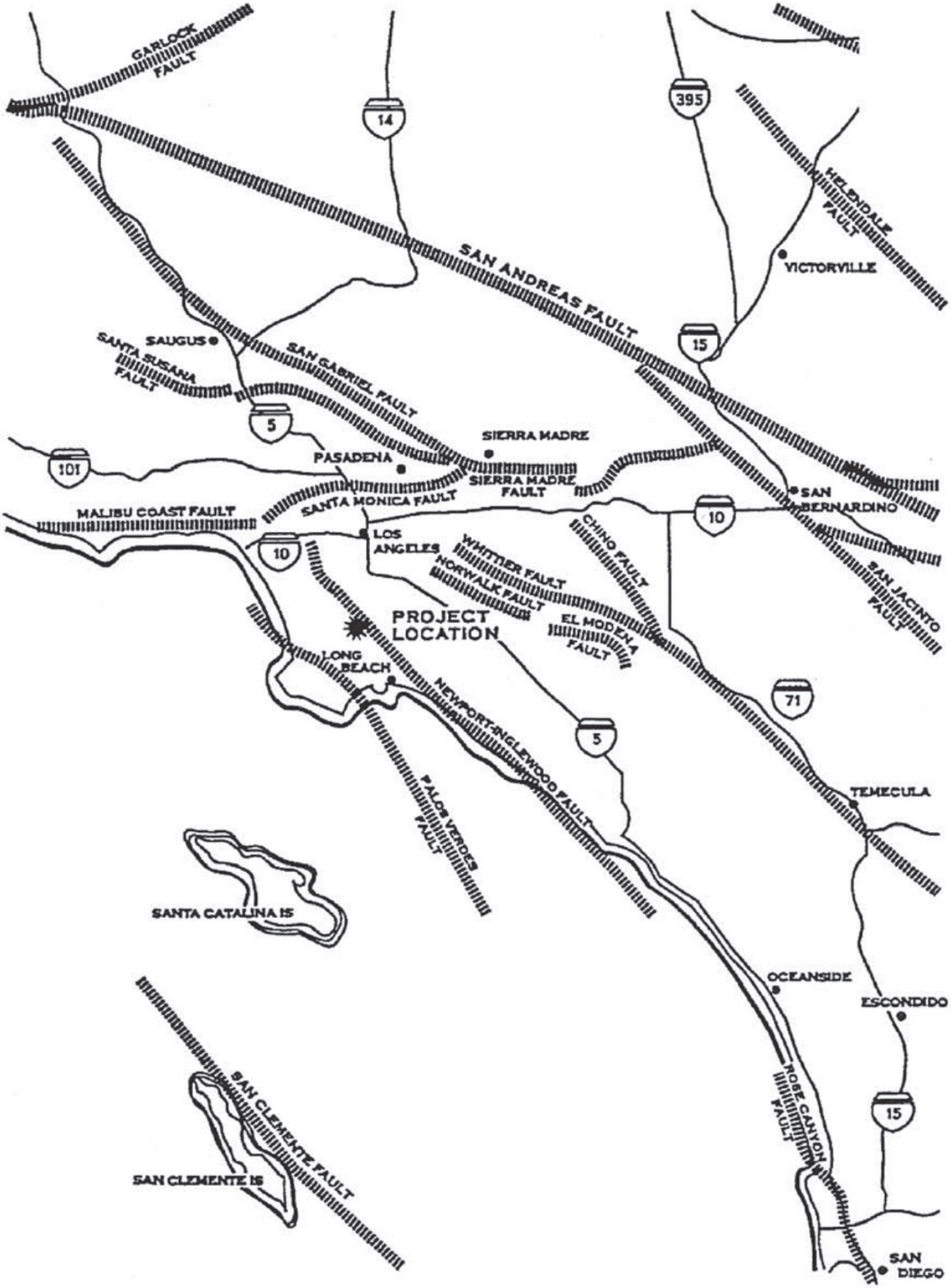
Secondary Seismic Hazards

Ground shaking, landslides, liquefaction, and amplification are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake. Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake and the primary cause of earthquake damage. Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

Earthquake-induced landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond and recover from an earthquake. Many communities in Southern California have a high likelihood of encountering such risks, especially in areas with steep slopes.

Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures. Basic conditions necessary for liquefaction are soil conditions conducive to liquefaction, saturation of these materials by water, and a source of shaking. The Newport-Inglewood fault zone is a potential source of

[3] *United States Geological Survey, Uniform California Earthquake Rupture Forecast (UCERF) II, 2007.*



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Southern California Earthquake Faults

Former Kast Property Tank Farm Site Remediation Project

Source: General Plan Safety Element, SAF-3, 2002.

FIGURE

5.2-1

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ground stress, and liquefaction could occur in the City of Carson if the groundwater table were high enough during an earthquake. Due to existing conditions in the City, particularly in the alluvial and former slough areas, there is the possibility that liquefaction could impact buildings and other structures in the event of an earthquake. **Figure 5.2-2,** *Liquefaction Areas - City of Carson,* shows the areas in the City which have shown historical occurrence of liquefaction, or areas in which local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements. Liquefaction can result in the shifting of foundations, settling of roadways and rupture of underground pipelines and cables. Buildings and other objects on the ground surface can settle, tilt and collapse as the foundations beneath them lose support, and lightweight buried structures may float to the surface. A significant portion of the City has been designated as potential liquefaction area and geotechnical investigation reports are required as part of the environmental and building permit processes for most development within these areas.

Ground cracking, ground lurching and lateral spreading are secondary features resulting from strong to moderately strong ground shaking and may be associated with liquefaction. Ground cracking usually occurs in near-surface materials, reflecting differential compaction or liquefaction of underlying materials. The potential for ground cracking exists especially in those areas of the City that have a moderate to high potential for liquefaction. Ground lurching results when soft, water-saturated surface soils are thrown into undulatory motion. Lateral spreading (a form of landsliding) is referred to as limited displacement ground failure, often associated with liquefaction. Compact surface materials may slide on a liquefied or low shear strength layer at a shallow depth, moving laterally several feet down slopes of less than two degrees. Such a condition may be present where conditions conductive to shallow liquefaction exist. Because liquefaction has a low potential of occurrence at the project site, these conditions are not anticipated.

Amplification can occur when soils and soft sedimentary rocks near the earth's surface modify ground shaking caused by earthquakes. Amplification increases the magnitude of the seismic waves generated by the earthquake. The amount of amplification is influenced by the thickness of geologic materials and their physical properties. Buildings and structures built on soft and unconsolidated soils can face greater risk. Amplification can also occur in areas with deep sediment filled basins and on ridge tops.

The historic withdrawal of oil has been known to cause subsidence in portions of the Wilmington oil field, which is located within the City of Carson. Subsidence extended along the Newport-Inglewood structural zone between Signal Hill and the Port of San Pedro on the south and Redondo Beach on the north. Total subsidence reached a maximum of 29 feet over the crest of the Wilmington anticline, where most of the oil had been withdrawn. There is no documented ground subsidence associated with the Dominguez oil field, also located in the City. By the early 1980s, water injection halted subsidence at the oil fields and, subsequently, no further subsidence has been documented.

Soil Characteristics

Other geologic hazards that have the potential to occur in and around the City of Carson include differential settlement, subsidence, and shrink/swell potential. Differential settlement occurs in loose, cohesionless sediments where differences in densities in adjacent materials lead to different degrees of compaction during ground shaking. In the case of saturated cohesionless sediments, post-earthquake settlement may occur when excess pore-water pressures generated by the earthquake dissipate. Given the lateral and vertical variation of the alluvial soils underlying Carson, differential settlement could occur as a result of an earthquake in areas thought to have a low susceptibility to settlement. According to the EIR prepared for the

City of Carson General Plan, the unstable sub-base of sandy soil in the alluvial deposits underlying the central and southeastern portions of the City, and Quaternary non-marine terrace deposits underlying the northern, western and southern portions of the City, Carson (as well as the entire South Bay area) is regarded as one of the most severe shock areas in the Los Angeles area.[4] The significance of the hazard at any particular site would be determined by soils investigations. Differential compaction resulting from earthquake ground shaking is potentially damaging to structures and buried utilities and services.[5]

The shrink/swell characteristics of soils in the City of Carson are another geotechnical constraint. Soils with a high clay content typically have high shrink/swell characteristics. Shrinking and swelling of soil can cause overlying concrete to crack and settle. In addition, soils with high percentages of sand have a moderate to high potential for erosion. **Table 5.2-1**, *General Physical Characteristics of Soils in the Carson Area*, describes the various soils types within the Carson area.

Table 5.2-1

General Physical Characteristics of Soils in the Carson Area

Soil Association	Soil Type	Depth	Slope	Erosion Potential	Shrink-Swell Potential
Oceano	Sand	60 inches	2-5 percent	Mod-High	Low
Netz-Cortina	Fine sand and fine sandy loam	60 inches	0-5 percent	Lo-Mod	Low
Hanford	Sandy loam	60 inches	2-5 percent	Low	Low
Yolo	Silty loam	60 inches	0 percent	Low-Mod	Mod
Chino (in inclusions of the Forster and Grangeville Associations)	Clay loam	60 inches	0 percent	Low	Mod
Ramona-Placenta	Sandy loam	18-60 inches	2-5 percent	Low-Mod	High

Source: City of Caron General Plan Safety Element, Table SAF-1.

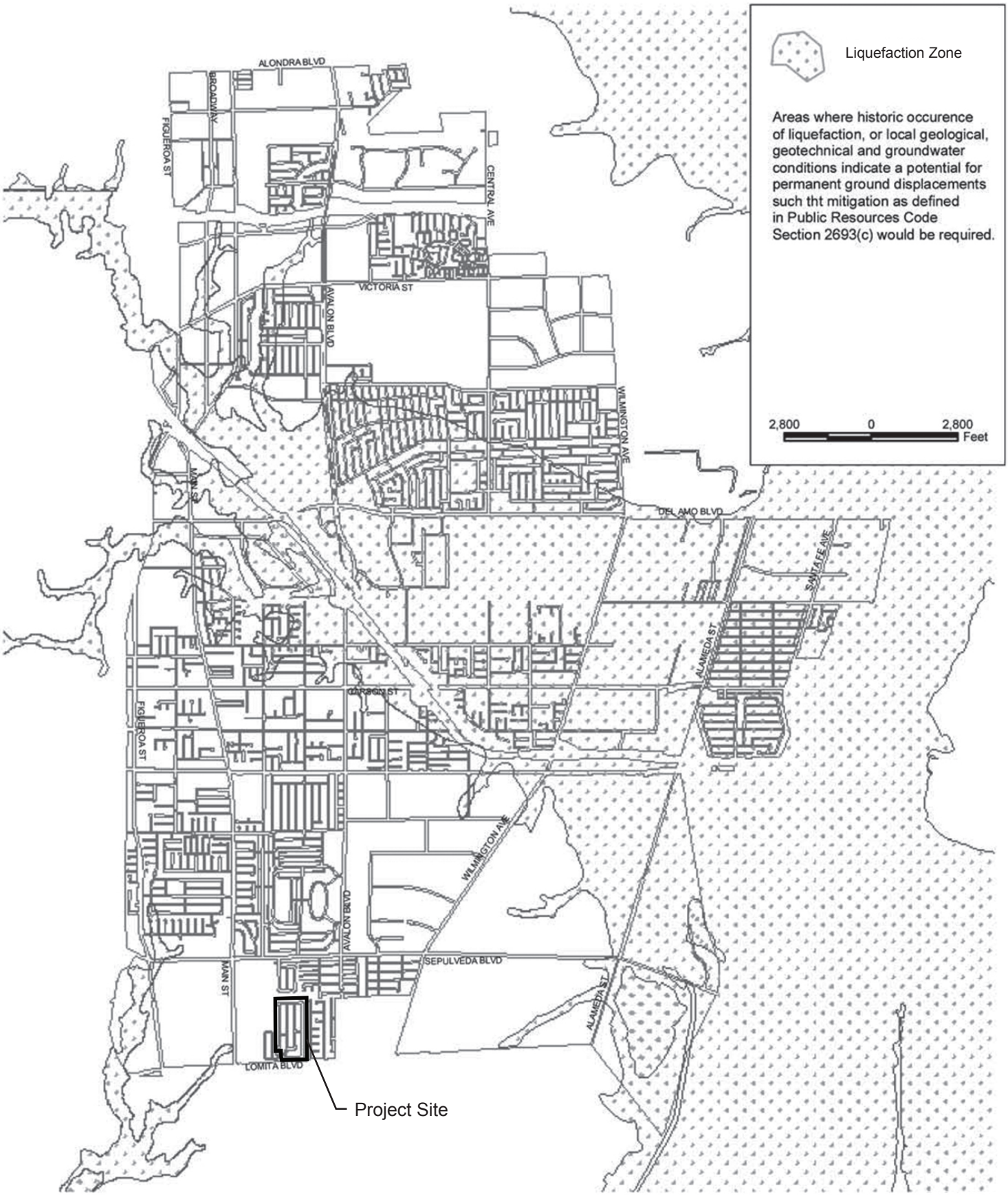
On-Site Geologic Setting

Historical Setting

Based on historical records, the former Kast Tank Farm that occupied the site consisted of three crude oil reservoirs. Oil was pumped into the reservoirs and withdrawn from the reservoirs via pipelines that ran north-south along the western site property line and east-west along what is now Lomita Boulevard.

[4] *City of Carson General Plan Environmental Impact Report, Chapter 4.6, Geologic and Seismic Hazards, October 30, 2002, page 4.6-6.*

[5] *Ibid.*



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Liquefaction Areas - City of Carson

Former Kast Property Tank Farm Site Remediation Project

Source: General Plan Safety Element, SAF-3, 2002.

FIGURE

5.2-2

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Pipelines are believed to have entered the property from Lomita Boulevard near what is now Neptune Avenue in a northward direction and ran to the pump house.

The reservoirs had reinforced concrete-lined floors with reinforced concrete-lined earthen berms forming sloped side walls and wood frame roofs supported by wooden posts and/or concrete pedestals. The concrete floors of the reservoirs were approximately 7 to 10 feet below current site grade, and the surrounding earthen walls were described as "generally about fifteen feet in height."[6] The reservoirs had depths of approximately 20 to 25 feet from the top of the berms. The sloped side walls of the reservoir berms were approximately 1.5:1 horizontal to vertical. The bottom and sides of the reservoirs were reportedly lined with a 4 to 5-inch thick reinforced concrete slab and there were also 1- to 15-foot high containment berms surrounding the property.

The concrete bases of the reservoirs were either partially removed from the site or abandoned in place. Following the removal of residual fluids from the reservoirs, trenches were cut into the concrete reservoir bases so that the reservoirs would not pond water and adversely affect drainage/infiltration for the subsequent residential lots. According to soils reports,[7][8] trenches approximately 8 inches wide were cut or punched into the concrete reservoir bases in concentric rings radiating from the center at 15-foot intervals. According to the geotechnical report for the southeastern reservoir (Reservoir No. 6), "nearly 6,000 lineal feet of trench were punched through the concrete floor using a truck mounted rig."[9] Concrete from the trenches was reportedly removed to promote infiltration and mitigate ponding of water. However, other documentation exists that indicate trenches in the reservoir bases were ripped in parallel lines rather than concentric rings.[10] The concrete from the reservoir side walls was reportedly mixed with soil before being placed in a single layer within the lower 1 foot of fill upon the base of the reservoirs where it was watered and compacted in place.[11] As discussed in the 1966 geotechnical report prepared for Lomita Development by Pacific Soils Engineering, the Los Angeles County Building and Safety Code required a minimum of 7 feet of fill soil to be placed over the concrete. The report recommended that "no concrete shall be placed within 7 feet of finished grade."[12]

The Pacific Soils Engineering geotechnical report for Reservoir No. 5 indicates that the westernmost portion of the concrete reservoir base in Tract 24836 along Marbella Avenue was entirely removed from the Site during demolition. Because the eastern edge of Tract 24836 is along the back property line of properties on the east side of Marbella Avenue, the concrete reservoir base for Reservoir No. 5 would have been removed from beneath lots on the east side of Marbella Avenue but not beneath properties on the eastern half of the

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6 *Pacific Soils Engineering, Inc, 1966, quoted in URS Corporation, Assessment of Environmental Impact and Feasibility of Removal of Residual Concrete Reservoir Slab, Former Kast Property, Carson, CA, June 28, 2013, page 2-1.*

7 *Ibid.*

8 *Pacific Soils Engineering, Inc, July 31,1967. Re: Tract No. 28441, Lots 7-10 inclusive in the County of Los Angeles, California*

9 *URS Corporation, Assessment of Environmental Impact and Feasibility of Removal of Residual Concrete Reservoir Slab, Former Kast Property, Carson, CA, June 28, 2013, page 2-4.*

10 *Ibid.*

11 *Ibid.*

12 *Ibid.*

block that front on Neptune Avenue. Trenches were cut in the remaining portion of the concrete base of Reservoir No. 5, similar to the other reservoirs.[13]

Testimony received from a prior project engineer indicated "there was enough soil in the berms to cover all of the reservoirs and bring the Property surface up to street level without importing any soil. Therefore, no soil was brought on to the property to cover the three reservoirs."[14]

Existing Geologic Setting

Geophysical and Soils Conditions

The Avalon-Compton Fault Zone, which is part of the Newport-Inglewood Fault Zone, is located approximately 5 miles to the north of the project site, is the only active fault in the City of Carson and the nearest fault zone to the project site. As illustrated in Figure 5.2-2, the areas designated as having high liquefaction potential in the City are located to the east of the site, to the east of Wilmington Avenue and to the west of the site to the west of Main Street and do not underlie the project site.

The current site ground surface elevation ranges from approximately 44.5 feet above mean sea level (amsl) at the intersection of Panama Avenue and 249th Street in the southeast corner of the Carousel Tract to 32.5 feet amsl near the intersection of Marbella Avenue and 244th Street near the northwest corner of the tract. The site was graded to slope to the northwest to promote drainage during rough grading after demolition of the reservoirs.

Based on site investigations, the upper 10 feet of soil beneath the site is dominantly fine grained and consists of silt with layers or lenses of silty fine sand. Soils between 10 and 15 feet bgs consist primarily of silt and silty fine sand. From 15 to 85 feet bgs site soils consist of fine sands to silty fine sand. Soils encountered between 85 and approximately 180 feet bgs consist of silt, silty sand, and fine to medium sand. The shallowest groundwater encountered beneath the site occurs within the Bellflower aquitard, an overall fine-grained unit that locally has sandy intervals. First groundwater occurs at a depth of approximately 53 feet beneath the site, with a groundwater flow direction to the northeast.

Field investigation and borings performed on the site in the 1960s determined that the site is underlain by relatively uniform soils. All soils were found to be in a dense state and suitable to receive fill. Generally, the first 3 feet of soils tended to be silty and clayey sands. Underlying soils ranged from fine to medium sands.[15] The geotechnical report determined that surface soils in all borings except Borings 1 and 2 were in a dense state and suitable for foundation purposes. The surface soils encountered in Borings 1 and 2 were lean sands in a soft, saturated state and the geotechnical report stated that "similar soils can be expected to exist in the northwest corner of the site due to the presence of an old watercourse as disclosed by aerial

[13] *Pacific Soils Engineering quoted in URS Corporation, Assessment of Environmental Impact and Feasibility of Removal of Residual Concrete Reservoir Slab, Former Kast Property, Carson, CA, June 28, 2013, page 2-4.*

[14] *Leroy H. Vollmer (Vollmer Engineering) signed Declaration September 9, 2011, quoted in URS Corporation, Assessment of Environmental Impact and Feasibility of Removal of Residual Concrete Reservoir Slab, Former Kast Property, Carson, CA, June 28, 2013, page 2-4.*

[15] *Pacific Soils Engineering, Inc, Work Order 6164, March 11, 1966, page 2.*

photographs taken prior to the construction of the reservoirs."[16] In their former state, these soils were unsuitable for foundation purposes. The geotechnical report required that soft, compressible materials, such as those encountered in Borings 1 and 2, be processed and compacted to a depth of four feet. According to the 1966 Pacific Soils geotechnical report, the resulting material would have a minimum relative capacity of 90 percent in accordance with the County Building Code[17]

Soils underlying the lean sands at a depth ranging from 10 to 15 feet were clean, dense to fine to medium sands. The moisture content decreased with depth and no groundwater was observed. The soils encountered on the tract were found to be non-expansive by both Los Angeles County and (Federal Housing Administration (FHA) criteria. A boring capacity of 1500 lbs/sq. ft. was recommended for structures founded in compacted fill or firm natural ground to a depth of one foot.[18]

Because no new soils were brought to the site when it was mass graded in 1966 (subsequent to the 1966 geotechnical report), it is likely that soils present in 1966 were spread over the property and are present in existing boring examples. According to 2009 borings, the upper 5 feet of soil encountered in the explorations was generally uniform, consisting of dark gray to dark grayish brown silt which was moist and generally included shell fragments. Much of the upper 5 feet of soil was observed to have hydrocarbon odor and staining. From 5 to 10 feet bgs, soils consisted primarily of silt, with occasional layers or lenses of silty fine sand. Hydrocarbon staining and odor were also generally observed at this depth interval. Based on a review of the boring logs and cone penetrometer test (CPT) logs, soils between 10 and 15 feet bgs consisted primarily of light olive to olive silts and silty fine sand. Lithology from 15 to 85 feet bgs consisted primarily of alternating fine sands to silty fine sand. The estimated percentage of fine soils varied from less than 5 percent to greater than 30 percent. Occasional silty deposits were encountered, approximately 1 to 8 feet thick. Groundwater was encountered between 53 and 64 feet bgs. Hydrocarbon staining and/or odor were noted in ten of the 20 locations drilled to depths beyond 15 feet bgs. The deepest staining observed was at approximately 65 feet bgs in the boring drilled for monitoring well MW-2.[19]

In the 2009 study, soil samples were recovered at approximately 3 feet, and every 2.5 to 5 feet thereafter with a Modified California split-spoon soil sampler. Bulk samples were taken from the upper 5 feet of each boring. Representative samples were placed in sealed containers and transported for testing. In boring logs for the 24612 Neptune Avenue site, Boring N24612G1, the subsurface soils consist of silty sand and very stiff sandy clay fill soils to a depth of 8.5 feet. Concrete slabs approximately 6-inches thick were encountered at depths of 7 and 8.5 feet bgs. A layer of very stiff lean clay was present between the slabs. The concrete slab at a depth of 8.5 feet was underlain by loose to very dense silty sand alluvium to a depth of approximately 17.5 feet. This layer is underlain by hard lean clay to approximately 22.5 feet. A layer of dense, silty sand is present from 22.5 feet to the maximum explored depth of 25.5 feet. In Boring N24612G2, the subsurface soils consist of medium dense clayey sand fills to a depth of 7.5 feet. A concrete slab approximately 6 inches thick was encountered at 7.5 feet. A layer of medium dense silty sands and poorly graded sand with silt (alluvium) was encountered below the concrete slab to a depth of 16 feet, underlain by hard lean clay to a depth of 22.5 feet. A layer of dense, silty sand is present from 22.5 feet to the maximum explored depth of

[16] *Pacific Soils Engineering, Inc, Work Order 6164, January 7, 1966, page 2.*

[17] *Pacific Soils Engineering, Inc, Work Order 6164, January 7, 1966, page 3.*

[18] *Pacific Soils Engineering, Inc, Work Order 6164, January 7, 1966, page 2.*

[19] *URS Corporation, Final Phase I Characterization Report, Former Kast Property, Carson, CA, October 15, 2009, page 4-1.*

25.5 feet. Groundwater was not encountered in any of the borings drilled to the maximum depth of 25.5 feet.[20]

Based on the review of environmental boring logs for the 24533 Ravenna Avenue site, the geotechnical report concluded that subsurface soils consist of sandy silt and silty sand to the explored depth of 10 feet. Groundwater was not encountered in the environmental borings drilled to the depth of 10 feet. Groundwater table monitoring from October through December 2011 at the site indicated that groundwater was at an elevation of 20 feet which corresponds to approximately 63 feet bgs.[21]

Subsurface Concrete Slabs

In order to locate concrete slabs buried on site, more than 2,400 soil borings were performed at 265 of the 285 properties in the Carousel Tract, with an average of approximately nine borings per property. The target completion depth for these borings is 10 feet bgs, which is the approximate upper end of the depth of burial range of the concrete reservoir slabs.

Figure 5.2-3, *Boring Refusal Map***,** outlines properties where "refusal"[22] was not encountered and shows refusal depths in increments for locations where borings were terminated due to an encountered object. Front and back yards are shown individually where refusal conditions differed between front and back yards. This figure shows a strong correspondence between boring refusal at depths ranging from 7.1 and 10 feet bgs and the outlines of the reservoir bases.[23]

Boring refusal at depths ranging from 0.1 to 5 feet (shaded green and yellow on Figure 5.2-3) is interpreted to be due to encountering rocks or other debris and not the reservoir base. Locations where refusal was encountered at depths ranging from 5.1 to 7 feet bgs are highlighted in orange on Figure 5.2-3, and locations where refusal occurred at depths of 7.1 to 10 feet bgs are shown in light blue. At a small number of locations, refusal was encountered at depths of greater than 10 feet bgs; these are shown in purple. At 133 of the 265 properties that have had residential soil sampling, borings were advanced to the target depth of 10 feet bgs and refusal was not encountered. This means that refusal was encountered at 132 properties in one or more borings at depths ranging from less than 1 foot to 12 feet bgs.[24]

In the area of northern Reservoir No. 7, refusal was encountered in borings at more than half of the properties located partially or completely within the inner ring interpreted to indicate the margins of the base of the reservoir. Refusal was more frequent in the western one-third of the reservoir and less frequent in the eastern one-third of the reservoir, consistent with site grade sloping to the northwest corner of the site and lower elevations in this area resulting in shallower depth of burial. At the majority of lots within the

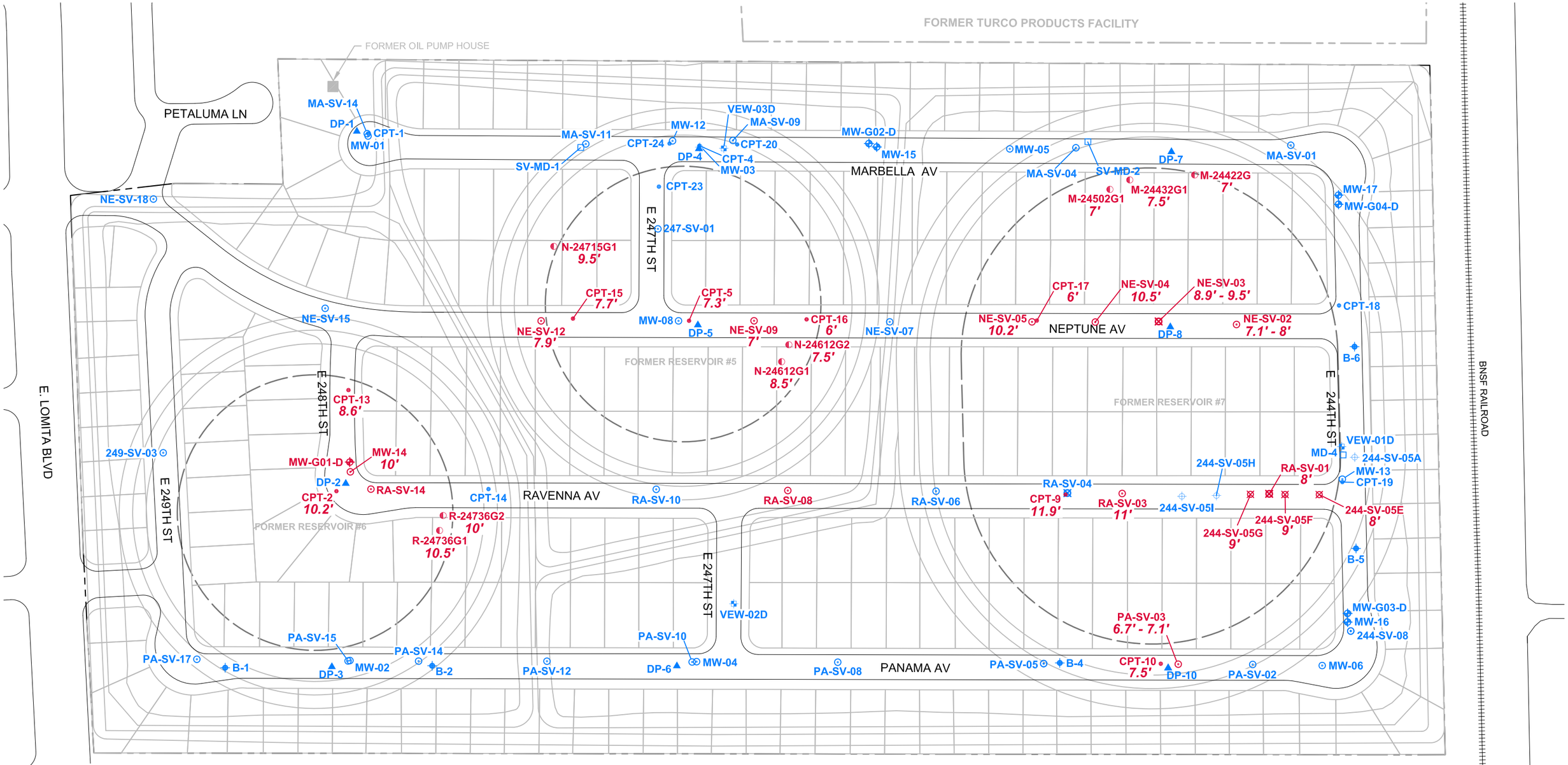
[20] *URS Corporation, Geotechnical Report, Planned Pilot Test for Remedial Excavation and Backfill Placement, 24612 Neptune Avenue, Carson, CA, March 29, 2012, page 4-1.*

[21] *URS Corporation, Geotechnical Report, Planned Pilot Test for Remedial Excavation and Backfill Placement, 24533 Ravenna Avenue, Carson, CA, April 13, 2012, page 2-1.*

[22] *"Refusal" is an obstruction of a boring, which may be caused by concrete slabs or other features, such as stones or other rubble.*

[23] *URS Corporation, Assessment of Environmental Impact and Feasibility of Removal of Residual Concrete Reservoir Slab, Former Kast Property, Carson, CA, June 28, 2013, page 2-5.*

[24] *URS Corporation, Assessment of Environmental Impact and Feasibility of Removal of Residual Concrete Reservoir Slab, Former Kast Property, Carson, CA, June 28, 2013, page 2-6.*



EXPLANATION

- LOCATION OF GROUNDWATER MONITORING WELL
- LOCATION OF CPT/UVOST SOUNDING
- LOCATION OF 10-FT BGS SOIL VAPOR PROBE
- LOCATION OF 15-FT AND 20-FT BGS SOIL VAPOR PROBE
- LOCATION OF DIRECT-PUSH BORING
- LOCATION OF MULTI-DEPTH SOIL VAPOR PROBE
- APPROXIMATE LOCATION OF PILOT TEST GEOTECHNICAL BORING
- LOCATION OF SVE EXTRACTION WELL
- ADVANCED TO ≥10' BGS WITHOUT REFUSAL NOTED ON BORING LOGS OR IN FIELD NOTES
- REFUSAL AT ≤10' BGS NOTED ON BORING LOGS OR IN FIELD NOTES WITH DEPTH OF REFUSAL NOTED
- APPROXIMATE PROPERTY LINE

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0 140 Feet

Boring Refusal Map

Former Kast Property Tank Farm Site Remediation Project

Source: URS Corporation, Assessment of Environmental Impact and Feasibility of Removal of Residual Concrete Reservoir Slabs, 2013.

FIGURE

5.2-3

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area of the footprint of the northern reservoir base, refusal was encountered at depths of 7.1 to 10 feet bgs. Refusals at the upper end of this depth range are interpreted to be due to the reservoir slab; refusals at shallower depths are potentially the result of encountering buried concrete rubble or concrete pedestals that were placed within the lower part of the fill section in this part of the site during grading by the developer.[25]

All of the properties investigated that are within the footprint of the base of Reservoir No. 5, the central reservoir, encountered refusal at depths of 10 feet or less. Refusal was encountered at properties along the eastern side of Marbella Avenue. At properties along Neptune Avenue, refusal was encountered at depths of 10 feet or less in all borings located within the footprint of the former reservoir based on historical drawings. Boring refusal was encountered less frequently in the area of southern Reservoir No. 6, and where refusal was encountered it occurred in a fraction of the borings at individual properties. This is not unexpected, as the site elevation is highest in this portion of the Tract due to rising topography to the northwest.[26]

The results of the site assessment suggest that concrete slabs are present within the soil profile. Due to the potential adverse effects of the impact of the remaining concrete slabs on waste migration where the concrete floors might still be present, the RAP proposes removal of some or all of the residual concrete slabs if encountered during the implementation of the remedial excavation.

3. METHODOLOGY AND THRESHOLDS

Methodology

The determination of impacts is based on the evaluation of the potential geologic hazards that are identified at the project site under existing condition and the evaluation of any hazards caused by proposed excavation or backfill activities. The determination of existing and potential hazards is based on background studies, including soils analyses, excavation pilot testing, and mapping of seismic or other geologic hazards in the area. These are compared to the activities needed to remove COC-containing soils around residential buildings to the extent feasible and the controls on excavation imposed under existing regulations. Seismic and other geologic hazards are identified according to the location of the site with respect to active earthquake faults, designated (state-mapped) liquefaction areas, and the effect of excavation on soils underlying building foundations that would remain in place.

Thresholds of Significance

Appendix G of the State CEQA Guidelines provides a set of screening questions that address impacts with regard to geology and soils. These questions are as follows:

Would the project:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

[25] *Ibid.*

[26] *Ibid.*

i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area based on other substantial evidence of a known fault;

ii. Strong seismic ground shaking;

iii. Seismic-related ground failure, including liquefaction; or

iv. Landslides?

b) Result in substantial soil erosion or the loss of topsoil?

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Be located on expansive soils, as defined by Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

d) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

As determined in the Initial Study, which is contained in Appendix A of this EIR, the RP's Proposed Remedy would not result in landslides. As the project is the implementation of the RAP in an urban residential area serviced by the municipal sewer system, the use of septic tanks is not applicable. As such, no further analysis of these topics is necessary.

For purposes of this analysis, the project would have a significant impact on geology and soils if it would:

GEO-1 Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death, involving:

- Strong seismic ground shaking, or
- Seismic-related ground failure, including liquefaction;

GEO-2 Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;

GEO-3 Result in substantial soil erosion or loss of topsoil; or

GEO-4 Be located on expansive soil creating substantial risks to life or property.

4. PROJECT ANALYSIS

Project Design Features

Project Design Features (PDFs) to be implemented as part of the RP's Proposed Remedy would include general provisions for grading and design measures that anticipate the preparation of a geotechnical report

and remedial excavation grading plans prior to the initiation of grading activities. The geotechnical report and remedial excavation grading plans would be subject to review and approval by the LACDPW, which represents the City of Carson. The proposed PDFs include, but are not limited to the following:

PDF GEO-1 Prior to issuance of a grading permit, a final geotechnical investigation and remedial excavation grading plan with final design recommendations applicable to every excavated area will be prepared by a California-registered geotechnical and civil engineer and submitted to the LACDPW and City of Carson for review. The geotechnical report will describe the characteristics of underlying natural or fill soils, including expansive soils, potential differential settlement and varying soils strength and the placement of backfill. The geotechnical report will contain recommendations for any needed cut slopes or compaction of fill materials. The remedial excavation grading plan will detail the excavation and backfill design details based on the findings and recommendations of the geotechnical report.

PDF GEO-2 The geotechnical report and remedial excavation grading plans will include site-specific design criteria related to the excavation activities in proximity to foundations and footings.

PDF GEO-3 Pre-excavation and post-excavation surveys of the existing structures and improvements at the site and at adjacent properties that have granted access will be conducted to document pre-excavation conditions and any changes in those conditions following excavation. Documentation will consist of written notes, digital photographs, and videos. Existing cracks or other distress present in structures or concrete will be documented and measured. Cracks will be monitored by direct measurement using a dial caliper capable of measuring distances to approximately ±0.001 inch, or using commercially available crack monitoring devices installed on the existing cracks, such that any potential change of crack size during implementation of the RAP can be monitored and documented.

PDF GEO-4 Full time observation should be provided by a licensed engineer during the excavation of the vertical slot cuts. Any conditions encountered within the field that are different than those anticipated (i.e. irrigation water seepage, localized loose soils, clean sand, etc.) will be brought to the immediate attention of the geotechnical engineer for corrective measures.

PDF GEO-5 Clean soil will be imported for backfill of excavations from an offsite source. Before importing the backfill soil to the site, samples of the proposed import soil will be submitted for laboratory geotechnical and chemical characterization analysis. Geotechnical tests include gradation, plasticity index (PI), maximum density and optimum moisture, and corrosivity tests. The geotechnical engineer will approve the backfill soil prior to its import, placement, and compaction at the site.

PDF GEO-6 Upon completion of excavation, concrete removal and environmental sampling (as appropriate), excavated areas will be backfilled as soon as possible. Backfill soils would be moisture conditioned to near optimal moisture content and compacted to at least 90 percent relative compaction, or as determined by the Geotechnical Engineer and approved by Los Angeles County Department of Public Works (LACDPW) and the City of Carson. Borings from auger excavation would be backfilled with controlled

low strength material (CLSM, also referred to as flowable fill or sand/cement slurry) the same day they are excavated. Where slot trenching is used for 5-foot excavations or for targeted deeper excavations to 10 feet, the lower part of the slot trenches would also be backfilled with CLSM. The upper 3 feet of excavations would be backfilled with certified clean imported soil. Backfill soil would be free of deleterious organic matter (i.e., vegetation) and cobbles larger than four inches in diameter, and would be approved by the Geotechnical Engineer. The upper foot of soil backfill would be topsoil suitable for vegetation growth and would be compacted to not more than 85 percent relative compaction.

PDF GEO-7 Landscaping of backfilled properties would be restored to "like conditions" or as agreed to with the homeowners.

Analysis of Project Impacts

Threshold GEO-1: The project would have a significant impact on geology and soils if it would expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death, involving strong seismic ground shaking or seismic-related ground failure, including liquefaction.

Short-term Impacts

Impact Statement GEO-1: *The project site is not located within a liquefaction-prone area and underlying soils are in a dense state or sufficiently compacted to reduce acceleration effects. Excavations would be setback from buildings and would not affect underlying geologic structures or soils beneath building foundations. Protective support would be provided for any encountered utility lines. Thus, the project would not increase the exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury or death, involving strong seismic ground shaking or seismic-related ground failure, including liquefaction. The impact of the RP's Proposed Remedy with respect to these geologic hazards would be less than significant. The Expedited Implementation Option, which would increase the intensity of activity on the site, would also result in a less than significant impact with respect to these geologic hazards.*

Fault Rupture

No known active or potentially active faults underlie the site, and the site is not located within a designated earthquake fault zone. Thus, the potential for surface ground rupture is considered low. Therefore, impacts regarding fault rupture would be less than significant, and no mitigation measures would be necessary.

Seismic Ground Shaking

The site is located within a seismically active region of Southern California. The most likely sources for ground motion are known faults (e.g., Newport-Inglewood Fault, Avalon Compton Fault), which are within a few miles of the site. Moderate to strong ground motion (acceleration) could be caused by an earthquake at these, or any of the local or regional faults. The level of ground shaking that would be experienced at the site from active, potentially active or blind thrust faults in the region would be a function of several factors including earthquake magnitude, type of faulting, rupture propagation path, distance from the epicenter, earthquake depth, duration of shaking, project site topography, and project site geology. The site is not located within a liquefaction area and, thus, accelerated ground shaking, differential settlement, ground

cracking, ground lurching and lateral spreading associated with liquefaction would not occur. In addition, the relative firmness and stability of on-site soils and distance to groundwater would not specifically amplify ground motion or settlement during a seismic event. Existing concrete slabs within the site are considered to be a dense material residing within the soil profile and do not cause instability or geologic hazards.

Project design features, including PDFs Geo-1 through Geo-3, which apply to the required geotechnical report, would ensure that final grading designs would incorporate adequate support of cuts (if needed), excavation methods, or setbacks from building foundations during excavation to avoid adverse effects of seismic ground shaking on adjacent buildings during the site remediation. With adequate structural protection during excavation, as determined by the geotechnical engineer, the project would not cause a seismic event to result in substantial damage to structures or cause or accelerate geologic hazards that would expose people to substantial risk of injury. Excavation activities would not affect soils and materials below 5 or 10 feet bgs or underlying geologic units. The implementation of required setbacks from habitable structures would avoid soils that support existing building foundations. It is anticipated that utility lines would be located within the excavation depth. Lines encountered would be protected in place or removed and replaced. [27] This would avoid additional stress during a ground-shaking event. In accordance with PDF-Geo-6, borings from auger excavation would be backfilled with CLSM the same day they are excavated. Where slot trenching is used for 5-foot excavations or for targeted deeper excavations to 10 feet, the lower part of the slot trenches would also be backfilled with CLSM. The upper 3 feet of excavations would be backfilled with certified clean imported soil. Backfill soil would be free of deleterious organic matter (i.e., vegetation) and cobbles larger than four inches in diameter, and would be approved by the Geotechnical Engineer. Backfill soils would be compacted to at least 90 percent relative compaction, or as determined by the Geotechnical Engineer and approved by Los Angeles County Department of Public Works (LACDPW) and the City of Carson in the Grading Permit. Because existing stable soils removed during excavation would be replaced by stable compacted soils, excavation and backfill activities would not cause ground shaking or other seismic hazards to be accelerated compared to existing conditions at the site. Thus, with the implementation of project design features, the RP's Proposed Remedy would not increase the exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury or death, involving strong seismic ground shaking or seismic-related ground failure, including liquefaction. The short-term impact of the project with respect to these geologic hazards would be less than significant.

Long-term Impacts

Any potential long-term impacts would be associated with changes that would result in increased ground shaking during a seismic event. The replacement of existing stable soils with unconsolidated or poor quality soils could increase amplification or other geologic hazards. The implementation of PDF-Geo-6 provides that, upon completion of excavation, excavated areas would be backfilled as soon as possible with moisture conditioned soils and compacted to a relative compaction of at least 90 percent, for soils placed from 3 feet bgs to one foot bgs. Adequate compaction of backfill would ensure that the site would be returned to its existing stable condition and would not present a potential geologic hazard resulting from ground shaking. In addition, the implementation PDF-Geo-6 would require that clean soil would be imported for backfill of excavations and that, prior to importation of soil, samples of the proposed soil would be submitted for laboratory geotechnical and chemical characterization analysis. Geotechnical tests include gradation, PI,

[27] *Transite water supply lines located in the front and side yards of properties would be avoided. Overhead power lines may require removal and replacement for safety considerations.*

maximum density and optimum moisture, and corrosivity testing, as well as inspection and approval by the geotechnical engineer would ensure that stable soil conditions would be achieved and maintained.

The substantial withdrawal of groundwater over a period of time has the potential to result in local or regional subsidence. In the Carson area historical subsidence has been remedied through a regional seawater injection system. The RAP requires the removal of LNAPL if it is present at a measureable thickness on the groundwater surface.accumulates to a thickness of 0.5 feet on the surface of the Bellflower aquitard, which underlies the site. The removal of LNAPL has been ongoing for three years where it has accumulates in a few monitoring wells. Because of the localized character of the LNAPL and relatively small volume of LNAPL compared to the volume of the aquitard, the removal of LNAPL does not affect the surface level of the water table, which has remained stable (between 52-68 feet bgs) over a period of observation since 2009. Therefore, the ongoing removal of LNAPL is not expected to result in localized or general subsidence.

Other project design features including PDF-Geo-3 would provide a data baseline against which future structural changes could be measured. PDF-Geo-3 requires an evaluation of pre-excavation building conditions and post-excavation conditions of buildings as well as evaluation of any structural changes. This project design feature would provide for the detection of changes in structures from grading and excavation activities. Existing cracks or other distress present in structures or concrete would be documented and measured. Cracks would be monitored by direct measurement using a dial caliper capable of measuring distances to approximately ±0.001 inch, or using commercially available crack monitoring devices installed on the existing cracks, such that any potential change of crack size during the pilot tests can be monitored and documented. Thus, with the implementation of project design features, the project would not increase the exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury or death, involving strong seismic ground shaking or seismic-related ground failure, including liquefaction. The long-term impact of the RP's Proposed Remedy with respect to seismic hazards would be less than significant.

Expedited Implementation Option

Under the Expedited Implementation Option, the number of properties being remediated at one time could increase from the proposed cluster of up to 8 properties up to 16 properties active at one time. The remediation contractor could implement this option only when the configuration of lots and other conditions are conducive to proceeding in this expedited manner safely. The Option would result in a greater level of activity on the site at one time but would not change the activity at an individual property or the total activity (number of lots remediated, amount of soil and other materials removed from the site, etc.). Project design features would be the same under the Expedited Implementation Option as under the RP's Proposed Remedy. Because the Expedited Implementation Option would comply with Code requirements related to excavation stability (shoring, etc.), monitoring of cuts, and maintaining baseline data to detect any damage or instability at adjacent structures, and would adhere to project design features which further ensure stability of excavations, the Expedited Implementation Option would not cause adverse impacts related to seismic hazards, such as ground shaking, ground failure, and liquefaction. Therefore, impacts regarding seismic hazards would be less than significant.

Threshold GEO-2: The project would have a significant impact on geology and soils if it would be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

Impact Statement GEO-2: *The excavation of the project site would not expose or alter underlying geologic units. Surface soil would be removed to 5 to 10 feet bgs and would be replaced with appropriately compacted backfill. Observation during grading and testing for required compaction and safety of structures due to any slippage or settlement of the completed grading, would ensure that conditions in approved engineering reports are implemented. With implementation of Building Code requirements and project design features the project would not cause on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. Therefore, the impact of the RP's Proposed Remedy with respect to these geologic hazards would be less than significant. The Expedited Implementation Option would also result in a less than significant impact with respect to these geologic hazards.*

Short-term Impacts

The implementation of the RAP would require temporary modifications to the existing grades of the site. Soil would be excavated to a depth of 5 to 10 feet bgs from both landscaped areas and areas currently covered by hardscape, including walkways, driveways, patio areas, and hardscape associated with landscaping. Approximately 177,870 CY of soil would be removed from the residential properties on the site. In addition to the residential soil excavation, there would be approximately 8,100 CY of soil excavated for SVE piping installation in the public rights-of-way and 725 CY excavated for well installation. Total excavation would be approximately 186,945 CY. Final recommendations, including vertical and lateral capacities of soils, would be developed during final design as required under PDF-Geo-1. Soil would be excavated from 219 residential properties where results of the previous site assessments indicate that RAOs are not met under existing conditions. Residual concrete slabs that formed a portion of the former reservoirs would be removed from excavation areas, where encountered. If encountered, concrete extending laterally beneath a structure or beneath the sidewalk would be cut at the edge of the structure or inner edge of the sidewalk and the remaining concrete would be left in place. Existing concrete slabs within the site are considered to be a dense material residing within the soil profile and do not cause instability or geologic hazards.

Hardscape and landscaping would be removed during the initial stage of excavation and restored to like conditions following completion of excavation in consultation with the homeowner. It may be necessary to remove fences and block walls between yards and ornamental or partitioning walls on individual properties, as the depth of excavation likely would exceed fence post and footing depths. As with other hardscape, fences and walls would be restored following completion of excavation and prior to restoration of landscaping. Exceptions to excavation beneath hardscape include patios covered by structures and roofs, swimming pools and pool decking surrounding swimming pools. These hardscape areas would not be excavated to avoid structural demolition and potential damage to swimming pools and appurtenant equipment. No excavation for the purposes of direct soil removal remediation would occur beneath City streets and sidewalks or beneath houses. However, excavation within City streets would be needed for trenching as part of the SVE conveyance piping installation process. In addition to treatment by the SVE/bioventing system discussed below, remaining soil in these non-excavated areas would be addressed in the SMP and by existing City regulatory requirements.

Excavation would be conducted using rubber track-mounted excavators or rubber-tired backhoes. An approximately 15,000 to 18,000 pound medium-sized excavator would be used for work in front yards and back yards where sufficient access is available, and an approximately 3,500-pound rubber track-mounted mini-excavator would be used in back yards with narrow access via side yards. Excavation would be conducted using a front-end loader and/or Bobcat skid-steer mini-loader to move soil from back yards to front yards and vice versa to bring in clean fill soil.

In areas where access for equipment is severely limited, hand tools and wheelbarrows would be used to conduct excavations.

Excavations would be made with side slopes at the horizontal to vertical ratio recommended by the geotechnical engineer and approved by the LACDPW and City of Carson in the grading permit for the particular property being excavated.[28] The basic excavation protocols would be altered as needed as excavations are conducted and to address any previously unknown utilities, concrete debris or foundations unearthed. If possible, and approved by the LACDPW and the City, excavations would have vertical sidewalls to maximize removal of impacted soil to the full depth of excavation.[29]

Geotechnical reports were prepared for the 24612 Neptune Avenue and 24533 Ravenna Avenue properties prior to the pilot test for trenching and excavations. Based on the properties of on-site soil, the report concluded that any construction work within the site would not be subjected to geologic hazards from landslides, settlement, or slippage. They also concluded that implementation of the remedial activities would not adversely affect the geologic stability of surrounding properties. The reports further concluded that, because groundwater was not observed in exploratory borings to a depth of 25.5 feet bgs at the 24612 Neptune Avenue site and to a depth of 10 feet bgs at the Ravenna Avenue site, the potential for groundwater-related impacts during excavation activities, including the potential for perched groundwater intrusion into the near-surface zones during construction, is not anticipated.[30]

Excavations to 5 bgs or deeper would require shoring of the cut area, setbacks from structures, sloped excavation sidewalls, and/or slot trenching in accordance the requirements of the geotechnical report for engineered grading. Placement of clean fill would need to meet compaction requirements under the Code. Because of the shallow depth of excavation (5 to 10 feet) and setbacks from building foundations, the excavation of soil would not alter underlying geologic units or the character of existing soil beneath existing foundations. Surface soil would be replaced by appropriately placed backfill that would meet County Building Code Section J107.4 to prevent fill material containing organic, frozen, or other deleterious materials that could contribute to instability. Implementation of PDF-Geo-5 requires that imported clean soil would be tested for suitability (stability, non-corrosive properties, etc.) as fill materials. Under PDF-Geo-6, backfill would begin upon completion of excavation and installation of other remedial elements. Borings from auger excavation would be backfilled with CLSM the same day they are excavated. Where slot trenching is used for 5-foot excavations or for targeted deeper excavations to 10 feet, the lower part of the slot trenches would also be backfilled with CLSM. The upper 3 feet of excavations would be backfilled with

[28] *The City of Carson follows the LACDPW Grading Guidelines and is a contract city, meaning that the LACDPW provides plan check services for the City.*

[29] *The LACDPW and City could require setbacks from structures in accordance with appropriate elements of Sections J101, J104, J106, and J108 of the County Grading Code as amended by the City of Carson.*

[30] *URS Corporation, Geotechnical Report, Planned Pilot Test for Remedial Excavation and Backfill Placement, 24612 Neptune Avenue, Carson, CA, March 29, 2012, page 4-1.*

certified clean imported soil. Backfill soil would be free of deleterious organic matter (i.e., vegetation) and cobbles larger than four inches in diameter, and would be approved by the Geotechnical Engineer. Backfill soils would be moisture conditioned to near optimal moisture content and compacted to at least 90 percent relative compaction, or as determined by the Geotechnical Engineer and approved by LACDPW and the City of Carson in the Grading Permit. The upper foot of soil backfill would be topsoil suitable for vegetation growth and would be compacted to not more than 85 percent relative compaction.

Los Angeles County Building Code Sections J105.3, Field Engineer Inspection, and J105.4, Soils Engineer Inspection, as well as PDF-Geo-6, require observation during grading, testing for required compaction and safety of structures due to any slippage or settlement of the completed grading, and to ensure that conditions in approved engineering reports are implemented. With implementation of County Building Code requirements and project design features, the RP's Proposed Remedy would avoid lateral spreading, subsidence, liquefaction, or collapse during construction. The project site is essentially level and no land sliding is anticipated. Therefore, the short-term impact of the project with respect to landslide, lateral spreading, subsidence, liquefaction, or collapse would be less than significant.

Expedited Implementation Option

Under the Expedited Implementation Option, the total amount of excavated soil and implementation of Code requirements, such as protection of adjoining properties, setbacks, and stability of cuts would be the same as under the RP's Proposed Remedy. The Option would result in a greater level of activity on the site at one time but would not change the activity at an individual property or the total activity (number of lots remediated, amount of soil and other materials removed from the site, etc.). Project design features would be the same under the Expedited Implementation Option as under the RP's Proposed Remedy. Because the Expedited Implementation Option would comply with Code requirements related to excavation stability (shoring, etc.), monitoring of cuts, and maintaining baseline data to detect any damage or instability at adjacent structures, and would adhere to project design features which further ensure stability of excavations, the Expedited Implementation Option would not cause adverse impacts related to geologic hazards. Therefore, impacts regarding geologic hazards, such as landslide, lateral spreading, subsidence, liquefaction, or collapse would be less than significant.

Long-term Impacts

Any potential long-term impacts would be associated with changes that would cause or increase instability and potentially result in lateral spreading, subsidence, liquefaction, or collapse. The replacement of existing stable soils with unconsolidated or poor quality soils could result in long-term lateral spreading or other geologic hazards. As described under "Short-term Impacts," above the implementation of PDF-Geo-5 and PDF-Geo-6 would provide for the use of clean soils that meet appropriate geotechnical and chemical characterization analysis and for compaction of soils to least 90 percent. Adequate compaction of backfill would ensure that the site would be returned to its existing stable condition and would not present a potential long-term geologic hazard resulting from ground shaking. In addition, project design features would ensure that stable soil conditions would be achieved and maintained.

Other project design features including PDF-Geo-3 would provide a data baseline against which future structural changes could be measured. PDF-Geo-3 requires an evaluation of pre-excavation building and foundation conditions and post-excavation conditions of buildings and foundations and evaluation of any structural changes. Existing cracks or other distress present in structures or concrete would be documented

and measured. Cracks would be monitored by direct measurement using a dial caliper capable of measuring distances to approximately ±0.001 inch, or using commercially available crack monitoring devices installed on the existing cracks, such that any potential change of crack size during the pilot test can be monitored and documented. This data baseline would indicate any geologic instability and, thus, provide a means by which potential geologic hazards could be addressed. Thus, with the implementation of project design features, the project would avoid or address adverse geologic conditions, such as poor soil consolidation that could cause lateral spreading, subsidence, liquefaction, or collapse. The impact of the RP's Proposed Remedy with respect to landslide, lateral spreading, subsidence, liquefaction, or collapse would be less than significant.

Threshold GEO-3: The project would have a significant impact on geology and soils if it would result in substantial soil erosion or loss of topsoil.

Impact Statement GEO-3: *With the implementation of Code-required best management practices for excavation and backfill activities, and immediate loading and covering of cut materials, the RP's Proposed Remedy would not result in substantial soil erosion. In addition, the removal of COC-containing soil would not constitute the substantial loss of top soil. Therefore, the impact with respect to erosion and loss of top soil would be less than significant. The Expedited Implementation Option would also result in a less than significant impact with respect to erosion and loss of top soil.*

Short-term Impacts

A function of the RP's Proposed Remedy is to remove approximately 177,870 CY of soil from residential sites (including a 10 percent contingency), approximately 8,100 CY from street excavations, and 725 CY for well preparation, for a total of approximately 186,945 CY. The soil would be replaced by backfill, which would be required to comply with project design features and Building Code requirements regarding absence of organic materials or other deleterious materials. PDF-Geo-6 requires that clean soil would be imported for backfill would be tested for gradation, plasticity, maximum density and optimum moisture, and corrosivity. Under existing conditions, petroleum hydrocarbons and related VOCs and SVOCs occur in shallow and deep soils on the site. Because of potential hydrocarbons present in existing soil, under existing conditions these soils are not suitable for beneficial uses typically associated with topsoil. Although surface soils would be removed from the residential properties, the removal of these materials would not constitute a substantial loss of topsoil. Topsoil in landscaped areas would be replaced in like condition so there would be no significant loss of top soil associated with the RP's Proposed Remedy.

Grading activities have the potential to increase erosion, including erosion of soils during excavation. The SWPPP and WWECP, which would be prepared in accordance with the County Building Code, Appendix J, would require best management practices for the control of runoff and potential transport of sediment or soil erosion during excavation and backfill operations. As described in Chapter 2, Project Description, of this EIR, generally excavated soil would be loaded directly into an awaiting transport vehicle (i.e., end-dump truck, dump truck, or covered soil bin) using the excavator, front-end loader or skid-steer mini-loader, for transport to the appropriate recycling or disposal facility. In the unlikely event that it is necessary to temporarily stockpile soil onsite before loading, soil either would be placed upon plastic sheeting and covered with plastic, or they would be temporarily placed in a covered bin. With the implementation of Code-required best management practices for excavations and backfill, and immediate loading and covering of cut materials, as needed, the project would not result in substantial soil erosion. In addition, the removal

of COC-containing soil would not constitute the substantial loss of top soil. Therefore, the short-term impact of the RP's Proposed Remedy with respect to erosion and loss of top soil would be less than significant.

Long-term Impacts

Long-term erosion has the potential to occur in areas of exposed backfill soils. Under PDF-Geo-7, landscape restoration, including the reconstruction of removed fencing or block walls, would be performed to "like conditions" or as agreed to with the homeowners. PDF-Geo-7 requires that properties be restored to like condition, including topsoil in landscaped and softscape areas. With the restoration of landscaping and any removed hardscape, backfill soils would be covered and the potential for erosion would be substantially reduced. With the implementation of project design features, the site would be returned to like condition and the long-term impact of the RP's Proposed Remedy with respect to erosion and loss of top soil would be less than significant.

Expedited Implementation Option

Under the Expedited Implementation Option, the total amount of excavated soil would be the same as under the RP's Proposed Remedy. However, because overall activity at any one time would be increased, the quantity of soil exposed to potential erosion forces would be greater. The PDFs and BMPs in the RP's Proposed Remedy would be applicable to all areas where soil is exposed under the Expedited Implementation Option thereby minimizing soil erosion. The discussion above of impacts associated with loss of top soil is the same as under the RP's Proposed Remedy because no additional surface area would be disturbed. Therefore, impacts regarding erosion and loss of top soil would be less than significant.

Threshold GEO-4: The project would have a significant impact on geology and soils if it would be located on expansive soil creating substantial risks to life or property.

Impact Statement GEO-4: *The project would not remove existing soils under residential buildings or garages and, thus, would not change existing conditions with respect to soils currently supporting habitable structures. Expansive soils do not naturally occur on the project site and expansive soils would not be imported to the project site. Because the RP's Proposed Remedy and the Expedited Implementation Option would not change the existing soils under habitable structures, it would not cause a change in expansiveness of existing materials that would increase risks to life or property. The impact of the RP's Proposed Remedy and the Expedited Implementation Option with respect to expansive soils would be less than significant.*

Short-term Impacts

Prior geotechnical investigations of the site determined that naturally-occurring on-site soils were non-expansive by both Los Angeles County and FHA criteria. The RP's Proposed Remedy would result in the removal of up to approximately 186,945 CY of soil from the site. Excavated soils would be backfilled with imported materials that must comply with County Building Code Section J107.4 to prevent fill material containing organic, frozen, or other deleterious materials that could contribute to instability. Under PDF-Geo-5, imported backfill soil to the site would be tested for gradation and plasticity, which would ensure that high levels of clay that could contribute to shrinking and swelling are considered deleterious and would not be allowed. Because expansive soils would not be imported to the site, any replaced fencing and hardscape would not be located in imported expansive soils. The RP's Proposed Remedy would not remove existing

soils under residential buildings or garages and, thus, would not change existing conditions with respect to existing non-expansive soils that currently support habitable structures. Because on-site soils are non-expansive, and imported soils would be tested to ensure that expansive soils would not be used in backfill, the short-term impact of the project with respect to expansive soils would be less than significant.

Long-term Impacts

Expansive soils do not naturally occur on the project site. With the implementation of County Building Code regulations that require that fill material not contain deleterious materials that could contribute to instability and PDF-Geo-5, which requires that imported backfill soil to the site would be tested for gradation and plasticity, soils that contain high levels of clay that could contribute to shrinking and swelling would not be allowed. The RP's Proposed Remedy would not remove existing soils under residential buildings or garages and, thus, would not change existing conditions with respect to existing non-expansive soils that currently support habitable structures. Because on-site soils are non-expansive, and imported soils would be tested to ensure that expansive soils would not be used in backfill, the long-term impact of the RP's Proposed Remedy with respect to expansive soils would be less than significant.

Expedited Implementation Option

Under the Expedited Implementation Option, the total amount of excavated soils would be the same as under the RP's Proposed Remedy. The Expedited Implementation Option would adhere to all project design features, such as PDF-Geo-5, which requires testing of imported backfill soil for gradation and plasticity. This would ensure that high levels of clay that could contribute to shrinking and swelling would not be allowed. Because expansive soils do not occur on the site or would be imported to the site, any replaced fencing and hardscape would not be located in imported expansive soils. The Expedited Implementation Option would not remove existing soils under residential buildings or garages and, thus, would not change existing conditions with respect to existing non-expansive soils that currently support habitable structures. Because on-site soils are non-expansive, and imported soils would be tested to ensure that expansive soils would not be used in backfill, the short-term impact of the Expedited Implementation Option with respect to expansive soils would be less than significant.

5. ALTERNATIVES ANALYSIS

Analysis of Impacts Associated with Alternative 1 (No Project Alternative)

The No Project Alternative would not involve any excavation of soils or change to existing ground conditions that would require grading permits or geotechnical analysis of activities at the site. The No Project Alternative would avoid any potential excavation-related impacts associated with sedimentation or erosion, which were determined to be less than significant under the RAP with the implementation of project design features. Although the No Project Alternative, which would not result in any geologic effects, would avoid the RAP's less than significant geological effects. However, this Alternative would not meet the statutory requirements of the RAP.

Analysis of Impacts Associated with Alternative 2 (Excavation Beneath Landscape and Hardscape to 10 Feet Alternative)

Seismic Hazards

As indicated previously, the site is not located within a designated earthquake fault zone and surface ground rupture is considered low. Because the site is located within a seismically active region, moderate to strong ground motion could be caused by an earthquake. As with the RP's Proposed Remedy, project design features, such as PDFs Geo-1 through Geo-3, would apply. These require a geotechnical report to ensure that final grading designs would incorporate adequate support of cuts (if needed) and setbacks from building foundations during excavation to avoid adverse effects of seismic ground shaking on adjacent buildings during the site remediation. It is expected that 10-foot-deep cuts would be shored and/or slot trenched to ensure stable cuts. With adequate structural protection during excavation, Alternative 2 would not cause a seismic event to result in substantial damage to structures or cause or accelerate geologic hazards that would expose people to substantial risk of injury. Excavation activities would not affect soils and materials below 10 feet bgs or underlying geologic units that could affect seismic activity. Design features would require backfill materials from the base of the cut to one foot bgs to be re-compacted to at least 90 percent, or as required under the grading permit for specific properties. The implementation of project design features, such as PDF-Geo-6, would provide that, upon completion of excavation, excavated areas would be backfilled as soon as possible with CLSM in the lower areas of cuts or borings and backfilled with certified clean imported soil in the upper 3 feet. Thus, with the implementation of project design features and existing grading regulations pertinent to engineered grading, Alternative 2 would not increase the exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury or death, involving strong seismic ground shaking or seismic-related ground failure, including liquefaction. Impacts with respect to seismic hazards would be less than significant.

Geologic Hazards

Under Alternative 2, all affected properties (241 residential properties) would be excavated to a depth of 10 feet bgs. Total excavated quantities would be approximately 274,700 CY from the residential properties and approximately 43,900 CY of impacted soils from other areas on the site (total approximately 318,600 CY). This Alternative would entail, on average, excavation of 1,222 CY of soil per property.

As with the RP's Proposed Remedy, excavation would be conducted using excavators or backhoes. A limited access bucket auger drilling rig would be used in conjunction with conventional excavation equipment for cuts. Conventional excavation using slot-trenching as necessary to protect structures or other features and open bulk excavation with appropriate sloping, setbacks, and/or shoring would be used where possible. Auger excavation using a limited access rig would allow excavation to be conducted in relatively tight spaces adjacent to structures to remove a column of soil. However, use of auger excavation would be slow and would therefore be used in limited application in favor of conventional excavation wherever possible.

Excavations to 10 feet bgs would require shoring of the cut area, setbacks from structures, sloped excavation sidewalls, and/or slot trenching according to the requirements of the geotechnical report for engineered grading. Placement of clean fill would need to meet compaction requirements under the Code. Geotechnical reports at two locations within the site concluded that any construction work within the site would not be subjected to geologic hazards from landslides, settlement, or slippage. The reports also concluded that

implementation of the remedial activities would not adversely affect the geologic stability of surrounding properties.[31]

Los Angeles County Building Code Sections J105.3, Field Engineer Inspection, and J105.4, Soils Engineer Inspection, which are implemented for all engineered grading, as well as implementation of project design features, such as PDF-Geo-6, require observation during grading, testing for required compaction and safety of structures due to any slippage or settlement of the completed grading, and ensure that conditions in approved engineering reports are implemented. With implementation of County Building Code requirements and project design features, Alternative 2 would avoid lateral spreading, subsidence, liquefaction, or collapse during construction. The site is essentially level and no land sliding is anticipated. Therefore, the short-term impact of the Alternative 2 with respect to landslide, lateral spreading, subsidence, liquefaction, or collapse would be less than significant.

Erosion Hazards

Alternative 2 would remove approximately 274,700 CY of impacted soils from the residential properties and approximately 43,900 CY of impacted soils from other areas on the site for a total of 318,600 CY. These soils would be replaced by equivalent volumes of clean backfill. Because the quantity of excavated soil would be greater under this Alternative, potential exposure to natural forces could increase erosion potential. Erosion would be addressed by the SWPPP and WWECP, which would be prepared in accordance with the County Building Code, Appendix J. These programs require best management practices for the control of runoff and potential transport of sediment or soil erosion during excavation and backfill operations. As with the RP's Proposed Remedy, excavated soils would be loaded directly into a transport vehicle (i.e., end-dump truck, dump truck, or covered soil bin). In the event that it is necessary to temporarily stockpile soil on site before loading, soils either would be placed upon Visqueen plastic sheeting and covered with plastic, or they would be temporarily placed in a covered bin. Project design features, such as PDF-Geo-5, which requires that topsoil suitable for plant growth in the upper 6 inches and underlain by 6-inch-thick backfills compacted to a relative compaction of 80 to 85 percent, would also be implemented. The inclusion of topsoil in the backfill materials and compacted underlying soil within the upper one-foot would promote the growth of vegetation, as well as reduce deep erosion. With the implementation of Code-required best management practices for excavations and backfill and project design features, Alternative 2 would not result in substantial soil erosion. The removal of existing COC-containing soils would not constitute useful top soil and, therefore, the impact of Alternative 2 with respect to loss of top soil would be less than significant.

Expansive Soils Hazards

Prior geotechnical investigations of the site determined that naturally-occurring on-site soils were non-expansive by both Los Angeles County and FHA criteria. Design features, such as PDF-Geo-5, would be implemented, which require that soils with high levels of clay that could contribute to shrinking and swelling would not be allowed as backfill material. Because expansive soils would not be imported to the site, any replaced fencing and hardscape would not be located in imported expansive soils. Alternative 2 would not remove existing soils under residential buildings or garages and, thus, would not change existing conditions with respect to existing non-expansive soils that currently support habitable structures. Because on-site

[31] *URS Corporation, Geotechnical Report, Planned Pilot Test for Remedial Excavation and Backfill Placement, 24612 Neptune Avenue, Carson, CA, March 29, 2012, page 4-1 and Planned Pilot Test for Remedial Excavation and Backfill Placement, 24533 Ravenna Avenue, Carson, CA, April 13, 2012, page 2-1.*

soils are non-expansive, and imported soils would be tested to ensure that expansive soils would not be used in backfill, the impact of Alternative 2 with respect to expansive soils would be less than significant.

Analysis of Impacts Associated with Alternative 3 (No Excavation Beneath Hardscape - 5 Feet to Targeted 10-Feet Alternative)

Seismic Hazards

As indicated previously, the site is not located within a designated earthquake fault zone. Although surface ground rupture is considered low, moderate to strong ground motion could be caused by an earthquake. Project design features, such as PDFs Geo-1 through Geo-3, would apply, which would ensure that final grading designs would incorporate adequate support of cuts and setbacks from building foundations during excavation to avoid adverse effects of seismic ground shaking on adjacent buildings during remediation. It is expected that cuts deeper than 5 feet would be shored and/or slot trenched to ensure stability. With adequate structural protection during excavation, Alternative 3 would not cause a seismic event to result in substantial damage to structures or cause or accelerate geologic hazards that would expose people to substantial risk of injury. Excavation activities would not affect soils and materials deeper than 10 feet bgs or underlying geologic units that could affect seismic activity. PDF-Geo-6 would provide that excavated areas would be backfilled as soon as possible. Thus, with the implementation of project design features and existing grading regulations pertinent to engineered grading, Alternative 3 would not increase the exposure of people or structures to potential substantial adverse seismic, including ground failure or liquefaction. Impacts with respect to seismic hazards would be less than significant.

Geologic Hazards

Based on the conclusions of geotechnical reports for two locations within the site, construction work within the site is not considered subject to geologic hazards from landslides, settlement, or slippage. The reports also concluded that implementation of the remedial activities would not adversely affect the geologic stability of surrounding properties.[32]

As with the RP's Proposed Remedy, all affected properties (219 residential properties) would be excavated to a depth of 5 feet, with targeted areas to 10 feet bgs. However, because hardscape (sidewalks, concrete patios, masonry walls, etc.) and soils beneath hardscape would not be removed, total excavated soils would be reduced. It is estimated that approximately 92,755 CY of soil would be exported from the site.

Conventional excavation using slot-trenching as necessary to protect structures or other features and open bulk excavation with appropriate sloping, setbacks, and/or shoring would be used where possible. As with the RP's Proposed Remedy, mini-excavators, hand tools, or wheelbarrows, which are limited to 5-foot-deep cuts, could be used to conduct the 5-foot-deep excavations.

Los Angeles County Building Code Sections J105.3, Field Engineer Inspection, and J105.4, Soils Engineer Inspection, which are implemented for all engineered grading, as well as implementation of project design

[32] *URS Corporation, Geotechnical Report, Planned Pilot Test for Remedial Excavation and Backfill Placement, 24612 Neptune Avenue, Carson, CA, March 29, 2012, page 4-1 and Planned Pilot Test for Remedial Excavation and Backfill Placement, 24533 Ravenna Avenue, Carson, CA, April 13, 2012, page 2-1.*

features, such as PDF-Geo-6, require observation during grading, testing for required compaction and safety of structures due to any slippage or settlement of the completed grading, and ensure that conditions in approved engineering reports are implemented. With implementation of County Building Code requirements and project design features, Alternative 3 would avoid lateral spreading, subsidence, liquefaction, or collapse during construction. The site is essentially level and no landsliding is anticipated. Therefore, the impact of the Alternative 3 with respect to landslide, lateral spreading, subsidence, liquefaction, or collapse would be less than significant.

Erosion Hazards

Alternative 3 would remove approximately 83,930 CY of impacted soils from the residential properties, including a 10 percent contingency. In addition, 8,100 CY of soil from street trenching and 725 CY from well preparation would be excavated, for a total of 92,755 CY. These soils would be replaced by equivalent volumes of clean backfill. Because the quantity of excavated soil would be less under this Alternative than under the RP's Proposed Remedy, potential exposure to natural forces could decrease erosion potential. Project design features, such as PDF-Geo-5, which requires that topsoil suitable for plant growth in the upper 6 inches and underlain by 6-inch-thick backfills compacted to a relative compaction of 80 to 85 percent, would also be implemented. The inclusion of topsoil in the backfill materials and compacted underlying soil within the upper one-foot would promote the growth of vegetation, as well as reduce deep erosion. With the implementation of Code-required best management practices for excavations and backfill and project design features, Alternative 3 would not result in substantial soil erosion. The removal of existing COC-containing soils would not constitute useful top soil and, therefore, the impact of Alternative 3 with respect to loss of top soil would be less than significant.

Expansive Soils Hazards

Prior geotechnical investigations of the site determined that naturally-occurring on-site soils were non-expansive by both Los Angeles County and FHA criteria. Design features, such as PDF-Geo-5, would be implemented, which require that soils with high levels of clay that could contribute to shrinking and swelling would not be allowed as backfill material. Alternative 3 would not remove existing soils under residential buildings, garages, or hardscape and, thus, would not change conditions with respect to existing non-expansive soils that currently support habitable structures. Because on-site soils are non-expansive, and imported soils would be tested to ensure that expansive soils would not be used in backfill, the impact of Alternative 3 with respect to expansive soils would be less than significant.

6. CUMULATIVE IMPACTS

The study area considered for the cumulative geologic impacts includes (1) the area that could be affected by the RAP and (2) the areas affected by other projects whose activities could directly or indirectly affect the geology and soils of the project site. Geologic and soil impacts are generally site-specific and there is little, if any, cumulative relationship between development or remediation projects. Adherence to all relevant plans, codes, and regulations with respect to project design and construction would reduce project-specific and cumulative geologic impacts to a less-than significant level. Therefore, since geologic hazards are site-specific, the RAP, in combination with other past, present, and reasonably foreseeable future projects, would not create a potentially significant cumulative impact on geological resources.

Impacts from erosion and loss of topsoil from site development and operation can be cumulative in effect within a watershed. The West Coast Basin of the Los Angeles Coastal Plain encompasses the immediate watershed region and forms the geographic context for cumulative erosion impacts. Development throughout the watershed would be subject to State and local runoff and erosion prevention requirements, including the applicable provisions of the general construction permit, BMPs, and Phases I and II of NPDES, as well as implementation of fugitive dust control measures of SCAQMD Rule 403. These measures are implemented as conditions of approval of project development and subject to continuing enforcement. As a result, it is anticipated that cumulative impacts on the West Coast Basin due to runoff and erosion from cumulative development activity would be less than significant.

7. MITIGATION MEASURES

With the implementation of existing regulations and project design features described above, the RP's Proposed Remedy nor the Expedited Implementation Option would result in significant impacts with respect to geologic hazards, such as ground shaking, slope stability, settlement, liquefaction, erosion, or expansive soils. Therefore, no mitigation measures would be necessary for the RP's Proposed Remedy or the Expedited Implementation Option.

With regard to alternatives, the No Project Alternative would not involve any excavation or other physical activity and would not result in any geologic hazards. Therefore, mitigation measures would also not be required for this Alternative. Alternatives 2 and 3 would not result in significant impacts with respect to geologic hazards, such as ground shaking, slope stability, settlement, liquefaction, erosion, or expansive soils. Therefore, no mitigation measures would be necessary for Alternatives 2 and 3.

8. LEVEL OF SIGNIFICANCE AFTER MITIGATION

No potentially significant impact with respect to seismic risk or other geologic hazards, such as ground shaking, slope stability, settlement, liquefaction, erosion, or expansive soils have been identified. No mitigation measures would be necessary. Because the RP's Proposed Remedy,Alternative 2, and Alternative 3 would be consistent with the existing regulatory framework relative to seismic hazards, grading, foundations, soils, erosion, and other geological concerns, mitigation measures would not be required. No significant impacts with respect to geology and soils would occur. Alternative 1, the No Project Alternative, would not involve any physical activity or cause any geologic effects. Therefore, no impacts are associated with this Alternative.

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5.3 GREENHOUSE GAS EMISSIONS

1. INTRODUCTION

This section describes applicable regulations that address greenhouse gas (GHG) emissions that would be generated by the implementation of the Revised RAP at the site and assesses the potential impacts of the RP's Proposed Remedy in terms of GHGs and global climate change. State law defines GHG emissions to include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Existing conditions at the site and influences on global climate change are also described, and an analysis is provided to assess potential cumulative and project related contributions to global climate change that would be caused by implementation of the project. The analysis accounts for energy and resource conservation measures that have been incorporated into the RAP and pertinent State mandated GHG emission reduction measures. GHG emission calculations prepared for the project are provided in Appendix D.

2. ENVIRONMENTAL SETTING

Regulatory Framework

A number of statutes, regulations, plans, and policies address air quality issues. The site and vicinity are subject to air quality regulations developed and implemented at the federal, state, and local levels.

Federal Regulations

The United States Environmental Protection Agency (USEPA) is responsible for implementing federal policy to address GHGs. The federal government administers a wide array of public-private partnerships to reduce the GHG intensity generated in the United States. These programs focus on energy efficiency, renewable energy, methane and other non-CO_2 gases, agricultural practices, and implementation of technologies to achieve GHG reductions. The USEPA implements numerous voluntary programs that contribute to the reduction of GHG emissions. These programs (e.g., the Energy Star labeling system for energy-efficient products) play a significant role in encouraging voluntary reductions from large corporations, consumers, industrial and commercial buildings, and many major industrial sectors.

In *Massachusetts v. Environmental Protection Agency* (Docket No. 05–1120), the U.S. Supreme Court held in April of 2007 that the USEPA has statutory authority under Section 2020 of the federal Clean Air Act (CAA) to regulate GHGs. The court did not hold that the US EPA was required to regulate GHG emissions; however, it indicated that the agency must decide whether GHGs cause or contribute to air pollution that is reasonably anticipated to endanger public health or welfare.

The U.S. President signed Executive Order 13432 on May 14, 2007, directing the USEPA, along with the Departments of Transportation, Energy, and Agriculture, to initiate a regulatory process that responds to the Supreme Court's decision. Executive Order 13432 was codified into law by the 2009 Omnibus Appropriations Law signed on February 17, 2009. The order sets goals in the areas of energy efficiency, acquisition, renewable energy, toxics reductions, recycling, sustainable buildings, electronics stewardship,

fleets, and water conservation. In addition, the order requires more widespread use of Environmental Management Systems as the framework in which to manage and continually improve these sustainable practices. This Executive Order requires federal agencies to lead by example in advancing the nation's energy security and environmental performance by achieving the following goals:

- **Energy Efficiency:** Reduce energy intensity 30 percent by 2015, compared to a fiscal year (FY) 2003 baseline.
- **Greenhouse Gases:** Reduce GHG emissions through a 30 percent reduction of energy intensity by 2015, compared to an FY 2003 baseline.
- **Renewable Power:** At least 50 percent of current renewable energy purchases must come from new renewable sources (in service after January 1, 1999).
- **Building Performance:** Construct or renovate buildings in accordance with sustainability strategies, including resource conservation, reduction, and use; siting; and indoor environmental quality.
- **Water Conservation:** Reduce water consumption intensity 16 percent by 2015, compared to an FY 2007 baseline.
- **Vehicles:** Increase purchase of alternative fuel, hybrid, and plug-in hybrid vehicles when commercially available.
- **Petroleum Conservation:** Reduce petroleum consumption in fleet vehicles by 2 percent annually through 2015, compared to an FY 2005 baseline.
- **Alternative Fuel:** Increase use of alternative fuel consumption by at least 10 percent annually, compared to an FY 2005 baseline.
- **Pollution Prevention:** Reduce use of chemicals and toxic materials and purchase lower risk chemicals and toxic materials.
- **Procurement:** Expand purchases of environmentally sound goods and services, including bio-based products.
- **Electronics Management:** Annually, 95 percent of electronic products purchased must meet Electronic Product Environmental Assessment Tool standards where applicable; enable Energy Star® features on 100 percent of computers and monitors; and reuse, donate, sell, or recycle 100 percent of electronic products using environmentally sound management practices.

On May 19, 2009, the President announced a national policy for fuel efficiency and emissions standards in the U.S. auto industry. The adopted federal standard applies to passenger cars and light-duty trucks for model years 2012 through 2016. The rule surpasses the prior Corporate Average Fuel Economy (CAFE) standards and requires an average fuel economy standard of 35.5 miles per gallon (mpg) and 250 grams of CO_2 per mile by model year 2016, based on USEPA calculation methods. These standards were formally adopted on April 1, 2010. In August 2012, standards were adopted for model year 2017 through 2025 passenger cars and light-duty trucks. By 2025, vehicles are required to achieve 54.5 mpg (if GHG reductions are achieved exclusively through fuel economy improvements) and 163 grams of CO_2 per mile. According to

the USEPA, a model year 2025 vehicle would emit one-half of the GHG emissions from a model year 2010 vehicle.[1]

On December 7, 2009, the USEPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the federal CAA. The USEPA adopted a Final Endangerment Finding for the six defined GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) on December 7, 2009. The Endangerment Finding is required before USEPA can regulate GHG emissions under Section 202(a)(1) of the CAA consistently with the U.S. Supreme Court decision. The USEPA also adopted a Cause or Contribute Finding in which the USEPA Administrator found that GHG emissions from new motor vehicle and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. These findings do not themselves impose any requirements on industry or other entities. However, these actions were a prerequisite for implementing GHG emissions standards for vehicles.

State Regulations

In response to growing scientific and political concern regarding global climate change, in the last decade California has promulgated a series of executive orders, laws, and regulations aimed at reducing both the level of GHGs in the atmosphere and emissions of GHGs from commercial and private activities within the State.

California Air Resources Board

The California Air Resources Board (CARB), a part of the California Environmental Protection Agency (CalEPA), is responsible for the coordination and administration of both federal and state air pollution control programs within California. In this capacity, CARB conducts research, sets state ambient air quality standards (California Ambient Air Quality Standards (CAAQS)), compiles emission inventories, develops suggested control measures, and provides oversight of local programs. CARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions. CARB has primary responsibility for the development of California's State Implementation Plan (SIP), for which it works closely with the federal government and the local air districts. The SIP is required for the State to take over implementation of the federal CAA.

Executive Order S-3-05

California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following GHG emission reduction targets:

- By 2010, California shall reduce GHG emissions to 2000 levels;
- By 2020, California shall reduce GHG emissions to 1990 levels; and
- By 2050, California shall reduce GHG emissions to 80 percent below 1990 levels.

[1] *U.S. Environmental Protection Agency, "EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks," August 2012, http://www.epa.gov/oms/climate/documents/420f12051.pdf. Accessed August 2014.*

The Secretary of CalEPA is required to coordinate efforts of various agencies in order to collectively and efficiently reduce GHGs. Some of the agency representatives involved in the GHG reduction plan include the Secretary of the Business, Transportation and Housing Agency, the Secretary of the Department of Food and Agriculture, the Secretary of the Resources Agency, the Chairperson of CARB, the Chairperson of the California Energy Commission, and the President of the Public Utilities Commission. Representatives from these agencies comprise the California Climate Action Team (CCAT).

The CCAT provides biennial reports to the Governor and Legislature on the state of GHG reductions in the state as well as strategies for mitigating and adapting to climate change. The first CCAT Report to the Governor and the Legislature in 2006 contained recommendations and strategies to help meet the targets in Executive Order S 3-05.[2] The 2010 CCAT Report, finalized in December 2010, expands on the policy oriented 2006 assessment.[3] The new information detailed in the CCAT Report includes development of revised climate and sea-level projections using new information and tools that have become available in the last two years; and an evaluation of climate change within the context of broader social changes, such as land-use changes and demographic shifts.

California Health and Safety Code, Division 25.5 – California Global Warming Solutions Act of 2006[4]

In 2006, the California State Legislature adopted Assembly Bill 32 (AB 32) (California Health and Safety Code [HSC], Division 25.5 – California Global Warming Solutions Act of 2006), focusing on reducing GHG emissions in California to 1990 levels by 2020. As required by HSC Division 25.5, CARB approved the 1990 GHG emissions inventory, thereby establishing the emissions limit for 2020. The 2020 emissions limit was set at 427 million metric tons (MMT) carbon dioxide equivalent (CO_2e). CARB also projected the state's 2020 GHG emissions under business as usual (BAU) conditions - that is, emissions that would occur without any plans, policies, or regulations to reduce GHG emissions. CARB originally used an average of the state's GHG emissions from 2002 through 2004 and projected the 2020 levels at approximately 596 $MMTCO_2e$. Therefore, under this original projection, the state must reduce its 2020 BAU emissions by 28.4 percent in order to meet the 1990 target. CARB updated their 2020 BAU emissions estimate to account for the effect of the 2007–2009 economic recession, new estimates for future fuel and energy demand, and the reductions required by regulation that were recently adopted for motor vehicles and renewable energy.[5] CARB's revised 2020 BAU emissions estimate is 507 $MMTCO_2e$. Therefore, the emission reductions necessary to achieve the 2020 emissions target of 427 $MMTCO_2e$ would be 80 $MMTCO_2e$, or a reduction of GHG emissions by 15.8 percent.

HSC Division 25.5 defines GHGs as CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 and represents the first enforceable statewide program to limit emissions of these GHGs from all major industries with penalties for noncompliance. The law further requires that reduction measures be technologically feasible and cost

[2] *California Environmental Protection Agency, California Climate Action Team Report to Governor Schwarzenegger and the Legislature, (2006).*

[3] *California Environmental Protection Agency, California Climate Action Team Report to Governor Schwarzenegger and the Legislature, (2010).*

[4] *Assembly Bill No. 32, http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf. Accessed August 2014.*

[5] *California Air Resources Board, "Greenhouse Gas Inventory – 2020 Emissions Forecast," http://www.arb.ca.gov/cc/inventory/data/forecast.htm. 2012.*

effective. Under HSC Division 25.5, CARB has the primary responsibility for reducing GHG emissions. CARB is required to adopt rules and regulations directing state actions that would achieve GHG emissions reductions equivalent to 1990 statewide levels by 2020. On or before June 30, 2007, CARB was required to publish a list of discrete early action GHG emission reduction measures that would be implemented to be made enforceable by 2010. In 2007, CARB published its Final Report for Proposed Early Actions to Mitigate Climate Change in California.[6] This report described recommendations for discrete early action measures to reduce GHG emissions as part of California's HSC Division 25.5 GHG reduction strategy. Resulting from this are three new regulations proposed to meet the definition of "discrete early action greenhouse gas reduction measures," including the following: a low carbon fuel standard; reduction of HFC 134a (HFC used in automobile air-conditioning systems) emissions from non-professional servicing of motor vehicle air conditioning systems; and improved landfill gas capture. CARB estimates that by 2020, the reductions from those three measures would range from 13 to 26 $MMTCO_2e$. Six additional early-action regulations were adopted on October 25, 2007 that targeted: motor vehicles; auxiliary engines from docked ships; PFCs from the semiconductor industry; propellants in consumer products; automotive maintenance; and SF_6 from non-electricity sectors.

California Health and Safety Code, Section 42823 and 43018.5[7]

In response to the transportation sector accounting for more than half of California's CO_2 emissions, AB 1493 (HSC Section 42823 and 43018.5), enacted on July 22, 2002, required CARB to set GHG emission standards for passenger vehicles, light duty trucks, and other vehicles whose primary use is non-commercial personal transportation manufactured in and after 2009. In setting these standards, CARB must consider cost effectiveness, technological feasibility, economic impacts, and provide maximum flexibility to manufacturers. The State of California in 2004 submitted a request for a waiver from federal clean air regulations, which ordinarily preempts state regulation of motor vehicle emission standards, to allow the state to require reduced tailpipe emissions of CO_2. In late 2007, the USEPA denied California's waiver request. In early 2008, the state brought suit against USEPA related to this denial. In January 2009, the President directed the USEPA to assess whether its denial of the waiver was appropriate under the federal CAA. In June 2009, the USEPA granted California the waiver.

However, as discussed previously, the USEPA and United States Department of Transportation (USDOT) have adopted federal standards for model year 2012 through 2016 light-duty vehicles. In light of the USEPA and USDOT standards, California - and states adopting California emissions standards - have agreed to defer to the proposed national standard through model year 2016. The 2016 endpoint of the federal and state standards is similar, although the federal standard ramps up slightly more slowly than required under the state standard. The state standards (called the Pavley standards) require additional reductions in CO_2 emissions beyond model year 2016 (referred to as Pavley Phase II standards). As noted above, the USEPA and USDOT have adopted GHG emission standards for model year 2017 through 2025 vehicles. These standards are slightly different from the Pavley Phase II standards, but the State of California has agreed not to contest these standards, in part due to the fact that while the national standard would achieve slightly less reductions in California, it would achieve greater reductions nationally and is stringent enough to meet state

[6] *California Air Resources Board, Proposed Early Actions to Mitigation Climate Change in California, (2007).*

[7] *Assembly Bill No. 1493, http://www.leginfo.ca.gov/pub/01-02/bill/asm/ab_1451-1500/ab_1493_bill_20020722_chaptered.pdf. Accessed August 2014.*

GHG emission reduction goals.[8] CARB is in the process of adopting regulations that would allow manufacturers to comply with the 2017-2025 national standards to meet state law.

Executive Order S-01-07

Executive Order S-01-07 was enacted by Governor Schwarzenegger on January 18, 2007. The order mandates the following: (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and (2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established in California.

Senate Bill 97 (SB 97, Dutton) (Chapter 185, Statutes of 2007)[9]

Senate Bill 97 (SB 97) (Chapter 185, Statutes of 2007), enacted in 2007, amended the California Environmental Quality Act (CEQA) to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. It directed the California Office of Planning and Research (OPR) to develop revisions to the State CEQA Guidelines "for the mitigation of GHG emissions or the effects of GHG emissions" and directed the Resources Agency to certify and adopt these revised State CEQA Guidelines by January 2010. The revisions were completed in March 2010 and codified into the California Code of Regulations and became effective within 120 days pursuant to CEQA. The amendments provide regulatory guidance for the analysis and mitigation of the potential effects of GHG emissions. The CEQA Guidelines require:

- Inclusion of GHG analyses in CEQA documents;
- Determination of significance of GHG emissions; and
- If significant GHG emissions would occur, adoption of mitigation to address significant emissions.

Senate Bill 375 (SB 375, Steinberg) (Chapter 728, Statutes of 2008)[10]

SB 375 (Chapter 728, Statutes of 2008), which establishes mechanisms for the development of regional targets for reducing passenger vehicle greenhouse gas emissions, was adopted by the State on September 30, 2008. Under SB 375, CARB is required, in consultation with the metropolitan planning organizations (MPOs), to set regional GHG reduction targets for the passenger vehicle and light-duty truck sector for 2020 and 2035. On September 23, 2010, CARB adopted the vehicular GHG emissions reduction targets for the Southern California Association of Governments (SCAG), which is the MPO for the region in which the City of Carson is located. The target is a per capita reduction of 8 percent for 2020 and 13 percent for 2035 compared to the 2005 baseline. Of note, the proposed reduction targets explicitly exclude emission reductions expected from HSC Section 42823 and 43018.5 and the low carbon fuel standard regulations.

Under SB 375, the target must be incorporated within that region's Regional Transportation Plan (RTP), which is used for long-term transportation planning, in a Sustainable Communities Strategy (SCS). Certain

[8] *California Air Resources Board, "Advanced Clean Cars Summary," http://www.arb.ca.gov/msprog/clean_cars/acc%20summary-final.pdf. Accessed August 2014.*

[9] *Senate Bill No. 97, http://opr.ca.gov/docs/SB_97_bill_20070824_chaptered.pdf. Accessed August 2014.*

[10] *Senate Bill No. 375, http://www.leginfo.ca.gov/pub/07-08/bill/sen/sb_0351-0400/sb_375_bill_20080930_chaptered.pdf. Accessed August 2014.*

transportation planning and programming activities would then need to be consistent with the SCS; however, SB 375 expressly provides that the SCS does not regulate the use of land, and further provides that local land use plans and policies (e.g., general plan) are not required to be consistent with either the RTP or SCS. On April 4, 2012, SCAG adopted the 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). Using growth forecasts and economic trends, the RTP/SCS provides a vision for transportation throughout the region for the next 20 years. It considers the role of transportation in the broader context of economic, environmental, and quality-of-life goals for the future, identifying regional transportation strategies to address mobility needs. The RTP/SCS successfully achieves and exceeds the greenhouse gas emission-reduction targets set by CARB by achieving a 9 percent reduction by 2020 and 16 percent reduction by 2035 compared to the 2005 level on a per capita basis. This RTP/SCS also meets criteria pollutant emission budgets set by the USEPA.

Senate Bill 1078 (SB 1078, Sher) (Chapter 516, Statutes of 2002)[11] and Senate Bill 107 (SB 107, Simitian) (Chapter 464, Statutes of 2006)[12] and Executive Order S-14-08

SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010. In November 2008, Governor Schwarzenegger signed Executive Order S-14-08, which expands the State's Renewables Portfolio Standard (RPS) to 33 percent renewable power by 2020. Pursuant to Executive Order S-21-09, CARB was also preparing regulations to supplement the RPS with a Renewable Energy Standard that will result in a total renewable energy requirement for utilities of 33 percent by 2020. But on April 12, 2011, Governor Jerry Brown signed SB X1-2 to increase California's RPS to 33 percent by 2020.

CEQA Guidelines, Appendix F

Appendix F of the State *CEQA Guidelines* states that, in order to ensure that energy implications are considered in project decisions, the potential energy implications of a project shall be considered in an EIR, to the extent relevant and applicable to the project. Appendix F further states that a project's energy consumption and proposed conservation measures may be addressed, as relevant and applicable, in the Project Description, Environmental Setting and Impact Analysis portions of technical sections, as well as through mitigation measures and alternatives. In accordance with Appendix F of the State *CEQA Guidelines,* relevant information that address the energy implications of the Project are provided below in subsection 5, Project Energy Implications.

Consideration of Sustainability

In addition to the nine evaluation criteria of the National Contingent Plan (NCP), the consideration of sustainability was included in the assessment of the RP's Proposed Remedy and Alternatives, as detailed in the Revised Feasibility Study Report.[13] The assessment of sustainability, or "green remediation", can illustrate impacts that occur on local, regional, and global scales, including the direct and indirect releases of

[11] *Senate Bill No. 1078, http://www.energy.ca.gov/portfolio/documents/documents/SB1078.PDF. Accessed August 2014.*

[12] *Senate Bill No. 107, http://www.leginfo.ca.gov/pub/05-06/bill/sen/sb_0101-0150/sb_107_bill_20060926_chaptered.pdf. Accessed August 2014.*

[13] *Geosyntec Consultants, Revised Feasibility Study Report, (2014) 86-87.*

contaminants; the consumption of raw materials; and the production, collection, and disposal of wastes. Sustainability can consider factors that are sometimes intangible and unquantifiable. Nonetheless, these factors, along with others, were considered by the Water Board in its screening of remedial alternatives.

Regional

Air pollutant emissions are regulated by the South Coast Air Quality Management District (SCAQMD). The SCAQMD is responsible for promoting and improving the air quality of the Basin. This is accomplished though air quality monitoring, evaluation, education, implementation of control measures to reduce emissions from stationary sources, permitting and inspection of pollution sources, enforcement of air quality regulations, and by supporting and implementing measures to reduce emissions from motor vehicles. After AB 32 was passed, SCAQMD formed a Climate Change Committee along with a Greenhouse Gases CEQA Significance Thresholds Working Group and the SoCal Climate Solutions Exchange Technical Advisory Group. On September 5, 2008, the SCAQMD Board approved the SCAQMD Climate Change Policy, which outlines actions the District will take to assist businesses and local governments in implementing climate change measures, decrease the agency's carbon emissions, and provide information to the public regarding climate change. On December 5, 2008, the Board approved interim CEQA GHG significance thresholds for stationary source projects where it is the lead agency. The threshold is a tiered approach to determine a project's significance, with 10,000 metric tons (MT) of CO_2e as a screening numerical threshold for stationary source projects. In order to provide guidance to local lead agencies on determining the significance of GHG emissions identified in CEQA documents, the GHG CEQA Significance Threshold Working Group drafted thresholds with the intent of capturing 90 percent of development projects.[14] Under Tiers 1 and 2, projects that are exempt from CEQA or consistent with an approved local GHG reduction plan can be found to be less than significant. Under Tier 3, a project's GHG emissions are compared to the draft screening thresholds. At present, the SCAQMD has not formally adopted thresholds for use by other lead agencies, but recommends that industrial projects utilize the 10,000 $MTCO_2e$ screening level that has been adopted for SCAQMD projects. Under Tier 4, a project's GHG emissions are compared to a performance standard, such as achieving a percentage reduction in GHG emissions from a base case scenario or achieving a project-level efficiency target of 4.8 $MTCO_2e$ per service population. It should be noted that these thresholds were never adopted by the SCAQMD.

Additionally, SCAQMD Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil, would govern the control of air pollutant emissions from the landfill on-site. A brief summary of this rule is provided below:

Regulation XI – Source Specific Standards: Regulation XI sets emissions standards for different specific sources.

- **Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil:** This rule sets requirements to control the emission of VOCs from excavating, grading, handling and treating VOC-contaminated soil (as defined under the Rule) at or from an excavation or grading site.

[14] *South Coast Air Quality Management District, "Greenhouse Gases (GHG) CEQA Significance Thresholds Working Group Meeting #15," September 28, 2010, http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ghg-significance-thresholds/page/2. Accessed August 2014.*

Local

The City's General Plan does not include any specific goals and objectives related to GHGs. However, the goals and policies in the Air Quality Element of the General Plan would also aid to reduce GHG emissions in the City. An analysis of applicable goals and policies of the Air Quality Element is provided in Section 5.1, Air Quality, of this EIR.

Existing Conditions

Greenhouse Gases

Global climate change refers to changes in average climatic conditions on Earth as a whole, including changes in temperature, wind patterns, precipitation and storms. Historical records indicate that global climate changes have occurred in the past due to natural phenomena; however current data increasingly indicate that the current global conditions differ from past climate changes in rate and magnitude. Global climate change attributable to anthropogenic (human) GHG emissions is currently one of the most important and widely debated scientific, economic and political issues in the United States and the world. The extent to which increased concentrations of GHGs have caused or will cause climate change and the appropriate actions to limit and/or respond to climate change are the subject of significant and rapidly evolving regulatory efforts at the federal and state levels of government.

GHGs are those compounds in the Earth's atmosphere which play a critical role in determining temperature near the Earth's surface. More specifically, these gases allow high-frequency shortwave solar radiation to enter the Earth's atmosphere, but retain some of the low frequency infrared energy which is radiated back from the Earth towards space, resulting in a warming of the atmosphere. Not all GHGs possess the same ability to induce climate change; as a result, GHG contributions are commonly quantified in the units of equivalent mass of carbon dioxide (CO_2e). Mass emissions are calculated by converting pollutant specific emissions to CO_2e emissions by applying the proper global warming potential (GWP) value.[15] These GWP ratios are available from the United States Environmental Protection Agency (USEPA) and are published in the California Climate Action Registry (CCAR) General Reporting Protocol. By applying the GWP ratios, project-related CO_2e emissions can be tabulated in metric tons per year. Typically, the GWP ratio corresponding to the warming potential of CO_2 over a 100-year period is used as a baseline. Compounds that are regulated as GHGs are discussed below.

Carbon Dioxide (CO_2): CO_2 is the most abundant GHG in the atmosphere and is primarily generated from fossil fuel combustion from stationary and mobile sources. CO_2 is the reference gas (GWP of 1) for determining the GWPs of other GHGs.

Methane (CH_4): CH_4 is emitted from biogenic sources (i.e., resulting from the activity of living organisms), incomplete combustion in forest fires, landfills, manure management, and leaks in natural gas pipelines. The GWP of CH_4 is 21.

[15] *GWPs and associated CO_2e values were developed by the Intergovernmental Panel on Climate Change, and published in its Second Assessment Report in, 1996. In accordance with international and United States convention to maintain the value of the carbon dioxide 'currency', GHG emission inventories are calculated using the GWPs from the Intergovernmental Panel on Climate Change Second Assessment Report.*

Nitrous Oxide (N_2O): N_2O produced by human-related sources including agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production. The GWP of N_2O is 310.

Hydrofluorocarbons (HFCs): HFCs are fluorinated compounds consisting of hydrogen, carbon, and fluorine. They are typically used as refrigerants in both stationary refrigeration and mobile air conditioning systems. The GWPs of HFCs ranges from 140 for HFC-152a to 11,700 for HFC-23.

Perfluorocarbons (PFCs): PFCs are fluorinated compounds consisting of carbon and fluorine. They are primarily created as a byproduct of aluminum production and semiconductor manufacturing. The GWPs of PFCs range from 5,700 to 11,900.

Sulfur Hexafluoride (SF_6): SF_6 is a fluorinated compound consisting of sulfur and fluoride. It is a colorless, odorless, nontoxic, nonflammable gas. It is most commonly used as an electrical insulator in high voltage equipment that transmits and distributes electricity. SF_6 has a GWP of 23,900.

Greenhouse Gas Emissions

Worldwide man-made emissions of GHGs were approximately 49,000 million metric tons (MMT) of CO_2e annually including ongoing emissions from industrial and agricultural sources and emissions from land use changes (e.g., deforestation).[16] Emissions of CO_2 emissions from fossil fuel use accounts for 56.6 percent of the total while CO_2 emissions from all sources accounts for 76.7 percent of the total. Methane emissions account for 14.3 percent and N_2O emissions for 7.9 percent. The European Commission's Emissions Database for Global Atmospheric Research (EDGAR) reported global emissions of carbon dioxide alone for 2012 at 34,500 MMT, an all-time high. In 2012, the United States was the world's second largest emitter of carbon dioxide at 5,190 MMT (China was the largest emitter of carbon dioxide at 9,860 MMT).[17]

The CARB compiles GHG inventories for the State of California. Based on the 2012 GHG inventory data (i.e., the latest year for which data are available from CARB), California emitted 458.7 $MMTCO_2e$ including emissions resulting from imported electrical power and 414.6 $MMTCO_2e$ excluding emissions related to imported power.[18] Between 1990 and 2012, the population of California grew by approximately 7.9 million (from 29.8 to 37.7 million).[19] This represents an increase of approximately 27 percent from 1990 population levels. In addition, the California economy, measured as gross state product, grew from $773 billion in 1990 to $2.13 trillion in 2012 representing an increase of approximately 176 percent (about two and three-

[16] *Intergovernmental Panel on Climate Change,* Fourth Assessment Report: Synthesis Report*, (2007). Based on the most recent global data from 2004. While more recent data are available from Annex I countries (countries with GHG reductions obligations), Non-Annex I countries (countries without GHG reduction obligations) typically do not have more recent data.*

[17] *PBL Netherlands Environmental Assessment Agency and the European Commission Joint Research Center, Trends in Global CO_2 Emissions 2013 Report, (2013).*

[18] *California Air Resources Board, "California Greenhouse Gas 2000-2012 Inventory by Scoping Plan Category - Summary," http://www.arb.ca.gov/cc/inventory/data/data.htm. Accessed August 2014.*

[19] *U.S. Census Bureau, "California, Population of Counties by Decennial Census: 1900 to 1990," http://quickfacts.census.gov/qfd/states/06000lk.html. Accessed August 2014; California Department of Finance, "E-5 Population and Housing Estimates for Cities, Counties and the State, January 2011-2014, with 2010 Benchmark," http://www.dof.ca.gov/research/demographic/reports/estimates/e-5/2011-20/view.php. Accessed August 2014.*

quarter times the 1990 gross state product).[20] Despite the population and economic growth, California's net GHG emissions only grew by approximately 8 percent between 1990 and 2012. The California Energy Commission (CEC) attributes the slow rate of growth to the success of California's renewable energy programs and its commitment to clean air and clean energy.[21] **Table 5.3-1**, *State of California Greenhouse Gas Emissions,* identifies and quantifies statewide anthropogenic GHG emissions and sinks (e.g., carbon sequestration due to forest growth) in 1990 and 2012 (i.e., the most recent year in which data are available from CARB). As shown in Table 5.3-1, the transportation sector is the largest contributor to statewide GHG emissions at 36 percent in 2012.

Table 5.3-1

State of California Greenhouse Gas Emissions

Category	Total 1990 Emissions ($MMTCO_2e$)	Percent of Total 1990 Emissions	Total 2012 Emissions ($MMTCO_2e$)	Percent of Total 2012 Emissions
Transportation	150.7	35%	167.4	36%
Electric Power	110.6	26%	95.1	21%
Commercial	14.4	3%	14.2	3%
Residential	29.7	7%	28.1	6%
Industrial	103.0	24%	89.2	19%
Recycling and Waste[a]	–	–	8.5	2%
High GWP/Non-Specified[b]	1.3	<1%	18.4	4%
Agriculture/Forestry	23.6	6%	37.9	8%
Forestry Sinks	-6.7		--[c]	--
Net Total[d]	**426.6**	**100%**	**458.7**	**100%**

[a] *Included in other categories for the 1990 emissions inventory.*

[b] *High GWP gases are not specifically called out in the 1990 emissions inventory.*

[c] *Revised methodology under development (not reported for 2012).*

[d] *Totals may not add up exactly due to rounding.*

Sources: California Air Resources Board, Staff Report – California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit, (2007); California Air Resources Board, "California Greenhouse Gas 2000-2012 Inventory by Scoping Plan Category – Summary," http://www.arb.ca.gov/cc/inventory/data/data.htm. Accessed August 2014.

Effects of Global Climate Change

The scientific community's understanding of the fundamental processes responsible for global climate change has improved over the past decade, and its predictive capabilities are advancing. However, there remain uncertainties in, for example, predictions of local effects of climate change, occurrence, frequency,

[20] *California Department of Finance, "Financial & Economic Data: Gross Domestic Product, California," http://www.dof.ca.gov/HTML/FS_DATA/LatestEconData/FS_Misc.htm. Accessed August 2014. Amounts are based on current dollars as of the date of the report (June 2014).*

[21] *California Energy Commission, Inventory of California Greenhouse Gas Emissions and Sinks 1990 to 2004, (2006).*

and magnitude of extreme weather events, effects of aerosols, changes in clouds, shifts in the intensity and distribution of precipitation, and changes in oceanic circulation. Due to the complexity of the Earth's climate system and inability to accurately model it, the uncertainty surrounding climate change may never be completely eliminated. Nonetheless, the Intergovernmental Panel on Climate Change (IPCC), in its *Fourth Assessment Report*, stated that, "it is likely that there has been significant warming due to human activity over the past 50 years."[22] In addition, the *Fourth Assessment Report* holds that the impacts of future climate change will vary across regions. While "large-scale climate events have the potential to cause very large impacts," the impacts of future climate change will be mixed across regions.[23] In its *Fourth Assessment Report*, the IPCC states "Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes (see Figure SPM.6 and Table SPM.1). This evidence for human influence has grown since AR4 [*Fourth Assessment Report*]. It is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century."[24] A report from the National Academy of Sciences concluded that 97 to 98 percent of the climate researchers most actively publishing in the field support the tenets of the IPCC in that climate change is very likely caused by human (i.e., anthropogenic) activity.[25]

According to CARB, the potential impacts in California due to global climate change may include: loss in snow pack; sea level rise; more extreme heat days per year; more high ozone days; more large forest fires; more drought years; increased erosion of California's coastlines and sea water intrusion into the Sacramento and San Joaquin Deltas and associated levee systems; and increased pest infestation.[26] Below is a summary of some of the potential effects, reported by an array of studies that could be experienced in California as a result of global warming and climate change.

Air Quality

Higher temperatures, conducive to air pollution formation, could worsen air quality in California. Climate change may increase the concentration of ground-level ozone, but the magnitude of the effect, and therefore, its indirect effects, are uncertain. If higher temperatures are accompanied by drier conditions, the potential for large wildfires could increase, which, in turn, would further worsen air quality. However, if higher temperatures are accompanied by wetter, rather than drier conditions, the rains would tend to temporarily clear the air of particulate pollution and reduce the incidence of large wildfires, thus ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state.[27]

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[22] *Intergovernmental Panel on Climate Change, Fourth Assessment Report, Summary for Policy Makers, (2007).*

[23] *Intergovernmental Panel on Climate Change, Fourth Assessment Report, Summary for Policy Makers (2007).*

[24] *Intergovernmental Panel on Climate Change, Fifth Assessment Report, Summary for Policy Makers, (2013) 17 (emphasis in original).*

[25] *Anderegg, William R. L., J.W. Prall, J. Harold, S.H., Schneider, Expert Credibility in Climate Change, Proceedings of the National Academy of Sciences of the United States of America. 2010;107:12107-12109.*

[26] *California Environmental Protection Agency, Climate Action Team, Climate Action Team Report to Governor Schwarzenegger and the Legislature, (2006).*

[27] *California Energy Commission, Scenarios of Climate Change in California: An Overview, February 2006. http://www.energy.ca.gov/2005publications/CEC-500-2005-186/CEC-500-2005-186-SF.PDF. Accessed August 2014.*

In 2009, the California Natural Resources Agency (CNRA) published the *California Climate Adaptation Strategy*[28] as a response to the Governor's Executive Order S-13-2008. The CNRA report lists specific recommendations for state and local agencies to best adapt to the anticipated risks posed by a changing climate. In accordance with the *California Climate Adaptation Strategy*, the CEC was directed to develop a website on climate change scenarios and impacts that would be beneficial for local decision makers.[29] The website, known as Cal-Adapt, became operational in 2011.[30] The information provided from the Cal-Adapt website represents a projection of potential future climate scenarios. The data are comprised of the average values from a variety of scenarios and models and are meant to illustrate how the climate may change based on a variety of different potential social and economic factors. According to the Cal-Adapt website, the City of Carson in which the project site is located could result in an average increase in temperature of approximately 5 to 9 percent (about 3.2 to 5.7°F) by 2070-2090, compared to the baseline 1961-1990 period.

Water Supply

Uncertainty remains with respect to the overall impact of global climate change on future water supplies in California. Studies have found that, "Considerable uncertainty about precise impacts of climate change on California hydrology and water resources will remain until we have more precise and consistent information about how precipitation patterns, timing, and intensity will change."[31] For example, some studies identify little change in total annual precipitation in projections for California while others show significantly more precipitation.[32] Warmer, wetter winters would increase the amount of runoff available for groundwater recharge; however, this additional runoff would occur at a time when some basins are either being recharged at their maximum capacity or are already full.[33] Conversely, reductions in spring runoff and higher evapotranspiration because of higher temperatures could reduce the amount of water available for recharge.[34] The California Department of Water Resources report on climate change and effects on the State Water Project (SWP), the Central Valley Project, and the Sacramento-San Joaquin Delta, concludes that "climate change will likely have a significant effect on California's future water resources…[and] future water demand."[35] It also reports that "much uncertainty about future water demand [remains], especially [for] those aspects of future demand that will be directly affected by climate change and warming. While climate change is expected to continue through at least the end of this century, the magnitude and, in some cases, the nature of future changes is uncertain."[36] It also reports that the relationship between climate change and its potential effect on water demand is not well understood, but "[i]t is unlikely that this level of uncertainty will

[28] *California Natural Resources Agency, Climate Action Team, 2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008, (2009).*

[29] *Ibid.*

[30] *The Cal-Adapt website address is: http://cal-adapt.org.*

[31] *Pacific Institute for Studies in Development, Environment and Security, Climate Change and California Water Resources: A Survey and Summary of the Literature, July 2003. http://www.pacinst.org/reports/climate_change_and_california_water_resources.pdf. Accessed August 2014.*

[32] *Ibid.*

[33] *Ibid.*

[34] *Ibid.*

[35] *California Department of Water Resources Climate Change Report, Progress on Incorporating Climate Change into Planning and Management of California's Water Resources, July 2006. http://baydeltaoffice.water.ca.gov/climatechange/DWRClimateChangeJuly06_update8-2-07.pdf. Accessed April 2014.*

[36] *Ibid.*

diminish significantly in the foreseeable future."[37] Still, changes in water supply are expected to occur, and many regional studies have shown that large changes in the reliability of water yields from reservoirs could result from only small changes in inflows. In its *Fourth Assessment Report*, the IPCC states "Changes in the global water cycle in response to the warming over the 21st century will not be uniform. The contrast in precipitation between wet and dry regions and between wet and dry seasons will increase, although there may be regional exceptions."[38]

Hydrology and Sea Level Rise

As discussed above, climate changes could potentially affect: the amount of snowfall, rainfall and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for salt water intrusion. Sea level rise can be a product of global warming through two main processes: expansion of seawater as the oceans warm, and melting of ice over land. A rise in sea levels could result in coastal flooding and erosion and could jeopardize California's water supply. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events.

Agriculture

California has a $30 billion agricultural industry that produces half the country's fruits and vegetables. Higher CO_2 levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, water demand could increase; crop-yield could be threatened by a less reliable water supply; and greater ozone pollution could render plants more susceptible to pest and disease outbreaks. In addition, temperature increases could change the time of year certain crops, such as wine grapes, bloom or ripen, and thus affect their quality.[39]

Ecosystems and Wildlife

Increases in global temperatures and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. Increasing concentrations of GHGs are likely to accelerate the rate of climate change. Scientists expect that the average global surface temperature could rise by 2-11.5°F (1.1-6.4°C) by 2100, with significant regional variation.[40] Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Sea level could rise as much as two feet along most of the U.S. coast. Rising temperatures could have four major impacts on plants and animals: (1) timing of ecological events; (2) geographic range; (3) species' composition within communities; and (4) ecosystem processes such as carbon cycling and storage.[41]

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[37] *Ibid.*

[38] *Intergovernmental Panel on Climate Change, Fifth Assessment Report, Summary for Policy Makers, (2013) 20.*

[39] *California Climate Change Center, Our Changing Climate: Assessing the Risks to California, (2006).*

[40] *National Research Council, Advancing the Science of Climate Change, (2010).*

[41] *Parmesan, C., 2004. Ecological and Evolutionary Response to Recent Climate Change. Annu. Rev. Ecol. Evol. Syst. 2006. 37:637–69; Parmesan, C and Galbraith, H, 2004. Observed Ecological Impacts of Climate Change in North America. Arlington, VA: Pew. Cent. Glob. Clim. Change*

Existing Emissions

The site is occupied by 285 single-family residential properties and City streets. The existing site generates operational GHG emissions from the 285 single-family residential properties. Sources of emissions include natural gas combustion from residential heating and cooking and fossil fuel combustion from landscaping equipment. In addition, motor vehicles traveling to and from the site generate emissions from fossil fuel combustion. These emissions would occur after implementation of the RAP; therefore, no long-term change in these operational emissions is anticipated.

According to the RAP, methane resulting from degradation of petroleum hydrocarbons is present at the site in soil vapor.[42] As discussed previously, methane is defined under State law as a GHG. However, "[v]ery few instances of methane detection above 1% (i.e., 20% of the LEL) have been found in subslab soil vapor, and in all but one location, the results of methane speciation indicate the source was either a natural gas pipeline leak or sewer leak."[43] Methane resulting from biodegradation of residual petroleum hydrocarbons was identified in one sub-slab garage probe at one property; however, methane was either not detected or detected at very low levels (less than 0.01 percent) at this property.[44] Furthermore, no methane exceedances were found at this property during the indoor air screening, and methane was not detected in indoor air samples analyzed by a laboratory.[45] Thus, existing methane emissions at the site due to petroleum hydrocarbons in soil vapor is considered negligible.

3. METHODOLOGY AND THRESHOLDS

Methodology

The evaluation of potential GHG impacts that may result from the short- and long-term implementation of the RAP is conducted as follows:

Short-Term GHG Emissions

Implementation of the RAP has the potential to generate short-term criteria pollutant emissions through the use of heavy-duty construction equipment and through vehicle trips generated from workers traveling to and from the site. Site remediation, including installation of the SVE/bioventing system and street paving, would being in 2015 and is expected to take approximately 6 years. Exhaust emissions would result from the use of construction equipment, such as dozers and loaders, and from on-road vehicle, such as haul trucks and worker vehicles. Fugitive emissions, such as methane, would occur from exposing contaminated material to the ambient air due to excavation and soil handling. Construction emissions can vary substantially from day-to-day, depending on the level of activity, the specific type of operation and, for dust, the prevailing weather conditions. The assessment of construction air quality impacts considers each of these potential sources.

[42] *Geosyntec Consultants and URS Corporation, Revised Remedial Action Plan, Former Kast Property, Carson, California, (2014) ES-2.*

[43] *Ibid., 3-7.*

[44] *Ibid., 3-7, 3-8.*

[45] *Ibid., 3-8.*

Short-term GHG emissions from heavy-duty construction equipment from vehicle trips generated from export and import of materials, visitors and workers traveling to and from the site were compiled using the mobile-source emissions factors derived from CARB's on-road and off-road emissions models (e.g., OFFROAD and EMFAC), which are emissions estimation models developed by CARB and frequently used to calculate emissions from construction activities. The output values used in this analysis were adjusted to be project-specific, based on equipment usage rates, type of fuel, and implementation schedule.

Short-term GHG emissions resulting from implementation of the RAP were developed for construction equipment that would be used on-site and on-road construction equipment which can travel on- and off-site. GHG emissions from equipment (dozers, loaders, sweepers, and other heavy-duty construction equipment) and on-road vehicles (tractor trailers, light duty trucks, employee vehicles, etc., which can travel on highways and local roads) were evaluated separately to account for the CARB's published emissions factors for both categories of equipment. GHG emissions for off-road equipment were then calculated by multiplying an emission factor by the horsepower, load factor, and operational hours for each type of equipment.

On-road equipment emissions are generated from pick-up trucks, water trucks, dump trucks, haul trucks, delivery trucks, and other on-road vehicles (i.e., vehicles licensed to travel on public roadways). Exhaust emissions from on-road on-site sources were calculated using the emission factors for CO_2 from CARB's on-road emission factor model. Emissions factors for heavy-duty diesel vehicles and trucks were based on EMFAC2011 emission factors for the "heavy-heavy-duty" vehicle classification. A complete listing of the short-term GHG emission assumptions used in this analysis is included within the CalEEMod printout sheets that are provided in Appendix D of this EIR.

The analysis of GHG impacts also considers an Expedited Implementation Option. Under the Expedited Implementation Option, rather than a cluster of up to 8 properties, the number being actively remediated could be incrementally increased with up to 16 properties active at one time. Given the overlap in activity with the clusters there could be up to 32 properties in some stage of remediation at one time. The total amount of demolished materials and excavated soils would be the same as under the project. The Expedited Implementation Option would result in a greater level of activity within the community on a given day but would not change the level of activity at an individual property. As with the RP's Proposed Remedy, under the Expedited Implementation Option, remediation would begin in 2015. However, with the increase in implementation, it is anticipated that the remediation would be complete in approximately 4 years.

Long-Term GHG Emissions

Long-term implementation of the RAP would entail periodic maintenance and monitoring as needed. Thus, long-term emissions would be caused by stationary (SVE/bioventing) and mobile (on-road and off-road) sources. The long-term net increase in emissions from new sources are expected to be minimal. Maintenance and housekeeping trips to support long-term RAP activities would occur on a monthly or less frequent basis, as needed. Stationary-source emissions from SVE/bioventing would also be minimal, given methane was non-detect at the majority of properties with only trace or low levels at a few properties. Therefore, the potential for long-term impacts are discussed qualitatively. Emissions caused by the supply of electricity to run the SVE/bioventing system as well as the sequestration of GHGs by restored vegetation on-site were not included as they are expected to be negligible.

Thresholds of Significance

For purposes of this EIR, the Regional Board has utilized the checklist questions in Appendix G of the *CEQA Guidelines* as thresholds of significance to determine whether the project would have a significant environmental impact regarding GHG and climate change. Based on the size and scope of the project and the potential for GHG impacts, the thresholds identified below are included for evaluation in this EIR.

Would the project:

a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, based on any applicable threshold of significance?

b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHG

Section 15064.7 of the CEQA Guidelines defines a threshold of significance as an identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant. CEQA leaves the determination of significance to the reasonable discretion of the lead agency and encourages lead agencies to develop and publish thresholds of significance to use in determining the significance of environmental effects. However, as of May 2014, the Regional Water Quality Control Board and the State Water Resources Control Board have not proposed or approved specific numeric thresholds for GHG emissions. Neither CARB nor SCAQMD have adopted numeric thresholds applicable to a remedial project. Thus, for CEQA purposes, the Regional Board has determined that the appropriate numeric threshold of significance to assess the short- and long-term GHG impacts of a project of this nature with respect to the first Appendix G checklist item is the SCAQMD's industrial source, 10,000 $MTCO_2e$ per year, threshold. This determination is based on the recommendation from the SCAQMD that industrial projects utilize the 10,000 $MTCO_2e$ per year threshold, which is used by the SCAQMD itself for projects where it is the lead agency under CEQA. With respect to the second checklist item, the Regional Board has determined that the appropriate threshold of significance is assessing the project's general consistency with the goals of HSC Division 25.5. While HSC Division 25.5 does not prescribe specific project-level measures, the *Climate Change Scoping Plan* provides strategies for the State to reduce GHG emissions in order to achieve the 2020 target.

Greenhouse Gas Emissions

GHG-1 Generate GHG emissions, either directly or indirectly, that would exceed 10,000 $MTCO_2e$ per year.

Greenhouse Gas Plans

GHG-2 Conflict with the GHG emissions reductions goals and strategies of HSC Division 25.5.

4. PROJECT ANALYSIS

Project Design Features

The following PDFs would result in a reduction in GHG emissions and are considered as part of the project in the analysis. A number of the PDFs listed below have been previously introduced in Section 5.1, Air Quality, of this EIR and are reproduced below. The PDFs from Section 5.1, *Air Quality*, are denoted as "PDF AQ-#."

PDF AQ-1 All off-road diesel construction equipment remaining on-site for more than 15 work days will meet USEPA Tier 3 off-road emission standards, if commercially available locally. Use of Tier 3 engines results in a substantial reduction in NO_X emissions compared to similar Tier 2 or lower engines, and has been shown to increase fuel economy over similar Tier 2 engines.[46] Documentation of all off-road diesel construction equipment on-site including Tier 3 certification will be maintained and made available to the Regional Board for inspection upon request.

PDF AQ-2 All on-road waste haul trucks exporting soil to the appropriate receiver facility will be model year 2007 or newer or retrofitted to comply with USEPA Year 2007 on-road emissions standards. Documentation of all on-road trucks exporting soil will be maintained and made available to the Regional Board for inspection upon request.

PDF AQ-3 The project will prohibit the idling of on- and off-road heavy duty diesel vehicles for more than five minutes at a time. This project design feature is consistent with California regulations and laws as well as CARB ATCM requirements.

PDF AQ-11 In order to minimize traffic congestion at or near the site, some construction worker parking will be provided at a nearby off-site location. Shuttles and/or vans will be provided to transport some of the construction workers from the off-site parking location to the site.

PDF AQ-12 To the maximum practical extent, recyclable materials, including non-hazardous construction and demolition debris, will be reused or recycled.

PDF GHG-1 The project will comply with the use of low carbon vehicle fuels as required under State law.

Analysis of Project Impacts

Greenhouse Gas Emissions

Threshold GHG-1: Would the project generate greenhouse gas emissions, either directly or indirectly, that would exceed 10,000 $MTCO_2e$ per year?

Impact Statement GHG-1: *Implementation of the RAP and the Expedited Implementation Option would result in short-term GHG emissions that would not exceed the significance threshold. Implementation of the RAP would not result in long-term emissions that exceed the significance threshold. Thus, implementation of the RAP would not generate GHG emissions, either directly or indirectly, that would*

[46] *Komatsu Technical Report, Development of Tier 3 Engine ecot3, Vol. 52, No. 157, http://www.komatsu.com/CompanyInfo/profile/report/pdf/157-03_E.pdf. 2006. Accessed August 2014.*

have a significant impact on the environment and impacts related to short-term and long-term GHG emissions would be less than significant.

Short-Term Impacts

Implementation of the RAP has the potential to generate short-term GHG emissions through the use of heavy-duty construction equipment and through vehicle trips generated from export and import of materials, visitors and workers traveling to and from the project site. In order to provide a conservative analysis, emissions associated with average daily and peak daily activity were estimated. Assumptions for each construction phase and the equipment that would be used during RAP implementation are provided in Appendix D of this EIR.

Emissions of GHGs were estimated for each year during the 6 year duration. The emissions were calculated for the activities described previously (i.e., residential excavation and associated activities, street trenching/pipe installation, well installation, and street paving) and include exhaust emissions and fugitive GHG emissions from contaminated soil (i.e., methane) that could be released to the atmosphere during soil handling activities. The emissions estimates take into account PDFs implemented during the construction activities that would limit, minimize, and reduce short-term GHG emissions. The majority of the emissions would be attributed to haul trucks exporting on-site materials or importing soil for the protective cover. Results of this analysis are presented in **Table 5.3-2**, *Unmitigated Short-Term Greenhouse Gas Emissions*. The estimated short-term GHG operational emissions are below the SCAQMD interim industrial standard of 10,000 $MTCO_2e$ per year (See Table 5.3-2).

Table 5.3-1

Unmitigated Short-Term Greenhouse Gas Emissions

Emission Source	Maximum Annual CO_2e (Metric Tons/year) [a]
Implementation of the RAP (6 years)	1,976
Applicable threshold	**10,000**
Exceeds Significance Threshold?	**No**

[a] *Emissions calculations are included in Appendix D of this EIR.*

Source: PCR Services Corporation, 2014

Expedited Implementation Option

Under the Expedited Implementation Option, the number of properties being remediated at one time could increase. Therefore, GHG emissions occurring in a single year would increase as a result of the use of additional heavy-duty construction equipment, increased excavation amounts, and increased numbers of haul trucks, vendor trucks, and construction worker trips. However, the overall number of years associated with implementation of the RAP would decrease.

Emissions of GHGs were estimated for each year of activity. The emissions were calculated for the activities described previously (i.e., residential excavation and associated activities, street trenching/pipe installation, well installation, and street paving) and include exhaust emissions and fugitive GHG emissions from

contaminated soil (i.e., methane) that could be released to the atmosphere during soil handling activities. The emissions estimates take into account PDFs implemented during the construction activities that would limit, minimize, and reduce short-term GHG emissions. The majority of the emissions would be attributed to haul trucks exporting on-site materials or importing soil for the protective cover. Results of this analysis are presented in **Table 5.3-3**, *Unmitigated Short-Term Greenhouse Gas Emissions – Expedited Implementation Option*. As shown in Table 5.3-3 the short-term GHG emissions would not exceed SCAQMD's 10,000 $MTCO_2e$ per year threshold.

Table 5.3-3

Unmitigated Short-Term Greenhouse Gas Emissions
Expedited Implementation Option

Emission Source	Maximum Annual CO_2e (Metric Tons/year) [a]
Expedited Implementation Option (4 years)	3,480
Applicable threshold	**10,000**
Exceeds Significance Threshold?	**No**

[a] *Emissions calculations are included in Appendix D of this EIR.*

Source: PCR Services Corporation, 2014

Long-Term Impacts

Emissions of GHGs resulting with long-term operations associated with the RAP would be generated by long-term activities, which include worker commute trips to support monitoring and maintenance activities. As described in Section 2.0, Project Description, long-term activities may include monthly or less frequent LNAPL recovery, quarterly or less frequent groundwater monitoring, and monitoring of utility vaults and street soil vapor probes. In addition, annual inspections to verify that the SSD systems are operating (monitoring of the vacuum and flow rate of the SSD fan) would be conducted. Therefore, the number of vehicle trips to the site would be negligible and annual long-term GHG emissions would be several orders of magnitude smaller than the short-term GHG emissions. As discussed previously, methane detected at one property from biodegradation of residual petroleum hydrocarbons was detected at very low concentrations (less than 0.01 percent) at this property.[47] Furthermore, no methane exceedances were found at this property during the indoor air screening, and methane was not detected in indoor air samples analyzed by a laboratory.[48] Thus, methane emissions from the SVE/bioventing system would be negligible. As a result, impacts related to regional emissions from long-term operations of the proposed RAP would be less than significant.

Greenhouse Gas Plan Conflicts

Threshold GHG-2: Would the project conflict with the greenhouse gas emissions reductions goals and strategies of HSC Division 25.5?

[47] *Ibid., 3-7, 3-8.*

[48] *Ibid., 3-8.*

Impact Statement GHG-2: *Implementation of the RAP would incorporate GHG reduction strategies that would be consistent with applicable GHG reduction plans. Therefore, implementation of the RAP under the Expedited Implementation Option would not conflict with plans for reducing GHG emissions and impacts relative to this threshold would be less than significant.*

Short-Term Impacts

As discussed in the Regulatory Framework section above, the State has promulgated regulations and programs for the purpose of reducing GHG emissions. The GHG emissions analysis in this EIR was performed in accordance with SCAQMD and CARB guidance developed in compliance with, and as a result of, those regulations and programs. The result of the analysis of the project's potential impacts in terms of GHG and global climate change indicates that the short-term and long-term GHG emissions from the project alone would not be expected to cause a direct physical change in the environment. Therefore, the project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHG.

The underlying purpose of the RAP is to remediate the site consistent with the Regional Board's Cleanup and Abatement Order (CAO) R4-2011-0046 dated March 11, 2011, as amended. The project objectives include limiting or minimizing environmental impacts associated with the cleanup activities. Although implementation of the RAP would result in a temporary increase in GHG emissions in the short-term, overall, the project would be considered consistent with the general goals of HSC Division 25.5 in that it would comply with applicable GHG reduction strategies. In support of HSC Division 25.5, the State has promulgated laws and strategies aimed at reducing GHG emissions, some of which are applicable to the remediation activities. Consistent with HSC Division 25.5, the Project would minimize short-term GHG emissions by using equipment that meet stringent USEPA emissions standards, using low carbon vehicle fuels as required under state law, and prohibiting diesel-fueled commercial motor vehicle idling consistent with CARB requirements. Additionally, the project would meet other applicable GHG reduction goals by incorporating strategies such as recycling non-hazardous on-site material to the maximum extent possible.

Since HSC Division 25.5 sets statewide targets for future GHG emissions, the Scoping Plan and other implementing tools of the law are clear that the reductions are not expected to occur uniformly from all sources or sectors. **Table 5.3-4,** *Greenhouse Gas Reduction Strategies*, contains a list of GHG-reduction strategies applicable to the project. Because the RAP would not conflict with strategies to reduce GHG emissions, it would be consistent with the overarching regulation to reduce GHG emissions. Therefore, implementation of the RAP would not conflict with plans for reducing GHG emissions and impacts relative to this threshold would be less than significant.

Expedited Implementation Option

The Expedited Implementation Option would incorporate the same GHG reduction strategies as the project (see Table 5.3-4). In addition, similar to the project, the Expedited Implementation Option would recycle non-hazardous on-site material to the maximum extent possible. Therefore, the Expedited Implementation Option would not conflict with plans for reducing GHG emissions and impacts relative to this threshold would be less than significant.

Table 5.3-4

Greenhouse Gas Reduction Strategies

Source	Description	Demonstration of Project Consistency
HSC Section 42823 and 43018.5 (Pavley Regulations)	Reduces GHG emissions in new passenger vehicles from 2012 through 2016. Also reduces gasoline consumption to a rate of 31 percent of 1990 gasoline consumption (and associated GHG emissions) by 2020	Applies to all new vehicles.
Low Carbon Fuel Standard	Establishes protocols for measuring life-cycle carbon intensity of transportation fuels and helps to establish use of alternative fuels.	Applies to fuels utilized by the Project.
Climate Action Team	Reduce diesel-fueled commercial motor vehicle idling.	Project is committed to implementing.

Source: Climate Action Team, Attorney General's Office, 2011; PCR Services Corporation, 2014

Long-Term Impacts

As discussed above, emissions of GHGs associated with long-term operations would be generated by long-term activities, which include worker commute trips to support monitoring and maintenance activities. These sources of long-term GHG emissions would not conflict with applicable GHG reduction strategies shown in Table 5.3-4. Therefore, impacts relative to this threshold would be less than significant.

5. PROJECT ENERGY IMPLICATIONS

Short-Term - Project

Consistent with Appendix F, Energy Conservation, of the State *CEQA Guidelines*, the potential energy implications that would occur with the implementation of the RAP are evaluated. Since energy consumption is related to emissions of GHGs, this section includes relevant information and analyses that address the energy implications of the project as described in Appendix F of the State *CEQA Guidelines*. This section represents a summary of the project's anticipated short-term energy needs, impacts, and conservation measures.

Active remediation to implement the RAP would last for approximately 6 years. Heavy-duty equipment associated with RAP implementation activities would include diesel-fueled equipment and haul trucks. Heavy-duty equipment associated with remediation would include bobcats, generators, small excavators, pumps, compactors, street sweepers, and pavers. The majority of the equipment would likely be diesel-fueled; however, smaller equipment, such as air compressors and lifts may be electric-, gas-, or natural gas-fueled. Based on the number and type of construction equipment that would be used during project construction, and based on the estimated duration of construction, implementation of the RAP would use approximately 31,525 gallons of diesel fuel for heavy-duty equipment.[49]

[49] *Fuel consumption is estimated based on fuel consumption factors in the OFFROAD2011 emissions model and the project-specific equipment horsepower and load factor ratings.*

The demolition, excavation, trenching, well installation, and street paving activities would generate debris and soil requiring off-site disposal. In addition, backfill materials and equipment supplies would be delivered to the site. These activities would require diesel-fueled haul and delivery trucks. It is estimated that haul and delivery trucks would travel a total of approximately 2,683,006 miles to transport material to and from the site. Based on the number of truck miles traveled, implementation of the RAP would use approximately 465,200 gallons of diesel fuel for hauling and delivery of demolition debris, excavation materials, backfill materials, and equipment supplies.[50]

The number of site workers that would be required would vary based on the activity taking place. The transportation fuel required by construction workers would depend on the total number of worker trips estimated for the duration of RAP implementation. A 2009 study by the California Department of Transportation (Caltrans) found that the statewide average fuel economy for all vehicle types (automobiles, trucks, and motorcycles) was 18.133 miles per gallon.[51] In 2012, California consumed a total of 337,666 thousand barrels of gasoline for transportation, which is equivalent to a total annual consumption of 14.1 billion gallons by the transportation sector.[52] For diesel, California consumed a total of 72,945 thousand barrels for transportation, which is equivalent to a total annual consumption of 3 billion gallons by the transportation sector.[53] According to the California Emissions Estimator Model (CalEEMod), worker roundtrips are assumed to be approximately 21.6 miles per round trip. Based on this data, approximately 82 percent of fuel by volume used in the transportation sector is gasoline. Assuming construction worker vehicles have an average fuel economy consistent with the Caltrans study and assuming the gasoline to diesel ratio is similar to the data provided above, based on the projected number of workers during all activities associated with RAP implementation, approximately 60,319 gallons of gasoline and 13,241 gallons of diesel fuel would be used for worker trips.

Based on the fuel usage amounts presented above, implementation of the RAP would use approximately 60,319 gallons of gasoline and 478,441gallons of diesel, assuming heavy-duty construction equipment is primarily diesel-fueled. Based on the statewide 2012 fuel use data for the transportation sector provided above, implementation of the RAP would use approximately 0.0004 percent of the statewide annual gasoline consumption and 0.02 percent of the statewide annual diesel consumption in the short-term.

As discussed previously, implementation of the RAP would incorporate PDFs to minimize equipment idling and traffic congestion. The project would prohibit the idling of on- and off-road heavy duty diesel vehicles for more than five minutes at a time (PDF AQ-3) and would provide a dedicated off-site worker parking area to minimize traffic congestion at or near the site (PDF AQ-11). In addition, newer Tier 3 equipment would be used for on-site remediation activities (PDF AQ-1) and model year 2007 of later haul trucks would be used to transport materials to and from the site (PDF AQ-2). Idling restrictions and the use of newer engines and equipment would result in less fuel combustion and energy consumption. Compliance with the above anti-idling and emissions regulations would result in efficient use of construction-related energy and the

[50] *Fuel consumption is estimated based on fuel consumption factors in the EMFAC2011 on-road vehicle emissions model for heavy-heavy-duty construction trucks and trip distances in the California Emissions Estimator Model (CalEEMod).*

[51] *California Department of Transportation, 2008 California Motor Vehicle Stock, Travel and Fuel Forecast, Table 7, (2009).*

[52] *U.S. Energy Information Administration, Table F3: Motor Gasoline Consumption, Price, and Expenditure Estimates, 2012, http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_mg.html&sid=US. Accessed July 2014.*

[53] *U.S. Energy Information Administration, Table F3: Motor Gasoline Consumption, Price, and Expenditure Estimates, 2012, http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_use_df.html&sid=US. Accessed July 2014.*

minimization or elimination of wasteful and unnecessary consumption of energy. The efficient use of energy and the minimization or elimination of wasteful and unnecessary consumption of energy leads to the minimization or elimination of wasteful and unnecessary GHG emissions, which is consistent with the State's goals and regulations intended to reduce GHG emissions.

Short-Term - Expedited Implementation Option

Consistent with Appendix F, Energy Conservation, of the State *CEQA Guidelines*, the potential energy implications that would occur with the implementation of the RAP are evaluated. The Expedited Implementation Option would take approximately 4 years and would require the same types of heavy-duty equipment as the RP's Proposed Remedy. While the Expedited Implementation Option would result in increased daily activities at the site, the total amount of activity would remain the same as the RP's Proposed Remedy. Therefore, the Expedited Implementation Option would result in the same total short-term fuel and energy use as discussed for the RP's Proposed Remedy.

The Expedited Implementation Option would incorporate the same PDFs as the RP's Proposed Remedy to minimize equipment idling and traffic congestion. Idling restrictions and the use of newer engines and equipment would result in less fuel combustion and energy consumption. Similar to the RP's Proposed Remedy, compliance with the anti-idling and emissions regulations, as well as the use of newer equipment and trucks, would result in efficient use of construction-related energy and the minimization or elimination of wasteful and unnecessary consumption of energy. The efficient use of construction-related energy and the minimization or elimination of wasteful and unnecessary consumption of energy leads to the minimization or elimination of wasteful and unnecessary GHG emissions, which provides additional support that the Expedited Implementation Option would not conflict with the State's plans and strategies to reduce GHG emissions.

Long-Term

With respect to Appendix F of the State *CEQA Guidelines*, long-term energy implications would be generally negligible. Worker commute trips to support monitoring and maintenance activities would be minimal. As described in Section 2.0, *Project Description*, long-term activities may include monthly or less frequent LNAPL recovery, quarterly or less frequent groundwater monitoring, and monitoring of utility vaults and street soil vapor probes. In addition, annual inspections to verify that the SSD systems are operating (monitoring of the vacuum and flow rate of the SSD fan) would be conducted. Therefore, the number of vehicle trips to the site would be negligible. The fuel used for these vehicle trips would be several orders of magnitude smaller than the short-term fuel use numbers discussed above. The electricity to run the SVE/bioventing system would be negligible. The system would be regularly maintained to ensure equipment is operating as intended, and minimize the potential for wasteful and unnecessary consumption of energy from equipment in the long-term.

6. ALTERNATIVES ANALYSIS

Analysis of Impacts Associated with Alternative 1 (No Project Alternative)

The No Project Alternative would not involve any excavation of soils or change to existing conditions that would result in new sources of GHG emissions at the site. The No Project Alternative would avoid any

potential excavation-related impacts associated with GHG emissions, which were determined to be less than significant under the RAP with the implementation of PDFs. Thus, the No Project Alternative would avoid the RAP's GHG impacts.

Analysis of Impacts Associated with Alternative 2 (Excavation Beneath Landscape and Hardscape to 10 Feet Alternative)

This Alternative would entail excavation of soils from landscaping and beneath residential hardscape to a depth of 10 feet below ground surface (bgs) at all affected properties. Unlike the RP's Proposed Remedy, which would require approximately 6 years, this Alternative would require proportionately additional years in order to excavate the additional materials. This Alternative would also implement the same PDFs as described previously.

Greenhouse Gas Emissions

Short-Term Impacts

Alternative 2 has the potential to create short-term GHG impacts through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and construction workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the same as the RP's Proposed Remedy. Remedial activities would occur for a greater number of days overall to account for the additional excavated material. The GHG emissions estimates take into account the same PDFs as the RP's Proposed Remedy. As shown in **Table 5.3-5**, *Unmitigated Short-Term Greenhouse Gas Emissions – Alternative 2,* the total short-term GHG emissions under this Alternative would not exceed SCAQMD's 10,000 $MTCO_2e$ per year threshold and impacts would be less than significant.

Table 5.3-5

Unmitigated Short-Term Greenhouse Gas Emissions – Alternative 2

Emission Source	Maximum Annual CO_2e (Metric Tons/year)
Alternative 2 – Implementation of the RAP (6 years)	1,976
Applicable threshold	**10,000**
Exceeds Significance Threshold?	**No**

Source: PCR Services Corporation, 2014

Long-Term Impacts

Alternative 2 would include the same long-term activities and equipment as the RP's Proposed Remedy. As a result, emissions of GHGs associated with long-term operations under Alternative 2 would be the same as the RP's Proposed Remedy. As a result, impacts related to GHG emissions from long-term operations under this Alternative would be less than significant.

Greenhouse Gas Plan Conflicts

Short-Term Impacts

The PDFs under Alternative 2, which would be the same as the RP's Proposed Remedy, would minimize equipment idling and traffic congestion. While this alternative would result in a temporary increase in GHG emissions in the short-term, overall, Alternative 2 would be considered consistent with the general goals of HSC Division 25.5 in that it would comply with applicable GHG reduction strategies. Consistent with HSC Division 25.5, this Alternative would minimize short-term GHG emissions by using equipment that meet stringent USEPA emissions standards, using low carbon vehicle fuels as required under state law, and prohibiting diesel-fueled commercial motor vehicle idling consistent with CARB requirements. Additionally, this Alternative would meet other applicable GHG reduction goals by incorporating strategies such as recycling non-hazardous on-site material to the maximum extent possible. Because this alternative would not conflict with strategies to reduce GHG emissions, it would be consistent with the overarching regulation to reduce GHG emissions. Therefore, this Alternative would not conflict with plans for reducing GHG emissions and impacts relative to this threshold would be less than significant.

This Alternative would incorporate the same PDFs as the RP's Proposed Remedy to minimize equipment idling and traffic congestion. Idling restrictions and the use of newer engines and equipment would result in less fuel combustion and energy consumption. Similar to the RP's Proposed Remedy, compliance with the anti-idling and emissions regulations, as well as the use of newer equipment and trucks, would result in efficient use of construction-related energy and the minimization or elimination of wasteful and unnecessary consumption of energy. However, since this Alternative would include excavation to 10 feet bgs at properties requiring excavation, it would result in the removal of soils that do not warrant excavation as per the Site-Specific Cleanup Goals (SSCGs). As such, this Alternative would require the use of additional transportation fuels to transport the increased amounts of excavation and backfill materials to and from the site as compared to the RP's Proposed Remedy. From a transportation energy perspective, this Alternative would less efficient than the RP's Proposed Remedy due to the need to transport materials that do not warrant excavation as per the SSCGs.

Long-Term Impacts

As discussed above, emissions of GHGs associated with long-term operations would be the same under Alternative 2 as the RP's Proposed Remedy. Similar to the RP's Proposed Alternative, long-term GHG emissions would not conflict with applicable GHG reduction strategies shown in Table 5.3-4. Therefore, impacts relative to this threshold would be less than significant.

Energy Implications

Short-Term Impacts

In accordance with Appendix F of the State *CEQA Guidelines*, in order to ensure that energy implications are considered in project decisions, the potential energy implications of this Alternative are considered. Since energy consumption is related to emissions of GHGs, this section includes relevant information that address the energy implications of the project as described in Appendix F of the State *CEQA Guidelines*. This Alternative would take approximately 8 years and would require the same types of heavy-duty equipment as the RP's Proposed Remedy. Based on the number and type of construction equipment that would be used, and based on the estimated duration of RAP implementation under this Alternative, approximately 43,936

gallons of diesel fuel would be used for heavy-duty equipment.[54] Similar to the RP's Proposed Remedy, this Alternative would require diesel-fueled haul and delivery trucks. Based on the additional, excavation and backfill materials needed for this Alternative, approximately 743,657 gallons of diesel would be used to transport materials to and from the site. Under this Alternative, based on the projected number of workers during all remediation activities, approximately 75,819 gallons of gasoline and 16,643 gallons of diesel fuel would be used for worker trips. Thus, the Alternative 2 would use in total approximately 75,819 gallons of gasoline and 760,300 gallons of diesel, assuming heavy-duty construction equipment is primarily diesel-fueled. Based on the statewide 2012 fuel use data for the transportation sector provided above, implementation of the RAP would use approximately 0.0005 percent of the statewide annual gasoline consumption and 0.03 percent of the statewide annual diesel consumption in the short-term.

Long-Term Impacts

With respect to Appendix F of the State *CEQA Guidelines*, as would be the case with the RP's Proposed Remedy, long-term energy implications under this Alternative would be generally negligible. Worker commute trips would be limited to monthly or less frequent trips for LNAPL recovery and quarterly or less frequent trips for groundwater monitoring and monitoring of utility vaults and street soil vapor probes. Annual inspection trips would occur for SSD systems maintenance. Therefore, the number of vehicle trips to the site would be negligible. The fuel used for these vehicle trips would be orders of magnitude smaller than the short-term fuel use numbers discussed above. The electricity to run the SVE/bioventing system would be negligible. The system would be regularly maintained to ensure equipment is operating as intended. Regular maintenance would minimize or eliminate the potential for wasteful and unnecessary consumption of energy from equipment.

Analysis of Impacts Associated with Alternative 3 (No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative)

Alternative 3 would not remove hardscape features or entail excavation of soils from beneath residential hardscape. As with the RP's Proposed Remedy, excavation would be to a depth of 5 feet with targeted 10 feet excavations where needed. Because excavations would not occur beneath hardscape features and no hardscape features would be removed, less excavation of COC-containing soils and inert debris would occur over individual residential properties. Total remediation would occur over an approximately 4-year period compared to approximately 6 years under the RP's Proposed Alternative. Daily demolition and excavation volumes, truck trips, and worker commutes are anticipated to be the same as the project. This Alternative would also implement the same PDFs described above.

Short-Term Impacts

Alternative 3 has the potential to create short-term GHG impacts through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and construction workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the same as the RP's Proposed Remedy. Remedial activities would occur for a fewer number of days overall to account for the reduced volume of excavated material. The GHG emissions estimates take into account PDFs

[54] *Fuel consumption is estimated based on fuel consumption factors in the OFFROAD2011 emissions model and the project-specific equipment horsepower and load factor ratings.*

implemented during the construction activities that would limit, minimize, and reduce short-term GHG emissions include: utilizing construction equipment meeting the USEPA Tier 3 off-road emission standards (PDF AQ-1); utilizing on-road export haul trucks that at a minimum comply with the USEPA 2007 on-road emissions standards (PDF AQ-2); prohibit the idling of on- and off-road heavy duty diesel vehicles for more than five minutes at a time (PDF AQ-3); utilizing low carbon fuels as required by state law (PDF GHG-1); and, to the maximum practical extent, recyclable materials, including non-hazardous construction and demolition debris, would be reused or recycled (PDF AQ-12). The majority of the emissions would be attributed to haul trucks exporting on-site materials or importing backfill materials. As shown in **Table 5.3-6**, *Unmitigated Short-Term Greenhouse Gas Emissions – Alternative 3,* the total short-term GHG emissions under this Alternative would not exceed SCAQMD's 10,000 $MTCO_2e$ per year threshold and impacts would be less than significant.

Table 5.3-6

Unmitigated Short-Term Greenhouse Gas Emissions – Alternative 3

Emission Source	Maximum Annual CO_2e (Metric Tons/year)
Alternative 3 – Implementation of the RAP (4 years)	1,976
Applicable threshold	**10,000**
Exceeds Significance Threshold?	**No**

Source: PCR Services Corporation, 2014

Long-Term Impacts

Alternative 3 would include the same long-term activities and equipment as the RP's Proposed Remedy. As a result, emissions of GHGs associated with long-term operations under Alternative 2 would be similar to the RP's Proposed Remedy. As a result, impacts related to GHG emissions from long-term operations under this Alternative would be less than significant.

Greenhouse Gas Plan Conflicts

Short-Term Impacts

The PDFs under Alternative 3, which would be the same as the RP's Proposed Remedy, would minimize equipment idling and traffic congestion. While this alternative would result in a temporary increase in GHG emissions in the short-term, overall, Alternative 3 would be considered consistent with the general goals of HSC Division 25.5 in that it would comply with applicable GHG reduction strategies. Consistent with HSC Division 25.5, this Alternative would minimize short-term GHG emissions by using equipment that meet stringent USEPA emissions standards, using low carbon vehicle fuels as required under state law, and prohibiting diesel-fueled commercial motor vehicle idling consistent with CARB requirements. Additionally, this Alternative would meet other applicable GHG reduction goals by incorporating strategies such as recycling non-hazardous on-site material to the maximum extent possible. Because this alternative would not conflict with strategies to reduce GHG emissions, it would be consistent with the overarching regulation to reduce GHG emissions. Therefore, this Alternative would not conflict with plans for reducing GHG emissions and impacts relative to this threshold would be less than significant.

This Alternative would incorporate the same PDFs as the RP's Proposed Remedy to minimize equipment idling and traffic congestion. Idling restrictions and the use of newer engines and equipment would result in less fuel combustion and energy consumption. Similar to the RP's Proposed Remedy, compliance with the anti-idling and emissions regulations, as well as the use of newer equipment and trucks, would result in efficient use of construction-related energy and the minimization or elimination of wasteful and unnecessary consumption of energy. Since this Alternative would not excavate soils from beneath residential hardscape, it would result in the removal of less soil compared to the RP's Proposed Remedy. As such, this Alternative would require the use of less transportation fuels to transport the reduced amounts of excavation and backfill materials to and from the site as compared to the RP's Proposed Remedy.

Long-Term Impacts

As discussed above, emissions of GHGs associated with long-term operations would be similar under Alternative 2 as the RP's Proposed Remedy. Similar to the RP's Proposed Alternative, long-term GHG emissions would not conflict with applicable GHG reduction strategies shown in Table 5.3-4. Therefore, impacts relative to this threshold would be less than significant.

Energy Implications

Short-Term Impacts

In accordance with Appendix F of the State *CEQA Guidelines*, in order to ensure that energy implications are considered in project decisions, the potential energy implications of this Alternative are considered. Since energy consumption is related to emissions of GHGs, this section includes relevant information that address the energy implications of the project as described in Appendix F of the State *CEQA Guidelines*. This Alternative would take approximately 4 years and would require the same types of heavy-duty equipment as the RP's Proposed Remedy. Based on the number and type of construction equipment that would be used, and based on the estimated duration of RAP implementation under this Alternative, approximately 19,505 gallons of diesel fuel would be used for heavy-duty equipment.[55] Similar to the RP's Proposed Remedy, this Alternative would require diesel-fueled haul and delivery trucks. Based on the additional, excavation and backfill materials needed for this Alternative, approximately 205,329 gallons of diesel would be used to transport materials to and from the site. Under this Alternative, based on the projected number of workers during all remediation activities, approximately 35,781 gallons of gasoline and 7,854 gallons of diesel fuel would be used for worker trips. Thus, Alternative 3 would use approximately 35,781 gallons of gasoline and 213,163 gallons of diesel, assuming heavy-duty construction equipment is primarily diesel-fueled. Based on the statewide 2012 fuel use data for the transportation sector provided above, implementation of the RAP would use approximately 0.0003 percent of the statewide annual gasoline consumption and 0.007 percent of the statewide annual diesel consumption in the short-term.

Long-Term Impacts

With respect to Appendix F of the State *CEQA Guidelines*, as would be the case with the RP's Proposed Remedy, long-term energy implications under this Alternative would be generally negligible. Worker commute trips would be limited to monthly or less frequent trips for LNAPL recovery and quarterly or less

[55] *Fuel consumption is estimated based on fuel consumption factors in the OFFROAD2011 emissions model and the project-specific equipment horsepower and load factor ratings.*

frequent trips for groundwater monitoring and monitoring of utility vaults and street soil vapor probes. Annual inspection trips would occur for SSD systems maintenance. Therefore, the number of vehicle trips to the site would be negligible. The fuel used for these vehicle trips would be orders of magnitude smaller than the short-term fuel use numbers discussed above. The electricity to run the SVE/bioventing system would be negligible. The system would be regularly maintained to ensure equipment is operating as intended. Regular maintenance would minimize or eliminate the potential for wasteful and unnecessary consumption of energy from equipment.

6. CUMULATIVE IMPACTS

Emitting GHGs into the atmosphere is not itself an adverse environmental effect. Rather, it is the increased accumulation of GHGs in the atmosphere that may result in global climate change. The resultant consequences of that climate change can cause adverse environmental effects. Due to the complex physical, chemical, and atmospheric mechanisms involved in global climate change, it is not possible to predict the specific impact, if any, to global climate change from one project's relatively small incremental increase in emissions.

As shown in Table 5.3-4, implementation of the RAP would incorporate GHG reduction strategies consistent with GHG reduction plans. Because of the complex physical, chemical and atmospheric mechanisms involved in global climate change, there is no basis for concluding that an emissions increase resulting from the project and the related projects could actually cause a measurable increase in global GHG emissions sufficient to force global climate change. In addition, emissions models used for project-level evaluations do not fully reflect improvements in technology and other reductions in GHG emissions that are likely to occur pursuant to State regulations, such as HSC Section 42823 and 43018.5, SB 1368, HSC Division 25.5, and Executive Order S-3-5, as well as future federal and/or state regulations. Therefore, it is not possible or meaningful to calculate emissions from each of the identified related projects and compare that with a numeric threshold or reduction target.

The project would cause a temporary increase in GHG emissions in the short-term, but is not expected to exceed the applicable significance threshold. The project would minimize short-term GHG emissions by using newer, cleaner, and energy efficient equipment as available. Long-term GHG emissions would be relatively minimal and consistent with applicable GHG reduction strategies. Therefore, implementation of the RAP would have a less than significant impact on the environment based on the above mentioned thresholds. Based on the above considerations, the project would not cause a cumulatively considerable impact and mitigation measures would not be required.

7. MITIGATION MEASURES

With the implementation of existing regulations and PDFs described above, the RP's Proposed Remedy nor the Expedited Implementation Option would result in significant impacts with respect to GHG emissions. Therefore, no mitigation measures would be necessary for the RP's Proposed Remedy or the Expedited Implementation Option.

With regard to alternatives, the No Project Alternative would not involve any excavation or other physical activity and would not result in any net new GHG emissions. Therefore, mitigation measures would not be

required for this Alternative. Alternative 2 and Alternative 3 would not result in significant impacts with respect to GHG emissions. Therefore, no mitigation measures would be necessary for Alternative 2 or Alternative 3.

8. LEVEL OF SIGNIFICANCE AFTER MITIGATION

No potentially significant impacts with respect to GHG emissions have been identified. No mitigation measures would be necessary. Because the RP's Proposed Remedy, Alternative 2, and Alternative 3 would be consistent with the applicable GHG reduction plans, mitigation measures would not be required. No significant impacts with respect to GHG emissions would occur. Alternative 1, the No Project Alternative, would not involve any physical activity or result in any net new GHG emissions. Therefore, no impacts are associated with the No Project Alternative.

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5.4 HAZARDOUS MATERIALS

1. INTRODUCTION

This section analyzes the project's potential impacts from hazards and hazardous materials. Relevant regulations and existing conditions are described, as well as the potential for the project to impact sensitive receptors. Information and the analysis in this section is largely based on the findings and documentation from the Human Health Risk Assessment (HHRA)[1], October 2014, that was prepared to identify and evaluate the potential risks to on-site human receptors. Data from this study, as well as other relevant information supporting the evaluation in this section are included in Appendix E of this EIR.

2. ENVIRONMENTAL SETTING

Regulatory Framework

Federal Regulations

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (USEPA), through the Code of Federal Regulations (CFR), defines a hazardous waste as a substance that (1) may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness and (2) that poses a substantial present or potential future hazard to human health or the environment when it is improperly treated, stored, transported, disposed of or otherwise managed. Hazardous waste can also be ignitable, corrosive, or reactive (explosive).[2] Hazardous and toxic substances are defined as chemicals (chemicals, dusts, mixtures, paints, fuels, solvents, etc.) present in the workplace which are capable of causing harm. A material that contains defined amounts of toxic chemicals may also be classified as a hazardous material. The USEPA has developed a list of specific hazardous wastes that are in the form of solids, semi-solids, liquids, and gases.

The USEPA is the lead federal agency responsible for enforcing federal regulations regarding hazardous materials and hazardous waste. The primary legislation governing hazardous materials and hazardous waste are the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Superfund Amendments and Reauthorization Act (SARA). A summary of potentially relevant major federal, state, and local laws regarding hazards and hazardous materials is provided below.

Resource Conservation and Recovery Act

The Federal Resource Conservation and Recovery Act[3] of 1976, as amended by the Hazardous Waste Amendments of 1984, provides for the management of hazardous waste for its entire existence (generation

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[1] *Geosyntec Consultants, 2014. Human Health Risk Assessment Report, Former Kast Property.*

[2] *U.S. Environmental Protection Agency; 40 CFR 261.3. http://www.gpo.gov/fdsys/pkg/CFR-2011-title40-vol26/pdf/CFR-2011-title40-vol26-sec261-3.pdf. Accessed August 2014.*

[3] *Resource Conservation and Recovery Act; 42 USC§6901-6992(k). http://elr.info/sites/default/files/docs/statutes/full/rcra.pdf. Accessed August 2014.*

to disposal) to ensure the waste is handled in a manner protective of human health and the environment. RCRA regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA's corrective action program is designed to investigate and guide the cleanup of any contaminated air, groundwater, surface water, or soil from hazardous waste management of spills or releases into the environment as a result of the past and present activities at RCRA-regulated facilities.

RCRA allows individual states to develop their own program for the regulation of hazardous waste as long as it is at least as stringent as RCRA. The State of California has developed the California Hazardous Waste Control Law (HWCL) (Health and Safety Code [HSC] §25100 et seq. and 22 California Code of Regulations [CCR] §66260.1 et seq.), and the USEPA has authorized RCRA enforcement by the State of California. Primary authority for the statewide administration and enforcement of the HWCL rests with the California Environmental Protection Agency (Cal EPA) Department of Toxic Substances Control (DTSC).

Under RCRA, a waste is hazardous if it belongs to any one of four waste categories as outlined below:

- Listed Wastes: specific wastes that EPA has determined are hazardous. The lists include the F-list (certain wastes from common manufacturing and industrial processes), K-list (certain wastes from specific industries), and P- and U-lists (certain wastes from specific commercial chemical products);
- Characteristic Wastes: wastes that do not meet any of the listings above but that exhibit ignitability, corrosivity, reactivity, or toxicity;
- Universal Wastes: batteries, pesticides, mercury-containing equipment (e.g., thermostats) and lamps (e.g., fluorescent bulbs); and,
- Mixed Wastes: waste that contains both radioactive and hazardous waste components.

RCRA Hazardous Waste Characterization/Classification

Under RCRA, waste characterization can be based on generator knowledge and/or testing to determine toxicity, ignitability, corrosivity and/or reactivity. To characterize a waste as RCRA hazardous for toxicity, sample results must be compared to the Toxicity Characteristic Leaching Procedure (TCLP) value for a particular constituent. The total concentration of a particular constituent must be compared to 20 times (20X) the threshold of the TCLP for that constituent. If the concentration does not exceed the 20X value, then the material is not considered RCRA hazardous; however, if the concentration exceeds this 20X value, then the sample must be analyzed for solubility using a TCLP method. If the result from TCLP test exceeds the TCLP value for the particular constituent, then the material is considered a RCRA-hazardous waste. If the TCLP result does not exceed the TCLP value for a particular constituent, then the material is non-hazardous under RCRA, though it can still be classified as hazardous under California law based on the results of a Waste Extraction Test (WET, see description below for non-RCRA hazardous waste characterization).

All RCRA-hazardous waste must either be disposed in a Class I landfill (i.e., sites that may accept hazardous and non-hazardous wastes), which may require some form of pre-treatment, or be destroyed via incineration or other appropriate methodology approved by the USEPA.

Non-RCRA Hazardous Waste Characterization/Classification

To characterize a waste as non-RCRA hazardous, the total concentration of a constituent must be compared to the Total Threshold Limit Concentration (TTLC) threshold value, and to 10 times (10X) the value of the Soluble Threshold Limit Concentrations (STLC) for that constituent. If the total concentration does not exceed the TTLC threshold or the 10X value, then the material is not non-RCRA hazardous; however, if the concentration exceeds this TTLC threshold, then it is considered non-RCRA hazardous, or if the concentration does not exceed the TTLC threshold, but exceeds the 10X value, then the sample must be analyzed for solubility using a WET. If the WET result exceeds the STLC threshold value for a particular constituent, then the material is considered a non-RCRA or California hazardous waste, and a TCLP test could be required to determine if this waste is RCRA hazardous. If the TTLC result does not exceed the TTLC threshold and the WET result does not exceed the STLC threshold value for a particular constituent, then the material is non-hazardous, pending the results of the TCLP test if the total concentration exceeds 20X the TCLP threshold.

When multiple samples are taken of a large quantity of impacted soil, appropriate averaging techniques are used to develop an average concentration of constituents of concern (COCs). This is done so that a small pocket of impacted soil with a high concentration of a COC (i.e., "nugget" effect) does not inappropriately define the entire soil quantity.

Non-Hazardous Waste

Materials that are not hazardous under California or federal law are considered non-hazardous and can be disposed in a Class III landfill (i.e., sites that may accept non-hazardous wastes). Materials disposed of in Class III landfills can include construction debris (i.e., asphalt, concrete, wood, etc.) and soil that is determined to be non-hazardous based on the results of analytical tests performed on the material.

National Contingency Plan/Comprehensive Environmental Response, Compensation, & Liability Act

The National Contingency Plan (NCP) is a blueprint for responding to both oil spills and hazardous substance releases originally prepared under the Clean Water Act. Following the passage of the Comprehensive Environmental Response, Compensation, and Liability Act in 1980, the NCP was broadened to cover releases at waste sites. CERCLA established the Federal Superfund program to respond to releases and threatened releases of hazardous substances at sites on the National Priority List (NPL), which are considered sufficiently impacted to justify the use of public funds for remediation, if no responsible parties are willing or able to perform the remediation. The NPL includes nine criteria with which to evaluate remedial alternatives.[4] An acceptable alternative must meet Criteria 1 and 2, known as "threshold criteria," in order to be carried further in the analysis. Criteria 3 through 7, known as "balancing criteria," are evaluated to determine the best overall solution. Criteria 8 and 9, known as "modifying criteria," are evaluated based on State and public comment. Under CERCLA, USEPA or other federal lead agency would provide the opportunity for the State and the public to provide comments. Although CERCLA does not apply to the project, the comments of state agencies and the public are considered by the Regional Board through the Porter-Cologne Act, the California Environmental Quality Act (CEQA), and other applicable state laws. The relative consistency of the RP's Proposed Remedy and other considered alternatives with these criteria is evaluated in the Feasibility Study (FS).

[4] *40 CFR §300.430.*

Superfund Amendments and Reauthorization Act

The Superfund Amendments and Reauthorization Act (SARA)amended CERCLA and those amendments pertain primarily to emergency management, reporting of releases, and compilation of data for public information (community right to know) purposes. SARA does not apply to the project because the site is not on the NPL and deals primarily with releases of petroleum hydrocarbons.

The Superfund Amendments and Reauthorization Act (SARA(pertains primarily to emergency management, reporting of releases, and compilation of data for public information (community right to know) purposes. SARA does not apply to the project because the site is not on the NPL.

Federal Occupational Safety and Health Administration

The Federal Occupational Safety and Health Act of 1970, which is implemented by the Federal Occupational Safety and Health Administration (OSHA), contains provisions with respect to hazardous materials handling. Federal OSHA requirements, including those set forth in 29 CFR §1910, et seq. and 29 CFR §1926 are designed to promote worker safety, worker training, and a worker's right–to-know. To the extent these laws and rules apply to the project, they are accounted for and applied in the Health and Safety Plan (HASP) that apply to all remediation activities.

State Regulations

California Code of Regulations

California law establishes a program of state "Superfund" sites, which are sites not on the NPL, but which the state believes are sufficiently problematic to warrant state intervention in the event that no responsible parties address the conditions. Like CERCLA, the state "Superfund" program contains mechanisms by which the state requires cooperation. The state "Superfund" program is substantially the same as CERCLA. The State of California Code of Regulations (CCR) establishes standards related to toxins and waste disposal. A summary of key standards related to remedial activities of hazardous materials are provided below. The California definition of "hazardous substance" utilizes, in large part, the same definitional language as CERCLA, but is more broad, and includes more substances as "hazardous substances" than the CERCLA definition. Those substances are the non-RCRA or California hazardous wastes.

California Hazardous Waste (aka "Non-RCRA Hazardous Waste") and California Code of Regulations Title 22

Among other things, Title 22 relates to the cleanup and prevention of toxins in soils and water. Sections 66261.1 through 66261.126 provide for the identification and listing of hazardous waste and criteria for identifying the characteristics of hazardous waste, sampling methods, hazardous constituents, and basis for listing hazardous waste. Title 22 identifies and lists hazardous wastes and standards applicable to generators and transporters of hazardous waste. It provides standards for owners and operators of hazardous waste transfer, treatment, storage and disposal facilities. Title 22 establishes the minimum standards for acceptable management of hazardous waste. It also governs enforcement and inspections. Selection and ranking criteria for hazardous waste sites requiring remedial action are identified. It governs site and facility cleanup services, corrective action, and site remediation.

California Code of Regulations Title 23

Title 23 addresses public health and safety issues related to hazardous materials and wastes, and it specifies disposal requirements. Title 23 includes requirements intended to protect waters of the state from discharges of hazardous substances. General closure requirements and criteria are provided in Title 23, Chapter 16.

California Health and Safety Code

The California Health and Safety Code, section 25356 establishes criteria for the protection of public health, safety, and the environment associated with toxic substances. The DTSC enforces cleanup of contaminated sites through the implementation of Remedial Action Plans (RAPs), which are regulated by CERCLA and Section 25356.1 of the California Health and Safety Code.

California Hazardous Waste Control Law

The Hazardous Waste Control Law (HWCL) is the primary hazardous waste statute in the State of California. The HWCL implements RCRA as a "cradle-to-grave" waste management system which specifies that generators have the primary duty to determine whether their wastes are hazardous and to ensure their proper management. The HWCL also establishes criteria for the reuse and recycling of hazardous wastes used or reused as raw materials. The HWCL exceeds federal requirements by mandating source reduction planning and a much broader requirement for permitting facilities that treat hazardous waste. It also regulates a number of types of wastes and waste management activities that are not covered by federal law with RCRA.

Disposal Facilities for Wastes

California has Class I, II and III receiver facilities. Class I facilities may accept both RCRA and non-RCRA or California hazardous wastes; Class II facilities may accept "designated"[5] non-hazardous wastes; and Class III facilities may only accept non-hazardous wastes."[6] Non-hazardous wastes can include construction debris (i.e., asphalt, concrete, wood, etc.) and soil that is determined to be non-hazardous.

All non-RCRA/California hazardous wastes must either be disposed of in a Class II landfill (i.e., sites that may accept "designated" and non-hazardous wastes), a Class I landfill or be destroyed via incineration or other appropriate methodology approved by the USEPA. Note that since material disposed of in Class II landfills are not considered hazardous waste by RCRA, it would not require pre-treatment prior to disposal.

In California, options for disposal of hazardous waste are limited by the capacity of the available receiver facilities under each facility's permit. However, the RP's Proposed Remedy does not anticipate use of Class I landfills. The RP intends to transfer impacted soil to a permitted waste treatment facility. More specifically, the soil would be transported to the Soil Safe facility in Adelanto, California.

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[5] *Designated waste (non-municipal, non-hazardous) is waste that under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state. Designated waste is permitted to be received by Class II landfills, which are specially designed to reduce the risks of groundwater contamination from industrial wastes.*

[6] *Land Disposal Section – Wastes Allowed for Discharge at Disposal Facilities, http://www.waterboards.ca.gov/water_issues/programs/land_disposal/walist.shtml. Accessed July2014.*

Department of Toxic Substances Control

The DTSC oversees and enforces the cleanup of soils and groundwater, and evaluates soil, water, and air samples taken at waste or contaminated sites. Primary authority for the statewide administration and enforcement of the HWCL rests with the DTSC. Pursuant to HSC §25355.5, DTSC may enter into agreements to provide remediation oversight services with responsible parties for cleanup of contaminated sites.

California Water Resources Control Board

Responsibility for the protection of water quality in California resides with the State Water Resources Control Board (State Water Board) and nine Regional Water Quality Control Boards (Regional Boards). The State Water Board and Regional Boards have legal authority to regulate site cleanup per Division 7 of the California Water Code (CWC), State Water Board plans and policies, and the Regional Water Quality Control Plans (Basin Plans). The Regional Boards oversee the dischargers' (responsible parties) activities pertaining to the cleanup of pollution at sites to ensure that the dischargers clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored. The site is within the jurisdiction of the Los Angeles Regional Board, as discussed below. Pursuant to WC sections 13304 and 13267, the Regional Boards may require responsible parties for cleanup of contaminated sites, such as the project[7], to pay the Regional Board's oversight costs.

In 2008, environmental investigations, overseen by DTSC, were conducted at the adjacent former Turco Products Facility. During those investigations, contamination by petroleum hydrocarbons was discovered at sample locations within the former Kast Tank Farm Property site. DTSC communicated these findings to the Regional Board in March 2008, and in April 2008 the Regional Board sent an inquiry to Shell regarding the status of any environmental investigations at the site. This inquiry was followed by the Regional Board's CWC Section 13267 Order to Conduct an Environmental Investigation at the former Kast Property issued to Shell on May 8, 2008. A series of extensive multimedia sampling and investigations, pilot studies, and other environmental evaluations of the site have been conducted in response to that Order and subsequent 13267 Orders issued on October 1, 2008 and November 18, 2009, Section 13304 Order dated October 15, 2009, and Cleanup and Abatement Order (CAO) R4-2011-0046 dated March 11, 2011, as amended.

Shell has conducted extensive multimedia sampling at the site during multiple investigations from 2008 to present. All of the investigations have occurred under Regional Board oversight, following work plans reviewed by the Regional Board in consultation with other governmental agencies including the Office of Environmental Health Hazard Assessment (OEHHA), the Los Angeles County Fire Department, and Los Angeles County Department of Public Health and approved by the Regional Board. All of these work plans and reports documenting findings of the work conducted are available to the public on the State Water Board GeoTracker website at http://geotracker.waterboards.ca.gov/profile_report.asp?globalo_id=T10000000228.

[7] *For the purposes of this section of the EIR, the term "contaminated" when used in reference to soil or materials at the Site means soil or materials at the Site that are or have been in contact with COPCs. This does not mean that the Site necessarily meets the definition of "contaminated" when the term is used in any federal, state, or local regulatory context, nor does it imply that the "contaminated" material presents a risk to human health or the environment.*

Investigations at the site since 2008 have included:

- Assessment in public rights-of-way, the adjacent railroad right-of-way, and other nonresidential areas consisting of:
  - Shallow and deep soil sampling;
  - Shallow and deep soil vapor sampling;
  - Advancing Cone Penetration Testing and Rapid Optical Screening Tool (CPT/ROST) and Cone Penetration Testing and Ultraviolet Optical Screening Tool (CPT/UVOST) soundings for Light Non-Aqueous Phase Liquid (LNAPL) assessment;
  - Groundwater monitoring well installation and sampling;
  - Background outdoor air sampling; and
  - Background soil sampling.
- Assessment at individual residential properties consisting of:
  - Methane screening;
  - Sub-slab soil vapor probe installation and sampling;
  - Shallow soil sampling, and
  - Indoor and outdoor air sampling.
- Assessment of environmental impact and feasibility of removal of residual concrete reservoir slabs.
- Pilot testing to evaluate different potential remedies for site impacts.

Shell, with oversight from the Regional Board has prepared three documents that address the remediation of the site: (1) the Feasibility Study (FS) which outlines available remediation technologies, (2) the Human Health Risk Assessment (HHRA) to estimate potential human health risks, and (3) the Remedial Action Plan (RAP) to identify the proposed remedial action.

Feasibility Study

A FS[8] was prepared o identify and screen remedial technologies for the COCs which include petroleum hydrocarbons (TPHs), TPH-diesel (TPHd), TPH-motor oil (TPHmo), and volatile organic compounds (VOCs) such as benzene, ethylbenzene, and naphthalene. The FS also evaluates remedial alternatives capable of achieving the remedial action objectives (RAOs) presented in the HHRA, leading to a recommendation of the preferred alternative. The preferred alternative is further developed in the RAP. The following RAOs are proposed for the project based on site-specific considerations:

- Prevent human exposures to concentrations of COCs in soil, soil vapor, and indoor air such that total (i.e., cumulative) lifetime incremental carcinogenic risks are within the NCP risk range of 1×10-6 to 1×10-4 and non-cancer Hazard Indices are less than 1 or concentrations are below background, whichever is higher. Potential human exposures include onsite residents and construction and utility

[8] *Geosyntec Consultants, 2014. Feasibility Study Report, Former Kast Property.*

maintenance workers. For onsite residents, the lower end of the NCP risk range (i.e., 1×10-6) and a non-cancer hazard index less than 1 have been used.

- Prevent fire/explosion risks in indoor air and/or enclosed spaces (e.g., utility vaults) due to the accumulation of methane generated from the anaerobic biodegradation of petroleum hydrocarbons in soils. Eliminate methane in the subsurface to the extent technologically and economically feasible.
- Remove or treat mobile LNAPL to the extent technologically and economically feasible, and where a significant reduction in risk to groundwater will result.
- Reduce COCs in groundwater to the extent technologically and economically feasible to achieve, at a minimum, the water quality objectives in the Basin Plan to protect the designated beneficial uses, including municipal supply.

Human Health Risk Assessment

The HHRA[9] was prepared to estimate potential human health risks associated with COCs detected in soil, sub-slab soil vapor, and soil vapor at the site. The objective of the HHRA is to evaluate potential human health impacts to onsite residents and onsite construction and utility maintenance workers. In addition, potential leaching of COCs from soil to underlying groundwater was evaluated. The findings of the HHRA were used as a basis for remedy evaluation in the FS, and remedial action planning as presented in the RAP. The HHRA contains these major components:

- Data evaluation and selection of COCs;
- Identification of potentially exposed populations and exposure pathways;
- Fate and transport modeling;
- Toxicity assessment;
- Site-specific cleanup goals (SSCGs);
- Risk characterization;
- Uncertainty analysis.

California Environmental Protection Agency

In January 1996, the California CalEPA adopted regulations implementing a "Unified Hazardous Waste and Hazardous Materials Management Regulatory Program" (Unified Program). The program addresses hazardous waste generators and hazardous waste on-site treatment, underground storage tanks (USTs) and above ground storage tanks (ASTs), hazardous material release response plans and inventories, risk management and prevention programs, and Uniform Fire Code (UFC) hazardous materials management plans and inventories. The Unified Program is implemented at the local level by a local agency: the Certified Unified Program Agency (CUPA). The CUPA is responsible for consolidating the administration of the six program elements within its jurisdiction. In the City of Carson the Los Angeles County Fire Department conducts inspections of businesses, manages and reviews various hazardous waste permits for business plans, and oversees cleanups. The County of Los Angeles Department of Public Works handles all other elements.

California Office of Environmental Health Hazard Assessment

The OEHHA is the state agency for the assessment of health risks posed by environmental contaminants. The mission of OEHHA is to protect human health and the environment through scientific evaluation of risks posed by hazardous substances. The Office is one of five state departments within the Cal EPA. OEHHA implements the Safe Drinking Water and Toxic Enforcement Act of 1986, commonly known as Proposition 65, and compiles the state's list of substances known or suspected to cause cancer or reproductive harm. The Office also develops health-protective exposure levels for contaminants in air, water, and soil as guidance for regulatory agencies and the public. These include public health goals for contaminants in drinking water and both cancer potency factors and non-cancer reference exposure levels for the Air Toxics Hot Spots Program (Assembly Bill [AB] 2588).

California Occupational Safety and Health Administration

Locally, the U.S. Department of Labor has delegated the authority to administer OSHA regulations to the State of California. The California OSHA program (CalOSHA) (codified in the CCR, Title 8, or 8 CCR generally and in the Labor Code §6300-6719) is administered and enforced by the Division of Occupational Safety and Health (DOSH). CalOSHA is very similar to the Federal OSHA program. For example, both programs contain rules and procedures related to exposure to hazardous materials during demolition and construction activities. CalOSHA standards establish exposure limits for certain air contaminants, which define the maximum amount of hazardous airborne chemicals to which an employee may be exposed over specific periods. Employers are required to provide a written health and safety program, worker training, emergency response training, and medical surveillance. CalOSHA requires employers to implement a comprehensive, written Injury and Illness Prevention Program (IIPP). An IIPP is an employee safety program for potential workplace hazards, including those associated with hazardous materials.

California Department of Transportation

The California Department of Transportation (Caltrans) sets standards for trucks in California which are enforced by the California Highway Patrol. Trucks transporting hazardous waste are required to maintain a hazardous waste manifest. This manifest is required to describe the contents of the material in the truck so that wastes can be readily identified in the event of a spill.

State regulations require the use of certified hazardous waste haulers for the transport of hazardous waste in California. Certified waste haulers are required to adhere to certain inspection and maintenance schedules and maintain sufficient insurance coverage. These regulations would apply to trucks that transport hazardous materials from the site under the project.

Regional

Los Angeles Regional Water Quality Control Board

The Regional Board develops and implements its Basin Plan that designates the beneficial uses of waters of the state, establishes water quality objectives to protect those uses, and describes implementation programs to meet the water quality objectives. The Basin Plan implements a number of federal and state laws, the most important of which are the State Porter-Cologne Water Quality Control Act and the Federal Clean Water

[9] *Geosyntec Consultants, 2014. Human Health Risk Assessment Report, Former Kast Property.*

Act. Refer to Section 5.5, *Hydrology and Water Quality*, of this EIR for a detailed discussion of the applicable water quality regulations.

The Regional Board has jurisdiction in matters concerning the management of potential sources of surface and groundwater contamination, including cleanup of discharges of waste from tanks and other point and non-point sources of discharges. The Regional Board will serve as the lead agency for the proposed project.

South Coast Air Quality Management District

As discussed in Section 5.1, Air Quality, of this EIR the South Coast Air Quality Management District (SCAQMD) regulates emissions associated with the excavation and remediation of certain contaminated materials through SCAQMD Rule 1166, Volatile Organic Compound Emissions from Decontamination of Soil. This rule requires development and approval of a mitigation plan, monitoring of VOC concentrations, and implementation of the mitigation plan if "VOC-contaminated material"[10] is detected. The SCAQMD also regulates fugitive dust emissions through SCAQMD Rule 403, Fugitive Dust. This rule requires the implementation of best available fugitive dust control measures during active construction periods capable of generating fugitive dust emissions from on-site earth-moving activities, construction/demolition activities, and construction equipment travel on paved and unpaved roads.

Local

City of Carson General Plan, Safety Element

The City of Carson General Plan Safety Element (adopted October 11, 2004) evaluates natural and man-made hazards that have the potential to endanger the welfare and safety of the general public and aims to reduce the potential risk of death, injuries, property damage and the economic and social dislocation resulting from them.[11] Man-made hazards involve hazardous materials, transportation, oil production facilities, civil unrest, national security emergencies and terrorism. The concerns identified in the Safety Element are subsequently incorporated into goals, policies and implementation actions to reduce the impacts of hazards. Policies and implementation measures of the General Plan Safety Element that pertain to the proposed project include the following:

> **Goal SAF-4**: Minimize the threat to the public health and safety and to the environment posed by a release of hazardous materials.
>
> - **Policy SAF-4.1:** Strictly enforce federal, state and local laws and regulations relating to the use, storage, and transportation of toxic, explosive, and other hazardous and extremely hazardous materials to prevent unauthorized discharges.
> - **Policy SAF-4.3:** Through the planning and business permit processes, continue to monitor the operations of businesses and individuals which handle hazardous materials.

[10] *VOC-contaminated material is defined by SCAQMD as excavated soil that measures greater than r ppm total VOCs as measured with an OVA (e.g., PID), within three inches of the excavated material within three minutes of excavation.*

[11] *City of Carson, 2004. General Plan Safety Element. http://ci.carson.ca.us/content/files/pdfs/GenPlan/Chapter06.Safety.pdf. Accessed August 2014.*

Existing Conditions

Regional Health Risks

The SCAQMD has conducted a series of region-wide air toxics studies called the Multiple Air Toxics Exposure Study (MATES), which are aimed at estimating the cancer risk from toxic air emissions throughout the South Coast Air Basin (SoCAB) by conducting a comprehensive monitoring program, an updated emissions inventory of toxic air contaminants, and a modeling effort to fully characterize health risks for those living in the air basin. The final draft of the third update of the study, MATES III, was released in September 2008. The study concluded that the average carcinogenic risk from air pollution in the South Coast Air Basin is approximately 1,200 in one million. Mobile sources (e.g., cars, trucks, trains, ships, aircraft, etc.) represent the greatest contributors. Approximately 85 percent of the risk is attributed to diesel particulate emissions, approximately 10 percent to other toxics associated with mobile sources (including benzene, butadiene, and formaldehyde), and approximately 5 percent of all carcinogenic risk is attributed to stationary sources (which include industries and other certain businesses, such as dry cleaners and chrome plating operations).

As part of the MATES III study, the SCAQMD has prepared a series of maps that show regional trends in estimated outdoor inhalation cancer risk from toxic emissions, as part of an ongoing effort to provide insight into relative risks. The maps' estimates represent the number of potential cancers per million people associated with a lifetime of breathing air toxics (24 hours per day outdoors for 70 years) in parts of the area. The MATES III Los Angeles County map, which is the most recently available map to represent existing conditions near the project area estimated cancer risk for that location is estimated at 1,090 cancers per million, while the area around the project site ranges between 1,087 to 1,434 cancers per million.[12] Generally, the risk from air toxics is lower near the coastline; it increases inland, with higher risks concentrated near large diesel sources (e.g., freeways, airports, and ports).

Existing Emissions

The site is currently occupied with residential uses with hardscape and streets. Various investigations at the site have identified contamination in soil, soil gas and groundwater. The site generates emissions through fugitive dust and volatilization of existing contaminants. Current fugitive dust emissions are mainly due to wind erosion and vehicles travelling on surface streets. Wind erosion and road dust is minimized due to existing development and paved roads. As the site is developed with residential uses, existing emissions are minimal and do not significantly impact the current ambient air quality.

Sensitive Receptors and Locations

Offsite

Some population groups, including children, elderly, and acutely and chronically ill persons (especially those with cardio-respiratory diseases), are considered more sensitive to air pollution than others. Off-site sensitive land uses close to the site are shown in **Figure 5.4-1**, *On and Off-Site Receptor Locations*, and include the following:

[12] *South Coast Air Quality Management District, Multiple Air Toxics Exposure Study, MATES III Carcinogenic Risk Interactive Map, http://www3.aqmd.gov/webappl/matesiii/. Accessed August 2014.*

- Single-Family Residential Dwellings: Residential uses located to the south, west and east, adjacent to the site, including the Monterey Pines Community located to the southwest of the site. Residential uses are also located further away to the north of the site.
- School: Wilmington Middle School is located southwest of the site across Lomita Boulevard.

On-site

In addition to the closest off-site sensitive receptors described above, this EIR also considers on-site residences as sensitive receptors. On-site residential uses include Single-Family Residential Dwellings which include the residential areas located along Marbella Avenue, East 24th Street, Ravenna Avenue, Panama Avenue, Realty Street, and Lomita Boulevard. On-site properties that are not being remediated or restored and that are not vacated but that are near to the cluster of properties in some stage of remediation and/or restoration would be treated as a sensitive receptor. This would provide for a conservative and health protective analysis.

Results of Sampling Activities

Soil Contaminants

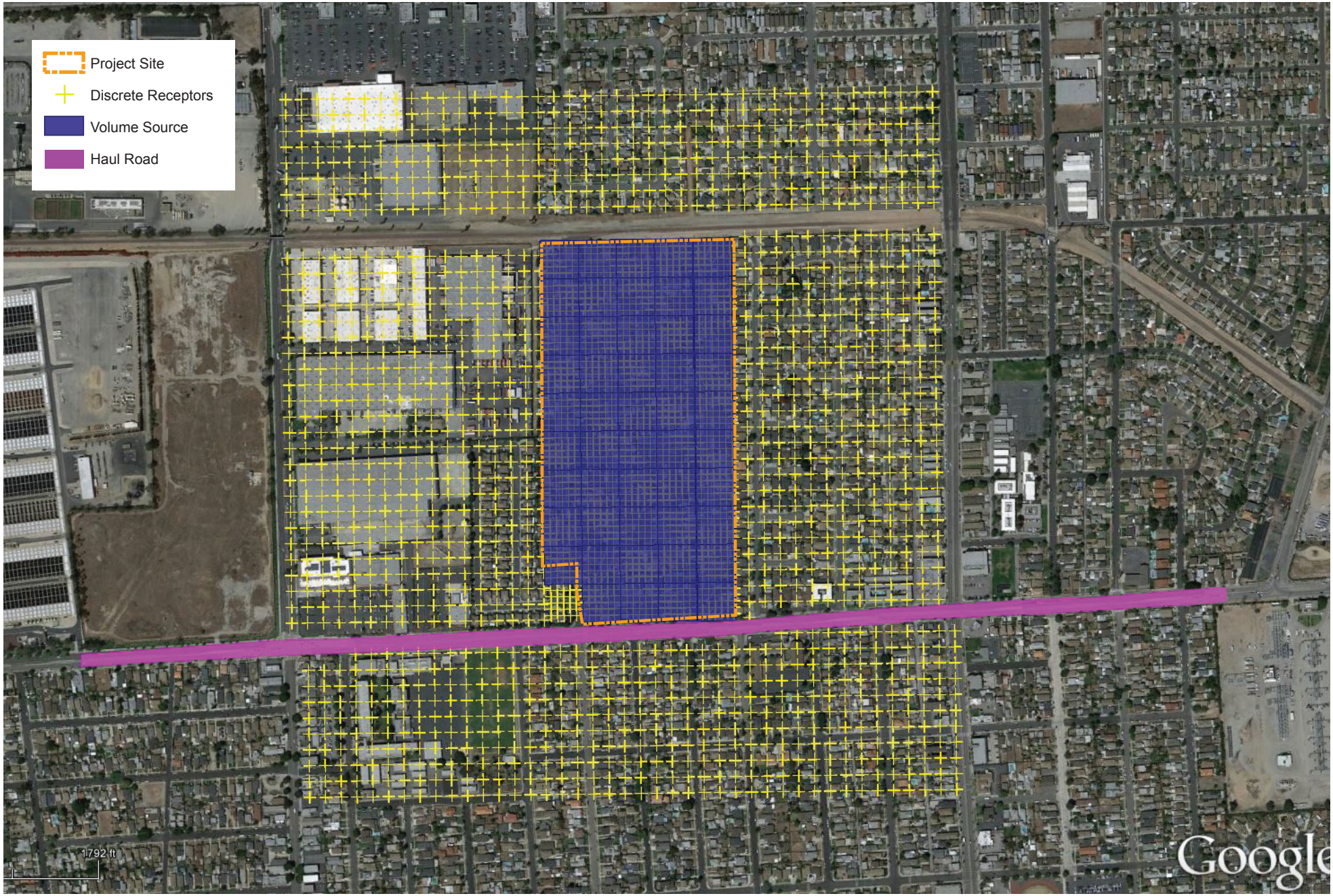
Soil samples showing elevated TPH and other VOCs and semi-volatile organic compounds (SVOCs) related to petroleum releases were found: (1) beneath the footprint of the former reservoirs; (2) within the fill material above the base level of the former reservoirs and (3) in areas outside the footprints of the former reservoirs. Higher concentrations of petroleum hydrocarbons tend to be located inside and closer to the edges of the former reservoir footprints. Concrete slabs, interpreted to be reservoir bottoms, were encountered in some of the borings at depths ranging from approximately 8 to 10 feet below ground surface (bgs).

Soil Vapor Contaminants

Methane, benzene, naphthalene, perchloroethylene (PCE) and trichloroethylene (TCE), and trihalomethanes (THMs) were all detected in soil vapor samples. Methane was detected in subsurface soil vapor samples, particularly deeper soil vapor samples. Methane screening conducted inside residences and in utility vaults, storm drains, and sewer manholes at and surrounding the site have not identified methane concentrations in enclosed spaces that indicate a potential safety risk. Very few instances of methane detection have been found in sub-slab soil vapor, and in all but one location, the results of methane speciation indicate the source was either a natural gas pipeline leak or a sewer leak.[13]

Benzene detections in sub-slab soil vapor are scattered and generally much lower than soil vapor detections at 5 feet bgs and deeper, up to 15 feet bgs. As with methane, transport is primarily through diffusion, and benzene moving upward from depth is typically biologically degraded and/or significantly attenuated in the aerobic shallow soils before it reaches the surface. Elevated benzene concentrations at 5 and 15 feet bgs are present inside the footprint of the former reservoirs as well as outside. Please refer to Figure 5.5-4 for additional details regarding benzene concentrations on-site.

[13] *URS Corporation and Geosyntec Consultants, 2014. Remedial Action Plan, Former Kast Property.*



PCR

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On and Off-Site Receptor Locations

Former Kast Property Tank Farm Site Remediation Project
Health Risk Assessment
Source: PCR Services Corporation, 2014.

FIGURE
5.4-1

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Elevated naphthalene concentrations in sub-slab soil vapor samples are few and scattered. Elevated naphthalene concentrations at 5 feet bgs appear to be concentrated along 244th Street and scattered along Marbella Avenue. Naphthalene was not detected in soil vapor samples from 15 feet bgs.

Groundwater Contaminants

Groundwater monitoring wells have been sampled quarterly since installation. Groundwater results from the most recent sampling event in the Second Quarter 2014 are discussed below. Most of the groundwater monitoring wells are screened in the water table aquifer, the top of which ranges from approximately 51 to 65 feet bgs. The remaining wells are screened in the Upper and Lower Gage aquifer. The Gage aquifer extends from approximately 90 to 170 feet bgs. The latest groundwater results are generally consistent with previously reported results. Groundwater is impacted with TPH and other VOCs and SVOCs related to petroleum releases on-site. These non-site related contaminants include tert-butyl alcohol (TBA) and chlorinated compounds (including TCE and PCE).

Site-related contaminants in groundwater exceeding California drinking water standards (Maximum Contaminant Levels [MCLs] or Department of Human Health Notification Levels [NLs]) are benzene, naphthalene, and arsenic. TPH also exceeds the Regional Water Quality Control Board, San Francisco Bay Region (San Francisco Bay Regional Board) December 2013 Environmental Screening Levels (ESLs). It should be noted that the drinking water supplied to the Carousel community by the water provider is screened in a lower aquifer than the impacted groundwater at the site and is tested according to state standards and is safe to drink (California Water Service Company, 2013). No current or future use of the shallow zone and Gage aquifer at or near the site is anticipated due to: 1) high total dissolved solids and other water quality issues unrelated to site conditions, 2) is present in a low yield, thin aquifer, 3) there are restrictions on groundwater pumping in the basin due to the adjudication of the groundwater resource; and, 4) the overlying land use is completely residential without the open space necessary for water production infrastructure.

If petroleum hydrocarbons from crude oilare present at sufficiently high concentration they may occur as a non-aqueous phase liquid (NAPL), which typically has lower density than water and is often referred to as "light NAPL" or LNAPL. LNAPL has been detected at a measurable thickness in groundwater at the site in two wells located approximately 43 feet from each other in Marbella Avenue. An LNAPL sample collected from one of the wells was analyzed and was characterized as a relatively unweathered crude oil. Currently, LNAPL is removed from these wells monthly using dedicated pumps installed in the wells. To date, approximately 120 gallons of LNAPL have been recovered from the two wells. LNAPL has not been detected in any of the other groundwater monitoring wells at the site.

Benzene is present beneath much of the site in the shallow groundwater zone. Benzene in groundwater is attributed to one or more of the following: leaching of benzene from hydrocarbon-impacted soils; and/or leaching of benzene from LNAPL locally present at or near the water table beneath the site.The highest concentrations of benzene detected in the shallow zone were from two wells located in the northeastern portion of the site. Offsite to the northeast (downgradient), benzene was detected in one downgradient well. Benzene was not detected in samples collected in the deeper portion of the Gage aquifer during recent monitoring events.

Naphthalene has been detected in groundwater from the majority of site monitoring wells. However, during the most recent sampling only one well located in the northern portion of the site had a detected concentration that exceeded the NL of 17 µg/L. Naphthalene historically has been detected at two monitoring wells. Concentrations of naphthalene historically exceeding the NL are limited to these two areas. The monitoring well located in 244th Street near Ravenna Avenue, consistently has had the highest naphthalene concentrations.

MCLs and NLs have not been established for TPH in groundwater. The San Francisco Bay Regional Board has established ESLs for TPHg, TPHd, and TPHmo in groundwater of 100 µg/L. Based on the most recent data, the TPHg ESL was exceeded in eight wells, the TPHd ESL was exceeded in eight wells, and TPHmo ESL was exceeded in six wells. The monitoring well located in 244th Street near Ravenna Avenue, consistently has had the highest TPH and VOC concentrations.

Arsenic has been detected in most of the monitoring wells. The latest sampling event had arsenic concentrations exceeding the MCL of 10 µg/L in four wells. Overall, arsenic concentrations have been declining in most wells with historic arsenic concentrations above MCLs. Arsenic was not detected above the MCL in the three offsite shallow zone downgradient wells. Dissolved arsenic concentrations in the deeper Gage wells are significantly lower and the concentration in only one well was above the MCL. Arsenic is a natural trace element that occurs in soils. Because arsenic is naturally soluble, dissolved arsenic is a common contaminant in Southern California groundwater. It is likely that at least a portion, if not all, of the dissolved arsenic beneath the site is derived from natural sediments beneath the site. Petroleum hydrocarbon contamination at the site may enhance the solubility of arsenic by lowering oxygen levels in the subsurface, thus increasing the mobility of arsenic in soils beneath the site. Once petroleum hydrocarbons are depleted, elevated arsenic would be expected to return to background concentrations. Based on groundwater monitoring well data, relatively elevated arsenic concentrations are localized in the central western portion of the site and are attenuated significantly in the downgradient direction.

Constituents of Concern

USEPA risk assessment guidance presents a methodology for identifying which detected chemicals should be included in a quantitative risk assessment. These COCs are defined by USEPA[14] as chemicals potentially related to the site whose data are of sufficient quality for use in a quantitative risk assessment. USEPA guidance states that the list of chemicals should include all chemicals that were:

- Positively detected in at least one sample;
- Detected above levels of the same chemicals found in associated blank samples;
- Tentatively identified but may be associated with the site based on historical information;
- Transformation products of detected chemicals; and
- Detected above naturally occurring levels (background).

[14] *U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A), (1989), http://www.epa.gov/oswer/riskassessment/ragsa/pdf/rags_a.pdf. Accessed August 2014.*

Some of contaminants at the site are considered to be hazardous and may volatilize when exposed to the atmosphere resulting in air emissions of toxic air contaminants (TACs). In addition, non-volatile TACs contained in soil may be released into the air in the form of fugitive dust through wind erosion, or soil handling activities. TACs are defined by California Health and Safety Code Section 39655 as follows:

> *"Toxic air contaminant" means 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. A substance that is listed as a hazardous air pollutant pursuant to subsection (b) of Section 112 of the federal act (42 U.S.C. Sec. 7412(b)) is a toxic air contaminant.*

Exposure to TACs may create adverse health effects, such as cancer and/or non-cancerous chronic and/or acute health impacts. Numerous samples have been collected as a part of the site investigation to determine the COCs.

Detected compounds include inorganics, polycyclic aromatic hydrocarbons (PAHs), TPHs, VOCs, SVOCs and metals. Those chemicals that have a potential to cause adverse human health impacts are defined as COCs. The first step for COC selection involved excluding a chemical as a COC if it was detected in five or less samples collected from across the site. Due to the large number of soil samples collected (over 10,000) this equates to less than or equal to 0.05 percent of soil samples.

USEPA guidance referenced above also allows for handling of outlier values which are not representative of the data set as a whole. However, distribution of concentration data at a site may be strongly skewed so that there are a few hot spots of contamination. Certain chemicals which may have outlier concentrations are further analyzed in order to determine if the concentration is representative of the entire site. If a hot spot is suspected, areas of high concentration may be evaluated as a separate hot spot or statistical analysis may be performed to determine a more representative concentration.

To identify COCs for each media, the maximum concentration for that media was compared to one-tenth of its respective risk based screening level (RBSL). One-tenth of the RBSL was used as a conservative approach to screen chemicals for further analysis and to address potential cumulative effects. If the maximum concentration was greater than one-tenth of the RBSL it was selected as a COC for the site. In addition to the RBSL screen, the COC screening process for metals and carcinogenic PAHs (cPAHs as benzo(a)pyrene equivalents) included a comparison to site background, with only those compounds exceeding background being selected as COCs.

For the selection of soil COCs to address the leaching to groundwater pathway, chemicals that were detected in groundwater above their respective MCL or NL were included. Based on the site conceptual model (SCM) presented in Section 2 of the Site-Specific Cleanup Goals (SSCG) report, by Geosyntec, and the age of potential petroleum releases at the site, groundwater impacts from leaching of soils are not expected to change. As a result, the inclusion of chemicals that have been detected above MCLs and NLs is considered appropriate for COC selection. For TPH constituents, no MCL or NL is available but, given their prevalence in soils, they were included as COCs in the evaluation of leaching to groundwater. **Table 5.4-1**, *List of Contaminants of Concern*, lists the COCs detected in soil and soil vapor samples that are associated with the site.

Table 5.4-1

List of Contaminants of Concern

Chemical Abstract Service (CAS) Number	Contaminant of Concern
7440-36-0	Antimony
7440-38-2	Arsenic
7440-43-9	Cadmium
18540-29-9	Chromium, Hexavalent
7440-48-4	Cobalt
7440-50-8	Copper
7439-92-1	Lead
7440-28-0	Thallium
7440-62-2	Vanadium
7440-66-6	Zinc
58-55-3	Benzo (a) Anthracene
50-32-8	Benzo (a) Pyrene
205-99-2	Benzo (b) Fluoranthene
207-08-9	Benzo (k) Fluoranthene
218-01-9	Chrysene
53-70-3	Dibenz (a,h) Anthracene
193-39-5	Indeno (1,2,3-c,d) Pyrene
90-12-0	1-Methylnapthalene
91-57-6	2-Methylnapthalene
129-00-0	Pyrene
121-14-2	2, 4-Dinitotoluene
117-81-7	Bis (2-Ethylhexyl) Phthalate
68334-30-5	TPH as Diesel
PHCG	TPH as Gasoline
TPHMOIL	TPH as Motor Oil
79-34-5	1,1,2,2-Tetrachloroethane
96-18-4	1,2,3-Trichloropropane
95-63-6	1,2,4-Trimethylbenzene
107-06-2	1,2-Dichloroethane
78-87-5	1,2-Dichloropropane
108-67-8	1,3,5-Trimethylbenzene
106-46-7	1,4-Dichlorobenzene
71-43-2	Benzene
75-27-4	Bromodichloromethane
74-83-9	Bromomethane
100-41-4	Ethylbenzene
75-09-2	Methylene Chloride

Table 5.4-1 (Continued)

List of Contaminants of Concern

Chemical Abstract Service (CAS) Number	Contaminant of Concern
91-20-3	Naphthalene
75-65-0	Tert-Butyl Alcohol (TBA)
127-18-4	Tetrachloroethene
108-88-3	Toluene
79-01-6	Trichloroethene
75-01-4	Vinyl Chloride
1330-20-7	Xylenes, Total

Source: Human Health Risk Assessment Report. Former Kast Property. Geosyntec. 2014.

Local Health Risks

As discussed in the RAP,[15] sampling completed during site investigations confirms that there were petroleum releases at the site. Petroleum hydrocarbon and related VOC and SVOCs impacts occur in shallow and deep soils; VOCs and methane resulting from degradation of petroleum hydrocarbons are present in subsurface soil vapor; dissolved-phase VOC and TPH impacts are present in groundwater, and LNAPL is locally present above groundwater.

In addition to hydrocarbon-related contaminants, contaminants are also locally present from chlorinated solvents, such PCE and TCE, and from THMs. Although the chlorinated solvents TCE and PCE are found sporadically around the site in shallow soils, their presence in groundwater is related to offsite sources.[16] THMs are commonly found in drinking water that has been treated with chlorine or chloramines and form when chlorine reacts with organic matter in the water.[17] THMs have all been detected in site soils, soil vapor, and groundwater. Because their source is related to drinking water delivered to the site by Cal-Water, THMs are not considered site-related COCs.

Although petroleum hydrocarbons in the subsurface have likely fermented to produce methane at depth, such methane is generally not present in the shallow subsurface and has not been detected in residences or enclosed areas of the site at levels that pose a hazard. Methane generated at depth typically migrates very

[15] *URS Corporation and Geosyntec Consultants, 2014. Remedial Action Plan, Former Kast Property.*

[16] *URS Corporation and Geosyntec Consultants, 2014. Human Health Risk Assessment, Former Kast Property.*

[17] *California Water Service Company. https://www.calwater.com/help/water-quality/. Accessed August 2014.*

slowly through soils because it is not under significant pressure. Transport is primarily through diffusion, and methane moving upward from depth is typically biologically degraded and/or significantly attenuated in the aerobic shallow soils before it reaches the surface.

This bio-attenuation in the vadose zone is evident in the soil vapor data collected at the site and reported in the Interim Residential Reports and the Street Soil Vapor Monitoring Reports.[18] These natural mechanisms explain the lack of elevated methane levels in the sub-slab soil vapor samples and in indoor air within the residences that have been tested.

As discussed previously, an HHRA was prepared for the project site to evaluate potential impacts associated with COCs detected in soil, sub-slab soil vapor, and soil vapor currently at the site. These health impacts presented in the HHRA represent the existing health risk to residents and workers on-site due to exposure to COCs.

Existing emissions were evaluated from soil and sub-slab soil vapor at different soil depth intervals. The soil pathway evaluated exposure via ingestion, dermal contact and inhalation of COCs. Sub-slab soil vapor evaluated exposure via indoor air inhalation. Cumulative risks were then summed up for soil and soil vapor risks to evaluate health impacts to on-site residents. It should be noted that analysis of soil and sub-slab soil vapor impacts included all COCs including background concentrations. Background concentrations are those that are either native or anthropogenic, that are presented but not associated with any site activities. Although soil and soil vapor health impacts evaluate all COCs, cumulative impacts exclude background concentrations. Therefore, cumulative health impacts may be lower than those calculated for soil and sub-slab soil vapor.

HI and Incremental Lifetime Cancer Risk (ICLR) over a 30 year period exceeded thresholds for on-site residences. The maximum ICLR due to the soil exposure pathway exceeded 10 in a million cancer risk. The maximum ICLR due to soil vapor was found to be 20 in a million at 378 E. 249th Street, where elevated benzene concentrations were observed underneath the residence and a sub-slab mitigation system was installed as an interim measure. Two indoor air sampling events have been conducted at this property and the multiple-lines-of evidence vapor intrusion evaluation indicated that the indoor air concentrations are indistinguishable from background levels. However, as discussed previously, cumulative risks were summed across all media, but excluded background levels. The HHRA indicates that only one property had cumulative risk greater than 1×10^{-6} (a value of 2×10^{-6}) when the media risks separately were less than 1×10-6. However, this property is already identified for consideration in the FS and RAP due to an exceedance of the SSCG for leaching to groundwater and therefore potential cumulative risks for this property will be addressed as a part of the remedial action for soils. The cumulative non-cancer HI was less than 1 for the maximum impacted on-site residential receptor.

Construction and utility maintenance worker exposures were evaluated for two areas within the site: (1) within the individual property boundaries and (2) within the streets. The maximum ILCR for maintenance workers due to soil was approximately 30 in one million. Soil vapor risk ILCR was 3 in one million. Non-cancer HI was below 1. Cumulative cancer risk for maintenance workers was below one in one million and non-cancer HI of less than 1.

3. METHODOLOGY AND THRESHOLDS

Methodology

This section explains the methodology used to assess health impacts due to TACs released during remediation activities and also identifies sources of TAC emissions. The evaluation of potential hazards from hazardous material handling that may result from the short- and long-term implementation of the RAP is conducted as follows:

Short-Term Hazards

Emissions Calculations

As discussed in Section 5.1, Air Quality, of this EIR implementation of the RAP has the potential to emit pollutant emissions through the use of heavy-duty construction equipment, soil movement (excavation), VOC off-gassing and SVE/bioventing. However, not all remediation activities are expected to release TACs. Emissions sources such as reentrained road dust and concrete breaking analyzed in Section 5.1 are not expected to contain large quantities of contaminated soil.

Fugitive dust emissions would result from various soil handling activities and unpaved road dust from on-site vehicle travel. TACs contained in the soil would be released along with the fugitive dust. Fugitive VOC emissions would occur from exposing VOC contaminated material to the ambient air due to excavation and soil handling. Diesel particulate emissions resulting from use of construction equipment can vary substantially from day-to-day, depending on the level of activity and the specific type of operation. The assessment of TACs emitted during remediation activities considers each of these potential sources. A summary of the remedial activities and equipment that would be used during implementation of the RAP is provided below:

- **Equipment and Truck Exhaust:** Equipment and trucks operating on-site would emit diesel particulate matter (DPM) during operation and idling.
- **Demolition Activities:** Implementation of the RAP and Alternatives 2 and 3would require removal of varying amounts of hardscape and softscape. Such activities would generate fugitive dust.
- **Excavation and Grading Activities:** Soil would be excavated from different portions of the site and transported off-site for treatment. Wells would also be drilled to install the SVE/bioventing system. Trenching would be performed throughout the site including off-site for installation of SVE piping. Fugitive dust and volatile compounds may be emitted when soil is handled (picked up/dropped).
- **Exposed Surfaces and Stockpiles:** As soil is excavated, VOCs contained in soil may be released to the atmosphere from the exposed active working excavation area.

Emissions from these sources were calculated for each phase of the RAP based on a six year construction schedule. Following the active construction phase, operations of the SVE/Bioventing would continue for 30 to 40 years. In addition to emissions being calculated on a temporal (time) basis, where a source of potential emissions could be identified emissions were also calculated specifically for such sources to allow for more

[18] *URS Corporation and Geosyntec Consultants , 2014. Remedial Action Plan, Former Kast Property.*

representative dispersion modeling. Additional details regarding how pollutant emissions were calculated are provided below and in Appendix E of this EIR.

Vehicle and Equipment Exhaust

Short-term activities associated with implementation of the RAP would require use of heavy-duty diesel-powered on-road vehicles and heavy-duty diesel-powered off-road equipment that generate emissions of DPM. Emission factors for both off-road (heavy construction equipment) and on-road (haul trucks) were generated through two different emissions models. Emissions from heavy-duty diesel-powered on-road vehicles were calculated using the EMFAC2011 emissions model developed by CARB.[19] On-road diesel vehicles include, but are not limited to, water trucks, dump trucks, fuel delivery trucks, and hauler trucks. As discussed in Section 5.1, Air Quality, Project Design Feature (PDF) AQ-2 requires that the, on-road diesel trucks would be limited to those that meet or exceed the emission standards for model year 2007 or newer, which would minimize emissions compared to the statewide fleet average. In addition, on-road diesel vehicle would comply with idling limit of five minutes at a time per location in accordance with the Air Toxics Control Measure (ATCM) adopted by CARB to limit toxic emissions from idling diesel trucks.[20] Idling emissions from on-road diesel vehicles were calculated based on compliance with the ATCM. Travel emissions were calculated based on the number of truck trips, speed, and distance travelled. The SCAQMD recommends that health risk assessments include other sources of toxics within a one-quarter mile of a facility. Thus, on-road diesel vehicle emissions resulting from travel on off-site local roadways (i.e., East Lomita Boulevard and Wilmington Avenue were considered). Off-site speeds were conservatively set at 25 mph, which is below the posted speed limits on East Lomita Boulevard and Wilmington Avenue. This lower speed was used for modeling as emissions are typically higher at lower speeds.

Emissions from heavy-duty diesel-powered off-road equipment are based on USEPA non-road emissions standards. USEPA emissions standards are classified as Tiers 1-4, with a higher tier engine resulting in lower emissions (i.e., cleaner). In accordance with PDF AQ-1 in Section 5.1, Air Quality, off-road diesel equipment would be limited to those that meet or exceed the emission standards for Tier 3 equipment. Therefore, emissions for off-road equipment were based on Tier 3 emissions standards. Other parameters used in the calculation include load factors, hours of operation, and horsepower ratings. The load factor is the percent of engine output during average operations. Equipment engines do not run at maximum load (100 percent) throughout the day. Average load factors were based on data from the California Emissions Estimator Model (CalEEMod) developed by the SCAQMD, which contains off-road engine load factors.[21] Off-road equipment emissions were then calculated based on the Tier 3 emissions standards, load factor, hours of operation and horsepower ratings supplied for the proposed equipment.

Fugitive Dust (Demolition, Excavation and Grading)

Emissions of fugitive dust from remediation related activities were calculated using USEPA methodologies for construction and hazardous waste/superfund site evaluations and include emissions from construction activities, wind erosion, and concrete breaking. The USEPA methodologies are outlined in the USEPA's *AP-*

[19] *California Air Sources Board Mobile Source Emission Inventory – Current Methods and Data: http://www.arb.ca.gov/msei/modeling.htm. Accessed June 2012.*

[20] *Cal. Code Regs. Tit. 13, §2485. (http://www.arb.ca.gov/msprog/truck-idling/2485.pdf)*

[21] *California Emissions Estimator Model, http://caleemod.com/. Accessed August 2014.*

42, Compilation of Air Pollutant Emission Factors.[22] Fugitive dust emissions are comprised of particulate matter of varying sizes. Respirable particulate matter consists of particles less than 10 microns in aerodynamic diameter (PM_{10}). Fine particulate matter are particles less than 2.5 microns ($PM_{2.5}$) and are known to penetrate deeper into the lungs and thus have increased adverse health effects compared to PM_{10}. It should be noted that $PM_{2.5}$ is a subset of PM_{10}, and that emissions of $PM_{2.5}$ are calculated using emission factors first developed for PM_{10} and conservative assumptions regarding percentages of PM_{10} that is $PM_{2.5}$ applied broadly by source type, such as dust and exhaust.

As required by the SCAQMD the project would implement fugitive dust control measures consistent with SCAQMD rules and regulations. At least 60 to 80 percent of potential fugitive dust emissions from exposed surfaces and active excavation or demolition sites would be controlled with water or other dust suppressants. Fugitive dust control percentages vary depending on the type of control measure (watering, soil stabilizers) and the type of surface (active, inactive). An 84 percent dust control efficiency was assumed in the emissions calculations which is consistent with application of dust suppressants and watering.

Volatile Emissions (Exposed Surfaces)

Volatile emissions from remedial activities would occur via the release of the VOCs in the soil during the handling/excavation of material. Volatile emissions also occur via diffusion of VOCs from undisturbed subsurface material through the soil media and emission at the surface. Emissions of VOCs depend on the amount of VOCs in the soil, soil physical properties, moisture content of the soil, vapor pressure and volatility of the compound, the partitioning between the contaminant and the soil moisture, and the diffusivity of the VOC through the air-filled pore space.

Since calculating VOC emissions requires a significant amount of chemical-specific information, computer models developed by USEPA are used in determining the volatilization factors and the emission rates. The Exposure Model for Soil Organic Fate and Transport (EMSOFT) (2002 Update) developed by the USEPA was used to calculate the volatile emissions for this EIR. The EMSOFT model is based on the theory and studies of Jury, et.al., and addresses situations in which contaminated materials are located at the surface and buried beneath a clean soil cover.[23,24] The model takes into account the specific properties of each chemical including Henry's law constant, diffusivity in air and water, and soil properties such as moisture and porosity. Chemical- and site-specific data were entered into the EMSOFT model. The 95 percent UCL concentrations for each chemical were used in the EMSOFT model for chemicals that were detected in five samples or more. The maximum concentrations for each chemical were used in the EMSOFT model for chemicals with less than eight samples or that were detected in less than five samples. USEPA default values were used where chemical- and site-specific data were not available based on recommendations in the *EMSOFT User's Guide*.[25] For modeling purposes, it was assumed that the incremental increase in volatile emissions from existing conditions would begin at the onset of the project and would continue for an

[22] *U.S. Environmental Protection Agency, AP-42, Compilation of Air Pollutant Emission Factors, http://www.epa.gov/ttnchie1/ap42/. Accessed 2012-2013. This risk assessment largely utilized data from Volume I, Chapters 4, 11, and 13.*

[23] *Jury, W. A., W. F. Spencer, and W. J. Farmer. 1983. Behavior Assessment Model for Trace Organics in Soil: I. Model Description. J. Environ. Qual., Vol. 12, no. 4, pp. 558-564.*

[24] *Jury, W. A., D. Russo, G. Streile, and H. El Abd. 1990. Evaluation of Volatilization by Organic Chemicals Residing Below the Soil Surface. Water Resources Res. Vol 26, No. 1, pp. 13-20.*

[25] *U.S. Environmental Protection Agency, EMSOFT User's Guide: Update to EMSOFT User's Guide, (2002).*

averaging period (i.e., the length of time off-gassing would occur) consistent with the duration of the specific volatile emissions-generating phase or sub-phase of the project.

To convert the EMSOFT modeled volatilization factors (in units of mass per area-time) into estimated VOC emissions (in units of mass per time) into the atmosphere, the volatilization factors were multiplied by the area exposed to the atmosphere, which is the area actively volatilizing due to short-term activities associated with implementation of the RAP. The values were then converted to the appropriate time period to obtain emissions in units of mass per time period (e.g., pounds per hour, pounds per year, etc.). As with fugitive dust emission, VOC emissions would be controlled using a number of measures. VOC emissions would be actively monitored during excavation/handling of contaminated materials. VOCs emissions would also be controlled using suppressants. Soils with over 50 ppm VOC would be reconsolidated to a treatment cell as required by SCAQMD regulations. For modeling purposes, the emission estimates take into account the application of suppressants, which USEPA has indicated has a control efficiency range between 91 and 100 percent for long-term control (the lower value of 91 percent was used as a conservative approach).[26]

Toxic Air Contaminants Pathways

The SCAQMD has developed guidance for Rule 1401 – New Source Review of Air Toxic Contaminants, which provides methodology for preparing health risk assessments within the basin. Under this guidance, the SCAQMD recommends that the inhalation, soil ingestion, dermal absorption, home-grown vegetables and mother's milk pathways be enabled in the Hotspots Analysis and Reporting Program (HARP)(discussed in more detail later in this Section). Therefore, these pathways were evaluated in the health risk assessment for residential receptors. The home-grown vegetables and mother's milk pathways are not included for non-residential receptors since no exposure would occur through these pathways for workers. It should be noted that the inclusion of these exposure pathways in the health risk assessment does not indicate that substantial risks are anticipated or expected for the pathways. It is expected that the primary risk driver would be associated with the inhalation pathway and that the other pathways (i.e., soil ingestion, dermal absorption, home-grown vegetables and mother's milk) would not result in substantial risks. Although home-grown vegetables are not a likely pathway, this was considered in the analysis as a conservative measure for on-site and off-site impacts.

Health Risk Assessment - TACs

Potential health impacts are evaluated through a health risk assessment which includes dispersion modeling and health risk calculations. Concentrations of COCs at receptors were determined based on dispersion modeling. A dispersion model is a "computerized set of mathematical equations that uses emissions and meteorological information to simulate the behavior and movement of air pollutants in the atmosphere. The results of a dispersion model are estimated outdoor concentrations of individual air pollutants at specified location."[27] Dispersion modeling was performed using the AMS/EPA Regulatory Model (AERMOD) (version 14134) which is a steady-state Gaussian plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain. AERMOD is listed as a preferred model in USEPA's *Guideline*

[26] *U.S. Environmental Protection Agency, Control of Air Emissions from Superfund Sites, (1992).*

[27] *U.S. Environmental Protection Agency, Glossary of Key Terms, http://www.epa.gov/ttn/atw/natamain/gloss1.html. Accessed June 2013.*

on Air Quality Models.[28] AERMOD is utilized by the USEPA and Cal EPA for estimating ground-level impacts from point and fugitive sources in simple and complex terrain. AERMOD is capable of modeling a variety of source types.

Sources of on-site equipment movement and excavation activities were characterized as volume sources each sized to represent an 8-house cluster under the base remedy, and a 16-house cluster under the Expedited Implementation Option.[29] Haul truck routes on and off-site were represented using area sources. Area sources simulate uniform emission density across a defined area, which is more representative of haul roads than other modeling source types. DPM, fugitive dust, and volatile emissions resulting from remediation activities were modeled as volume sources. Emissions from heavy duty diesel trucks coming to and from the site were modeled as an area source along Lomita Boulevard, at a distance of one mile from the site. Trucks travelling over one mile away from the site are not expected to impact on-site or nearby off-site receptors. Vehicle height was assumed to be 10 feet (~3 meters) which results in a plume height of approximately 5 meters based on equations in the USEPA guidance for haul roads.

As mentioned previously, remediation would occur in sets of 8-home clusters under the base remedy and a maximum of 16 homes at one time under the Expedited Option. While each home cluster is being remediated, residential uses which are not undergoing active remediation may be occupied, which may include homes adjacent to remediation activities. In order to account for these homes in the health risk analysis, receptors were placed on-site throughout the remediation area. Receptors were also placed off-site to account for residential and school uses as well as workers near the project site. Off-site receptors were placed at a 25-meter spacing covering nearby receptors including residential uses, school, and workers. On-site receptors were placed using 10-meter spacing between receptors.

As remediation activities would move throughout the site when a cluster is completed, the location of sources and receptors would change over time (temporally). In order to account for the temporal nature of emissions sources and receptors, sources were overlaid on top of receptors as shown in Figure 5.4-1. The AERMOD dispersion model ignores receptors placed inside volume sources and concentrations at each sensitive receptor would be representative of all sources which do not overlap the receptor location. This source-receptor configuration would account for all sources throughout the site. This source-receptor configuration would be appropriate for modeling long-term emissions and short-term emissions.

The SCAQMD provides model-ready, preprocessed meteorological data for use in dispersion modeling using AERMOD. The use of SCAQMD meteorological data ensures consistency among dispersion modeling analyses in the South Coast Air Basin and eliminates the need for a project applicant to process its own meteorological data. Meteorological data from the SCAQMD Long Beach North monitoring station, located at 3648 N Long Beach Blvd, Long Beach, CA 90807, approximately four and a half miles to the north-east of the site, was used. To account for annual variations in wind patterns, six years of meteorological data were used (years 2006-2011). Terrain heights were obtained from digital terrain elevation data developed by the U.S. Geological Survey (USGS) by using its Shuttle Radar Topography Mission (SRTM) data.

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[28] *40 CFR Part 51, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions; Final Rule.*

[29] *Base remedy is proposed in the RAP as remediating 8-home clusters. However, an expedited option is proposed which will remediate a maximum of 16 homes at one time.*

Cancer risk calculations require other parameter inputs, such as breathing rate, body weight and exposure duration. Residential and school receptor breathing rates were assumed to be OEHHA "high end" of 393 liters per kilogram of body weight per day (L/kg body weight/day) which represents the 95th percentile breathing rate as a conservative assumption. Although use of a high end breathing rate may overestimate cancer risk, this breathing rate takes into account children's breathing rates, which tend to be higher than those of adults.[30] Worker breathing rates were assumed to be 149 L/kg body weight/day. Body weight was assumed to be an average 63 kg (139 pounds) for residential or school receptors and 70 kg (154 pounds) for worker receptors, consistent with OEHHA recommendations.[31] Exposure durations were also assumed to be 350 days per year for residential uses. Worker receptors are assumed to be 245 days per year. These OEHHA values for these parameters are generally more conservative than typically used for risk assessments and, thus, likely result in overestimated impacts.

Pollutants emitted from the site may impact a sensitive receptor through multiple environmental pathways such as inhalation, ingestion, and dermal absorption. Although inhalation is the dominant pathway (contributes most to health risk impacts), particulate based COCs emitted from the site have the potential to deposit in the soil near the site. These particulates may be deposited on skin (dermal) or ingested during inhalation. As indicated above, SCAQMD guidance for Rule 1401 – New Source Review of Air Toxic Contaminants provides methodology for preparing health risk assessments within the basin. Under this guidance, the SCAQMD recommends that the inhalation, soil ingestion, and dermal absorption pathways be enabled in HARP. As a result, even though some of these are not expected to contribute substantially to the overall risk, these pathways were nevertheless enabled in the HARP software for analysis of project impacts.

Carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, would have some associated risk. Incremental health risk associated with exposure to carcinogenic compounds is defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. Under a deterministic approach (i.e., point estimate methodology), the cancer risk probability is determined by multiplying the chemical's annual concentration by its unit risk factor (URF). The URF is a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It represents an upper bound estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one microgram per cubic meter ($\mu g/m^3$) over a 70-year lifetime. The URFs utilized in the assessment and the corresponding cancer potency factors (CPF) were obtained principally from OEHHA Guidance.

OEHHA and CalEPA are responsible for identifying compounds the State believes are TACs and for developing and updating toxicity factors. Several COCs identified on-site do not have OEHHA toxicity factors and, therefore, are not included in the HARP software. However, these COCs have toxicity factors developed by other agencies and are listed in sources such as the USEPA Integrated Risk Information System (IRIS) database, Provisional Peer Reviewed Toxicity Values (PPRTV), Agency for Toxic Substances and Disease Registry (ASTDR), or the Health Effects Assessment Summary Tables (HEAST). The Regional Board determined on a case-by-case basis the toxicity data for each of these COCs. As the toxicity factor database contained within HARP cannot be edited by the user, health risk calculations for these chemicals must be

[30] *Base remedy is proposed in the RAP as remediating 8-home clusters. However, an expedited option is proposed which will remediate a maximum of 16 homes at one time.*

[31] *Ibid.*

performed outside of HARP. These calculations include dispersion modeling output values, dose calculation (breathing rate, body weight), health risk calculations (cancer, chronic, acute). These calculations were performed using methodology identical to that used in HARP, and are included in Appendix E of this EIR.

Total Petroleum Hydrocarbons were analyzed based on the Interim Guidance on Evaluating Human Health Risk from Total Petroleum Hydrocarbons (Cal-EPA, 2009). Toxicity factors for TPH have been suggested by CalEPA DTSC (CalEPA, 2009a, 2013a). Even though these toxicity factors for TPH have not gone through the same level of peer review as the other toxicity factor references used for the other COCs, the toxicity factors presented in CalEPA DTSC TPH guidance were used for TPH SSCGs. These values were presented in a letter from Geosyntec dated August 15, 2011 describing the derivation of RBSLs for TPH (TPH RBSL Letter; Geosyntec, 2011), which was approved by the Regional Board on November 14, 2011.

Health risk impacts are assessed using the HARP (version 1.4) developed by CARB.[32] The health risk calculation methodology contained in HARP is consistent with the OEHHA *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*.[33] For this risk assessment, the HARP model was used to analyze the results of the AERMOD dispersion model and determine the chemical-specific incremental increases in cancer risks and non-cancer chronic and acute health impacts. The results of the health risk assessment are calculated based on identifying the maximum exposed individual (MEI) for each receptor type (i.e., residential, worker, school). The location of the MEI for acute, chronic and cancer risk may vary depending on the type of chemical and the source. Certain chemicals may have a cancer risk factor, while others may only have a chronic and/or acute risk factor which would result in the MEI for cancer, chronic, and acute cases being located at different receptor locations.

It should be noted that not all chemicals have a cancer, chronic and acute toxicity factor. A chemical may have an adverse effect on human health with respect to cancer risk (70-year lifetime risk), long-term chronic impacts, or short-term acute impacts, or a combination thereof. Thus, each COC was evaluated in the health risk assessment based on chemical-specific toxicity values with respect to cancer risk, chronic impacts, and/or acute impacts, as appropriate. Detailed information regarding modeling input values, modeling results, and health risk impact calculations, including those performed outside of the HARP model, are provided in Appendix E of this EIR.

Accidental Upset or Release

Evaluation of accidental upset or release was based on the Chemical Process Safety (CCPS) Guidelines for Hazard Evaluation Procedures[34] risk assessment matrix reproduced as **Table 5.4-2**, *Release Risk Assessment Matrix*. This risk assessment matrix takes into account both the likelihood of accidental release and severity of consequence and rates the accidental release risk ranging from "acceptable" to "unacceptable." A significant impact with regard to accidental upset or release would occur if the accidental release risk exceeds the "acceptable with controls" level.

[32] *California Air Resources Board, "Hotspots Analysis Reporting Program," http://www.arb.ca.gov/toxics/harp/harpdownload.htm. Accessed April 2013.*

[33] *Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003.*

[34] *California Accidental Release Prevention Program Regulation (CCR Title 19, Division 2, Chapter 4.5), http://www.lafd.org/prevention/pdfforms/calarp_appen_a1.pdf. Accessed July 2013.*

Table 5.4-2

Release Risk Assessment Matrix

Frequency Category (Increasing Likelihood)					
	4				
	3				
	2				
	1				
		1	2	3	4
		Consequence Category (Increasing Severity)			

Risk Guide

	Unacceptable
	Undesirable
	Acceptable (with controls)
	Acceptable (as is)

Source: Guidelines for Hazard Evaluation Procedure. Center for Chemical Process Safety (CCPS), (1992).

Implementation of the RAP would involve several processes which may be subject to accidental release or upset conditions. In the short-term, trucks involved in the transport of contaminated materials off-site (long distance hauling) may experience an accident resulting in a spill. Equipment involved in the excavation and consolidation of on-site materials may result in an acute, accidental release to the environment. A failure of equipment during long term implementation of the RAP may occur and result in an acute release to the environment and the potential consequences are analyzed below.

The frequency of occurrence for an upset condition or accidental release is defined as follows, based on CCPS Guidelines, for increasing likelihood:

1. Very unlikely to unlikely, but possible.
2. Likely to occur during lifetime.
3. Will occur several times over life of process.
4. Likely to occur frequently.

CCPS defines the consequence of an accident as follows, for increasing severity.

1. Negligible – Less than minor injury, occupational illness, or system damage.
2. Marginal - Minor injury, minor occupational illness, or minor system damage.
3. Critical – severe injury, severe occupational illness, or major system damage.
4. Catastrophic – death or system loss.

The acceptability of the risk posed by a specific future hypothetical scenario is assessed by qualitatively identifying the appropriate consequence category along the horizontal axis of the matrix and the appropriate frequency category along the vertical axis. The intersection of those two categories defines the acceptability of the risk, shown in Table 5.4-2.

Long Term Hazards

The HHRA[35] identified populations that may potentially be exposed to chemicals in environmental media, their exposure pathways during post-remediation (long-term), and the route of potential intake. The conceptual site model (CSM), which identifies long-term impacts, developed for the project incorporates the current and the anticipated future use of the site, the current understanding of the sources of COCs, the means by which they may be released and transported within and among media, and the exposure pathways and routes by which they may contact human receptors.

Potential exposure to COCs detected in soil, sub-slab soil vapor, and soil vapor is partly dependent on the type of chemicals that are present and their respective exposure media. For VOCs in soil, exposure may occur via direct contact to soil (dermal contact or incidental ingestion) as well as indirect exposure (inhalation) from vapors migrating from the subsurface into indoor or outdoor air. Potential exposure to soil vapor may occur from inhalation of vapors migrating up from the subsurface into outdoor air. For non-volatile chemicals such as metals and most SVOCs and PAHs, exposure could be from direct human contact as well as inhalation of particulates. While the groundwater beneath the site is not currently used for drinking water (nor will be in the foreseeable future due to the level of Total Dissolved Solids, existing controls on pumping from the groundwater basin, and built out nature of overlying land use), COCs in soils may migrate to groundwater through leaching. **Table 5.4-3**, *Summary of Receptor Groups and Exposure Pathways*, summarizes the information presented below.

Long term hazards analysis will also consider background concentrations in evaluating health impacts to on-site receptors. Metals and other compounds may be associated with petroleum hydrocarbons, but are also naturally occurring in the environment. According to the DTSC for naturally occurring materials such as metals, evaluation of background concentrations can be used to determine if concentrations are consistent with naturally occurring levels. [36] If concentrations of a compound are within background, the compound is

[35] *Geosyntec Consultants, 2014. Human Health Risk Assessment Report, Former Kast Property.*

[36] *Department of Toxic Substances Control, Interim Guidance: Evaluating Human Health Risks from Total Petroleum Hydrocarbons. 2009.*

Table 5.4-3

Summary of Receptor Groups and Exposure Pathways

Receptor	Exposure Medium	Potentially Complete Exposure Pathway
Onsite Resident (Child and Adult)	Surface Soil (< 2 ft bgs)	Incidental Ingestion Dermal Contact Outdoor Air Inhalation
	Shallow Surface Soil (< 5 ft bgs)	Incidental Ingestion Dermal Contact Outdoor Air Inhalation
	Shallow Subsurface Soil (> 5 to < 10 ft bgs)	Infrequent Incidental Ingestion Infrequent Dermal Contact Infrequent Outdoor Air Inhalation
	Sub-Slab and Soil Vapor	Vapor Inhalation in Indoor Air via Vapor Intrusion
Construction and Utility Maintenance Worker	Shallow Soil (< 10 ft bgs)	Incidental Ingestion Dermal Contact Outdoor Air Inhalation
	Soil Vapor	Vapor Inhalation in Outdoor Air
Groundwater	Shallow Soil (< 10 ft bgs)	Leaching to Groundwater

Source: PCR Services Corporation, 2014

not considered a COC and is not evaluated further. Cumulative long-term health risk impacts will be analyzed while taking into account background concentrations determined in the HHRA.

Uncertainties in Health Risk Assessments

The process of assessing health risks and impacts includes a degree of uncertainty. The level of uncertainty is dependent on the availability of data and the extent to which assumptions are relied upon in cases where the data are incomplete or unknown. All health risk assessments rely upon scientific studies in order to reduce the level of uncertainty; however, it not possible to completely eliminate uncertainty from the analysis. Where assumptions are used to substitute for incomplete or unknown data, it is standard practice to err on the side of health protection in order to avoid underestimating or underreporting the risk to the public. Therefore, as discussed earlier, this health risk assessment used for purposes of this EIR followed the standard practice of erring on the side of health protection in cases where assumptions were relied upon. In general, sources of uncertainty that may lead to an overestimation or an underestimation of the risk include: (1) extrapolation of toxicity data in animals to humans; (2) uncertainty in the estimation of the emissions; (3) uncertainty in the air dispersion models; and (4) uncertainty in the exposure estimates. These sources of uncertainty, as they relate to the project, are described in greater detail below. In addition to uncertainty, there exists "a natural range or variability in the human population in such properties as height, weight, and susceptibility to chemical toxicants."[37] As mentioned previously, it is typical to err on the side of health

[37] *Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003.*

protection by assessing risk on the most sensitive populations, such as children and the elderly. Some examples of uncertainty or overestimation may include:

- Receptor exposure duration: The health risk assessment assumes residents would be exposed to project-related average annual concentrations 24-hours per day, 350 days per year. The exposure duration does not take into account residents who leave the house for work or school or work stoppages or breaks (such as meal and rest periods and idle non-work hours). In addition, the exposure duration does not take into account time spent indoors vs. outdoors.
- Emissions estimation: Emissions from diesel powered equipment are assumed to be running continuously during a 8-hour workday. While most equipment may run continuously during each work day throughout the remediation process, some equipment may sit idle or be used for only a few hours per day. The health risk assessment assumes a worst-case scenario where all equipment would be running during the workday, generating diesel particulate emissions.
- Dispersion modeling parameters: The AERMOD dispersion model is able to account for dust deposition while in transport through the air which would deplete the plume (lower concentration). As a dust plume travels from the source to the receptor, heavier dust particles may drop out of the plume resulting in lower concentrations for receptors located farther away from the source. As a worst-case scenario, the dispersion modeling did not account for plume depletion due to deposition as sensitive receptors are located relatively close to the dust generating activities.

Thresholds of Significance

For purposes of this EIR, the Regional Board has utilized the checklist questions in Appendix G of the *CEQA Guidelines*[38] as significance criteria to determine whether a project would have a significant environmental impact due to hazards and hazardous materials. The questions are as follows:

Would the project:

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment?

c) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

d) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

[38] *Association of Environmental Professionals, 2014. 2014 CEQA Statute and Guidelines. http://resources.ca.gov/ceqa/docs/2014_CEQA_Statutes_and_Guidelines.pdf. Accessed August 2014.*

e) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

f) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

As determined in the Initial Study, which is contained in Appendix A of this EIR, the RP's Proposed Remedy would not result in a safety hazard for people residing or working at a public or private airport or airstrip within two miles of the project area (criterion d). The nearest airport is the Torrance Municipal Airport located over 3.3 miles to the west of the site. In addition, the project would not expose people or structures to a significant risk of loss, injury or death involving wildland fires (criterion f) as the project is located in an industrial/residential area with no wildlands. No further analysis of these topics is necessary.

The project site is not included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5 (criterion b) and therefore, would not create a significant safety hazard to the public or environment under Government Code Section 65962.5.[39] Site investigations and remediation are being conducted under the oversight of the Regional Board and all applicable rules and regulations are being followed. Therefore, impacts relating to the project site creating a significant safety hazard to the public or environment as a result of being on the list of hazardous sites compiled pursuant to Government Code Section 65962.5 is less than significant. Therefore, no further analysis of this topic is necessary.

The project could potentially impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan (criterion e). However, lane closures if required during the soil excavation phase of the project would be done in accordance with the Construction Traffic Management Plan and Encroachment Permits from the City of Carson. These temporary lane closures are not expected to interfere with emergency evacuation or emergency response plans. There may be temporary street blockages for several minutes at a time as trucks maneuver to dump loads, but no long term closures are expected. Drilling and trenching in the streets for well and piping installation would be required for installation of the soil vapor extraction system. Similar to the installation of water or sewer lines, there may be short-term blockages of driveways to individual residential properties for less than a day. Trenching that interferes with access would be covered by steel plates to allow access at night and if construction activities are delayed. Therefore, impacts relating to interference with an adopted emergency response or evacuation plan would be less than significant. Therefore, no further analysis of this topic is necessary.

Under CEQA, "a significant hazard to the public" is typically defined based on consideration of the increased risk in carcinogenic and non-carcinogenic human health impacts due to exposure to short- and long-term project-related TACs. The Regional Board has established Remedial Action Objectives (RAOs) and Site-Specific Cleanup Goals (SSCGs) applicable to the site for COCs during implementation of the RAP and the monitoring period after implementation. Thus, based on the RAOs and SSCGs established for the RAP in

[39] *Department of Toxics Substance Control. Envirostor Hazardous Waste and Substances Site List. http://www.envirostor.dtsc.ca.gov/public/mapfull.asp?global_id=&x=-119&y=37&zl=18&ms=640,480&mt=m&findaddress=True&city=carson,%20ca&zip=&county=&federal_superfund=true&state_response=true&voluntary_cleanup=true&school_cleanup=true&ca_site=true&tiered_permit=true&evaluation=true&military_evaluation=true&school_investigation=true&operating=true&post_closure=true&non_operating=true. Accessed August 2014.*

addition to SCAQMD guidance, a significant impact on human health or safety would occur if the direct or indirect changes in the environment brought about by the project would potentially result in one or more of the following future conditions:

HAZ-1 Result in an incremental increase in cumulative lifetime potential cancer risk from exposure to project-related TACs and COCs emitted as a direct result of implementation of the RAP in excess of one in one million (1×10^{-6}), or in excess of 10 in one million (1×10^{-5}) if Best Available Control Technologies (BACT) are implemented.[40]

HAZ-2 Result in an incremental increase in cumulative lifetime potential cancer risk from exposure to COCs in soil, soil vapor, and indoor air for residences in excess of 1×10^{-6} and for on-site construction and utility maintenance workers an incremental increase in cumulative lifetime potential cancer risk outside of the NCP risk range of 1×10^{-6} to 1×10^{-4};

HAZ-3 Result in a chronic or acute non-cancer hazard index (HI) of greater than 1.0;

HAZ-4 In accordance with the SSCGs, create conditions leading to, or otherwise allowing, building interiors to accumulate and or be exposed to methane concentrations exceeding 5 percent of the Lower Explosive Limit (LEL) for methane.

HAZ-5 Create a risk of accidental release which exceeds the "acceptable with controls" category (see Table 5.4-2 of this EIR) through the routine transport, use, or disposal of hazardous materials;

HAZ-6 Create a risk of accidental release which exceeds the "acceptable with controls" category (see Table 5.4-2 of this EIR) through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;

HAZ-7 Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.

4. PROJECT ANALYSIS

Project Design Features

The following Project Design Features (PDFs) would result in a reduction in hazards and are proposed as part of the Project. The PDFs contained in Section 5.1, *Air Quality* (PDF AQ-1 through AQ-12) would also apply to a reduction in hazards as well as Section 5.5*, Hydrology and Water Quality* (PDF H/WQ 5-1 through H/WQ 5-3).

PDF HAZ-1 Remediation activities conducted at the property located at 24832 Panama Avenue shall implement additional measures to control volatile TAC emissions, due to high concentrations of vinyl chloride found on-site. These measures include applying water at least twice daily or Rusmar AC-565 foam (or similar), in accordance with manufacturer recommended specifications to active excavation areas. Workers performing remediation activities at this address shall use appropriate Personal Protective Equipment (PPE).

[40] *T-BACT is defined under SCAMQD Rule 1401(c)(2) as being the most stringent emissions limitation or control technique which has been achieved in practice or is technologically feasible.*

Analysis of Project Impacts

Threshold HAZ-1: Would the project result in an incremental increase in cumulative lifetime potential cancer risk from exposure to project-related TACs and COCs emitted as a direct result of implementation of the RAP in excess of one in one million (1×10^{-6}), or in excess of 10 in one million (1×10^{-5}) if Best Available Control Technologies (BACT) are implemented?

Impact Statement HAZ-1: *Unmitigated impacts due to on-site remediation activities would result in a less than significant impact. The incremental lifetime increase in cancer risk due to implementation of the RAP would not exceed the one in one million threshold at nearby sensitive receptors. The Expedited Implementation Option would also result in a less than significant impact.*

Threshold HAZ-2: Would the project result in an incremental increase in cumulative lifetime potential cancer risk from exposure to COCs in soil, soil vapor, and indoor air for residences in excess of 1×10^{-6} and for on-site construction and utility maintenance workers an incremental increase in cumulative lifetime potential cancer risk outside of the NCP risk range of 1×10^{-6} to 1×10^{-4}?

Impact Statement HAZ-2: *The RAP is intended to reduce long-term risk from potential exposure to COCs in soil, soil vapor, and indoor air. As documented in the HHRA, risks to residences and onsite construction and utility workers post-implementation of the RAP, would be below thresholds. Therefore, implementation of the RAP would result in less than significant impacts.*

Threshold HAZ-3: Would the project result in a chronic or acute non-cancer hazard index (HI) of greater than 1.0?

Impact Statement HAZ-3: *On-site remediation activities would result in less than significant impacts with regard to chronic and acute non-cancer risk with incorporation of PDFs. Therefore, mitigation measures would not be required. The Expedited Implementation Option would also result in a less than significant impact.*

Short-Term

During excavation activities, COCs contained in the soil would be released to the atmosphere in the form of fugitive dust and volatile gases. In addition, heavy equipment and trucks operating on-site would release DPM. The COCs and DPM released as a result of the RAP may pose a hazard to the public occupying the site or the environment. Such emissions would vary somewhat from day to day, depending on the level of disposal and other activities, but the analysis here assumes disposal of the maximum daily amount of excavated materials determined from the maximum total volume.

As specified in the PDFs mentioned above, emissions of toxins would be controlled through various methods including spraying water onto the soil and work area or using chemical suppressants as appropriate (PDF AQ-7 and AQ-8). VOC monitoring would be conducted to ensure no applicable state or SCAQMD standards would be exceeded (PDF AQ-4). In particular, the project would comply with SCAQMD Rule 1166 regarding VOC-contaminated material (PDF AQ-6). The possibility of hazards from ignitable waste or soil gas accumulation would be maintained at a negligible level through proper grading and transport loading procedures. Transport trucks would undergo procedures to avoid the inadvertent transport of materials off-

site (decontamination) and would be inspected for compliance prior to exiting the site, and wastes transported off-site would be properly manifested and handled by a fully licensed and permitted waste transporter (PDF AQ-10).

As discussed previously, the receptors analyzed in the health risk assessment include on-site residential receptors and off-site receptors including residential uses, students, staff and visitors to Wilmington Middle School to the southwest of the site as well as workers located to the west of the site. As cancer and chronic health risk impacts are based on long-duration exposure times, receptors at which individuals may reside at for long periods of time (>8-hours per day) were analyzed for cancer and chronic health risk impacts. These receptors include residential, the middle school, and workers. Because acute risk impacts are based on short-duration exposure times (<1-hour), all receptors (residential, school, worker) were analyzed for acute health risk impacts. **Table 5.4-4**, *Maximum Incremental Cancer Risk Impacts - Unmitigated*, presents a summary of the health risk assessment results (Appendix E of this EIR). Sensitive receptors are numbered sequentially and include residents, school, and workers. Please refer to the figures in the following sections for the location of maximum impacted receptors and corresponding receptor number. As discussed earlier, due to the conservative nature of the risk evaluations conducted for the project, actual health risks are expected to be much lower than predicted.

Table 5.4-4

Maximum Incremental Cancer Risk Impacts – Unmitigated [a,b]

Sensitive Receptor Type [c]	Cancer Risk (per million)	Chronic Risk Hazard Index	Acute Risk Hazard Index
Residential, On-Site	0.81	0.01	0.01
Residential, Off-Site	0.59	0.01	0.01
School	0.11	0.001	0.001
Workers	0.09	0.01	0.01

[a] *The "unmitigated" scenario includes emissions reductions from implementation of the voluntary project design features (PDFs) described throughout this EIR. PDFs will be enforceable by the Regional Board. Mitigation measures are discussed separately. Cancer risk values based on a 5-year exposure duration of maximum levels of all chemicals, which is a hypothetical and very conservative set of assumptions. Analysis includes inhalation, soil ingestion, and dermal for residential receptors and non-residential receptors.*

[b] *Shaded values indicate an exceedance of the significance threshold.*

[c] *Sensitive receptors include residential within the site. School receptors include Wilmington Middle School.*

Additional details and modeling files may be found in Appendix E of this EIR.

Source: PCR Services Corporation 2014.

Off-Site Sensitive Receptors

Residential Receptors

Based on upper bound toxicity values and exposure assumptions, an incremental cancer risk of 0.59 in one million is estimated for the maximally exposed individual residential receptor (MEIR) off-site. The maximum chronic HI estimate at the MEIR is 0.01, and the maximum estimated acute HI is 0.01.

It should be noted that health risk impact values presented in Table 5.4-4 represent the combined impact from the various chemicals that would be emitted from implementation of the RAP. In order to identify the health risk impact contribution by each source and chemical, receptors with the maximum impact have been

further analyzed to identify source and chemical contribution. The details of these maxima are listed on **Table 5.4-5**, *Maximum Impacted Off-Site Residential Receptor - Unmitigated*. The maximum impact for each exposure evaluation point (cancer, chronic and acute risk) may not occur at the same receptor due to varying toxicity factors, source location and wind direction. As discussed above, certain chemicals may not have a toxicity factor for long-duration exposure or short-duration exposure. In addition, chemicals would be emitted from different areas of the site depending upon the phase with varying emission rates. Locations of the corresponding maximally impacted receptors are shown on **Figure 5.4-2**, *Maximally Exposed Individual Resident (MEIR): Off-Site*. The predicted maximum impacted residential receptor for cancer risk is located in the residential area adjacent to the halfway point of the site's western boundary (see Figure 5.4-2).

Table 5.4-5

Maximally Impacted Off-site Residential Receptor – Unmitigated [a,b]

Cancer Risk – Maximally Exposed Individual Receptor

Chemical	Cancer Risk Contribution [c] (per million)	Percent of Total
Total	**0.59**	**100%**
Diesel engine exhaust, particulate matter	0.46	77%
Benzene	0.08	13%
Naphthalene	0.05	8%

Chronic Risk – Maximally Exposed Individual Receptor

Chemical	Chronic Risk Contribution [c]	Percent of Total
Total	**0.01**	**100%**
Benzene	0.01	~ 100%
Chromium, hexavalent (& compounds)	<0.01	~ 0%

Acute Risk – Maximally Exposed Individual Receptor

Chemical	Acute Risk Contribution [c]	Percent of Total
Total	**0.01**	**100%**
Benzene	0.01	96.4%
Arsenic	<0.01	3.6%
Xylenes (mixed)	<0.01	0.3%

[a] *Cancer risk values based on a five year exposure duration. Analysis includes inhalation, soil ingestion, and dermal for residential receptors.*

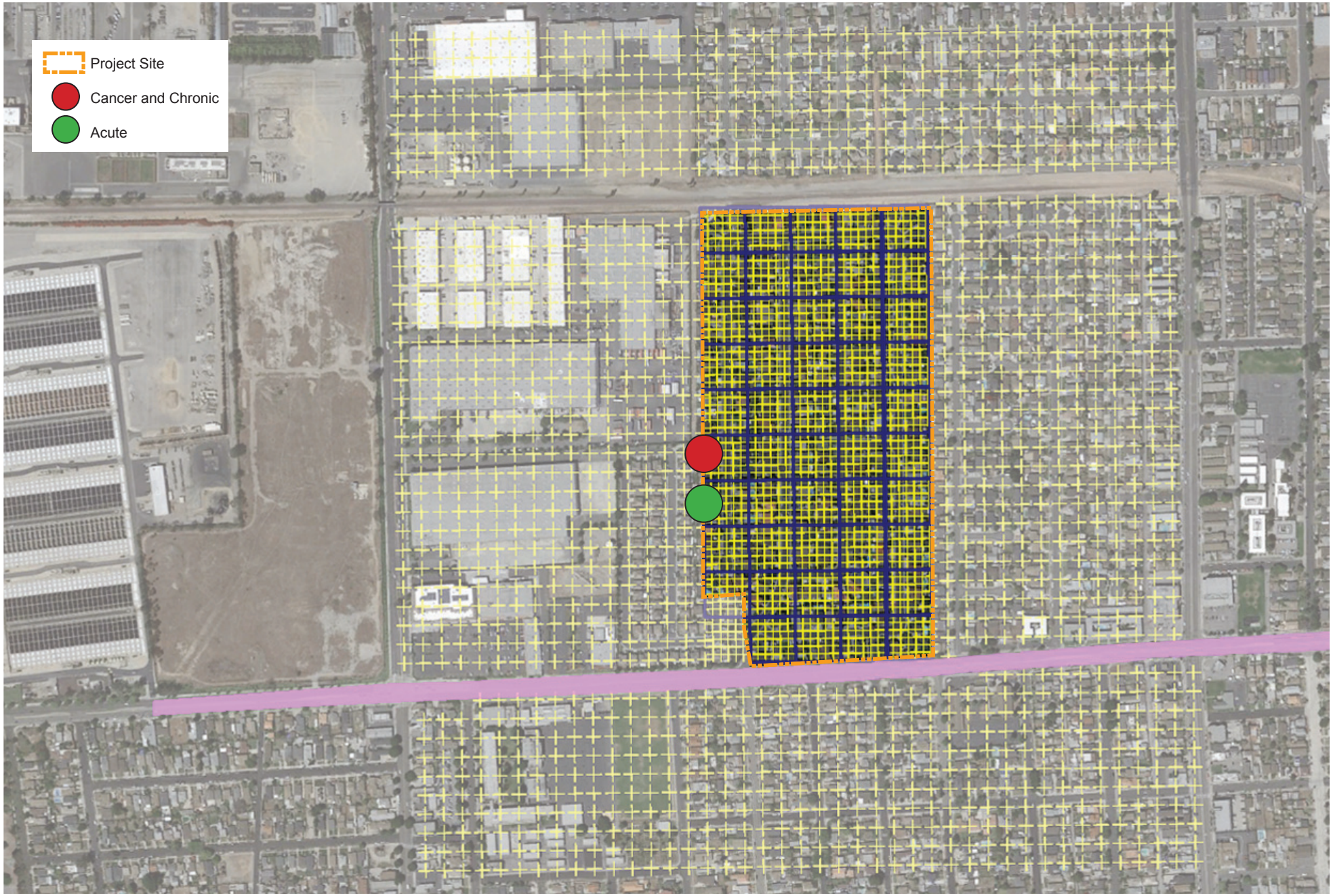
[b] *Sensitive receptors include residential uses within the site. School receptors include Wilmington Middle School southwest of the site.*

[c] *Shaded values indicate an exceedance of the significance threshold.*

Additional details and modeling files may be found in Appendix E of this EIR.

Source: PCR Services Corporation 2014.

As shown in Table 5.4-8, DPM and benzene contribute approximately 77 and 13 percent of the total cancer risk, respectively. Benzene contributes almost 100 percent of the total chronic risk. The maximum residential acute health risk impact occurs off-site, located directly adjacent to the eastern boundary of the



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Maximally Exposed Individual Resident (MEIR): Off-Site

Former Kast Property Tank Farm Site Remediation Project
Health Risk Assessment
Source: PCR Services Corporation, 2014.

FIGURE
5.4-2

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site(see **Figure 5.4-2**). The main contributor to the maximum acute risk are volatile emissions resulting from excavation activities.

Health risk impact values calculated for this EIR take into account the PDFs listed above. As a result, maximum cancer risk at the off-site residential receptor would not exceed the threshold of one in one million. Chronic and acute HIs are less than 1. Therefore, implementation of the RAP would result in a less than significant impact with regard to cancer, chronic, and acute risk.

Student Receptor. Based on upper bound toxicity values and exposure assumptions, the maximally exposed individual student receptor (MEIS) unmitigated incremental cancer risk estimate is 0.11 in a million. The maximum estimated unmitigated chronic and acute HIs are 0.01 and 0.001, respectively.

The maximally impacted student receptor is located at the northeast corner of Wilmington Middle School (see **Figure 5.4-3**, *Maximally Exposed Individual School Receptor*). As shown in **Table 5.4-6,** *Maximally Impacted School Receptor - Unmitigated*, DPM and benzene contribute to 85 and 9 percent of the total cancer risk, respectively. The maximum chronic non-cancer risk impact also occurs at the northeast corner of the school in which benzene contributes to almost 100 percent of the total chronic risk. The cancer risk and chronic non-cancer risk assessments represent a highly conservative assumption of continuous exposure for five years at that same location, in accordance with OEHHA guidance, even though that is not expected to occur. The maximally impacted acute receptor occurs at along the northern portion of the school. Benzene emissions contribute to 96 percent of the acute health risk. Cancer, chronic and acute health impacts at the school receptor would remain below significance thresholds.

Worker Receptors. Several off-site worker receptors have been analyzed surrounding the site. These receptors include off-site. Detailed results for individual worker receptors are provided in Appendix E. Based on upper bound toxicity values and exposure assumptions, the maximally exposed individual worker receptor (MEIW) incremental cancer risk estimate is 0.09 in a million. The maximum estimated chronic and acute HIs are 0.01 and 0.01, respectively.

The maximum estimated incremental cancer risk for the MEIW is located at the eastern boundary of the office building area directly adjacent to the site (see **Figure 5.4-4**, *Maximally Exposed Individual Worker*). As shown in **Table 5.4-7,** *Maximally Impacted Worker Receptors - Unmitigated*, DPM and benzene contribute to 77 and 13 percent of the total cancer risk of 0.09 per million, respectively with inhalation being the primary pathway. This receptor is located along Lomita Boulevard, the project's designated haul route for heavy-duty diesel trucks during construction. The maximum chronic risk impact also occurs at this same receptor, in which DPM contributes to almost 100 percent of the total chronic risk with a chronic HI of 0.01. The maximum worker acute health risk impact is located at an off-site receptor along the eastern boundary of the site. Benzene contributes to 96 percent of the acute health risk with an HI of 0.01.

The maximum incremental cancer risk estimate at the worker receptor would remain below the threshold of one in one million. Chronic and acute HIs are also less than 1. Therefore, implementation of the RAP would result in a less than significant impact with regard to cancer, chronic and acute health risk for off-site workers.

Table 5.4-6

Maximally Impacted School Receptor – Unmitigated [a,b]

Cancer Risk – Maximally Exposed Individual Receptor

Chemical	Cancer Risk Contribution (per million)	Percent of Total
Total	**0.11**	**100%**
Diesel engine exhaust, particulate matter	0.09	85%
Benzene	0.01	9%
Naphthalene	0.01	5%

Chronic Risk – Maximally Exposed Individual Receptor

Chemical	Chronic Risk Contribution	Percent of Total
Total	**0.001**	**100%**
Benzene	0.001	~ 100%
Chromium, hexavalent (& compounds)	<0.01	~ 0%

Acute Risk – Maximally Exposed Individual Receptor

Chemical	Acute Risk Contribution	Percent of Total
Total	**0.001**	**100%**
Benzene	0.001	96.2%
Arsenic	<0.001	3.6%
Xylenes (mixed)	<0.001	0.3%

[a] *The "unmitigated" scenario includes emissions reductions from implementation of the voluntary project design features (PDFs) described throughout this EIR. PDFs will be enforceable by the Regional Board. Mitigation measures are discussed separately. Cancer risk values based on a five-year exposure duration. Analysis includes inhalation, soil ingestion, and derma for non-residential receptors.*

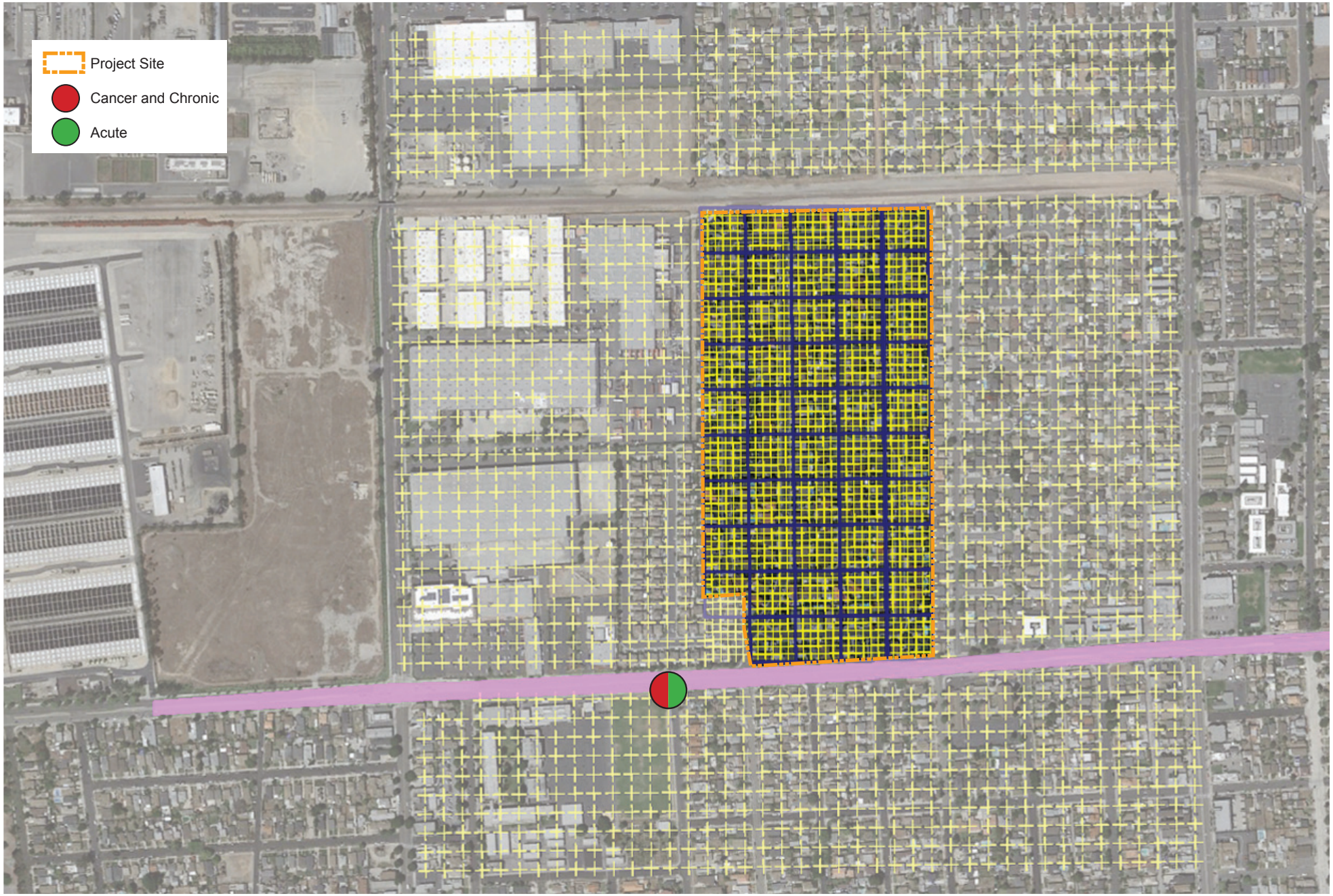
[b] *Sensitive receptors include residential uses on site. School receptors include Wilmington Middle School southwest of the site.*

Additional details and modeling files may be found in Appendix E of this EIR.
Source: PCR Services Corporation 2014.

On-Site Residential Receptors

Based on upper bound toxicity values and exposure assumptions, an incremental increase in cancer risk of 0.81 in one million is estimated for the maximally exposed individual residential receptor (MEIR) on-site. The lifetime incremental increase in cancer risk for on-site receptors resulting from remediation activities range from 0.25 to 0.81 in one million, depending on location and proximity to activities. The majority of on-site residents would be exposed to cancer risk values between 0.60 and 0.81 to in one million, mainly occurring within the center portions of the site. The maximum chronic HI estimate at the on-site MEIR is 0.01, and the maximum estimated acute HI is 0.01.

It should be noted that health risk impact values presented in Table 5.4-4 represent the combined impact from the various chemicals that would be emitted from implementation of the RAP. In order to identify the health risk impact contribution by each source and chemical, receptors with the maximum impact have been further analyzed to identify source and chemical contribution. The details of these maxima are listed on **Table 5.4-8**, *Maximally Impacted On-Site Residential Receptor - Unmitigated*. The maximum impact for each



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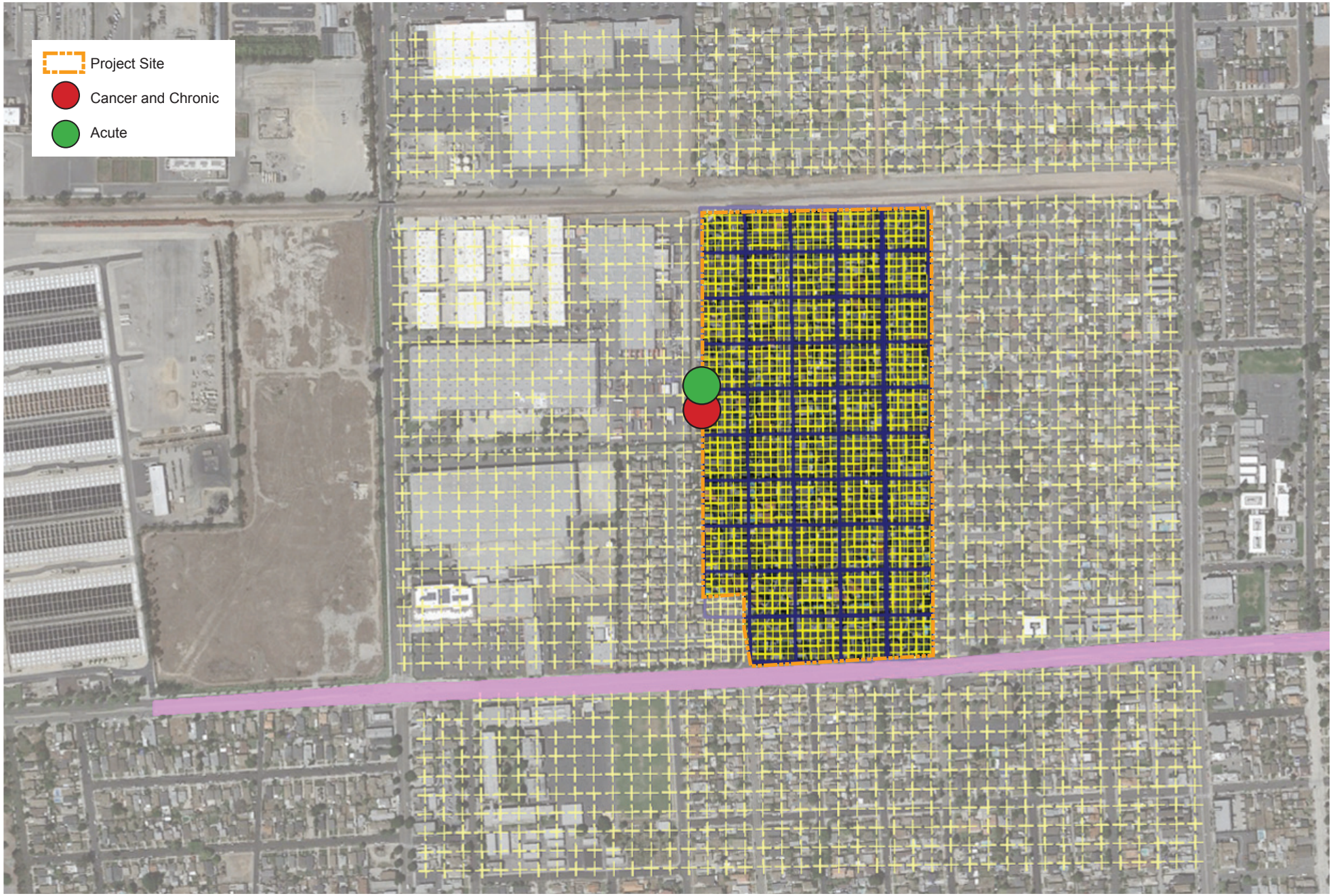
Maximally Exposed Individual School Receptor (MEIS)

Former Kast Property Tank Farm Site Remediation Project
Health Risk Assessment
Source: PCR Services Corporation, 2014.

FIGURE
5.4-3



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Maximally Exposed Individual Worker (MEIW)

Former Kast Property Tank Farm Site Remediation Project
Health Risk Assessment
Source: PCR Services Corporation, 2014.

FIGURE
5.4-4

Table 5.4-7

Maximally Impacted Worker Receptors – Unmitigated [a,b]

Cancer Risk – Maximally Exposed Individual Receptor

Chemical	Cancer Risk Contribution (per million)	Percent of Total
Total	**0.09**	**100%**
Diesel engine exhaust, particulate matter	0.07	77%
Benzene	0.01	13%
Naphthalene	0.01	8%

Chronic Risk – Maximally Exposed Individual Receptor

Chemical	Chronic Risk Contribution	Percent of Total
Total	**0.01**	**100%**
Benzene	0.01	~ 100%
Chromium, hexavalent (& compounds)	<0.01	~ 0%

Acute Risk – Maximally Exposed Individual Receptor

Chemical	Acute Risk Contribution	Percent of Total
Total	**0.01**	**100%**
Benzene	0.01	96.3%
Arsenic	<0.01	3.6%
Xylenes (mixed)	<0.01	0.3%

[a] *Cancer risk values based on a five year exposure duration. Analysis includes inhalation, soil ingestion, and dermal for non-residential receptors.*

[b] *Sensitive receptors include light industrial/commercial uses to the west of the site.*

Additional details and modeling files may be found in Appendix E of this EIR.

Source: PCR Services Corporation 2014.

exposure evaluation point (cancer, chronic and acute risk) may not occur at the same receptor due to varying toxicity factors, source location and wind direction. As discussed above, certain chemicals may not have a toxicity factor for long-duration exposure or short-duration exposure. In addition, chemicals would be emitted from different areas of the site depending upon the phase with varying emission rates. Locations of the corresponding maximally impacted receptors are shown on **Figure 5.4-5**, *Maximally Exposed Individual Resident (MEIR): On-Site*. The predicted maximum impacted residential receptor for cancer and chronic risk is located towards a receptor towards the center of the site (see Figure 5.4-5).

As shown in Table 5.4-8, DPM and benzene contribute to 77 and 13 percent of the total cancer risk, respectively. Benzene contributes to almost 100 percent of the total chronic risk. The maximum residential acute health risk impact occurs at a receptor located towards the center of the site (see Figure 5.4-5 Benzene emissions contribute 96 percent of the acute health risk.

Health risk impact values calculated for this EIR take into account the PDFs listed above. As a result, the maximum cancer risk at the on-site residential receptor would not exceed the threshold of one in one million

Table 5.4-8

Maximum Impacted On-site Residential Receptor – Unmitigated [a,b]

Cancer Risk

Chemical	Cancer Risk Contribution [c] (per million)	Percent of Total
Total	**0.81**	**100%**
Diesel exhaust, particulate matter	0.62	77%
Benzene	0.10	13%
Naphthalene	0.06	8%

Chronic Risk

Chemical	Chronic Risk Contribution [c]	Percent of Total
Total	**0.01**	**100%**
Benzene	0.01	~ 100%
Chromium. Hexavalent (& compounds)	<0.01	~ 0%

Acute Risk

Chemical	Acute Risk Contribution [c]	Percent of Total
Total	**0.01**	**100%**
Benzene	0.01	96.4%
Arsenic	<0.01	3.6%
Xylenes (mixed)	<0.01	0.3%

[a] *Cancer risk values based on a 5-year exposure duration. Analysis includes inhalation, soil ingestion, and dermal for residential receptors.*

[b] *Sensitive receptors include residential uses within the site. School receptors include Wilmington Middle School southwest of the site.*

[c] *Shaded values indicate an exceedance of the significance threshold.*

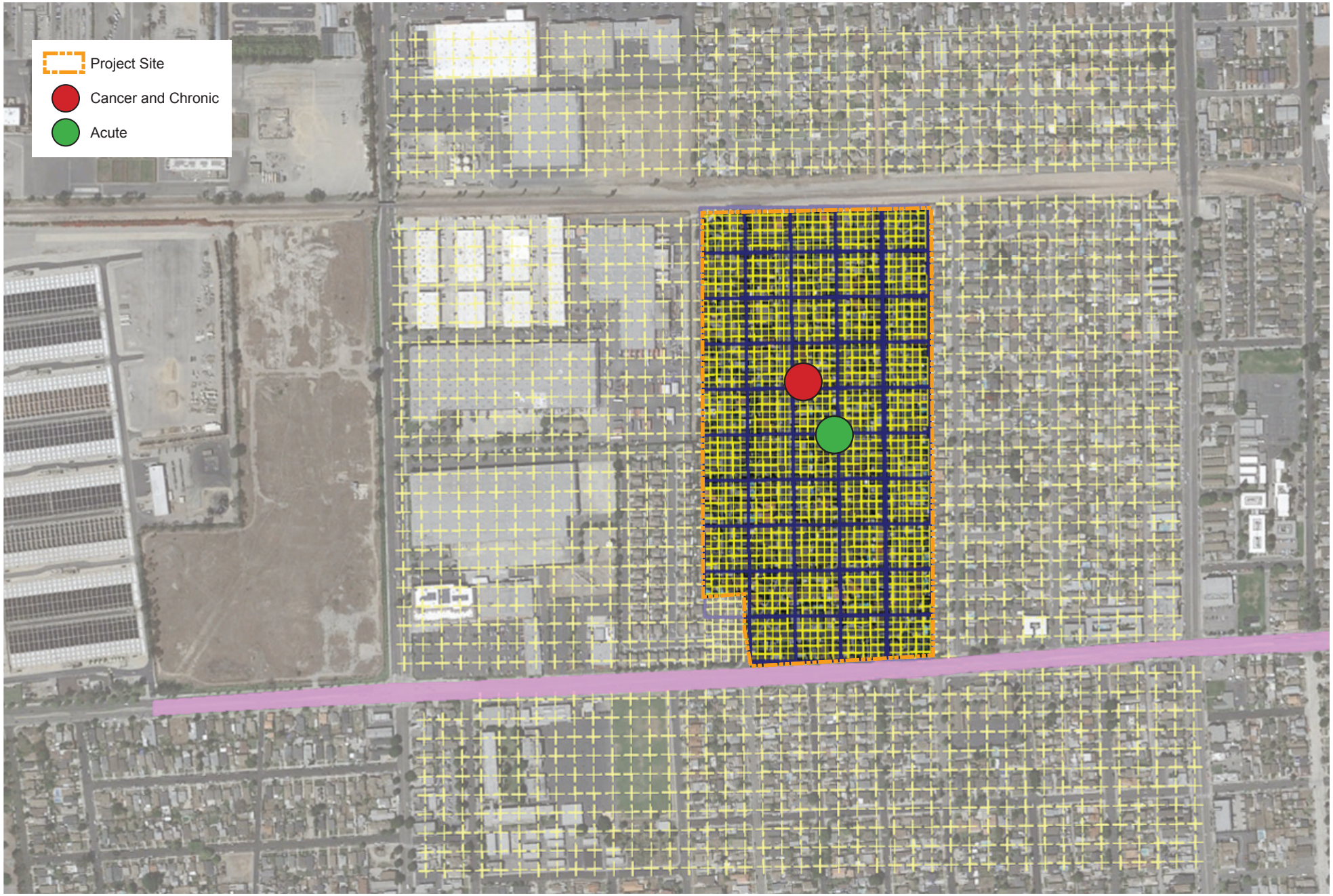
Additional details and modeling files may be found in Appendix E of this EIR.

Source: PCR Services Corporation 2014.

even with incorporation of PDFs. Chronic and acute HIs are less than 1. Therefore, implementation of the RAP would result in a less than significant impact with regard to cancer and non-cancer health risks.

Long-Term

In addition to the physical removal of COC-impacted soil and back fill with non-impacted soil, the use of SVE/bioventing would further reduce COC concentrations beneath existing paved areas, City sidewalks, and concrete foundations of the homes. SVE/bioventing system would also address impacted media that may be associated with residual concrete reservoir slabs left in place below the depth of excavation. Following excavation and backfill but prior to site restoration, SVE/bioventing wells would be installed at each property where required. Additionally, for those properties where a sub-slab mitigation system is proposed, the system would be installed concurrent with or following the excavation activities. As indicated previously, the RP would install a sub-slab mitigation system at any residence at which a homeowner requests such a system. The SVE/bioventing infrastructure would consist of a system of extraction/inlet wells, below ground conveyance piping, and an above ground treatment system. The design of the SVE



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Maximally Exposed Individual Resident (MEIR): On-Site

Former Kast Property Tank Farm Site Remediation Project
Health Risk Assessment
Source: PCR Services Corporation, 2014.

FIGURE
5.4-5

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system potentially would include use of multiple treatment technologies in a staged approach, depending on inlet concentrations. The remediation equipment would provide the flexibility to transition from thermal oxidation to catalytic oxidation followed by granular activated carbon (GAC) treatment, when the concentrations have decreased sufficiently.

Volatile COCs may migrate through the clean fill and pose an exposure concern to on-site receptors. For this reason, SSCGs, see discussion above, were developed to identify the maximum concentration of specific COCs in soil predicted to result in a risk or hazard above the design thresholds of 1 in one million (1×10^{-6}) incremental cancer or 1.0 HI, appropriate significance threshold for residents and 10 in one million (1×10^{-5}) or 1.0 HI for workers. Post-excavation confirmation samples would be collected once the initial target depth is reached and results would be compared to SSCGs to confirm that any remaining COCs do not pose an unacceptable health risk.

Conveyance piping would be installed in trenches within the City streets. Trenching would be performed for installation of SVE/bioventing piping and conveyance systems. No excavation would be performed underneath City streets. Asphalt would be replaced, so that the public would have no direct (dermal) or indirect (wind-blown inhalation) contact with contaminated materials. Any future excavation of the street, such as for utilities, would need to consider the potential hazards present before proceeding and mitigate exposure of construction workers and the public as necessary. The construction worker SSCGs were prepared with the assumption that any workers digging utility trenches in the street after completion of the project would be protected.

The long-term operation of the SVE/bioventing system is expected to result in periodic emissions from vehicles transporting visitors and maintenance activities. These trips are expected to be a source of negligible TAC emissions.

Off-Site Sensitive Receptors

With regard to off-site sensitive receptors, the installation of the SVE/bioventing system would treat emissions and limit exposure to off-site uses. The system would consist of ground conveyance piping and treatment systems which are not located near off-site receptors. Following approval of the RAP, a Site-wide Remedial Design and Implementation Plan (RDIP) will be prepared. The RDIP will provide details on the design and implementation of the RP's Proposed Remedy outlined in the RAP. The placement of the wells and treatment systems will be placed in areas to limit impacts to residential or sensitive uses. As discussed in the RAP, SVE/bioventing equipment will be constructed under a Site-specific SCAQMD Permit to Construct/Operate. The SSD system will also require SCAQMD permits. The RDIP and SCAQMD permitting requirements will limit impacts to off-site receptors. Therefore, impacts to off-site sensitive receptors would be minimal.

On-Site Sensitive Receptors

In addition to the RDIP, Property-Specific Remediation Plans (PSRPs) will be prepared for properties requiring excavation, sub-slab mitigation, and/or SVE/bioventing. The PSRP will identify venting wells and piping locations for the SVE/bioventing system. The SVE/bioventing locations would be directed away from on-site sensitive receptors to the furthest extent possible. As discussed previously, the SVE/bioventing system will be subject to SCAQMD permitting requirements. A Land Use Covenant (deed restriction) is

proposed which will require on-site properties to be recorded with the County Recorder's Office advising of potential presence of impacted soil beneath hardscaped areas. In addition, the City of Carson Municipal Code currently requires a Grading Permit to be obtained for excavations deeper than 3 feet. The RP would implement a community outreach program to inform and educate residents of the community of residual impacted soil. Therefore, impacts to on-site residential uses would be minimal.

Expedited Implementation Option

The Expedited Implementation Option would increase the number of properties actively remediated from 8 to a maximum of 16 properties at one time. The total amount of demolished materials and excavated soils would be the same as under the project. The Option would result in a greater level of activity on the site on a given day but would not change the level of activity at an individual property. Therefore, long-term impacts (cancer and chronic risk) would remain the same as the base remedy. Short-term impacts (acute risk) may be doubled in comparison to the base remedy as these impacts are evaluated on a maximum hourly throughput. However, as shown in **Table 5.4-9**, *Maximum Impacted Acute Receptor – Unmitigated* acute risk under the Expedited Implementation Option would remain below significance thresholds.

Table 5.4-9

Maximum Impacted Acute Receptor – Unmitigated

Acute Risk

Chemical	Acute Risk Contribution	Percent of Total
Total	**0.12**	**100%**
Benzene	0.12	99%
Arsenic	<0.01	1%
Toluene	<0.01	0%

Additional details and modeling files may be found in Appendix E of this EIR.

Source: PCR Services Corporation 2014.

Threshold HAZ-4: In accordance with the SSCGs, create conditions leading to, or otherwise allowing, building interiors to accumulate and or be exposed to methane concentrations exceeding 5 percent of the Lower Explosive Limit (LEL) for methane.

Impact Statement HAZ-4: *Impacts due to on-site remediation activities would result in a less than significant impact with regard to methane concentrations. The Expedited Implementation Option would also result in a less than significant impact. Therefore, mitigation measures would not be required.*

Short-Term

During remediation activities, methane would be released to the atmosphere during excavation of yards and trenching of public streets, but would not be allowed to accumulate in building interiors. Thus, this scenario does not warrant further evaluation.

Long-Term

Implementation of the RAP would result in excavation of contaminated soil and backfill with clean imported soil. The site contains small amounts of methane resulting from degradation of petroleum products, which is flammable over a narrow range of concentrations (5-15 percent) in air.[41] Sub-slab vapor mitigation systems would be installed at residences where methane levels exceed SSCGs or where a homeowner requested one. In order to keep vapors emanating from the soil below from entering a building a sub-slab depressurization (SSD) system would be used. The SSD system creates a negative pressure below the slab of the residence using a fan to remove air from below the slab and exhaust it above the building. The SSD system would include a manometer or in-line pressure gauge to provide a simple measure that the system is operating as designed. Additionally, the RP's contractors would confirm that homes with a SSD have a carbon monoxide (CO) monitor, as required in all homes by California law.

SSD design, installation, and operation would be in accordance with the DTSC Vapor Intrusion Mitigation Advisory.[42] The system would consist of creating holes in the slab or footing of the structure, removing a quantity of soil from beneath the slab to create a suction pit and installing suction pipes into the holes. The suction pipes would be directed to above the roof and a fan connected to the system to create a sub-slab vacuum. After installation of the SSD system, based on diagnostic testing to assess the vacuum distribution beneath the building foundation, any necessary adjustments to the SSD system (e.g., larger fan or additional suction pits) would be made. Because the SSD systems would be operated in an active mode using a fan to create a vacuum, the SSD systems would be permitted by the SCAQMD. Vapors vented by the system would be treated prior to discharge as required by the SCAQMD permit.

LNAPL removal would occur in localized areas through pumping at or beneath the surface of groundwater in monitoring wells. LNAPL is currently being recovered from monitoring wells MW-3 and MW-12 on a monthly basis using dedicated pneumatic total fluids pumps installed in the wells. Recovered LNAPL is placed in drums which are immediately transported off-site for proper disposal. As part of RAP implementation, LNAPL recovery would continue from wells MW-3 and MW-12 on a monthly basis, and, if LNAPL is detected in other wells, monthly LNAPL recovery would be initiated on these wells if they have an LNAPL thickness of greater than 0.5 foot. The current LNAPL recovery setup in use for MW-3 and MW-12, or equivalent, would be used for LNAPL recovery in other wells if needed. Monitoring of LNAPL and water levels, and LNAPL recovery volume monitoring would continue during LNAPL recovery events. When LNAPL recovery shows a declining trend in wells in which LNAPL occurs, recovery trends would be evaluated, a recommendation may be made to the Regional Board to reduce the frequency of LNAPL recovery, as appropriate.

The installation of the SSD system would actively reduce the amount of methane allowed to accumulate within building interiors. Recovery of LNAPL would prevent the generation of methane by removing liquid wastes. Therefore, long-term impacts of the methane generated from the Project would be less than significant.

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[41] *U.S. Environmental Protection Agency, Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities, EPA-600/R-05/123a, September 2005.*

[42] *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance). DTSC, October 2011.*

Expedited Implementation Option

The Expedited Implementation Option would increase the number of properties actively remediated at one time. The Expedited Implementation Option would install an SSD system and LNAPL recovery identical to the base remedy. Therefore, long-term impacts would remain the same as the base remedy. Short-term impacts would also be the same as the base remedy as methane would be released to the atmosphere during excavation activities. Therefore, short-term impacts would remain the same as the base remedy.

Threshold HAZ-5: Would the project create a risk of accidental release which exceeds the "acceptable with controls" category (see Table 5.4-2 of this EIR) through the routine transport, use, or disposal of hazardous materials?

Impact Statement HAZ-5: *Implementation of the RAP results in an acceptable level of risk regarding accidental release through the routine transport, use, or disposal of hazardous materials. Therefore, mitigation measures would not be required.*

Threshold HAZ-6: Would the project create a risk of accidental release which exceeds the "acceptable with controls" category (see **Table 5.4-2)** through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Impact Statement HAZ-6: ***I****mplementation of the RAP would result in an acceptable level of risk regarding reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. The Expedited Implementation Option would also result in a less than significant impact. Therefore, mitigation measures would not be required.*

Short-Term

Short-term implementation of the RAP would not involve the use or storage of acutely hazardous materials on-site, above minimal amounts such as consumer packages of solvents for cleaning and other miscellaneous materials (e.g., engine oil, and paints , etc.) needed for maintenance of equipment. Those would be stored in appropriate areas such as marked storage areas and cabinets, as required. An accidental release (spill) would be easily contained to a small area and would not be expected to reach the off-site environment. Thus, this scenario does not warrant further evaluation.

Heavy-duty equipment, such as excavators and dump trucks, do contain hazardous materials such as diesel fuel. Diesel fuel may be delivered in bulk, stored in small tanks or brought on-site by a mobile re-fueler, and dispensed as needed into individual pieces of equipment. A mobile maintenance vendor may be called on-site for routine maintenance, but equipment would be taken off-site if significant maintenance or repair were required. The drivers/operators of the bulk delivery trucks or mobile re-fuelers are trained and equipped to respond to a fuel spill, should one occur. Operators of heavy-duty equipment are trained to remain alert and nearby during fueling of equipment, and spills, should they occur, should not reach the off-site environment. Failure of the small fuel storage tanks is possible. However, with controls, such as secondary containment, even a complete de-inventory of the diesel fuel from the storage tanks is not expected to reach the receptors on-site. Any spill of diesel fuel upon the Site would be remediated and treated in accordance with applicable regulations. Therefore, an accidental release scenario involving the spill of fuel from a mobile re-fueler or from the AST does not warrant further evaluation. Although unlikely, it is possible over the life of the project

(approximately 6 years) that a device, such as a hose, valve, clamp, tank, or reservoir, on the heavy duty construction equipment could rupture or leak. However, this equipment would operate exclusively on-site, and as such, even if a leak or spill occurred, it is highly unlikely that the material would reach the off-site environment or receptors on-site. The site specific HASP would include measures to appropriately handle an on-site accidental release of fuel or other material from the equipment, and as such, this scenario does not warrant further evaluation.

With regard to the contaminated material and other material on-site, most of the COCs do not pose an immediate risk to health or safety, especially at the relatively low concentrations found in soil on-site. Some of the COCs, such as benzene and arsenic, are classified as acutely hazardous materials (AHM) by the Office of Emergency Services (OES) because they can pose an immediate threat in an upset or accidental release scenario if found in their pure form or at high concentrations. It is important to note however, that the analytical data show that these AHMs are present at the site only in low concentrations. Further, AHMs are subject to CalARP requirements, if present in volumes above thresholds quantities (TQs). CalARP requirements apply to stationary sources and not trucks; however, for the purposes of CEQA, this analysis relied on the CalARP methodology to assess impacts relative to this impact criterion. The analytical data show that any AHMs present at the site are at concentrations below TQs.

Due to the inconsistent nature of impacted materials throughout the site, not all of the approximately 188,095 CY to be transported and treated off-site is likely to contain AHMs. For the purposes of this analysis, as a conservative basis, it was assumed trucks would haul material that could contain AHMs. For haul trucks, the probability of an accident involving a collision is estimated to be 2 per 1,000,000 miles travelled.[43] However, not all collisions would result in a breach of the container and release to the environment. The probability of a release of a solid hazardous cargo is approximately 9.1 percent for solid materials.[44] The transport of 188,095 CY of material would require approximately 13,851 roundtrips. The longest on-road trip is estimated to be approximately 100 miles, which equates to approximately 130,000 total vehicle miles traveled (VMT) to transport the 188,095 CY. Based on the rate of 2 collisions per 1,000,000 miles travelled, this poses a mathematical collision chance of 0.12, where 1 means it is likely to occur once during the lifetime of the project. With a release rate of 9.1 percent of accidents, the probability of a release of AHM in transport to off-site receiver landfills is 0.01, using very conservative assumptions in that all of the 188,095 CY contains AHMs. Therefore a collision involving a truck transporting this material resulting in a release is very unlikely to occur, which is defined as a frequency category 2 on Table 5.4-2. Thus, regardless of the severity ranges if exposure were to occur (across all four categories), the risk of a spill resulting in a release of this material to the environment is so low that it falls within the "acceptable (as is)" or "acceptable (with controls)" risk ranges. Drivers of waste hauling trucks are required to be trained to respond to and contain releases, and appropriate controls are in place. Therefore, short-term impacts related to accident or upset conditions would be less than significant and no mitigation measures are required.

Using the CCPS risk assessment matrix, the hypothetical scenario of the transport of materials potentially impacted by AHM are highly unlikely that they result in risk characterization within the "Acceptable (as is)" or "Acceptable (with controls)" ranges. Appropriate controls have been identified and would be

[43] *Argonne National Laboratory, Environmental Assessment Division, Risk Assessment for the Transportation of Hazardous Waste and Hazardous Waste Components of Low-Level Mixed Waste and Transuranic Waste for the U.S. Department of Energy Waste Management Programmatic Environmental Impact Statement, December 1996.*

[44] *Ibid.*

implemented. Therefore, the risks posed by the potential hypothetical release of contaminated materials or other materials to the environment through upset conditions or accidental release during the transport of materials off-site and on-site implementation of the RAP are acceptable, and the project results in less than significant impacts.

Long-Term

The site is not expected to involve the use or storage of acutely hazardous materials on-site, above minimal amounts such as consumer packages of solvents for cleaning. Thus, this scenario does not warrant further evaluation.

Expedited Implementation Option

The Expedited Implementation Option would increase the number of properties actively remediated at one time. The total amount of soil excavation would remain the same as the base remedy. Therefore, short-term impacts would remain the same as the base remedy and result in a less than significant impact. Long-term impacts would also be the same as the base remedy as the site is not expected to use or store AHMs. Therefore, long-term impacts would remain the same as the base remedy and result in a less than significant impact.

Threshold HAZ-7: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.

Impact Statement HAZ-7: *Hazardous emissions would be emitted during the implementation of the RAP, but would result in less than significant potential health risks. Long-term use of SVE would control potential emissions from impacted materials remaining on site long-term Therefore, the project would result in a less than significant impact with regard to release or handling of hazardous materials within one-quarter mile of a school. The Expedited Implementation Option would also result in a less than significant impact.*

Short-Term

Wilmington Middle School is located approximately 600 feet southwest of the site (i.e., the distance from the southwest corner of the site to the edge of the high school parking lot). Excavation and soil handling would occur throughout the entire site including portions closest to the school. Haul trucks using regional freeways regardless of their origin/destination would access local streets to and from I-110 at Sepulveda Boulevard. Incoming trucks would access the site via Sepulveda Boulevard eastbound, Wilmington Avenue southbound, Lomita Boulevard westbound, and a right turn on either Neptune or Lagoon Avenues. Trucks leaving the site would then travel westbound on Lomita, northbound on Main Street, and westbound on Sepulveda to the I-110. The haul route(s) on municipal streets would be stipulated in a Construction Traffic Management Plan reviewed and approved by the City of Carson prior to project implementation. Trucks would enter within 600 feet of the school and would exit the site travelling on Lomita Boulevard past the school. As discussed above, trucks exiting the site would be decontaminated and inspected before being allowed to leave. Implementation of the PDFs described above and the safety measures included in the RAP would ensure that impacts on school staff, attendees and visitors from emissions related to handling site materials would remain at, or be reduced to, a less than significant level and no mitigation measures are required.

As described above, the HHRA prepared for implementation of the RAP addressed impacts on off-site receptors and supports this conclusion. The HHRA estimated, based on upper confidence limit potency values, that the maximally exposed receptor at the school would experience an unmitigated cancer incidence risk of 0.29 in one million based on five year exposure duration. The estimated risk for school receptors is below the significance threshold of one in one million. The HRA shows hazard indices of 0.03 for non-cancer effects of chronic exposure and 0.12 for non-cancer effects of acute exposure at the maximally exposed school receptor. Both hazard indices are well below the significance threshold of 1.00. As shown in Table 5.4-4 above, short-term cancer risks at the school receptor would not exceed significance thresholds. In addition, the acute and chronic HI for the school receptor would remain below the significance threshold of 1.

Long-Term

Once implementation of the RAP is complete, the installation of the SVE/bioventing systems, sub-slab vapor mitigation systems, LNAPL collection, natural attenuation groundwater recovery, would serve to reduce COCs present on site and limit the release of hazardous emissions. During catalytic oxidation of the SVE/bioventing system, VOCs are thermally destroyed. Therefore, no VOC emissions would result. The design of the SVE system potentially would include use of multiple treatment technologies in a staged approach, depending on inlet concentrations. The remediation equipment would provide the flexibility to transition from thermal oxidation to catalytic oxidation followed by GAC treatment, when the concentrations have decreased sufficiently. If the treatment systems utilizes GAC, spent activated carbon would be transported off-site for treatment/regeneration or disposal. The likelihood of accidental release of spent activated carbon would be very low due to periodic maintenance trips to the site that ensure proper functioning of the treatment system. In addition, any release of spent activated carbon would not result in emissions since the VOCs would be bound to the GAC. All systems will be permitted and properly maintained and documented. Therefore, long-term operation of the project would not emit hazardous emissions within one-quarter mile of a school. No mitigation measures are required.

Expedited Implementation Option

The Expedited Implementation Option would increase the number of properties actively remediated at one time, decreasing the duration but not increasing the amount of material excavated site-wide. Therefore, lifetime cancer risks and chronic health risks from implementation of the RAP under the Expedited Implementation Option would remain the same as the base remedy and result in a less than significant impact. Acute risks would increase incrementally in comparison to the base remedy, but would not exceed threshold levels and would be less than significant. Long-term impacts would also be the same as the base remedy as the site will implement the same SVE/bioventing systems, LNAPL collection and other systems to limit the release of hazardous emissions. Therefore, long-term impacts would remain the same as the base remedy and result in a less than significant impact.

4. ALTERNATIVES ANALYSIS

Analysis of Impacts Associated with Alternative 1 (No Project Alternative)

Hazard to Public or Environment through Transport, Use or Disposal of Hazardous Materials

Under the No Project Alternative, the RAP would not be implemented. Remediation of contaminated soils, sub-soil vapor, and groundwater would not occur. The SVE/bioventing system would not be built and the

excavation of soil would not be conducted, so transport would not occur. The No Project Alternative would not create a significant hazard to the public or environment through the routine transport, use or disposal of hazardous materials, because none of that would occur. However, the site is already contaminated and the No Project Alternative would not fulfill the requirements set out by the Regional Board to remediate the site, leaving the residents subject to possible hazardous materials exposure.

Accidental Upset

Under the No Project Alternative, the RAP would not be implemented. No storage, transport or use of hazardous materials would occur. Remediation of contaminated soils, sub-soil vapor, and groundwater would not occur. The No Project Alternative would not create a significant hazard to the public or environment through reasonable foreseeable upset or accidental conditions involving a release of hazardous materials. However, the site is already contaminated and the No Project Alternative would not fulfill the requirements set out by the Regional Board to remediate the site, leaving the residents subject to possible hazardous materials exposure. The contamination on-site is not expected to be released accidentally and would not likely pose a hazard to on-site residents. Therefore, the No Project Alternative would result in a less than significant impact with regard to accidental upset.

Impacts to Nearby Schools

The No Project Alternative would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one quarter mile of an existing or proposed school. Under the No Project Alternative, the RAP would not be implemented so remediation of the site would not occur. However, the site is already contaminated and the No Project Alternative would not fulfill the requirements set out by the Regional Board to remediate the site, leaving the residents and Wilmington Middle School, as it is within the quarter-mile distance, subject to possible hazardous materials exposure. As discussed in the HHRA, health risk impacts to sensitive receptors due to existing conditions and emissions would be less than significant. Therefore, the No Project Alternative would have a less than significant impact on the School.

Analysis of Impacts Associated with Alternative 2 (Excavation Beneath Landscape and Hardscape to 10 Feet Alternative)

Alternative 2 would entail excavation of soil from landscaped areas and beneath residential hardscape to a depth of 10 feet bgs at all affected properties. Implementation of Alternative 2 would take approximately 8.4 years in order to excavate the additional materials. Daily demolition and excavation volumes, truck trips, and worker commutes are anticipated to be the same as the project. This Alternative would also implement the same project design features as described previously.

Hazard to Public or Environment through Transport, Use or Disposal of Hazardous Materials

Short-Term Impacts

Alternative 2 would result in an increase release of short-term TAC emissions compared to the project. Although daily emissions would be similar to the RP's Proposed Remedy, total emissions would be increased in comparison to the project. This Alternative would incorporate the same PDFs as the RP's Proposed Remedy, which would reduce short-term emissions from heavy equipment, trucks, fugitive dust and volatiles. However, Alternative 2 would result in an increase in exposure which would increase lifetime

cancer risks for sensitive receptors as a result of the extended duration of remediation activities. Impacts with regard to health risk would be greater under this alternative and would likely exceed cancer risk threshold of one in one million. As a result, health risk impacts due to Alternative 2 would be significant and mitigation measures would be required (see section 6.0 below).

Long-Term Impacts

Implementation of the RAP would result in restoration of affected properties and infrastructure, including yards, landscaping, and streets. Following implementation of the RAP, long-term emissions would result from the SVE/bioventing system, sub-slab vapor mitigation system, and from periodic monitoring and maintenance activities; however, these are expected to be negligible. Therefore, Alternative 2 would result in less than significant impacts with regard to hazards to the public or environment.

Accidental Upset or Release

Short-Term Impacts

Alternative 2 would not use or store acutely hazardous materials on-site. Materials needed for maintenance of equipment or vehicles might be stored on-site. However, these materials would be stored in appropriate storage areas and cabinets. Under Alternative 2, the RAP would be implemented and remediation activities would be similar to the project, but longer in duration. Thus the amount of diesel fuel handled on-site would be increased compared to the RP's Proposed Remedy.

Contaminated material on-site would not pose an immediate risk to health or safety at nearby sensitive uses. The total amount of AHMs handled under Alternative 2 would be greater than the project, which results in more total truck trips required for export. With additional truck trips, the likelihood of accidental release of contaminated soil during transport would also be increased. However, risk of accidental release during transport is minimal for the project. The increase in accidental release during transport under Alternative 2 would be increased, but would not result in a significant impact.

With regard to the CCPS risk assessment matrix, the possibility of accidental release during transport of AHMs would be greater than the project, but would not result in a significant impact. Therefore, implementation of the RAP under Alternative 2 would result in less than significant impacts.

Long-Term Impacts

Implementation of Alternative 2 would excavate contaminated soil and backfill with clean soil, similar to the project. As with the project, sub-slab vapor mitigation systems would be installed to keep methane levels from exceeding SSCGs. In addition sub-slab depressurization (SSD) systems would be used to keep soil vapors from entering buildings. Under Alternative 2, LNAPL removal and ground water monitoring would be performed similar to the project. The SVE/bioventing systems would also be installed similar to the project. Therefore, long-term impacts under Alternative 2 would be similar to the project and impacts would be less than significant.

Impacts to Nearby Schools

Short-Term Impacts

Under Alternative 2, remediation activities would be similar to the project on a daily basis. However, the total amount of soil excavated and duration would be increased in comparison to the project. As the amount of toxic emissions from remediation activities and exposure duration would be increased, health risk impacts to the Wilmington Middle School would be greater in comparison to the project. However, health risk impacts to the nearby school would remain below significance thresholds. Therefore, impacts to schools resulting from implementation of Alternative 2 would be less than significant.

Long-Term Impacts

Alternative 2 would implement the same long-term SVE/bioventing systems as the project. Once implementation of the RAP is complete, the installation of the SVE/bioventing systems, sub-slab vapor mitigation systems, LNAPL collection, natural attenuation groundwater recovery, would serve to prevent accidental release of contaminated material remaining on-site. During catalytic oxidation of the SVE/bioventing system, VOCs are thermally destroyed. As with the project, VOC emissions would be minimal and would not result in significant impacts to nearby school receptors. Therefore, long-term operation of Alternative 2 would not emit hazardous emissions within one-quarter mile of a school and impacts would be less than significant.

Analysis of Impacts Associated with Alternative 3 (No Excavation Beneath Hardscape - 5 Feet With Targeted 10 Feet Alternative)

Alternative 3 would not remove hardscape features or entail excavation of soils from beneath residential hardscape. As with the RP's Proposed Remedy, excavation would be to a depth of 5 feet with targeted 10-foot excavation. Because excavations would not occur beneath hardscape features and no hardscape features would be removed, less excavation of COC-containing soils and inert debris would occur over individual residential properties. Total remediation would occur over an approximately 4-year period compared to approximately 6 years under the RP's Proposed Remedy. Daily demolition and excavation volumes, truck trips, and worker commutes are anticipated to be the same as the project. This Alternative would also implement the same PDFs described above.

Hazard to Public or Environment through Transport, Use or Disposal of Hazardous Materials

Short-Term Impacts

Alternative 3 would result in a decrease in short-term TAC emissions compared to the project. This Alternative would incorporate the same PDFs the RP's Proposed Remedy, including PDFs HAZ-1 and AQ-1 through AQ-12 which would reduce short-term emissions from heavy equipment, trucks, fugitive dust and volatiles. The reduction in exposure duration (4-years vs. 6-years) would also reduce the lifetime increase in cancer risk. Therefore, impacts with regard to carcinogenic health risks would be less than significant under Alternative 3.

Long-Term Impacts

Implementation of the RAP would result in restoration of affected properties and infrastructure, including yards, landscaping, and streets. Following implementation of the RAP, long-term emissions would result from the SVE/bioventing system, sub-slab vapor mitigation system, and from periodic monitoring and maintenance activities. However, these emissions would be negligible, as under the RP's Proposed Remedy. Therefore, although Alternative 3 would result in less than significant impacts with regard to hazards to the public or environment.

Accidental Upset or Release

Short-Term Impacts

Implementation of Alternative 3 would excavate contaminated soil and backfill with clean soil, similar to the project, but in reduced amounts since excavation would not occur beneath hardscape. Removal of less impacted material would result in a decrease in the short-term risk of accidental release or upset involving hazardous materials. Therefore, Alternative 3 would result in less than significant impacts, with regard to accidental release or upset.

Long-Term Impacts

As with the project, the risk of upset or accidental release long-term would be less than significant.

Impacts to Nearby Schools

Short-Term Impacts

Under Alternative 3, remediation activities would be similar to the project. However, the amount of soil excavated and the duration would be reduced in comparison to the project. Heavy equipment activity and truck trips would be lower under Alternative 3. As the amount of toxic emissions from remediation activities and exposure duration would be reduced, health risk impacts to the Wilmington Middle School would be lower in comparison to the project, and impacts would be less than significant.

Long-Term Impacts

Alternative 3 would implement the same long-term SVE/bioventing systems as the project. Therefore, long-term operation of Alternative 3 would not emit hazardous emissions within one-quarter mile of a school and impacts would be less than significant.

5. CUMULATIVE IMPACTS

Short-Term Impacts

As described above, the project is located in an area with a slightly below average cancer risk due to regional airborne toxins. Ambient cancer risk due to regional airborne pollutants is approximately 1,090 in a million at the site and ranges from 1,087 to 1,434 in a million in the area surrounding the site. The incremental increase in cancer risk estimated in the health risk assessment resulting from short-term implementation of the RAP would be greater than one in a million with mitigation. Although the cancer risk would be greater than the threshold, based on a conservatively estimated incremental increase of less than one-half of 1

percent (~1/500) over the area-wide risk of average of 1,260 in a million, the cumulative impact with regard to cancer risk, the project would have a less than significant impact with regard to short-term impacts.

Accidental release incidents are typically based on individual incidents and would not be affected by cumulative conditions. The chance of accidental release due to transport of hazardous waste is based on vehicle miles travelled by the individual operator. Accidental release of on-site materials would also be dependent upon site conditions and would not be influenced by cumulative conditions. Therefore, the project would have no short-term cumulative impacts with regard to accidental release or upset conditions.

Long-Term Impacts

Health risk impacts from long-term implementation of the project would be minimal. Contaminated soil would be excavated and imported clean fill used to backfill the site. The SVE/bioventing, sub-slab vapor systems, LNAPL system, and groundwater natural attenuation system would be installed to collect and treat contaminated media. The SVE/bioventing and sub-slab vapor systems would prevent additional release of gases. Occasionally, maintenance vehicles would drive to the site for maintenance of the system and sampling activities. However, the number of trips would be minimal and would not result in vehicle emissions that exceed SCAQMD thresholds. Therefore, the project would have a less than significant impact with regard to long-term cumulative impacts. Accidental release incidents would also be based on site conditions and not cumulative conditions, as is the case with short-term impacts. Therefore, the project would have no long-term cumulative impacts with regard to accidental release or upset conditions.

6. MITIGATION MEASURES

The RP's Proposed Remedy, No Project Alternative, and Alternative 3 would have less than significant impacts. However, the project site may contain hot spots with elevated concentrations of volatile compounds. The following mitigation measures would help reduce impacts to Hazardous Materials. Mitigation Measure HAZ-1 would apply to the project and Alternative 2 and 3. Mitigation Measures HAZ-2, and HAZ-3 below are developed exclusively for Alternative 2.

MM HAZ-1 Due to the contribution of benzene to the incremental increase in cancer risks during implementation of the RAP, remedial activities conducted at properties with known substantial volatile emissions (benzene, vinyl chloride) impacts shall be undertaken with additional measures to control volatile TAC emissions implemented. Such measures include increased monitoring and watering of active excavation areas or foam application (i.e. Rusmar AC-565 or similar), in accordance with manufacturer recommended specifications, as needed. Increased monitoring will identify elevated releases of volatile emissions in a shorter time frame allowing for corrective measures to be taken.

MM HAZ-2 CARB certified Level 3 diesel particulate filter (DPF) shall be installed on construction equipment used during excavation activities. DPFs shall be required for construction equipment rated at 20 horsepower (hp) or higher and used on-site for 21-days or longer. Diesel particulate filters (DPFs) shall reduce off-road diesel particulate matter (DPM) emissions from each piece of off-road equipment by at least 85 percent. Equipment which needs servicing (breaks down) may be replaced with Tier 3 on a temporary basis if equipment with a DPF is not commercially available. If

replacement equipment is not equipped with a DPF, documentation must be provided to demonstrate that no commercially available equipment with a DPF is available.

MM HAZ-3 The applicant shall investigate the feasibility of requiring haul trucks to be model year 2010 and newer engines or trucks which have been retrofitted to meet model year 2010 emissions standards. Results of this feasibility investigation shall be documented and provided to the Regional Water Quality Control Board for approval prior to start of hauling activities.

7. LEVEL OF SIGNIFICANCE AFTER MITIGATION

Short-Term Impacts

Project-related cancer risk impacts would not exceed the one in one million cancer risk threshold at offsite and onsite sensitive receptors. Although the project would not result in significant impacts, Alternative 2 would exceed the cancer risk threshold of one in one million and mitigation measures would be required.

As discussed above, the project, Alternative 1 and Alternative 3 would result in less than significant impacts with regard to health risk. However, Alternative 2 would result in an exceedance of cancer risk thresholds and mitigation measures would be required. Mitigation Measures HAZ-2 and HAZ-3 are designed specifically for Alternative 2 to reduce impacts due to diesel particulate matter. Implementation of HAZ-2 would reduce DPM emissions by approximately 85 percent for equipment equipped with diesel particulate filters (DPFs). Mitigation Measure HAZ-3 would also reduce diesel emissions from haul trucks.

The use of diesel particulate filters on equipment reduce toxic emissions to the greatest extent feasible for Alternative 2 and meet the definition of T-BACT. As T-BACT is incorporated into the project, acceptable cancer risks of greater than 1 in one million but less than 10 in one million are applicable to the analysis. With implementation of HAZ-2 and HAZ-3, cancer risk impacts would remain below the 10 in one million threshold for Alternative 2 and would result in a less than significant impact with mitigation.

Although the RP's Proposed Remedy would result in a less than significant impact with regard to health risk, mitigation measures are proposed to reduce potential impacts from vinyl chloride emissions. As discussed previously, a vinyl chloride and benzene hotspot was detected at one residence. Excavation and remediation of this residence may result in elevated concentrations of vinyl chloride and benzene at nearby sensitive receptors. Thus, Mitigation Measure HAZ-1 has been designed to avoid potential impacts due to vinyl chloride emissions.

Mitigation Measure HAZ-1 would reduce emissions of benzene during excavation activities through the targeted use of foam or watering to control vinyl chloride or benzene emissions at those properties with known substantial concentrations of such chemicals. Although health risk impacts are below significance thresholds, implementation of the Mitigation Measure HAZ-1 would further reduce incremental cancer risk impacts.

Long-Term Impacts

Implementation of the RAP would result in long-term impacts to hazards and hazardous materials that would be less than significant. Therefore, no mitigation measures are required.

5.5 HYDROLOGY AND WATER QUALITY

1. INTRODUCTION

This section of the EIR describes existing surface and groundwater conditions and applicable regulations related to surface and groundwater quality. This section evaluates the potential impacts resulting from implementation of the Remedial Action Plan (RAP) on surface and groundwater quality and on groundwater supply. Extensive multimedia investigations and testing have been conducted at the site from 2008 to the present. Details of the groundwater sampling and other site assements are included in Chapter 3.0, *Previous Investigations*, of the RAP document, which is attached as Appendix B of this EIR. Groundwater monitoring reports and other references that characterize the site are listed in Chapter 9, *References*, of this EIR. Referenced documents are on file with the Regional Board.

2. ENVIRONMENTAL SETTING

Regulatory Framework

Federal Laws/Regulations

Clean Water Act

The federal Clean Water Act (CWA) was designed to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The CWA was created in 1972, and then amended in 1977, and again in 1987. The United States Environmental Protection Agency (USEPA) has delegated responsibility for implementation of portions of the CWA, including water quality control planning and control programs, such as the National Pollutant Discharge Elimination System (NPDES), to the State Water Resources Control Board (State Water Board) and the nine Regional Water Quality Control Boards (Regional Boards). The NPDES program is administered by federal and state agencies, which establish requirements that must be met by permittees, such as local agencies. The NPDES program, as implemented in Los Angeles County, is described in detail below.

Comprehensive Environmental Response, Compensation, and Liability Act

The federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) grants the President the authority to require investigation and remediation of sites containing hazardous substances, pollutants, and contaminants. USEPA is the primary federal agency that implements and enforces CERCLA and has adopted regulations and guidance documents addressing remediation. CERCLA does not apply directly to the project, but USEPA guidance is relevant to the cleanup of some of the constituents present at the site.

State Laws/Regulations

Responsibility for the protection of water quality in California resides with the State Water Board and nine Regional Boards. The State Water Board establishes statewide policies and regulations for the implementation of water quality control programs mandated by federal and state water quality statutes and regulations.

Porter-Cologne Water Quality Act (California Water Code §§ 13000 et seq)

California's Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act) grants the authority to the State Water Board and the nine Regional Boards, including the Los Angeles Regional Board to protect surface water and groundwater quality and protect against nuisance associated with waste. Under the authority of the Porter-Cologne Act, the State Water Board adopts water quality control plans and policies and regulations that are implemented by the State Water Board and the Regional Boards. Under the authority of the Porter-Cologne Act, the Regional Boards adopt water quality control plans. Both the State Water Board's and the nine Regional Boards issue waste discharge requirements (WDRs) and NPDES permits and may require investigation and cleanup of sites affected by discharges of waste. WDRs and NPDES permits must be consistent with the applicable plans, policies, and regulations. The Porter-Cologne Act also establishes reporting requirements for certain unintended discharges of any hazardous substance, sewage, oil, or petroleum product.

The Porter-Cologne Act is also the primary vehicle for implementing California's responsibilities under the CWA. The Porter-Cologne Act is the basic water quality control law for California and works in concert with the CWA. The State Water Board and the nine Regional Boards implement the Porter-Cologne Act and permit provisions of Section 402 and certain planning provisions of Sections 205, 208, and 303 of the CWA. Under the Porter-Cologne Act, each Regional Board must formulate and adopt a Water Quality Control Plan (Basin Plan) for its region. The Basin Plan must conform to the policies set forth in the Porter-Cologne Act and established by the State Water Board in its State Water Policy. The Basin Plan designates beneficial uses for surface and groundwater in the region, establishes narrative and numeric water quality objectives to protect those beneficial uses, and describes implementation programs to attain the water quality objectives. The Porter-Cologne Act applies to "waters of the state", which is defined as any surface water or groundwater, including saline waters, within the boundaries of the state. The Porter-Cologne Act also authorizes the State Water Board and the nine Regional Boards to adopt discharge prohibitions applicable to particular conditions, areas, or types of waste within its Basin Plan or in WDRs.

The Porter-Cologne Act also authorizes the State Water Board and Regional Boards to require investigations and order cleanup of waste or abatement of discharges of waste. For example, California Water Code (CWC) Section 13267 (a) provides that a regional board, in establishing or reviewing any water quality control plan or waste discharge requirements, may investigate the quality of any waters of the state within its region. Under Section 13267 (b)(1), the regional board may require that any person who has discharged waste within its region shall furnish technical or monitoring program reports. Section 13267 (d) allows the State Water Board or a Regional Board to require a complete report on the condition and operation of the facility or injection well, or any other information that may affect the quality of the waters of the state.

CWC Section 13304(a) authorizes, in part, the State Water Board and the Regional Boards to order any person who has discharged or discharges waste into the waters of the state in violation of any waste discharge requirement or other order or prohibition issued by a regional board or the state board or who has caused or permitted waste to be discharged where it has caused or permitted or threatens to cause or permit waste to be discharged or deposited where it is or probably will be discharged into waters of the state and creates, or threatens to create, a condition of pollution or nuisance, to clean up the waste or abate the effects of the waste in accordance with the state or regional board's cleanup or abatement order. Section 13304(e) defines "threaten," as a condition creating a substantial probability of harm, when the probability

and potential extent of harm make it reasonably necessary to take immediate action to prevent, reduce, or mitigate damages to persons, property, or natural resources.

Activities that result in discharges of waste that could affect the quality of the waters of the state are required to obtain WDRs issued by the Regional Boards. Discharges of waste to land or groundwater regulated by WDRs include, for example, discharges of privately or publicly treated domestic wastewater, treated industrial wastes, and treated wastewater associated with groundwater cleanups. WDRs for discharges to surface waters also serve as NPDES permits, which are further described below. The actions proposed in the RAP are not likely to require issuance of WDRs and will require compliance with NPDES stormwater permits.

The Regional Boards have primary responsibility for issuing WDRs. The Regional Boards may issue individual WDRs to cover individual discharges or general WDRs to cover a category of discharges. WDRs may include effluent limitations or other requirements that are designed to implement applicable water quality control plans, including designated beneficial uses and the water quality objectives established to protect those uses and prevent the creation of nuisance conditions.

State Water Board Resolution No. 92-49

State Water Board Resolution No. 92-49 ("Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304"), sets forth policies and procedures for investigation and cleanup, including the determination of cleanup levels at sites where there are discharges of waste. Under Resolution No. 92-49, Regional Boards use any relevant evidence, such as documentation of historical or current activities, waste characteristics, chemical use, and other sources of information; site characteristics and location in relation to other potential sources of discharge; hydrologic and hydrogeologic information (such as differences in upgradient and downgradient water quality). Regional Boards shall make a reasonable effort to identify the dischargers associated with the discharge and to proceed to require dischargers to investigate and clean up and/or abate the wastes. Regional Boards shall require the discharger to conduct investigation, clean up and abatement in a progressive sequence to include:

a. Preliminary Site Assessment
b. Soils and Water Investigation
c. Proposal and Selection of Cleanup and Abatement Action
d. Implementation of Cleanup and Abatement
e. Monitoring to confirm short- and long-term effectiveness of cleanup and abatement.

The Regional Boards shall ensure that the discharger is aware of and considers techniques which provide a cost-effective basis for initial assessment of a discharge, including sampling and analysis of groundwater. The Regional Boards shall ensure that the discharger is aware and considers methods such as in-place treatment of soil or water, or excavation or extraction of soil, water or gas.

Under Resolution No. 92-49, the Regional Boards shall require actions for cleanup and abatement to conform to the provisions of Resolution No. 68-16 of the applicable Water Quality Control Plans and policies. The Regional Boards shall concur with any investigation and cleanup and abatement proposal which the

discharger demonstrates and the Regional Board finds to have a substantial likelihood to achieve compliance, within a reasonable time frame, with applicable cleanup goals. The Regional Boards shall ensure that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of background levels of water quality or the best water quality that is reasonable if background levels of water quality cannot be restored.

The Regional Boards shall determine schedules for investigation, cleanup, and abatement taking into account the following factors:

a. The degree of threat or impact of the discharge on water quality and beneficial uses;
b. The obligation to achieve timely compliance with cleanup and abatement goals and objectives that implement the applicable Water Quality Control Plans and Policies adopted by the State Water Board and Regional Water Boards;
c. The financial and technical resources available to the discharger; and
d. Minimizing the likelihood of imposing a burden on the people of the state with the expense of cleanup and abatement, where feasible.

Regional Water Quality Board Order to Conduct Environmental Investigation and Cleanup and Abatement Order No. R4-2011-0046

As discussed in Chapter 2, Project Description, of this EIR, beginning in 2008, the Regional Board issued a series of orders to Shell, including the CWC Section 13267 Order to Conduct an Environmental Investigation at the former Kast Property (May 8, 2008). Shell conducted a series of extensive site multimedia sampling and investigations, pilot studies, and other environmental evaluations of the site in response to that Order and subsequent 13267 Orders issued on October 1, 2008 and November 18, 2009, Section 13304 Order dated October 15, 2009, and Cleanup and Abatement Order (CAO) R4-2011-0046 dated March 11, 2011, as amended. The CAO requires Shell to investigate the site, conduct pilot tests, and to submit plans for approval prior to implementation of cleanup activities at the site. Pursuant to CWC Section 13304, the CAO requires the Responsible Party (RP) to clean up the waste and abate the effects of the discharge, including but not limited to total petrochemical hydrocarbons (TPH) and other TPH-related wastes discharged to the soil and groundwater in accordance with the following requirements:

1. Complete delineation of on- and off-site waste discharges: Completely delineate the extent of waste in soil, soil vapor, and groundwater caused by the discharge of wastes including, but not limited to TPH and other TPH-related waste constituents at the site into the saturated and unsaturated zones.

2. Continue to conduct groundwater monitoring and reporting:

    a. Continue the existing quarterly groundwater monitoring and reporting program previously required by the Regional Board, and

    b. As new wells are installed, they are to be incorporated into the existing groundwater monitoring and reporting program.

3. Conduct remedial action: Initiate a cleanup and abatement program for the cleanup of wastes in soil, soil vapor, and groundwater and abatement of the effects of the discharges, but not limited to, petroleum and petroleum-related contaminated shallow soils and pollution sources as highest priority. Shallow soils in this Order are defined as soils found to a nominal depth of 10 feet, where potential exposure for residents and/or construction and utility maintenance workers are considered likely (Ref. Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities – CalEPA 1996).

With regard to groundwater quality, the CAO requires Shell to prepare a RAP, based on cleanup goals that (1) at a minimum achieve applicable Basin Plan water quality objectives, including California's Maximum Contaminant Levels or Action Levels for drinking water as established by the California Department of Public Health, and the State Water Resources Control Board's "Antidegradation Policy" (State Board Resolution No. 68-16), at a point of compliance approved by the Regional Board, and comply with other applicable implementation programs in the Basin Plan and (2) meet the "Antidegradation Policy," which requires attainment of background levels of water quality, or the highest level of water quality that is reasonable in the event that background levels cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of water, and not result in exceedance of water quality objectives in the Board's Basin Plan. Goals under the CAO also include meeting the State Water Board's "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304" (State Board Resolution No. 92-49), which requires cleanup to background or the best water quality that is reasonable if background levels cannot be achieved and sets forth criteria to consider where cleanup to background water quality may not be reasonable.

State Anti-degradation Policy

State Water Board Resolution No. 68-16 ("Statement of Policy with Respect to Maintaining the High Quality of Waters of the State", also known as the "Anti-degradation Policy") restricts degradation of surface water and groundwater. In particular, Resolution 68-16 protects water bodies where existing quality is higher than necessary for the protection of beneficial uses. Under Resolution 68-16, whenever the existing quality of water is better than the quality established in policies, such existing high quality will be maintained until it has been demonstrated to the state that any change would be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality that is less than that prescribed in the policies. Any activity that produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements that would result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with the maximum benefit to the people of the State will be maintained.

National Pollutant Discharge Elimination System Permit

The State Water Board has adopted several general NPDES permits, including the general construction stormwater permit. The Los Angeles Regional Board adopted the Waste Discharge Requirements for municipal separate storm sewer system (MS4) discharges within the Los Angeles County Flood Control District, including the County of Los Angeles and the Incorporated Cities Therein, except the City of Long Beach (Order No. R4-2012-175) (LA County MS4 Permit). The LA County MS4 Permit requires the

participating permittees, which includes Los Angeles County and 84 municipalities, to implement the requirements of the permit and requires comprehensive Best Management Practices (BMPs) to reduce pollution in stormwater and other construction site runoff. BMPs are defined as means methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water. BMPs include structural and nonstructural controls, and operation and maintenance procedures. BMPs, including erosion controls, sediment controls, water conservation practices, and waste management are required for all construction sites. Additional BMPs are required for all construction sites disturbing one acre or more.

California Environmental Protection Agency Monitoring Well Design and Construction Guidelines

The California Environmental Protection Agency (Cal/EPA) guidance, *Monitoring Well Design and Construction Guidelines for Hydrogeologic Characterization of Hazardous Substance Sites* (1995), provides recommended quality assurance and quality control (QA/QC) procedures, and establishes a standardized approach to the presentation of groundwater monitoring well construction records. The recommendations of the Cal/EPA Guidelines include minimal criteria necessary to obtain quality data and assure reasonable and independently verifiable interpretations. Cal/EPA Guidelines also incorporate the ASTM International (ASTM) guidelines for well construction and decommissioning, where technically and legally relevant, into the Cal/EPA's guidance framework.[1]

Cal/EPA acknowledges that groundwater monitoring wells provide a means to assess groundwater quality, estimate groundwater flow direction and velocity, and calculate aquifer hydraulic properties. According to Cal/EPA, monitoring information enables the characterization of hydrogeologic conditions, identification of contamination, and development of appropriate remedies to mitigate groundwater contamination.[2] Cal/EPA's well design Guidelines provide standards for borehole construction; stratigraphic control; installation procedures; well casing and screen materials; well casing diameters; casing cleaning requirements; well intake design; documentation of well design, construction, and development; and processes for the decommissioning of groundwater monitoring wells and boreholes. All design features are intended to protect and limit impacts to monitored aquifers. The Guidelines, however, do not supersede California Code of Regulations (CCR) Title 22 or other specific regulatory controls.

Regional and Local

Basin Plan

The Basin Plan for the Los Angeles Region, administered by the Los Angeles Regional Board is designed to preserve and enhance water quality and to protect the beneficial uses of waters of the state within the Region. Specifically, the Basin Plan (i) designates beneficial uses for surface water and groundwater, (ii) establishes narrative and numerical water quality objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's anti-degradation policy, and (iii) describes implementation programs to protect all waters in the Region. In addition, the Basin Plan incorporates by reference all applicable State and Regional Board plans and policies and other pertinent water quality

[1] *State of California, Environmental Protection Agency, Monitoring Well Design and Construction for Hydrologic Characterization for Hazardous Substance Release Sites, July 1995.*

[2] *State of California, Environmental Protection Agency, Op. Cit.*

policies and regulations. The Basin Plan implements a number of state and federal laws, the most important of which are the Porter-Cologne Act and the federal Clean Water Act.

According to the Basin Plan, groundwater accounts for most of the Region's local supply of fresh water.[3] Based on a classification system developed by the California Department of Water Resources, the Basin Plan divides ground waters into major groundwater basins. Regional groundwater basins south of the Santa Monica Mountains include the Los Angeles Coastal Plain, which encompasses the Central and West Coast Groundwater Basins. According to the Basin Plan, groundwater in the lower aquifers of the Central and West Coast Basins is of good quality, but large plumes of degraded water in parts of the upper aquifers have threatened the quality of the lower basins, through migration between interfingered confining layers.[4]

Basin Plan Table 2-2, *Beneficial Uses of Ground Waters in the West Coast Basin of the Los Angeles Coastal Plan*, applicable to the City of Carson area, includes existing municipal and domestic supply, existing industrial service supply, existing industrial process supply, and existing agricultural supply as beneficial uses in the basin. The designated municipal use reflects the importance of groundwater as a source of drinking water in a region. Basin Plan Table 3-10, *Water Quality Objectives for Selected Constituents in Regional Ground Waters*, of the Basin Plan establishes an objective of 800 mg/L for TDS in the West Coast Basin of the Los Angeles Coastal Plan and California maximum contaminant levels to protect sources of drinking water.

Basin Plan Chapter 4, *Strategic Planning and Implementation*, defines the Regional Board's mission as achieving and maintaining water quality objectives that are necessary to protect the beneficial uses of waters in the region. Depending on the nature of the water quality problem, strategies include (1) control of point source pollutants and (2) control of non-point source pollutants. As described in Chapter 4, the protection of water quality from point source pollutants is primarily regulatory in nature. Permitting programs such as California's Waste Discharge Requirements and federal NPDES permits are examples of key regulatory programs. Non-source pollutants are diffuse, both in terms of their origin and mode of transport to surface and groundwater. These often enter waters in sudden pulses and large quantities as rain, irrigation and other types of runoff that mobilizes and transports wastes into surface and groundwater. Other sources include unregulated discharges, such as spills and leaks.

Basin Plan Chapter 5, *Plans and Policies*, describes policies and procedures for investigation and cleanup and abatement of discharges under Water Code Section 13304. As described therein, the Chapter establishes cleanup and abatement policies and procedures for those cases of pollution wherein it is not reasonable to restore water quality to background levels. Under this policy, case-by-case cleanup levels for the restoration of water quality must, at a minimum:

- Consider all beneficial uses of the waters,
- Not result in water quality less than that prescribed by the Basin Plan and policies adopted by the State and Regional Boards;

[3] *California Regional Water Quality Control Board, Los Angeles Region (4), Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, as amended February 23, 1995, page 1-21.*

[4] *Ibid.*

- Be consistent with the maximum benefit to the people of the state; and
- Be established in a manner consistent with California Code of Regulations, Title 23, Chapter 15, Article 5 (Water Quality Monitoring and Response Programs for Waste Management Units).

According to the Basin Plan, monitoring and assessment are essential to the success of the Region's water quality control program. Monitoring is considered necessary to assess existing water quality conditions, examine long-term trends, and ensure the attainment and maintenance of beneficial uses consistent with state and federal standards. Monitoring is also necessary to assess the effectiveness of cleanup programs. Objectives of surveillance and monitoring programs outlined in the Basin Plan include the following:

- Measure the achievement of water quality objectives specified in the Basin Plan.
- Measure background conditions of water quality and determine long-term trends.
- Locate and identify sources of water pollution that pose an acute, accumulative, and/or chronic threat to the environment.
- Provide information needed to relate receiving water quality to mass emissions of pollutants by waste dischargers.
- Provide date for determining discharger compliance with permit conditions.
- Measure waste loads discharged into receiving waters and identify their effects in order to develop waste load allocations.
- Provide the documentation necessary to support the enforcement of permit conditions and waste discharge requirements.
- Provide date needed for the continuing planning process.
- Measure the effects of water rights decisions on water quality, and to guide the State Board in its responsibility to regulate unappropriated water in the control of quality.
- Provide a clearinghouse for water quality data gathered by other agencies and private parties cooperating in the program.
- Report on water quality conditions as required by federal and state regulations or requested by others.

Los Angeles County Building Code

The Los Angeles County Building Code, which is incorporated by reference into the City of Carson Municipal Code, is applicable to all grading activities in the City of Carson. Under the County Building Code, for each Grading Permit application, an assessment of potential disturbed area must be made. If the disturbed area is equal to or greater than one acre, a referral to the Drainage and Grading Section is required. For projects where the disturbed area is less than one acre, the County's Plan Check Engineers must verify that the prescriptive BMP requirements[5] are implemented during actual project construction and included in the plan notes. Projects that disturb areas of one acre or more need to submit a Stormwater Pollution Prevention Plan (SWPPP) which details proposed BMPs to control erosion and prevent the discharge of

[5] *Los Angeles County Department of Public Works, Building and Safety Division, Building Code Manual for Plan Check and Inspection Policy for the NPDES Permit, Best Management Practices for Construction Activities., Attachment A.*

construction related pollutants. Review of the SWPPP is the responsibility of the Regional Drainage and Grading Engineer (RDGE). Attachment A of the County's Building Code Manual, which sets forth plan check and inspection policy for the LA County MS4 NPDES permit, summarizes the California Stormwater Quality Association (CSAQA) Handbook. BMPs address erosion control, temporary sediment control, equipment tracking control, non-stormwater management, waste management and material pollution control. Example measures listed in Attachment A of the Handbook include:

Example Erosion Control BMPs:
Hydraulic Mulch
Hydroseeding
Straw mulch
Soil Binders
Geotextiles and Mats
Earth Dikes and Drainage Swales
Velocity Dissipation Devices

Example Temporary Sediment Control BMPs:
Hydraulic Mulch
Hydroseeding
Straw mulch
Soil Binders
Geotextiles and Mats
Earth Dikes and Drainage Swales
Velocity Dissipation Devices

Example Equipment Tracking Control BMPs:
Stabilized Construction Entrance and Exit
Stabilized Construction Roadway
Entrance/Outlet Tire Wash

Example Non-Stormwater Management BMPs:
Water Conservation Practices
Potable Water/Irrigation
Vehicle and Equipment Cleaning
Vehicle and Equipment Fueling
Vehicle and Equipment Maintenance

Example Waste Management and Material Pollution Control BMPs:
Stockpile Management
Spill Prevention and Control
Hazardous Waste Management
Contamination Soil Management
Concrete Waste Management
Liquid Waste Management

Actions that must be implemented at all construction sites regardless of size include, at a minimum, the following:

- Eroded sediments and other pollutants must be retained on site and may not be transported from the site via sheetflow, swales, area drains, natural drainage courses, or wind.
- Stockpiles of earth and other construction-related materials must be protected from being transported from the site by the forces of wind or water.
- Fuels, oils, solvents, and other toxic materials must be stored in accordance with their listing and are not to contaminate the soil and surface waters. All approved storage containers are to be protected from the weather. Spills must be cleaned up immediately and disposed of in a proper manner. Spills may not be washed into the drainage system.
- Non-stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the project site.
- Excess or waste concrete may not be washed into the public way or any other drainage system. Provisions shall be made to retain concrete wastes on site until they can be disposed of as solid waste.

- Trash and construction-related solid wastes must be deposited into a covered receptacle to prevent contamination of rainwater and dispersal by wind.
- Sediments and other materials may not be tracked from the site by vehicle traffic. The construction entrance roadways must be stabilized so as to inhibit sediments from being deposited into the public way. Accidental depositions must be swept up immediately and may not be washed down by rain or other means.
- Any slopes with disturbed soils or denuded of vegetation must be stabilized so as to inhibit erosion by wind and water.

The Manual requires that the RDGE verifies that BMPs are properly detailed on the grading plans. No grading permit shall be issued until the applicant has satisfied BMP requirements. It is also the responsibility of the RDGE to refer all commercial and industrial projects to Environmental Programs Division (EPD) for the approval and permitting of all structural BMP's. The RDGE shall not approve any project plans until EPD approval is obtained. The inspector must verify that all permanent BMPs shown on the plans are installed and are operational. Special attention shall be made to stenciling and label requirements for all inlets to storm drains on private property. In addition, Appendix J, Section J111.3 of the Los Angeles County Building Code requires that all active grading projects submit Wet Weather Erosion Control Plans (WWECP) each storm season.

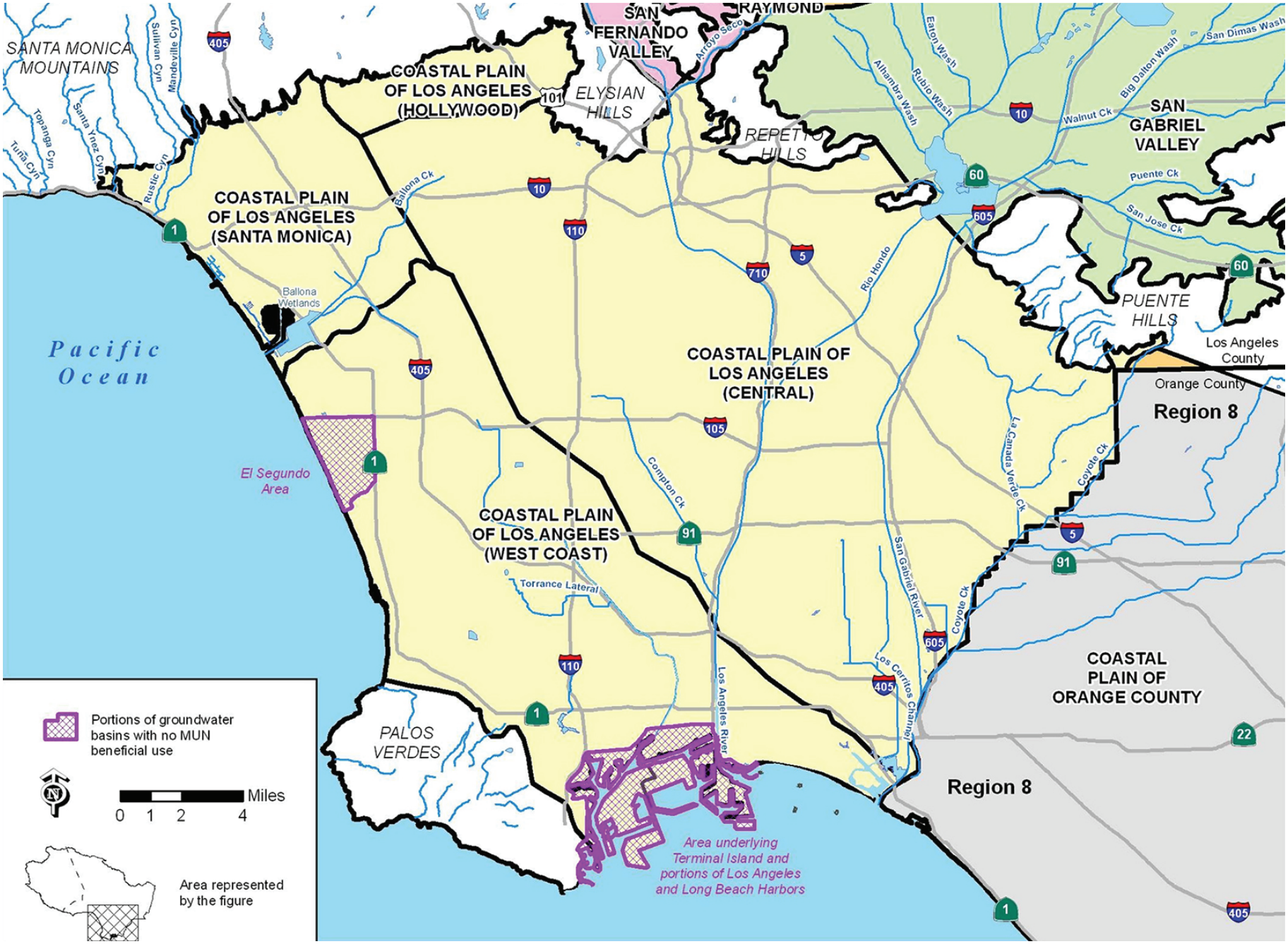
Existing Conditions

Regional

Groundwater basins underlying the region are the Coastal Basins, including the Central Basin and the West Coast Water Basin, of the Los Angeles Plain. The Los Angeles Coastal Groundwater Basins are illustrated in **Figure 5.5-1**, *Los Angeles Coastal Groundwater Basins*. The Newport-Inglewood fault zone, which passes through the north-central portion of the City of Carson in a southeast direction, serves as a water barrier separating the Central Water Basin and the West Coast Water Basin. Development of the yield of the Central Basin is dependent on the use of local storm runoff, imported and recycled water for groundwater recharge and the injection of imported water from the backside of the Alamitos Seawater Intrusion Barrier. The Central Basin is replenished though subsurface flows from the San Gabriel Valley and precipitation that falls directly on the Montebello Forebay and percolates into the Basin. Groundwater for the West Coast Basin also occurs from injection along the Dominguez Gap seawater barrier system. Groundwater flows in a generally southwest direction within the area of the City of Carson. Los Angeles County studies have indicated that 90 percent of the rain and runoff in the County either percolates naturally into the ground or is captured in the flood control reservoirs for later release to recharge groundwater basins.[6]

According to the City of Carson General Plan EIR, several aquifers occur within the City of Carson, including the Gage/Gardena, Lynwood, Silverado and Sunnyside aquifers. The Gage/Gardena aquifer occurs at a depth of 180 feet and varies in thickness from 50 to 100 feet. The Lynwood aquifer occurs at a depth of 270 feet. The Silverado aquifer occurs at a depth of 320 to 450 feet and is the principal groundwater source for the

[6] *City of Carson General Plan EIR, October 30, 2002, pages 4.7-1 and 4.7-2.*



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Los Angeles Coastal Groundwater Basins

Former Kast Property Tank Farm Site Remediation Project

Source: PCR Services Corporation, 2014.

FIGURE

5.5-1

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region. The Sunnyside aquifer which is located beneath the Silverado aquifer occurs at a depth of 600 feet. These aquifers are primarily replenished by area rainfall.[7]

A significant man-made hydrogeological feature in the region is the Dominguez Gap injection barrier. Excessive historical pumping of the Gage, Lynwood, Silverado, and Sunnyside aquifers caused intrusion of salt water inland from the Pacific Ocean, which degraded groundwater quality and threatened future drinking and production water use of these aquifers. Historical seawater intrusion occurring in the West Coast and Central Basins is controlled in most areas through the recharge system, which involves injecting fresh water into impacted aquifers via the Dominguez Gap injection wells. These spreading basins and injection wells create a fresh water hydrologic barrier between the Pacific Ocean to the south and drinking water supply wells to the north. The injection programs have been in operation since 1970 and have resulted in a regional water level rise of more than 30 feet during the past 30+ years.[8]

Results of basin-wide monitoring have confirmed that the quality of groundwater extracted from lower aquifers of the Central Basin has been very good. However, large plumes of saline water have been trapped behind the barrier of injection wells within the West Coast Basin, degrading significant volumes of groundwater with high concentrations of chloride. In addition, the quality of groundwater in parts of the upper aquifers of the Central and West Coast Basins is degraded by both organic and inorganic pollutants from a variety of sources, such as leaking tanks, leaking sewer lines and illegal discharges. Leakage primarily consists of gasoline, diesel fuel and waste oil. Industrial solvents continue to contaminate groundwater within limited areas of the Central Basin. These solvents, namely trichloroethylene (TCE) and tetrachloroethylene (PCE), have been detected in several wells in the areas straddling the pressure and nonpressure areas of the basin.[9]

According to the Basin Plan, groundwater in the lower aquifers of the West Coast Basin is of good quality, but large plumes of degraded water in parts of the upper aquifers have threatened the quality of the lower basins. As stated in the Basin Plan: "The quality of groundwater in the upper aquifers of the Central and West Coast Basins is degraded by both organic and inorganic pollutants from a variety of sources, such as leaking tanks, leaking sewer lines, and illegal discharges. As the aquifers and confining layers in these alluvial basins are typically inter-fingered, the quality of groundwater in the deeper production aquifers is threatened by migration of pollutants from the upper aquifers."[10] The California Water Service Company (Cal Water), which provides imported and local water to the region, is a major beneficiary of the West Coast and Central Water Basins. Cal Water has groundwater rights totaling 16,481 acre-feet and ten producing wells. Approximately 18 percent of Cal Water's water supply comes from groundwater resources and approximately two percent is derived from desalinization water. The remaining 80 percent comes from imported water.[11]

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[7] *City of Carson General Plan EIR, October 30, 2002, page 4.7-2, paragraphs 2.*

[8] *URS Corporation, Final Phase I site Characterization Report, Former Kast Property, Carson, California, October 15, 2009, page 2-1.*

[9] *City of Carson General Plan EIR, October 30, 2002, page 4.7-7.*

[10] *California Regional Water Quality Control Board, Los Angeles Region (4), Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, as amended February 23, 1995), page 1-21.*

[11] *City of Carson General Plan EIR, October 30, 2002, page 4.7-3.*

According the City of Carson General Plan EIR, no naturally occurring, permanent surface water features occur within the City of Carson.[12] The General Plan EIR also states that Los Angeles County Department of Public Works (LACDPW), however, presently owns and maintains three regional flood control facilities in and around the City of Carson. These facilities are the Dominguez Channel, Compton Creek and Wilmington Channel.[13]

Local

The site is located on the Torrance Plain of the West Coast Groundwater Basin of Los Angeles County. The site is located on the inland side of the Dominguez Gap Barrier. Four major aquifers have been reported in the vicinity of the site. These are, with increasing depth: the Gaspur aquifer, the Gage aquifer, the Lynwood aquifer, and the Silverado aquifer. The Gaspur aquifer is a channel deposit comprising of coarse-grained lower recent deposits. The Gaspur aquifer does not underlie the site but has been found approximately three miles to the east of the site. The Gage aquifer, which does underlie the site, is approximately 80 feet thick and extends from approximately 90 to 170 feet bgs. The Lynwood aquifer, also known as the "400-foot Gravel," and the deeper Silverado aquifer are located below the Gage aquifer within the San Pedro Formation and may be merged in the site vicinity. The Lynwood aquifer is dominated by coarse sand and gravel in the site vicinity. These two aquifers extend from approximately 200 feet bgs to at least 550 feet bgs below the site. The Lynwood and Silverado aquifers are the major sources of groundwater for municipal drinking water wells in the Los Angeles Basin.[14]

Based on results from the groundwater monitoring well installations, the first encountered groundwater beneath the site is located at depths ranging from approximately 52 to 68 feet bgs. Uppermost groundwater occurs within sandy deposits of the Bellflower aquitard. This zone is referred to as the Shallow Zone. **Figure 5.5-2**, *Hydrogeologic Cross Section*, illustrates the location of the Bellflower aquitard in relation to the Gage aquifer.

Six groundwater monitoring wells (MW-1 through MW-6) were installed on the Kast property in 2009 (three on Marbella Avenue and three on Panama Avenue) to provide quarterly groundwater sampling in accordance with the Regional Board's CWC Section 13267 Order.[15] There are currently 17 monitoring wells used to monitor Shallow Zone groundwater on a quarterly basis.[16] Based on data provided by current wells, which is consistent with 2009 data,[17] the groundwater flow direction in the Shallow Zone is toward the northeast at an approximate gradient of 0.002, based on groundwater levels in site monitoring wells.[18] This has remained generally consistent since monitoring began.[19]

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[12] *City of Carson General Plan EIR, October 30, 2002, page 4.7-1.*

[13] *City of Carson General Plan EIR, October 30, 2002, page 4.7-7*

[14] *URS Corporation, Final Phase I Site Characterization Report, Former Kast Property, Carson, California, October 15, 2009, pages 2-1 and 2-2.*

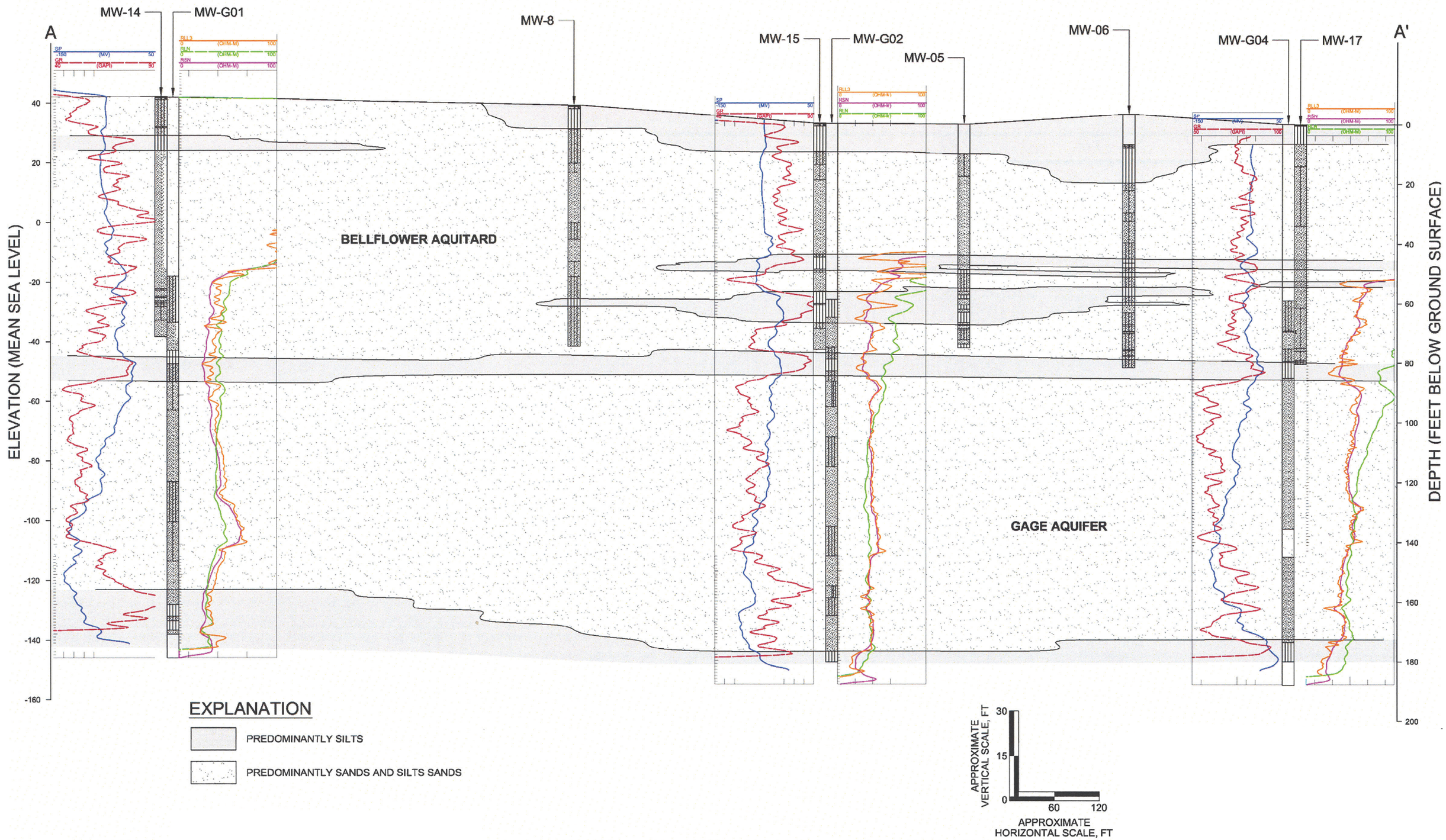
[15] *URS Corporation, Final Phase I Site Characterization Report, Former Kast Property, Carson, California, October 15, 2009, page 3-19.*

[16] *Geosyntec Consultants, Site-Specific Cleanup Goal Report, Former Kast Property, Carson, California, February 22, 2013, page 37.*

[17] *URS Corporation, Final Phase I Site Characterization Report, Former Kast Property, Carson, California, October 15, 2009, Appendix H, Figure 4, Groundwater Elevations.*

[18] *URS Corporation, Final Phase I Site Characterization Report, Former Kast Property, Carson, California, October 15, 2009, page 2-2.*

[19] *Geosyntec Consultants, Site-Specific Cleanup Goal Report, Former Kast Property, Carson, California, February 22, 2013, page 37.*



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Hydrogeologic Cross Section

Former Kast Property Tank Farm Site Remediation Project

Source: URS, 2011; Geosyntec Consultants, 2013.

FIGURE

5.5-2

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The Gage aquifer is interpreted to underlie the site at a depth of approximately 80 to 90 feet bgs. The base of the aquifer is estimated to occur at a depth of approximately 163 to 176 feet. The Gage aquifer is underlain by low permeability materials which separate the Gage aquifer from the underlying Lynwood aquifer. According to the "Site Specific Clean-up Goals Report, "Four monitoring wells are installed in the lower portion of the Gage aquifer, which are paired spatially with four monitoring wells installed in the upper portion of the aquifer. These wells are also co-located near Shallow Zone wells."[20] In the Shallow Gage wells, the gradient is to the northeast in the northwestern part of the site to east-northeast in the central to southwestern part of the site at a gradient of approximately 0.0014 (Fourth Quarter 2012). The gradient has varied from east-northeast to

northeast over the monitoring period. The vertical gradient varies from slightly downward from the Shallow Zone to the Upper Gage to the Lower Gage, to slightly upward in the same zones.[21] **Figure 5.5-3,** *Monitoring Well Locations*, illustrates the location of monitoring wells in the Shallow Zone, shallow Gage aquifer, and deep Gage aquifer. There is no documented use of groundwater within the Gage aquifer near the site. The nearest production well to the site (CWS Well 275), which is located 435 feet west of the site's west boundary, produces from the underlying Lynwood and Silverado aquifers. Drinking water supplied to the Carousel community by the water provider is screened in a lower aquifer than the impacted groundwater at the site and is tested according to state standards and is safe to drink.[22]

Sampling results indicate that on-site groundwater is impacted with COCs, some of which may be attributed to upgradient sources. Levels of benzene, naphthalene, and arsenic in on-site groundwater exceed California drinking water standards (Maximum Contaminant Levels or MCLs) or Department of Human Health Notification Levels (NLs). A NL is a health-based advisory level for chemicals in drinking water that lack MCLs. COCs also exceed the Regional Water Quality Control Board, San Francisco Region December 2013 Environmental Screening Levels (ESLs). Compounds detected in one or more sampling rounds that exceed respective MCL or NL are summarized in **Table 5.5-1**, *Groundwater Sampling Data*.

LNAPL

Light non-aqueous phase liquid (LNAPL) is locally present floating on the groundwater table. LNAPL consists of petroleum hydrocarbons that are not soluble in water and has lower density than water. LNAPL has been detected in two on-site wells, including MW-3 and MW-12, located approximately 43 feet from each other in Marbella Avenue. These wells have measurable thicknesses of LNAPL, which are removed monthly. As of the end of Second Quarter 2014, an estimated108.87 and 10.63 gallons of LNAPL have been removed from MW-03 and MW-12, respectively, since LNAPL recovery began in 2009.

[20] *Geosyntec, Site Specific Clean-up Goal Report, Former Kast Property, Carson, California, February 22, 2013, page 38.*

[21] *Geosyntec Consultants, Site-Specific Cleanup Goal Report, Former Kast Property, Carson, California, February 22, 2013, page 38.*

[22] *Cal Water, 2013, cited in URS Corporation, Remedial Action Plan, Former Kast Property, Carson, California, March 10, 2014, page 3-9.*

Table 5.5-1

Groundwater Sampling Data

	Chemical	MCL (µg/L)	NL (µg/L)	Maximum Detected Concentration (µg/L)[a]
VOCs and Hydrocarbons:	1,1-Dichloroethane	5		33
	1,1-Dichloroethene	6		100
	1,2,3-Trichloropropane		0.005	27
	1,2- Dichloroethane	0.5		3.6
	Benzene	1		650
	cis-1,2- Dichloroethene	6		230
	Naphthalene		17	82
	Tert-Butyl Alcohol (TBA)		12	250
	Tetrachloroethene	5		210
	trans-1,2	10		120
	Dichloroethene			
	Trichloroethene	5		450
	Vinyl Chloride	0.5		1.9
	1,4-Dichlorobenzene	5		11
Metals and General Minerals:	Antimony	6		24.8
	Arsenic	10		900
	Thallium	2		4.24 J
	Mercury	2		2.33
	Iron	300		67,000
	Manganese	50		2550
	Chloride	500 mg/L		3200 mg/L
	Nitrate (as N)	10,000		14,000
	Total Dissolved Solids	1,000 ng/L		5,620 mg/L
	Specific Conductance	1600 µS/cm		7,600 µS/cm

[a] *Unless noted.*

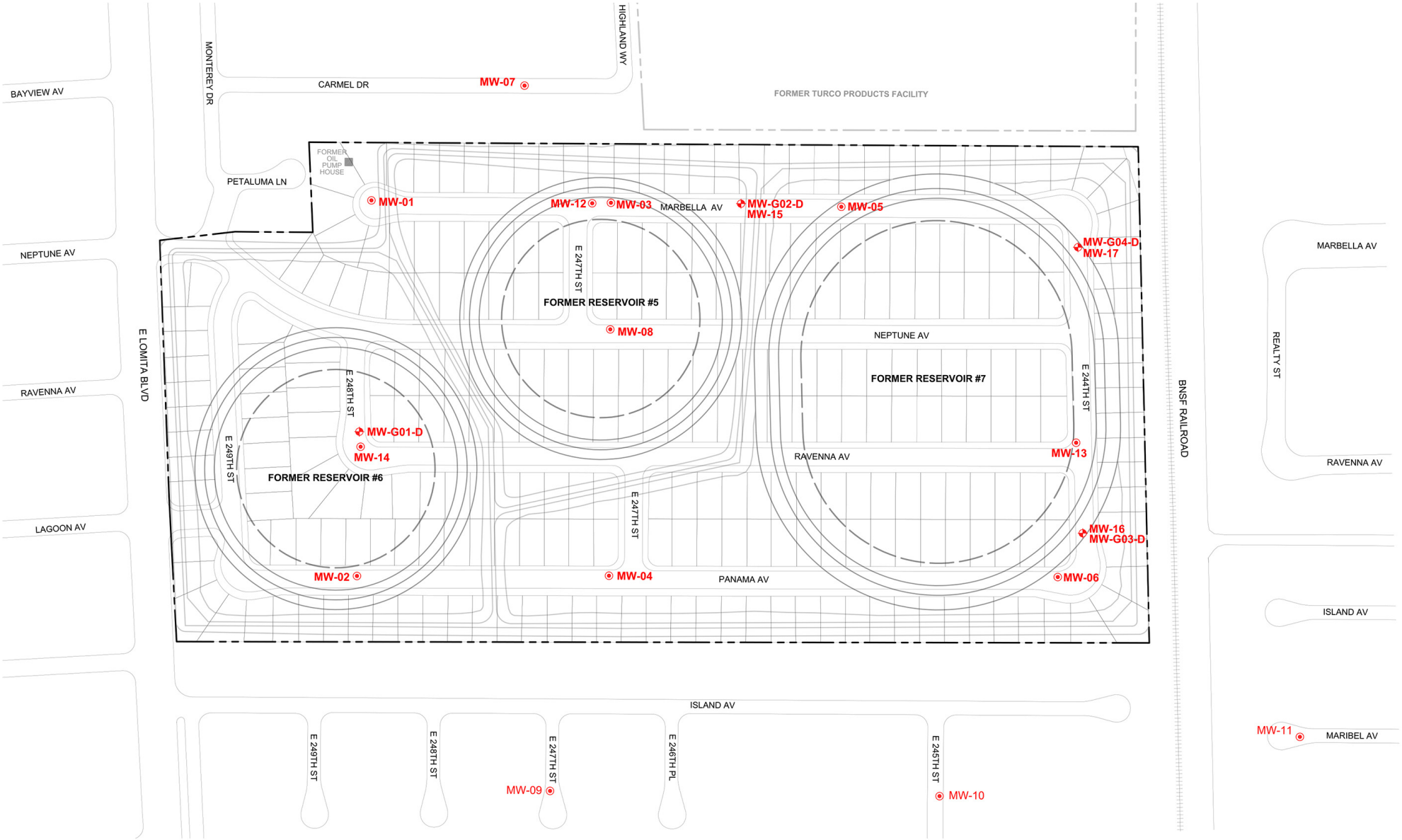
Note: MCLs for iron, manganese, chloride, Total Dissolved Solids and Specific Conductance are secondary MCLs. MCLs shown for chloride, Total Dissolved Solids and Specific Conductance are the "Upper" Secondary MCLs.

Source: Geosyntec Consultants, Site-Specific Cleanup Goal Report, Former Kast Property, Carson, California, February 22, 2013, page 39.

Benzene

Benzene is present beneath much of the site in the shallow groundwater zone. Benzene concentrations in the Shallow Zone, shallow Gage aquifer, and deep Gage aquifer are illustrated in **Figures 5.5-4,** *Benzene Concentrations in Groundwater – Shallow Zone*; **Figure 5.5-5**, *Benzene Concentrations in Groundwater – Shallow Gage Aquifer*, **Figure 5.5-6**, *Benzene Concentrations in Groundwater – Deep Gage Aquifer*. These figures are based on data provided in the Fourth Quarter 2013 Groundwater Monitoring Report.[23] Benzene in site groundwater is attributed to one or more of the following: leaching of benzene from hydrocarbon-

[23] *URS Corporation, Fourth Quarter 2013 Groundwater Monitoring Report, October through December 2013, Former Kast Property, Carson, California, January 15, 2014.*



EXPLANATION

MW-G01-D — APPROXIMATE LOCATION OF KAST GAGE MONITORING WELL

MW-10 — APPROXIMATE LOCATION OF SHALLOW WATER-TABLE MONITORING WELL

— — — — APPROXIMATE SITE BOUNDARY

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N

0 200 Feet

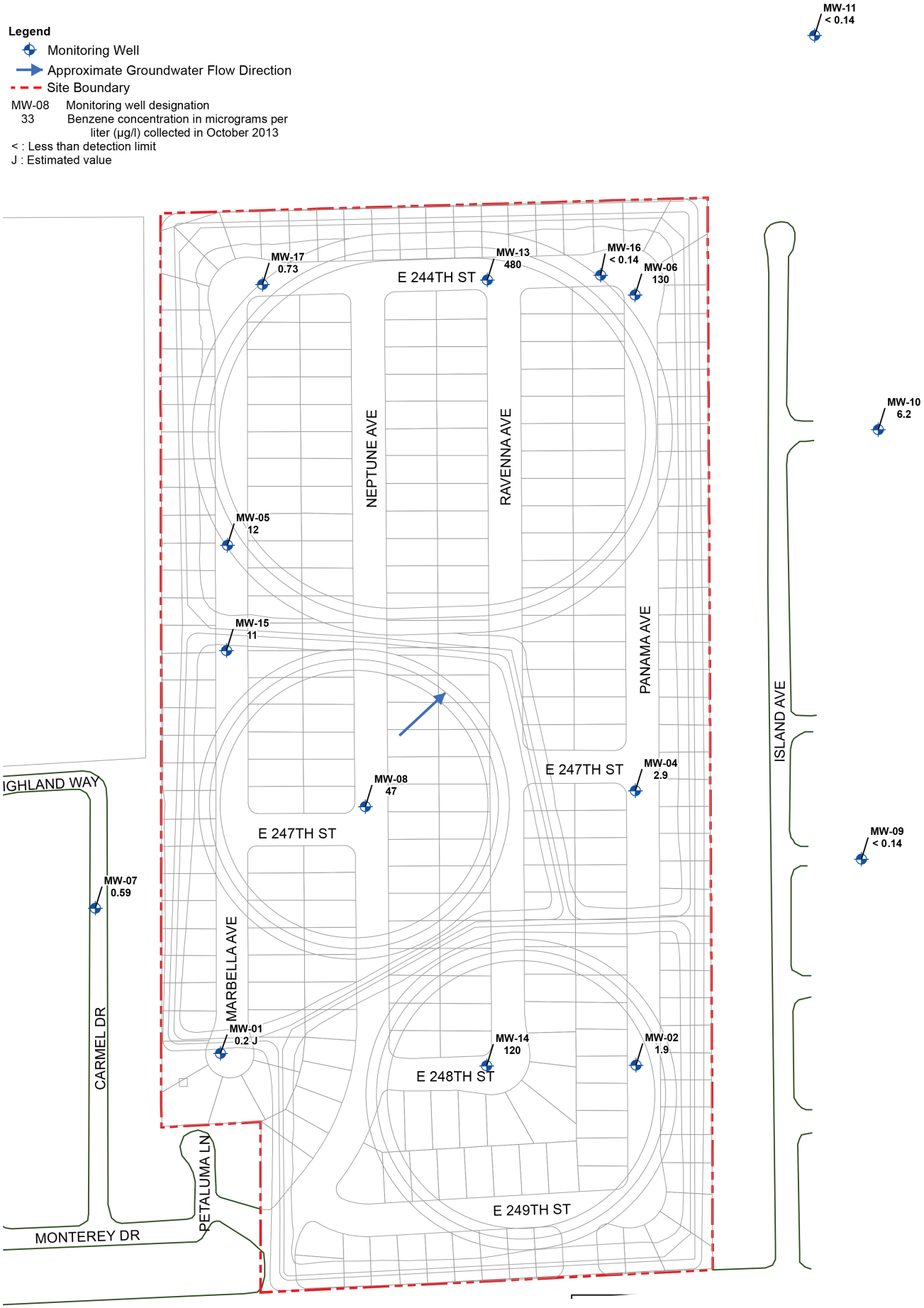
Monitoring Well Locations

Former Kast Property Tank Farm Site Remediation Project

Source: URS, 2014.

FIGURE

5.5-3



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Benzene Concentrations in Groundwater – Shallow Zone

Former Kast Property Tank Farm Site Remediation Project

Source: Geosytec Consultants, 2014.

FIGURE

5.5-4

Legend

Monitoring Well

Approximate Groundwater Flow Direction

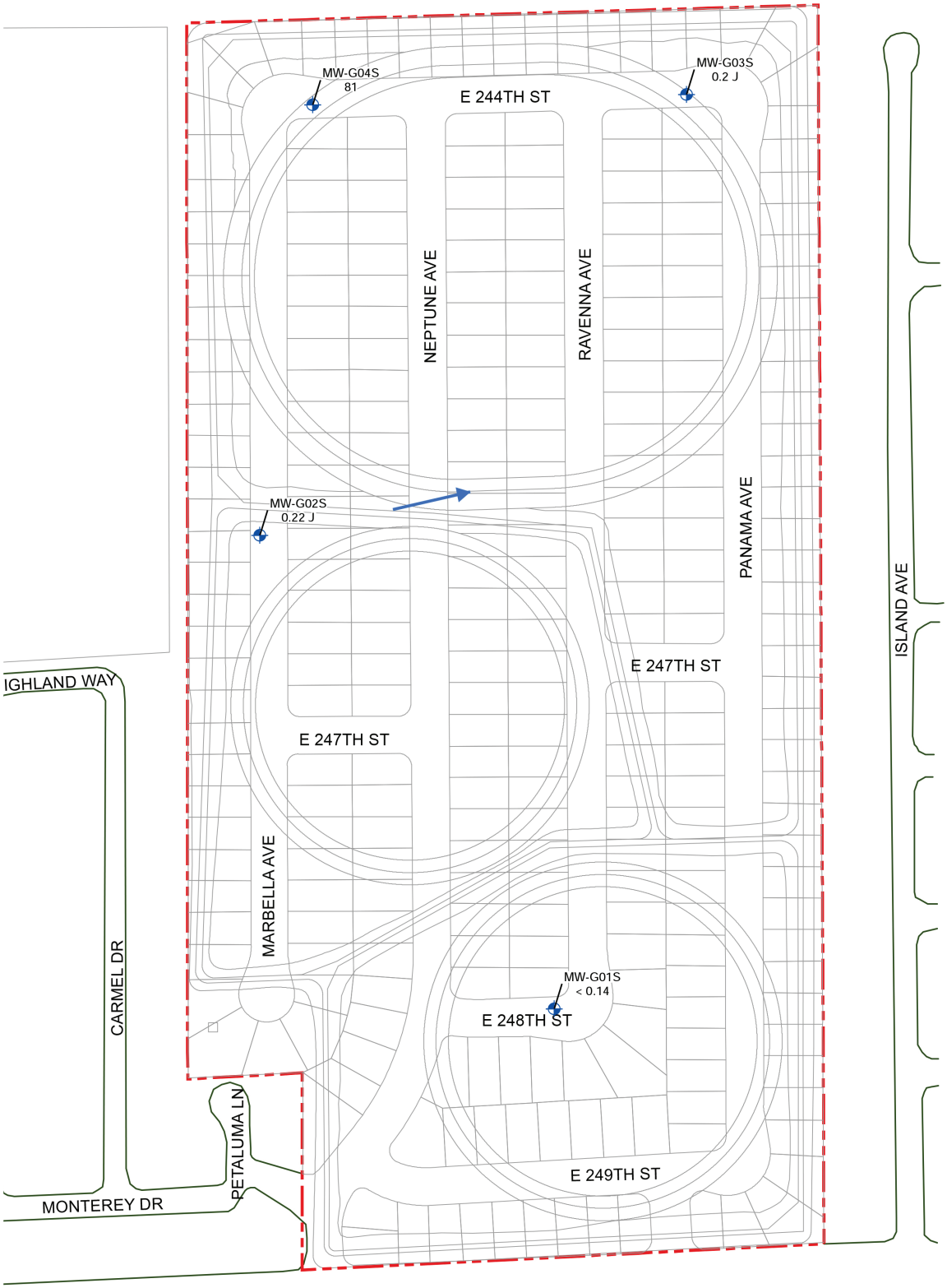
Site Boundary

MW-G02S Monitoring well designation

0.19 Benzene concentration in micrograms per liter (µg/l) collected in October 2013

< : Less than detection limit

J : Estimated value



N

0 350 Feet

Benzene Concentrations in Groundwater – Shallow Gage Aquifer

Former Kast Property Tank Farm Site Remediation Project

Source: Geosytec Consultants, 2014.

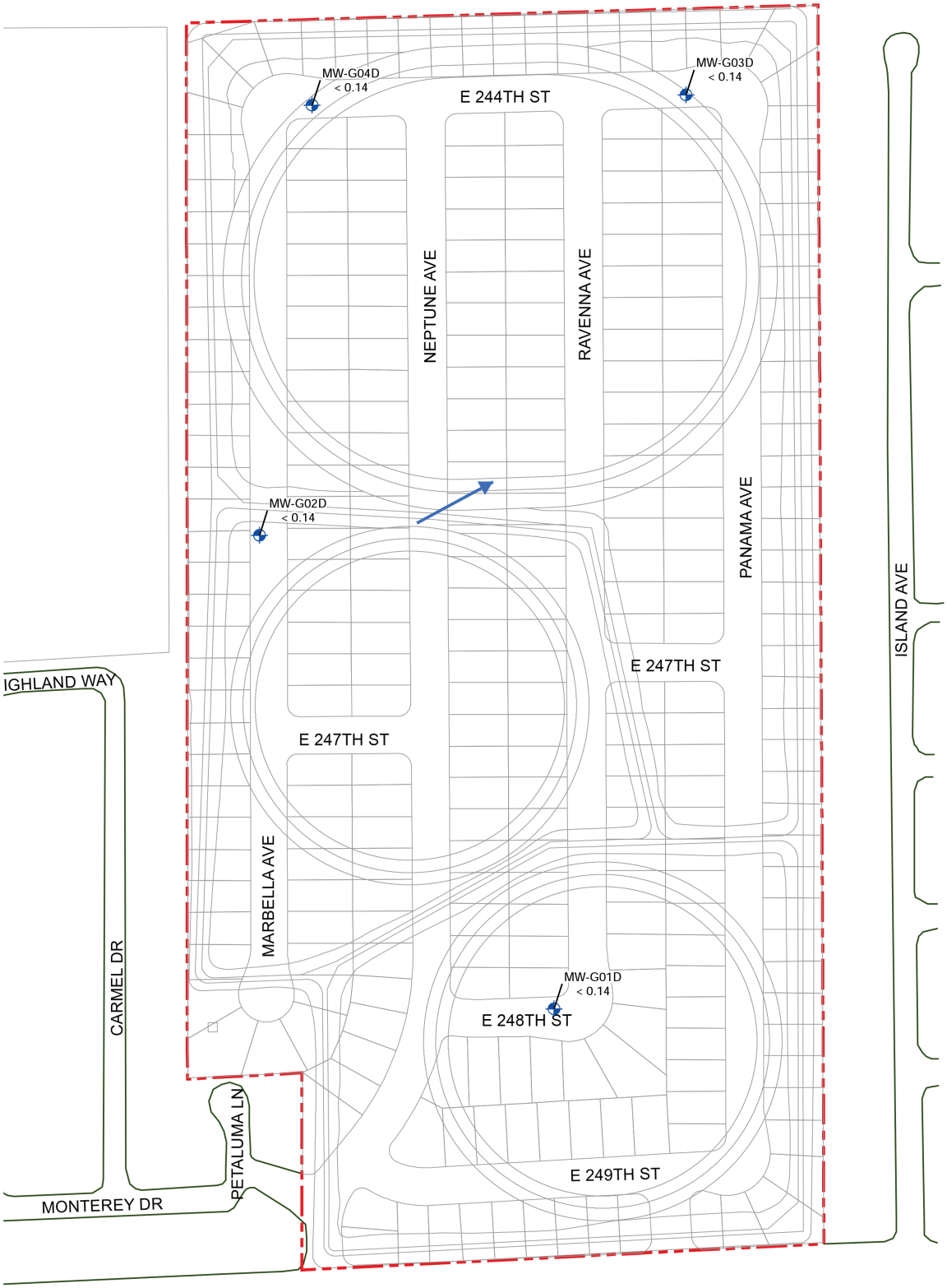
FIGURE

5.5-5

PCR

Legend

Approximate Groundwater Flow Direction
Site Boundary
MW-G03D Monitoring well designation
<0.14 Benzene concentration in micrograms per liter (µg/l) collected in October 2013
< : Less than detection limit
J : Estimated value



N

0 350 Feet

Benzene Concentrations in Groundwater – Deep Gage Aquifer

Former Kast Property Tank Farm Site Remediation Project

Source: Geosytec Consultants, 2014.

FIGURE

5.5-6

PCR

impacted site soils; leaching of benzene from LNAPL locally present at or near the water table beneath the site; and/or migration onto the site from upgradient sources, including the former Turco Products Facility and former FORCO refinery property. The highest concentrations of benzene were detected during the 4th quarter of 2013 in wells MW-13 and MW-6 (480 micrograms per liter (µg/L) and 130 µg/L, respectively). Both monitoring wells are located in the northeastern portion of the site. Offsite to the northeast (downgradient), benzene was detected in one downgradient well, MW-10, at a concentration of 6.2 µg/L (URS, 2014). As discussed in the 2010 Plume Delineation Report, downgradient well MW-10 previously had benzene detected at 2.6 µg/L and TPHd at 110 µg/L.[24]

Benzene was not detected in samples collected in the deeper portion of the Gage aquifer during recent monitoring. The lateral and vertical distributions of benzene at the site are well defined. URS used Monitoring and Remediation Optimization System (MAROS) software to model and evaluate the stability of the benzene groundwater plume at the site and suggested that it is likely that the benzene in on-site groundwater is being attenuated through natural biodegradation processes and is a stable or decreasing plume.

Naphthalene

Naphthalene has been detected in groundwater from the majority of on-site wells. Concentrations that exceed the NL of 17 µg/L have been detected in two wells. These include monitoring well MW-13, located in the northern portion of the site and MW-14. A maximum concentration of 82 µg/L was detected at MW-13 and at MW-14 naphthalene was detected below the NL at 3.6 µg/L during the 4th Quarter 2013. Concentrations of naphthalene historically exceeding the NL are limited to these two areas.[25] The highest detected concentration of benzene and other hydrocarbon-related volatile organic compounds (VOCs) are also detected at MW-13.[26]

Total Petroleum Hydrocarbons

MCLs and NLs have not been established for total petroleum hydrocarbons in groundwater. The San Francisco Regional Board has established Environmental Screening Levels (ESLs) for total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), and total petroleum hydrocarbons as motor oil (TPHmo) in groundwater of 100 µg/L (December 2013). TPH has been detected in on-site monitoring wells at concentrations exceeding San Francisco Regional Board groundwater ESLs. Based on 4th quarter 2013 data, the TPHg ESL was exceeded in nine wells, the TPHd ESL was exceeded in seven wells, and TPHmo ESL was exceeded in four wells. Monitoring well MW-13, located in 244th Street near Ravenna Avenue, has consistently had the highest TPH and VOC concentrations.[27] Downgradient well MW-10 had benzene detected at 2.6 µg/L and TPHd at 110 µg/L. A number of chlorinated VOCs detected

[24] *URS Corporation, Plume Delineation Report Former Kast Property, Carson, California, September 29, 2010, page 4-30.*

[25] *URS Corporation, Remedial Action Plan, Former Kast Property, Carson, California, March 10, 2014, pages 3-9 and 3-10.*

[26] *Ibid..*

[27] *URS Corporation, Remedial Action Plan, Former Kast Property, Carson, California, March 10, 2014, pages 3-9 and 3-10.*

were also detected in downgradient well MW-10. Downgradient wells MW-9 and MW-11 did not have detectable concentrations of VOCs.[28]

Arsenic

Arsenic has been detected in most of the site monitoring wells. During the most recent groundwater monitoring event in which arsenic was sampled (4th quarter 2013), arsenic concentrations exceeding the MCL of 10 µg/L were detected in six wells. Arsenic was not detected above the MCL in the three offsite shallow zone downgradient wells. Dissolved arsenic concentrations in the deeper Gage wells are significantly lower and the concentration in only one monitoring well, MW-G04S, was above the MCL at a concentration of 16.8 µg/L.

Although arsenic is identified as a COC, it is likely that a portion, if not all, of the dissolved arsenic present in groundwater is derived from native on-site soils. Arsenic is a natural trace element that occurs in soils. Based on groundwater monitoring well data, relatively elevated arsenic concentrations are localized in the west-central portion of the site and are attenuated in the downgradient direction.[29]

3. METHODOLOGY AND THRESHOLDS

Methodology

The hydrology and water quality evaluation is based on the URS assessment of existing conditions required by the Regional Board's CAO. The analysis is based on the application of Project Design Features that meet applicable Basin Plan water quality objectives, including California's Maximum Contaminant Levels or Action Levels for Drinking Water as established by the California Department of Public Health and State Water Board Resolution 68-16, at a point of compliance approved by the Regional Board. The evaluation also describes the applicability of state and local regulations in reducing the concentrations of constituents in surface and groundwater resources associated with construction activities.

Thresholds of Significance

Appendix G of the State *CEQA Guidelines* provides a set of screening questions that address impacts with regard to hydrology and water quality. These questions are as follows:

Would the project:

a) Violate any water quality standards or waste discharge requirements?

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

[28] *URS Corporation, Plume Delineation Report, Former Kast Property, Carson, California, September 29, 2010, page 4-30.*

[29] *URS Corporation, Remedial Action Plan, Former Kast Property, Carson, California, March 10, 2014, page 3-11.*

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

d) Substantially alter the existing drainage pattern of the site or area, including through the alternation of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

f) Otherwise substantially degrade water quality?

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

j) Inundation by seiche, tsunami, or mudflow?

For purposes of this EIR, the Regional Board has utilized the checklist questions in Appendix G of the *CEQA Guidelines* as thresholds of significance to determine whether a project would have a significant environmental impact regarding water quality and depletion of groundwater supplies. As determined in the Initial Study, which is contained in Appendix A of this EIR, the site is not located in a 100-year floodplain. In addition, the implementation of the RAP would not result in a substantial alteration of existing drainage patterns or increase the rate or amount of surface runoff such that flooding would occur. Therefore, no further analysis of these topics is necessary.

Surface Water Quality

H/WQ-1 Result in discharges that would create pollution, contamination or nuisance as defined in Section 13050 of the California Water Code (CWC) or would cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water body.

Groundwater Quality

H/WQ-2 Affect the rate or change the direction of movement of existing COCs or expand the area affected by COCs.

H/WQ-3 Result in an increased level of concentrations of COCs in groundwater or in a violation of any federal, state, or local groundwater quality standard, including the water quality objectives in the Basin Plan (to protect the designated beneficial uses, including municipal supply).

4. PROJECT ANALYSIS

Project Design Features

The following Project Design Features (PDFs) are components that would be implemented as part of the RP's Proposed Remedy to minimize the potential impacts to water quality.

PDF H/WQ-1 The Responsible Party will provide a Surface Containment and Soil Management Plan to permitting agencies prior to the start of RAP implementation. This document will provide measures for surface containment and management of residual soils containing COCs above SSCGs and will serve as part of the grading permit process. In addition, in compliance with the General Construction NPDES Permit, the Responsible Party will provide specific BMPs on proposed grading plans to reduce the potential for discharge of runoff into the storm drain system during grading. In accordance with the Los Angeles County Building Code, BMPs must demonstrate that eroded sediments and other pollutants will be retained on site and not transported from the site via sheetflow, swales, area drains, natural drainage courses, or wind; stockpiles of earth and other construction-related materials will be protected from being transported from the site by the forces of wind or water; fuels, oils, solvents, and other toxic materials will be stored in accordance with their listing and will not contaminate the soil and surface waters; spills will be cleaned up immediately and disposed of in a proper manner and not washed into the drainage system; non-stormwater runoff from equipment. Vehicles will be dry decontaminated before leaving the site to avoid water runoff. Excess or waste concrete will not be washed into the public way or any other drainage system and provisions will be made to retain concrete wastes on site until they can be disposed of as solid waste; sediments and other materials will not be tracked from the site by vehicle traffic, construction entrance roadways will be stabilized so as to inhibit sediments from being deposited into the public way, and accidental depositions will be swept up immediately and will not be washed down by rain or other means. Site-specific BMPs will be submitted to the Los Angeles County Department of Building and Safety (reviewing agency for the City of Carson) for review and approval. For areas of one-acre or greater, the RP shall prepare a SWPPP that describes all structural and non-structural BMPs. BMPs must be reviewed and approved by the Los Angeles County Department of Buliding and Safety prior to issuance of a grading permit. In accordance with Los Angeles Building Code, Appendix J, Section J111.3 a Wet Weather Erosion Control Plans (WWECP) for each storm season will be submitted for all active grading projects.

PDF H/WQ-2 Dust monitoring will be conducted for all excavations. If visible dust is encountered, periodic watering of the active excavation areas will be recommended throughout the excavation and backfill activities. Watering will be monitored to prevent off-site runoff.

PDF-H/WQ-3 Impacted soil will be directly loaded into approved waste containers (such as drums, bins, or directly into trucks) for off-site transport. The RP will provide suitable containers based on the nature of the excavation work being conducted. In the event that it is necessary to temporarily stockpile soil onsite before loading, soils will be placed upon plastic sheeting and covered with plastic until they can be loaded into approved waste containers to be provided by the RP.

PDF H/WQ-4 LNAPL will be recovered where it has accumulated in monitoring wells to the extent technologically and economically feasible, and where a reduction in current and future risk to groundwater will result.

PDF H/WQ-5 A stable or decreasing plume of site-related COCs will be maintained beneath the site. This will be achieved through reduction of COCs in soils through soil vapor extraction (SVE) and bio-venting, which would reduce COCs entering groundwater via on-site soils, removal of wastes in soil, and monitored natural attenuation (MNA) of groundwater.

PDF H/WQ-6 Periodic groundwater monitoring will continue as part of the remedial action. If, based on a five-year review following soil excavation and initiation of the SVE/bioventing system operation, the groundwater plume is not stable or declining, an evaluation of additional groundwater treatment technologies will be conducted and implemented as needed.

PDF H/WQ-7 The Shallow Zone and Gage aquifer will be returned to background levels for site-related benzene and naphthalene through natural biodegradation.

Analysis of Project Impacts

Threshold H/WQ-1: The project would have a significant impact on surface water quality if it resulted in discharges that would create pollution, contamination or nuisance as defined in Section 13050 of the California Water Code (CWC) or would cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water body.

Impact Statement H/WQ-1: *Compliance with regulatory requirements and dust control would ensure that potential surface water quality impacts associated with short-term grading activities would be adequately addressed and would meet California Water Code (CWC) requirements. As such, short-term impacts would be less than significant. Also, because the RAP would result in the removal of COC-containing soil as feasible and residual soil would be biovented to reduce COCs, the potential for discharges to surface water would be reduced. The RAP would not create pollution, contamination or nuisance as defined in Section 13050 of the CWC or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. The Expedited Implementation Option, which would increase the intensity of activity on the site, would also result in a less than significant impact with respect to surface water quality. Therefore, impacts to surface water quality from the RP's Proposed Remedy and the Expedited Implementation Option would be less than significant.*

Short-term Impacts

The implementation of the RAP would involve the excavation of shallow soils from landscaped and hardscape areas of residential properties where remedial action objectives (RAOs) are not met. Surface water quality could be adversely affected by grading activities if direct contact between contaminated materials and off-site surface waters occurred. Surface runoff, particularly during wet weather, has the potential to carry exposed or eroded soils to off-site areas, where pollutants can enter surface flows on off-site properties or in the City's drainage system. In addition, the movement of dust has the potential to

pollute off-site surface water. PDF H/WQ-1 and PDF H/WQ-2 are intended to prevent erosion and discharge of pollutants in soils in surface runoff during grading activities through the implementation of specific surface runoff and dust control measures. As described under PDF H/WQ-1, BMPs must demonstrate that eroded sediments and other pollutants would be retained on site and not transported from the site via sheetflow, swales, area drains, natural drainage courses, or wind. Any stockpiles of soils and other construction-related materials must be protected from being transported from the site by the forces of wind or water.

Fuels, oils, solvents, and other toxic materials must be stored in accordance with their labels and are not to contaminate the soil nor pollute surface waters. Any spills would be cleaned up immediately and disposed of in a proper manner and not washed into the drainage system. Non-stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the site. Excess or waste concrete shall not be washed into the public way or any other drainage system and provisions shall be made to retain concrete wastes on site until they can be disposed of as solid waste. Sediments and other materials shall not be tracked from the site by vehicle traffic, the construction entrance roadways shall be stabilized so as to inhibit sediments from being deposited into the public way, and accidental depositions must be swept up immediately and shall not be washed down by rain or other means.

Typical BMPs, which must be detailed on all grading plans, would include silt fences, fiber rolls, stockpile management, spill prevention and control, and the use of protective sheeting or tarps prior to any rain event on exposed soils incidental to construction. The BMPs would be set forth in the approved SWPPP, and all grading permit regardless of the size of the graded area. The City inspector must verify that all permanent BMPs shown on the plans are installed and are operational. PDF H/WQ-2 would require the monitoring of visible dust and provide measures to reduce the migration of dust. Compliance with the requirements of the Los Angeles County Building Code, which includes but is not limited to implementation of PDF H/WQ-1, and dust control under PDF H/WQ-2, would ensure that grading activities would not result in discharges that would create pollution, contamination or nuisance as defined in Section 13050 of the California Water Code (CWC) or would cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for a receiving water body. Therefore, short-term impacts on surface water related to grading would be less than significant.

Long-term Impacts

Surface flow (runoff) across the site from irrigation water, rainfall, and domestic activities such as car washing and hosing of driveways and sidewalks, has the potential to transport COCs that occur in on-site soils. Under existing conditions, such flows may enter the City's drainage system or off-site properties and enter off-site surface waters. One purpose of the RAP is to clean up existing COCs that occur in on-site soils in accordance with the Regional Board's CAO No. R4-2011-0046. In response to the CAO, the RAP would result in the excavation and removal of residential soils to a minimum depth of five feet and up to ten feet at targeted locations.

The Surface Containment and Soil Management Plan (Appendix C of the RAP) and PDF-H/WQ-2 provides that COCs in residual soils that are not covered by buildings or sidewalks, would be reduced through SVE/bioventing and, states that this technology would meet RAOs within approximately 30 to 40 years.[30]

[30] *URS Corporation and Geosyntec, Revised Remedial Action Plan Former Kast Property, June 30, 2014, Appendix C, page C-3.*

The reduction of COCs in the upper level of soils and residual soils would reduce the potential for discharges of COCs to surface water. Residual soils below the depths of excavation (five feet minimum and up to 10 feet in targeted locations) and below buildings and sidewalks would not be exposed to surface runoff and, thus, would not adversely affect surface water quality. SSCGs, if met for residual soils not covered by structures or soils below five to ten feet bgs would reduce the potential discharge of pollutants in surface water runoff and achieve consistency with the requirements of the CAO.

Implementation of the RAP would reduce waste concentrations and attain the SSCGs for residual soils. Because implementation of the RAP would remove COC-containing soils as feasible, and residual soils would be treated by SVE/bioventing to reduce COCs, potential exposure of surface water to COCs would be greatly reduced. Therefore, implementation of the RAP would not create pollution, contamination or nuisance as defined in Section 13050 of the CWC or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. Long-term surface water quality impacts would be less than significant.

Expedited Implementation Option

Under the Expedited Implementation Option, the number of properties being remediated at one time would increase from the cluster of up to 8 properties up to 16 properties active at one time. The remediation contractor could implement this option only when the configuration of lots and other conditions are conducive to proceeding in this expedited manner safely. The Option would result in a greater level of activity at one time but would not change the activity at an individual property or the total activity (number of lots remediated, amount of soil and other materials removed from the Site, etc.). With accelerated excavation activities, the potential for greater exposure at one time of residual soils or replacement soils exists. Project design features would be the same under the Expedited Implementation Option as under the RP's Proposed Remedy. Because the Expedited Implementation Option would comply with PDFs and BMPs related to protection of surface during excavation and soil replacement, and would implement the RAP as would the RP's Proposed Remedy but in an accelerated timeframe as feasible, impacts regarding surface water quality would be less than significant.

Threshold H/WQ-2: The project would have a significant impact on groundwater quality if it would affect the rate or change the direction of movement of existing COCs or expand the area affected by COCs.

Impact Statement H/WQ-2: *Implementation of Project Design Features that would require that contaminated soil be covered and removed from the site during excavation and the monitoring and management of the groundwater plume, would ensure that the RP's Proposed Remedy would not affect the rate or change the direction of movement of existing COCs or expand the area affected by COCs. The Expedited Implementation Option would also result in a less than significant impact with respect to groundwater quality. Therefore, impacts related to short- and long-term management of the groundwater plume from the RP's Proposed Remedy and the Expedited Implementation Option would be less than significant.*

Short-term Impacts

Grading activities have the potential to move soils from one location to another, or spread soils and, thus, cause wastes to spread. However, because the presence of COCs has been identified in on-site soils, all

excavation would be conducted according to specific project design features that are intended to protect workers and the public. These include the implementation of PDF-H/WQ-3, in which contaminated soil will be directly loaded into approved waste containers for off-site transport. The RP will provide suitable containers based on the nature of the excavation work being conducted. In the event that it is necessary to temporarily stockpile soil onsite before loading, soils would be placed upon plastic sheeting and covered with plastic until they can be loaded into approved waste containers to be provided by the RP. Measures that reduce the exposure of soils to the environment would reduce the potential for soils to be accidently transported or moved through the forces of erosion to a broader area. Therefore, grading activities associated with the RP's Proposed Remedy would not affect the rate or change the direction of movement of existing COCs in groundwater or expand the area affected by COCs in groundwater. Short-term impacts on groundwater related to the rate or change of COCs in groundwater would be less than significant.

Long-term Impacts

Groundwater monitoring has occurred on the site for several years. During that period, the lateral and vertical distribution of COCs in groundwater has been generally well defined. The downgradient (lateral) limit of the benzene plume is located or near the northeastern property boundary. The Gage aquifer wells define the vertical benzene distribution. The vertical extent of benzene concentrations is limited primarily to the Shallow Zone and are low to non-detectable in the Gage aquifer. The only exception is one well (MW-G04S), which has concentrations of benzene in the shallow Gage aquifer.[31] Benzene was not detected in samples collected in the deeper portion of the Gage aquifer during recent monitoring. The benzene plume at the site appears to be stable or declining. In addition, it is expected that the benzene source has declined through time and would continue to do so in the future. Crude oil present in the vadose zone above the groundwater table has been subject to biological degradation and leaching over a minimum 45-year period. It is expected that benzene concentrations in soils would be further reduced through time by degradation and leaching. The diminishing concentrations of benzene in the vadose zone are expected to result in declining benzene levels in groundwater in the future.[32]

MAROS software, which was used to model and evaluate the stability of the benzene groundwater plume at the site, indicated it is likely that the benzene in on-site groundwater is being attenuated through natural biodegradation processes and is a stable or decreasing plume. Model simulations predict a reduction of benzene concentrations to MCLs in 70 to several hundred years depending on the level of source removal. This conclusion is based on the currently observed distribution of benzene in the plume, which shows significant attenuation (to non-detect or near non-detect concentrations) at the downgradient plume edge near the property boundary. The conclusion is also supported by the age of the plume source (more than ~50 years).[33]

Under the proposed project design features, MNA and monitoring, as well as other measures, would provide for the decrease in COCs in the groundwater. PDF H/WQ-4 would require that LNAPL will be recovered where it has accumulated in monitoring wells to the extent technologically and economically feasible and where a reduction in current and future risk to groundwater could result. This would reduce LNAPL and, as

[31] *Geosyntec Consultants, site-Specific Cleanup Goal Report, Former Kast Property, February 22, 2013, page 45.*

[32] *Geosyntec Consultants, site-Specific Cleanup Goal Report, Former Kast Property, February 22, 2013, page 45.*

[33] *URS Corporation, Remedial Action Plan, Former Kast Property, Carson, California, March 10, 2014, pages 3-9 and 3-10.*

such would contribute to the reduction of the extent of pollution. PDF H/WQ-5 provides that a stable or decreasing plume of site-related COCs will be maintained beneath the site. This would be achieved through MNA of COCs in groundwater and reduction of COCs in soils through SVE and bio-venting. The reduction in COCs in the soil would result in the reduction in COCs entering groundwater via on-site soils.

PDF H/WQ-6 requires groundwater monitoring to continue as part of the remedial action. After a five-year monitoring period following initiation of the SVE system operation, PDF H/WQ-6 provides for the evaluation and implementation of additional groundwater treatment technologies if the extent of groundwater plumes are not stable or declining, and on-site COCs do not show a reduction in concentration. PDF H/WQ-7 requires that the Shallow Zone and Gage aquifer will be returned to background levels for site-related benzene and naphthalene through natural biodegradation. Although not a specific cleanup goal, concentrations of arsenic would also be reduced through time as petroleum hydrocarbon levels decline.

Off-site migration is not currently occurring and, as such, the presence of COCs in the site's groundwater is not expected to expand the area affected by COCs. In addition, because a reduction in COCs would occur as a result of the implementation of the RP's Proposed Remedy, the proposed RAP is not expected to affect the rate or change the direction of movement of existing COCs. In addition, the RP's Proposed Remedy would result in an incremental reduction of groundwater COCs with soil clean up. Therefore, impacts would be less than significant.

Expedited Implementation Option

The Expedited Implementation Option would result in a greater level of activity on the site at one time but would not change the activity at an individual property or increase the level of activities site-wide. Project design features would be the same under the Expedited Implementation Option as under the RP's Proposed Remedy. The Expedited Implementation Option would increase the amount of excavation at one time but would not affect the rate or change the direction of movement of existing COCs or expand the area affected by COCs. Therefore, the Expedited Implementation Option would result in less than significant impacts with regard to groundwater quality.

Threshold H/WQ-3: The project would have a significant impact on groundwater quality if it caused an increased level of concentrations of COCs in groundwater or a violation of any federal, state, or local groundwater quality standard, including the water quality objectives in the Basin Plan (to protect the designated beneficial uses, including municipal supply).

Impact Statement H/WQ-3: *Compliance with regulations and dust control would ensure that potential groundwater quality impacts associated with short-term grading activities would be adequately addressed and would not have a significant impact on groundwater quality. With the implementation of Project Design Features to reduce LNAPL, to provide periodic groundwater monitoring, and to return the Shallow Zone and the Gage Aquifer to background levels, the RAP would reduce COCs in groundwater. Because the RAP (with or without the Expedited Implementation Option) would not create pollution, contamination or nuisance as defined in Section 13050 of the CWC or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water, long-term groundwater quality impacts would be less than significant.*

Short-term Impacts

Groundwater quality could be adversely affected by grading activities if surface runoff from grading activities were to transport exposed soils to off-site locations or into the City's drainage system. Collected runoff in the drainage system has the potential to infiltrate the area's groundwater basins. Grading activities would be conducted in accordance with existing Los Angeles County Building Code requirements, as presented in PDF H/WQ-1, and would provide dust monitoring and control measures presented in PDF H/WQ-2. BMPs required under PDF H/WQ-1 would control erosion and runoff from exposed soils, require that non-stormwater runoff from equipment and vehicle washing and any other activity to be contained at the site, require the removal of wastes from excavation equipment prior to removal from the site, and require that any temporary stockpiles be adequately covered. With the implementation of PDF H/WQ-1 and PDF H/WQ-2, the RAP would not cause existing COCs to spread or migrate into groundwater in the surrounding area. Because grading activities would be regulated through the Building Code and would comply with BMP requirements and with project design features, the RP's Proposed Remedy would not result in discharges that would create pollution, contamination or nuisance as defined in CWC Section 13050 or would cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Basin Plan for the receiving water body. Therefore, short-term impacts on groundwater related to grading would be less than significant.

Long-term Impacts

A goal of the RP's Proposed Remedy is to clean up existing COCs that occur in on-site groundwater in accordance with the Regional Board's CAO No. R4-2011-0046, which states that the Discharger has caused or permitted waste to be discharged or deposited into waters of the state and has created, or threatens to create a condition of pollution or nuisance. As stated in the CAO, "the constituents found at the site constitute waste as defined in the Water Code section 13050(d). The discharge of waste has resulted in pollution, as defined in Water Code section 13050(l). The concentration of waste constituents in soils and groundwater exceed water quality objectives contained in the Water Quality Control Plan for the Los Angeles Region, including state-promulgated maximum contaminant levels. The presence of waste at the site constitutes a "nuisance" as defined in Water Code section 13050(m)."[34] The CAO also finds that the waste is present at concentrations and locations that "is injurious to health, or is indecent, or offensive to the senses, or an obstruction of the free use of property, so as to interfere with the comfortable enjoyment of life or property."[35]

The RP's Proposed Remedy proposes to remove LNAPL where it occurs in monitoring wells where it accumulates to a depth exceeding 0.5 feet. LNAPL removal has been ongoing at the site for approximately three years. During this time, an estimated 108.9 and 10.6 gallons of LNAPL have been removed from two on-site wells (MW-3 and MW-12), respectively, since LNAPL recovery began in 2009. LNAPL recovery would continue from these wells on a monthly basis, and, if LNAPL is detected at a measurable thickness in other wells in the future, monthly LNAPL recovery would be initiated with sorbent socks or, if they have an LNAPL thickness of greater than 0.5 feet, with a dedicated pump. Monitoring of LNAPL and water levels, and LNAPL recovery volume monitoring would continue during LNAPL recovery events. When LNAPL recovery shows a

[34] *State of California Regional Water Quality Control Board Los Angeles Region, Cleanup and Abatement Order No. R4-2011-0046, File No. 97-043, March 11, 2011, page 8.*

[35] *Ibid.*

declining trend in wells in which LNAPL occurs, recovery trends would be evaluated, a recommendation may be made to the Regional Board to reduce the frequency of LNAPL recovery, as appropriate.[36]

In addition, source reduction through excavation, SVE/bioventing in the vadose zone, as well as LNAPL removal as discussed above, would be used in conjunction with MNA as the remedy for site-related COCs in groundwater. MNA relies on naturally occurring processes to decrease concentrations of chemical constituents in soil and groundwater. Natural processes include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of constituents in media of concern. Trend analyses and modeling were conducted in the *Revised Site-Specific Cleanup Goals Report* (Geosyntec, 2013c) to assess temporal trends and the stability of the benzene plume at the Site to support the MNA approach. Results of the MAROS analysis indicated that the benzene in site groundwater is likely being attenuated through natural biodegradation processes and is a stable or decreasing plume. This conclusion is supported by the current observed distribution of benzene in the plume, which shows significant attenuation (to non-detect or near non-detect concentrations) at the downgradient plume edge near the property boundary). The conclusion is also supported by the significant age of the plume source (more than ~50 years). In addition, the Bioscreen model simulation results (Geosyntec, 2013c) show that even without source zone reduction no significant downgradient migration of the benzene plume is predicted. The second simulation, which assumed 80 percent benzene source zone mass removal, predicts that the benzene concentrations in groundwater would be degraded to below the MCL in approximately 70 years, also with no significant down-gradient migration of the benzene plume.[37, 38]

The Shallow groundwater at the site is not likely to be used in the foreseeable future due to high total dissolved solids and other water quality issues unrelated to site conditions. In addition, the groundwater is present in a low yield, thin aquifer and there are restrictions on groundwater pumping in the basin due to the adjudication of the groundwater resource.

If warranted by the results of the statistical analyses conducted on the initial five years of semiannual MNA data, contingency remediation of certain site-related COCs in localized areas of groundwater (e.g. where site-related COCs exceed 100x MCLs) would be implemented. The purpose of this contingency remediation would be to further shorten the time over which the concentrations of COCs would return to background or MCL levels if the proposed site remedy, including natural processes, were insufficient. The contingency in-situ groundwater remediation technology would be oxidant injection, which involves the introduction of an oxidant (e.g., phosphate-intercalated magnesium peroxide that, when hydrated, produces a controlled and continuous release of oxygen to the saturated zone).[39] Oxidant injection could be implemented in localized site areas to remediate volatile petroleum hydrocarbons and VOCs. If implemented, the injection of chemical oxidants into the saturated zone would be conducted in accordance with applicable waste discharge requirements (WDRs). The controlled-release of oxygen to the saturated zone accelerates the development of existing indigenous microorganisms to biodegrade the organic constituents. The process involves mixing

[36] *URS Corporation and Geosyntec, Revised Remedial Action Plan Former Kast Property, June 30, 2014, page 8-28.*

[37] *URS Corporation and Geosyntec, Revised Remedial Action Plan Former Kast Property, June 30, 2014, page 8-25.*

[38] *This is a reasonable assumption given the proposed remedy of LNAPL removal coupled with SVE that would remove a large proportion of the leachable lighter petroleum fractions including benzene, and soil excavation.*

[39] *The conceptual evaluation assumes use of ORC® as the oxidant, although similar commercially-available oxidants could also be used.*

an oxidant with water to form a slurry that is pressure injected (using a pump) into the saturated zone. Once the slurry is injected into the groundwater, tiny oxidant particles produce a controlled-release of oxygen. Oxidant can also be injected into filter socks placed in wells. When filter socks are exhausted, spent socks are replaced with new filter socks containing the slurry to restore oxygen supply to promote biodegradation of remaining organic constituents.

The radius of influence (ROI) for oxidant injection is estimated to be 15 feet. The conceptual design would target injection near wells with the highest concentrations of COCs in shallow groundwater, with the injection points transecting shallow groundwater water flow. The oxidant injectate volume and injection schedule would be optimized during operation as the rate of constituent removal would decrease when concentrations of dissolved constituents are reduced. A pilot test would be performed to assess the ability of oxidant injection to achieve SSCGs. For conceptual design purposes, based on an estimated injection ROI of 15 feet at the site, it is envisioned that a total of 19 oxidant injection wells or injection points would be installed in the streets with an average spacing of 30 feet. If deemed necessary, a remedial design implementation plan (RDIP) providing the injection well location(s), specifications, and calculations of oxidant delivery would be submitted for Regional Board approval.

Implementation of the RAP also includes post-construction long-term monitoring and sampling. This includes sampling of existing soil vapor probes in streets and utility vaults, SVE/bioventing system operational sampling, and monitoring of SVE/bioventing effectiveness.

The RAP would remove COC-containing soils or reduce COCs in residual soils and provide for LNAPL removal and monitoring of groundwater and future action if necessary. Because the RAP would reduce COCs that would potentially enter groundwater, it would not create pollution, contamination or nuisance as defined in CWC Section 13050 or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. Therefore, long-term groundwater quality impacts would be less than significant.

Expedited Implementation Option

As indicated previously, the Expedited Implementation Option would result in a greater level of activity on the site at one time but would not change the activity at an individual property or total activity on the site. Project design features would be the same under the Expedited Implementation Option as under the RP's Proposed Remedy. The Expedited Implementation Option would comply with PDFs and BMPs related to protection of groundwater during excavation and soil replacement. The Option would implement the RAP, which is designed to improve the groundwater quality, but in a shorter timeframe. Therefore, impacts regarding groundwater quality would be less than significant under this Option.

5. ALTERNATIVES ANALYSIS

Analysis of Impacts Associated with Alternative 1 (No Project Alternative)

Surface Water Quality

Under the No Project Alternative, the RAP would not be implemented and no excavation or installation of wells, SVE system or sub-slab mitigation would occur. Because grading activities would not occur, this

Alternative would avoid any potential direct contact between contaminated materials and on- or off-site surface water that would occur as a result of excavation. This Alternative would also avoid potential erosion of COC-containing soils associated with grading activities under the RP's Proposed Remedy.

However, this Alternative would not provide for SVE/bioventing, which is intended to promote degradation of residual hydrocarbon concentrations in soils, or for excavation of COC-containing soils. Therefore the benefit of bioventing in concert with SVE to increase oxygen levels in subsurface soils and promote microbial activity and degradation of longer-chain petroleum hydrocarbons would not occur. Because COC-containing soils would not be removed or vented, the potential for runoff (surface water) to enter and flow out of these materials would continue as under existing conditions. As such, surface water would continue to potentially violate regulatory standards, as defined in the applicable NPDES stormwater permit for the receiving water body. Impacts with respect to surface water quality would be potentially significant.

Groundwater Quality

Project design features, such as PDF H/WQ-5, to maintain a stable or decreasing plume of site-related COCs through reduction of COCs in soils through SVE/bio-venting, would not be implemented. Because the presence of COCs in soils has the potential to degrade groundwater quality, this Alternative would have the potential to expand the area affected by COC's. Therefore, impacts with respect to groundwater quality would be potentially significant.

Groundwater Regulatory Standards

Under the No Project Alternative, the RAP would not be implemented. Because a goal of the RAP is to clean up existing COCs that occur in on-site groundwater in accordance with the Regional Board's CAO No. R4-2011-0046, non-implementation of the RAP would not be consistent with the objectives and requirements of the Regional Board's CAO. In addition, because removal of COC-containing soils, SVE, bioventing, and removal of LNAPL would not occur under the No Project Alternative, existing COCs would not be reduced. Because COCs, which have the potential to enter the groundwater would not be reduced, the No Project Alternative would potentially create pollution, contamination or nuisance as defined in CWC Section 13050 or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. Therefore, under the No Project Alternative impacts associated with regulatory standards would be potentially significant.

Analysis of Impacts Associated with Alternative 2 (Excavation Beneath Landscape and Hardscape to 10 Feet Alternative)

Surface Water Quality

Alternative 2 would involve the excavation of soils to 10 feet bgs. Surface water quality could be adversely affected by grading activities if direct contact between contaminated materials and off-site surface waters occurred. However, as under the RP's Proposed Remedy, PDF's would be implemented to prevent erosion and discharge of pollutants in soils in surface runoff during grading activities. BMPs would require that eroded sediments and other pollutants would be retained on site and not transported from the site via sheetflow, swales, area drains, natural drainage courses, or wind. Any stockpiles of soils and other construction-related materials would be protected from being transported from the site by the forces of wind or water in accordance with applicable regulations. Typical BMPs, which must be detailed on all

grading plans, would include silt fences, fiber rolls, stockpile management, spill prevention and control, and the use of protective sheeting or tarps prior to any rain event on exposed soils incidental to construction. Therefore, under Alternative 2 short-term impacts on surface water related to grading would be less than significant.

Under Alternative 2, waste concentrations would be reduced and the SSCGs for soil would be attained. Alternative 2 would result in the excavation and removal of residential soils to a depth of 10 feet. Because this alternative would remove COC-containing soil as feasible and residual soil would be treated in place by SVE/bioventing to reduce COCs, potential exposure of surface water to COCs would be reduced. As such, Alternative 2 would not create pollution, contamination or nuisance as defined in CWC Section 13050 or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. Long-term surface water quality impacts would be less than significant under Alternative 2.

Groundwater Quality

Alternative 2 would require 10-foot-deep excavations at all affected residential sites. As with the RP's Proposed Remedy, Alternative 2 would implement PDFs to manage soils during excavation and soil replacement. As with the RP's Proposed Remedy, suitable containers based on the nature of the excavation work being conducted would be provided. In the event that it is necessary to temporarily stockpile soil onsite before loading, soils would be placed upon plastic sheeting and covered with plastic until they can be loaded into approved waste containers. With implementation of measures to reduce the exposure of soils to the environment, grading activities associated with Alternative 2 would not affect the rate or change the direction of movement of existing COCs in groundwater or expand the area affected by COCs in groundwater. Short-term impacts on groundwater related to the rate or change of COCs in groundwater would be less than significant.

Under Alternative 2, PDFs, which include MNA and monitoring, as well as other measures, would provide for the decrease in COCs in the groundwater. LNAPL would be recovered where it has accumulated in monitoring wells to the extent technologically and economically feasible and where a reduction in current and future risk to groundwater could result. This would reduce LNAPL and, as such would contribute to the reduction of the extent of pollution. The reduction in COCs in the soil would result in the reduction in COCs entering groundwater via on-site soils.

As with the RP's Proposed Remedy, PDF's would require groundwater monitoring to continue as part of the remedial action and would provide for the evaluation and implementation of contingency groundwater treatment technologies, such as oxidant injection, if the extent of groundwater plumes are not stable or declining, and on-site COCs do not show a reduction in concentration. PDF's would also require that the Shallow Zone and Gage aquifer would be returned to background levels for site-related benzene and naphthalene through natural biodegradation. As with the RP's Proposed Remedy, Alternative 2 would reduce COCs that would potentially enter groundwater and therefore, would not create pollution, contamination or nuisance as defined in CWC Section 13050 or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. Therefore, Alternative 2 would result in a less than significant impact with regard to long-term groundwater quality.

Groundwater Regulatory Standards

Alternative 2 would implement PDF's to control erosion and runoff from exposed soils, require that non-stormwater runoff from equipment and vehicle washing and any other activity to be contained at the project site, require the removal of wastes from excavation equipment prior to removal from the site, and require that any temporary stockpiles be adequately covered. With the implementation of PDFs, Alternative 2 would not cause existing COCs to spread or migrate into groundwater in the surrounding area. Because grading activities would be regulated through the Building Code and would comply with BMP requirements and with project design features, Alternative 2 would not result in discharges that would create pollution, contamination or nuisance as defined in CWC Section 13050 or would cause regulatory standards to be violated. Therefore, short-term impacts on groundwater regulatory standards would be less than significant.

Alternative 2 would comply with the Regional Board's CAO No. R4-2011-0046 through removal of COC-containing soils to a depth of 10 feet bgs, bioventing, removal of LNAPL where it occurs in monitoring wells where it accumulates to a depth exceeding 0.5 feet, and MNA to reduce concentrations of COCs in groundwater to levels that meet applicable water quality objectives. Contingency remediation, consisting of oxidant injection of certain site-related COCs in localized areas of groundwater (e.g. where site-related COCs exceed 100x MCLs), would be implemented if needed. The purpose of this contingency remediation would be to further shorten the time over which the concentrations of COCs would return to background or MCL levels if the proposed site remedy, including natural processes, were insufficient.

PDFs would require monitoring of groundwater and, based on a five-year review following initiation of the SVE/bioventing system operation, an evaluation of additional groundwater treatment technologies would be conducted and implemented as needed. Shallow Zone and Gage aquifer would be returned to background levels for site-related benzene and naphthalene through natural biodegradation. Because Alternative 2 would reduce COCs that could potentially enter groundwater, it would not create pollution, contamination or nuisance as defined in Section 13050 of the CWC or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. Therefore, long-term impacts on groundwater regulatory standards would be less than significant.

Analysis of Impacts Associated with Alternative 3 (No Excavation Beneath Hardscape -5 Feet to Targeted 10 Feet Alternative)

Surface Water Quality

As with the RP's Proposed Remedy, Alternative 3 would involve the excavation of soils to 5 feet with targeted areas to 10 feet bgs. Surface water quality could be adversely affected by grading activities if direct contact between contaminated materials and off-site surface waters occurred. However, as under the RP's Proposed Remedy, PDF's would be implemented to prevent erosion and discharge of pollutants to soils in surface runoff during grading activities. In addition, BMPs would require that eroded sediments and other pollutants would be retained on site and not transported from the site. Any stockpiles of soils and other construction-related materials would be protected. Typical BMPs would be detailed on all grading plans. Under Alternative 3 short-term impacts on surface water related to grading would be less than significant.

This alternative would remove COC-containing soils not currently covered by structures or hardscape, such as sidewalks and patios. Residual soils would be biovented to reduce COCs, and potential exposure of

surface water to COCs would be reduced. Therefore, Alternative 3 would not create pollution, contamination or nuisance as defined in CWC Section 13050 or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. Long-term surface water quality impacts would be less than significant under Alternative 3.

Groundwater Quality

As with the RP's Proposed Remedy, Alternative 3 would implement PDFs to manage soils during excavation and soil replacement. Suitable containers based on the nature of the excavation work being conducted would be provided. In the event that it is necessary to temporarily stockpile soil onsite before loading, soils would be placed upon plastic sheeting and covered with plastic until they can be loaded into approved waste containers. With implementation of measures to reduce the exposure of soils to the environment, grading activities associated with Alternative 3 would not affect the rate or change the direction of movement of existing COCs in groundwater or expand the area affected by COCs in groundwater and impacts would be less than significant.

Under Alternative 3, PDFs, which include MNA and monitoring, as well as other measures, would provide for the decrease in COCs in the groundwater. LNAPL would be recovered where it has accumulated in monitoring wells to the extent technologically and economically feasible and where a reduction in current and future risk to groundwater could result. This would reduce LNAPL and, as such would contribute to the reduction of the extent of pollution. The reduction in COCs in the soil would result in the reduction in COCs entering groundwater via on-site soils.

As with the RP's Proposed Remedy, PDF's would require groundwater monitoring to continue as part of the remedial action and would provide for the evaluation and implementation of contingency groundwater treatment technologies, such as oxidant injection, if the extent of groundwater plumes are not stable or declining, and on-site COCs do not show a reduction in concentration. PDF's would also require that the Shallow Zone and Gage aquifer would be returned to background levels for site-related benzene and naphthalene through natural biodegradation. As with the RP's Proposed Remedy, Alternative 3 would reduce COCs that would potentially enter groundwater and therefore, would not create pollution, contamination or nuisance as defined in CWC Section 13050 or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. Therefore, Alternative 3 would result in a less than significant impact with regard to long-term groundwater quality.

Groundwater Regulatory Standards

Alternative 3 would implement PDF's to control erosion and runoff from exposed soils, require that non-stormwater runoff from equipment and vehicle washing and any other activity to be contained at the site, require the removal of wastes from excavation equipment prior to removal from the site, and require that any temporary stockpiles be adequately covered. With the implementation of PDFs, Alternative 3 would not cause existing COCs to spread or migrate into groundwater in the surrounding area. Because grading activities would be regulated through the Building Code and would comply with BMP requirements and with project design features, Alternative 3 would not result in discharges that would create pollution, contamination or nuisance as defined in CWC Section 13050 or would cause regulatory standards to be violated. Therefore, short-term impacts on groundwater regulatory standards would be less than significant.

Alternative 3 would comply with the Regional Board's CAO No. R4-2011-0046 through removal of COC-containing soils to a depth of 5 to 10 feet bgs, bioventing, removal of LNAPL where it occurs in monitoring wells where it accumulates to a depth exceeding 0.5 feet, and MNA to reduce concentrations of COCs in groundwater to levels that meet applicable water quality objectives. Contingency remediation, consisting of oxidant injection of certain site-related COCs in localized areas of groundwater (e.g. where site-related COCs exceed 100x MCLs), would be implemented if needed. The purpose of this contingency remediation would be to further shorten the time over which the concentrations of COCs would return to background or MCL levels if the proposed site remedy, including natural processes, were insufficient.

PDFs would require monitoring of groundwater and, based on a five-year review following initiation of the SVE/bioventing system operation, an evaluation of additional groundwater treatment technologies would be conducted and implemented as needed. Because Alternative 3 would reduce COCs that could potentially enter groundwater, it would not create pollution, contamination or nuisance as defined in CWC Section 13050 or cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water. Although long-term impacts on groundwater regulatory standards would be less than significant, incrementally less COC-containing soils would be removed under Alternative 3 and a larger volume of soils may require bio-venting.

6. CUMULATIVE IMPACTS

The study area considered for the cumulative impact is the hydrologic area that could be affected by the remediation activities of the RP's Proposed Remedy. Water quality and groundwater resources are protected by existing state and local regulations in compliance with the CWA. Cumulative effects on water quality would be greatest during excavation and soil replacement because of exposure of soils to rainfall. However, as with the RP's Proposed Remedy, large development projects would be required to implement BMPs through mandated, site-specific SWPPPs. All large development projects are subject to existing Code and policies and regulations related to the protection of water quality for surface water and groundwater. In addition, related projects having hazardous materials components, as with the RP's Proposed Remedy, are subject to State Water Board or DTSC regulations for the protection of water quality. The enforcement of existing regulations would ensure that cumulative impacts on water quality would be less than significant. Because the RAP is intended to improve groundwater quality, it would not contribute to long-term, cumulatively adverse groundwater conditions.

7. MITIGATION MEASURES

The RP's Proposed Remedy, Alternative 2 and Alternative 3 would result in less than significant impacts with regard to surface water and groundwater. Therefore, no mitigation measures are required. The No Project Alternative (Alternative 1), which would not remove LNAPL or COCs in soils, has the potential to continue to violate ground and surface water quality standards. As such, impacts on water quality would be potentially significant. No mitigation measures are available under Alternative 1 that would reduce impacts to less than significant leve.ls.

8. LEVEL OF SIGNIFICANCE AFTER MITIGATION

With compliance with applicable regulations and the implementation of the project design features, the RP's Proposed Remedy, Alternative 2, and Alternative 3 would result in less than significant impacts with regard to surface water and groundwater. No mitigation measures are available to reduce Alternative 1's violation of water quality standards. Therefore, impacts under this Alternative would be significant and unavoidable.

5.6 NOISE AND VIBRATION

1. INTRODUCTION

This section analyzes potential impacts resulting from noise and vibration associated with implementation of the RAP. The analysis describes the existing noise environment of the site and within the vicinity of the site, estimates future noise and vibration levels at surrounding land uses resulting from implementation of the RAP, identifies the potential for significant impacts, and provides mitigation measures to address significant impacts. Relevant data and project-specific noise calculation worksheets are included in Appendix F of this EIR.

2. ENVIRONMENTAL SETTING

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

Sound pressure magnitude is measured and quantified using a logarithmic ratio of pressures; the scale measures the level of sound in decibels (dB). The human hearing system is not equally sensitive to sound at all frequencies. Therefore, to approximate this human, frequency-dependent response, the A-weighted filter system is used to adjust measured sound levels. The A-weighted sound level is expressed in "dBA." This scale de-emphasizes low frequencies to which human hearing is less sensitive and focuses on mid- to high-range frequencies. The range of human hearing is approximately 3 to 140 dBA, with 110 dBA considered intolerable or painful to the human ear. A change in sound level of 3 dB is considered "just perceptible," a change in sound level of 5 dB is considered "clearly noticeable," and a change in 10 dB is recognized as "twice as loud."[1]

The A-weighted scale accounts for the range of people's responses, and therefore, is commonly used to quantify individual event or general community sound levels. However, it does not quantify the degree of annoyance or other response effects which are dependent on several other perceptibility factors. These factors include:

- Ambient (background) sound level;
- Magnitude of sound event with respect to the background noise level;
- Duration of the sound event;
- Number of event occurrences and their repetitiveness; and
- Time of day that the event occurs.

[1] *California Department of Transportation, Technical Noise Supplement, September 2013. http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf. Accessed, August 2014.*

In an outdoor environment, sound levels attenuate through the air as a function of distance. Such attenuation is called "distance loss" or "geometric spreading" and is based on the source configuration: point source (i.e. stationary equipment), or line source (i.e. roadway with constant flow of traffic). For a point source, the rate of sound attenuation is 6 dB per doubling of distance from the noise source. For example, a sound level of 50 dBA at a distance of 25 feet from the noise source would attenuate to 44 dBA at a distance of 50 feet. A point source can attenuate at a higher rate of 7.5 dBA at acoustically "soft" sites, which are noise-absorptive sites characteristic of normal earth and most ground with vegetation.[2] For a line source the rate of sound attenuation is 3 dB per doubling of distance.[3] Empirical evidence has shown that, where a line source propagates close to "soft" ground, a more suitable drop-off rate to use is 4.5 dBA per doubling of distance.[4]

In addition, structures (e.g., buildings and solid walls) and natural topography (e.g., hills) that obstruct the line-of-sight between a noise source and a receptor further reduce the noise level if the receptor is located within the "shadow" of the obstruction, such as behind a sound wall. This type of sound attenuation is known as "barrier insertion loss." If a receptor is located behind the wall but still has a view of the source (i.e., line-of-sight not fully blocked), some barrier insertion loss would still occur, however to a lesser extent. Additionally, a receptor located on the same side of the wall as a noise source may actually experience an increase in the perceived noise level as the wall reflects noise back to the receptor, thereby compounding the noise. Noise barriers can provide noise level reductions ranging from approximately 5 dBA (where the barrier just breaks the line-of-sight between the source and receiver) to an upper range of 20 dBA with a more substantial barrier.[5]

Community noise levels usually change continuously throughout the day. The equivalent sound level (L_{eq}) is normally used to describe community noise. The L_{eq} is the equivalent steady-state A-weighted sound level that would contain the same acoustical energy as the time-varying A-weighted sound level during the same time interval. For intermittent noise sources, the maximum noise level (L_{max}) is normally used to represent the maximum noise level measured during the measurement. Maximum and minimum noise levels, as compared to the L_{eq}, are a function of the characteristics of the noise source. As an example, sources such as generators have maximum and minimum noise levels that are similar to L_{eq} since noise levels for steady-state noise sources do not substantially fluctuate. However, as another example, vehicular noise levels along local roadways result in substantially different minimum and maximum noise levels when compared to the L_{eq} since noise levels fluctuate during pass-by events.

To assess noise levels over a given 24-hour time period, the Community Noise Equivalent Level (CNEL) descriptor is used in land use planning. CNEL is the time average of all A-weighted sound levels for a 24-hour period with a 10 dBA adjustment (upward) added to the sound levels which occur in the night (10:00 P.M. to 7:00 A.M.) and a 5 dBA adjustment (upward) added to the sound levels which occur in the evening

[2] *U.S. Department of Transportation, Federal Highway Administration, Highway Noise Fundamentals, 1980, 97. An acoustically "hard" or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt, concrete, and very hard packed soils. An acoustically "soft" or absorptive site is characteristic of normal earth and most ground with vegetation.*

[3] *Caltrans, Technical Noise Supplement (TeNS), 2013. http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf. Accessed, August 2014.*

[4] *U.S. Department of Transportation, Federal Highway Administration, Highway Traffic Noise: Analysis and Abatement Guidance, 2010 (revised 8/11/2010), 10.*

[5] *Ibid.*

(7:00 P.M. to 10:00 P.M.). These penalties attempt to account for increased human sensitivity to noise during the quieter nighttime periods, particularly where sleep is the most probable activity. CNEL has been adopted by the State of California to define the community noise environment for development of a community noise element of a General Plan and is also used by the City of Carson for land use planning in the City's Noise Element of the General Plan ("Noise Element").[6]

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. The response of humans, buildings, and equipment to vibration is more accurately described using velocity or acceleration.[7] Vibration amplitudes are usually described in terms of peak levels, as in peak particle velocity (PPV). The peak level represents the maximum instantaneous peak of the vibration signal. In addition, vibrations can be measured in the vertical, horizontal longitudinal, or horizontal transverse directions. Ground vibrations are most often greatest in the vertical direction.[8] Therefore, the analysis of ground-borne vibration associated with the project is addressed in the vertical direction. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Man-made vibration issues are therefore usually confined to short distances (i.e., 50 feet or less) from the source.

Regulatory Framework

Many government agencies have established noise standards and guidelines to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise and ground-borne vibration. The City of Carson has adopted a number of policies that are based in part on federal and State regulations and are intended to control, minimize or mitigate environmental noise effects. The regulations and policies that are relevant to the project are discussed below.

Noise

City of Carson

City of Carson Noise Element

The City of Carson Noise Element includes policies and implementation measures to limit the exposure of the community to excessive noise levels. The Noise Element incorporates California's noise and land use compatibility matrix included as **Table 5.6-1**, *Noise and Land Use Compatibility Matrix*, which presents criteria used to assess the compatibility of land uses with the noise environment. The Noise Element also identifies interior and exterior noise standards included as **Table 5.6-2**, *Interior and Exterior Noise Standards*, which indicate standards and criteria that specify acceptable limits of noise for various land uses throughout the City. Policies and implementation measures of the Noise Element that pertain to the proposed project include the following:[9]

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[6] *State of California, General Plan Guidelines, 2002. City of Carson, 2004. City of Carson General Plan 2004, Noise Element. http://ci.carson.ca.us/content/files/pdfs/GenPlan/Chapter07.Noise.pdf. Accessed August 2014.*

[7] *Federal Transit Authority, Transit Noise and Vibration Impact Assessment, Final Report, page 7-3, April 2006.*

[8] *California Department of Transportation (Caltrans), Transportation Related Earthborne Vibrations, page 4, February 2002.*

[9] *State of California, General Plan Guidelines, 2002. City of Carson, 2004. City of Carson General Plan 2004, Noise Element. http://ci.carson.ca.us/content/files/pdfs/GenPlan/Chapter07.Noise.pdf. Accessed August 2014.*

Table 5.6-1

Noise and Land Use Compatibility Matrix

Land Use Category	Community Noise Exposure CNEL, dBA			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low Density	50 – 60	60 – 65	65 – 75	75 – 85
Residential – Multi-Family	50 – 60	60 – 65	65 – 75	75 – 85
Transient Lodging—Motels, Hotels	50 – 65	65 – 70	70 – 80	80 – 85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 – 60	60 – 65	65 – 80	80 – 85
Auditoriums, Concert Halls, Amphitheaters	NA	50 – 65	NA	65 – 85
Sports Arena, Outdoor Spectator Sports	NA	50 – 70	NA	70 – 85
Playgrounds, Neighborhood Parks	50 – 70	NA	70 – 75	75 – 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 – 70	NA	70 – 80	80 – 85
Office Buildings, Business Commercial and Professional	50 – 67.5	67.5 – 75	75 – 80	NA
Industrial, Manufacturing, Utilities, Agriculture	50 – 70	70 – 75	75 – 85	NA

NA = not applicable

Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

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

Source: City of Carson, City of Carson General Plan, Chapter 7,Noise Element, 2004.

Goal N-2: Minimize noise impacts on residential uses and noise sensitive receptors along the City's streets, ensuring that the City's interior and exterior noise levels are not exceeded.

- **Policy N-2.1** – Limit truck traffic to specific routes and designated hours of travel, where necessary, as defined in the Transportation and Infrastructure Element and by the City's Development Services Group. Said routes and hours shall be reviewed periodically to ensure the protection of sensitive receptors and residential neighborhoods.

- **Policy N-2.4** – Minimize potential transportation noise through proper design of street circulation, coordination of routing, and other traffic control measures such as enforcing the speed limit, shifting travel lanes away from impacted units or sensitive receptors, and adding bike lanes.

Table 5.6-2

City of Carson Interior and Exterior Noise Standards

Land Use Categories		CNEL	
Categories	**Uses**	**Interior[a]**	**Exterior[b]**
Residential	Single-Family, duplex, multi-family	50-55	50-60
	Mobile home	45	65
Commercial, Industrial, Institutional	Hotels, Motel, Transient Lodging	45	--
	Commercial Retail, Bank, Restaurant	55	--
	Office Building, Research and Development, Professional Offices, City Office Building	50	--
	Amphitheatre, Concert Hall, Auditorium, Meeting Hall	45	--
	Gymnasium (Multipurpose)	50	--
	Sports Club	55	--
	Manufacturing, Warehousing, Wholesale, Utilities	65	--
	Movie Theaters	45	--
Institutional	Hospital, schools' classrooms	45	65
	Church, Library	45	--
Open Space	Parks	--	65

Noise level requirement with closed windows. Mechanical ventilation system or other means of natural ventilation shall be provided as of Uniform Building Code (UBC) Chapter 12, Section 1205.
Exterior noise level should be such that interior noise levels will not exceed 45 CNEL.
[a] *Indoor environment including bedrooms, living areas, bathrooms, toilets, closets, corridors.*
[b] *Outdoor environment limited to: private yard of single-family or multi-family private patio or balcony which is served by a means of exit from inside, mobile home park, park's picnic area, and school's playground.*

Source: City of Carson, City of Carson General Plan, Chapter 7, Noise Element, 2004.

- **Policy N-2.5** – Discourage through-traffic in residential neighborhoods.
- **Policy N-2.6** – Actively advocate noise control requirements for all motor vehicles.
- **Policy N-2.7** – Continue to promote the use of alternative clean fueled vehicles for personal and business use.

Goal N-7: Incorporate noise considerations into land use planning decisions.

- **Policy N-7.1** – Incorporate noise considerations into land use planning decisions by establishing acceptable limits of noise for various land uses throughout the community.

- **Policy N-7.2** – Continue to incorporate noise assessments into the environmental review processes, as needed. Said assessments shall identify potential noise sources, potential noise impacts, and appropriate sound attenuation. In nonresidential projects, potential noise sources shall include truck pick-up and loading areas, locations of mechanical and electrical equipment, and similar noise sources. Require mitigation of all significant noise impacts as a condition of project approval.

- **Policy N-7.4** – Ensure acceptable noise levels near schools, hospitals, convalescent homes, churches, and other noise-sensitive areas in accordance with Table 5.6-1, above. To this end, require buffers or appropriate mitigation of potential noise sources. Such sources include, but are not limited to truck pick-up and loading areas, mechanical and electrical equipment, exterior speaker boxes, and public address systems.

City of Carson Municipal Code, Noise Control Ordinance

In 1995, the City of Carson adopted the Noise Control Ordinance of the County of Los Angeles (Los Angeles County Code, Title 12, Chapter 12.08), as amended, as the City's Noise Control Ordinance (City of Carson Municipal Code, Ordinance 95-1068; Chapter 5). The City's Noise Ordinance sets standards for noise levels citywide and provides the means to enforce the reduction of obnoxious or offensive noises. The noise sources enumerated in the ordinance include radios, phonographs, loudspeakers and amplifiers, electric motors or engines, animals, motor vehicles, and construction equipment. The Noise Ordinance sets interior and exterior noise levels for all properties within designated noise zones, unless exempted.

Note that the following standards are first taken from the Los Angeles County Noise Control Ordinance[10] and then incorporate City of Carson amendments in accordance with the City's Noise Control Ordinance.[11]

12.08.390 Exterior noise standards--Citations for violations authorized when.

A. Unless otherwise herein provided, the following exterior noise levels, **Table 5.6-3**, *City of Carson Exterior Noise Ordinance,* shall apply to all receptor properties within a designated noise zone:

B. Unless otherwise herein provided, no person shall operate or cause to be operated, any source of sound at any location within the unincorporated county, or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person

[10] *County of Los Angeles Noise Control Ordinance. https://library.municode.com/index.aspx?clientId=16274. Accessed, August 2014.*

[11] *City of Carson Noise Control Ordinance, 2014. http://www.codepublishing.com/ca/carson.html. Accessed, August 2014.*

Table 5.6-3

City of Carson Exterior Noise Ordinance

Noise Zone	Designated Noise Zone Land Use (Receptor Property)	Time Interval	Exterior Noise Level (dB)
I	Noise-sensitive area	Anytime	45
II	Residential properties	10:00 P.M. to 7:00 A.M. (nighttime) 7:00 A.M. to 10:00 P.M. (daytime)	45 50
III	Commercial properties	10:00 P.M. to 7:00 A.M. (nighttime) 7:00 A.M. to 10:00 P.M. (daytime)	55 60
IV	Industrial properties	Anytime	70

Source: City of Carson, Noise Control Ordinance, Section 12.08.390.

which causes the noise level, when measured on any other property either incorporated or unincorporated, to exceed any of the following exterior noise standards:

- Standard No. 1 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 15 minutes in any 30-minute period. Standard No. 1 shall be the applicable noise level from subsection A of this Section; or, if the ambient L50 exceeds the foregoing level, then the ambient L becomes the exterior noise level for Standard No. 1.
- Standard No. 2 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 7.5 minutes in any 30-minute period. Standard No. 2 shall be the applicable noise level from subsection A of this Section plus 5 dB; or, if the ambient L25 exceeds the foregoing level, then the ambient L25 becomes the exterior noise level for Standard No. 2.
- Standard No. 3 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 2.5 minutes in any 30-minute period. Standard No. 3 shall be the applicable noise level from subsection A of this Section plus 20 dB; or, if the ambient L8.3 exceeds the foregoing level, then the ambient L8.3 becomes the exterior noise level for Standard No. 3.
- Standard No. 4 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 30 seconds in any 30-minute period. Standard No. 4 shall be the applicable noise level from subsection A of this Section plus 15 dB; or, if the ambient L1.7 exceeds the foregoing level, then the ambient L1.7 becomes the exterior noise level for Standard No. 4.
- Standard No. 5 shall be the exterior noise level which may not be exceeded for any period of time. Standard No. 5 shall be the applicable noise level from subsection A of

this Section plus 20 dB; or, if the ambient L0 exceeds the foregoing level then the ambient L0 becomes the exterior noise level for Standard No. 5.

C. If the measurement location is on a boundary property between two different zones, the exterior noise level utilized in subsection B of this section to determine the exterior standard shall be the arithmetic mean of the exterior noise levels in subsection A of the subject zones. Except as provided for above in this subsection C, when an intruding noise source originates on an industrial property and is impacting another noise zone, the applicable exterior noise level as designated in subsection A shall be the daytime exterior noise level for the subject receptor property.

12.08.400 Interior noise standards.

A. No person shall operate or cause to be operated within a dwelling unit, any source of sound, or allow the creation of any noise, which causes the noise level when measured inside a neighboring receiving dwelling unit to exceed the following standards:

- Standard No. 1 The applicable interior noise level for cumulative period of more than 5 minutes in any hour; or
- Standard No. 2 The applicable interior noise level plus 5 dB for a cumulative period of more than 1 minute in any hour; or
- Standard No. 3 The applicable interior noise level plus 10 dB or the maximum measured ambient noise level for any period of time.

B. The following interior noise levels, **Table 5.6-4**, *City of Carson Interior Noise Ordinance*, for multifamily residential dwellings shall apply, unless otherwise specifically indicated, within all such dwellings with windows in their normal seasonal configuration.

Table 5.6-4

City of Carson Interior Noise Ordinance

Noise Zone	Designated Noise Zone Land Use (Receptor Property)	Time Interval	Allowable Interior Noise Level (dB)
All Zones	Multi-family Residential	10:00 P.M. to 7:00 A.M. (nighttime)	40
	Residential	7:00 A.M. to 10:00 P.M. (daytime)	45

Source: City of Carson, Noise Control Ordinance, Section 12.08.400.

C. If the measured ambient noise level reflected by the L_{50} exceeds that permissible within any of the interior noise standards in subsection A of Section 12.08.390, the allowable interior noise level shall be increased in 5 dB increments in each standard as appropriate to reflect said ambient noise level (L_{50}).

12.08.410 Correction for certain types of sounds.

For any source of sound which emits a pure tone or impulsive noise, the noise levels as set forth in Sections 12.08.390 and 12.08.400 shall be reduced by five decibels.

12.08.440 Construction noise.

A. Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between weekday hours of 7:00 PM and 7:00 AM, or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real-property line, except for emergency work of public service utilities or by variance issued by the health officer is prohibited.

B. Noise Restrictions at Affected Structures. The contractor shall conduct construction activities in such a manner that the maximum noise levels at the affected buildings will not exceed those listed in the following schedule:

1. At Residential Structures.

a) Mobile Equipment. Maximum noise levels, **Table 5.6-5**, *Short-term Operation Construction Equipment Maximum Noise Levels*, for non-scheduled, intermittent, short-term operation of twenty (20) days or less for construction equipment:

Table 5.6-5

Short-term Operation Construction Equipment Maximum Noise Levels (20 days or less)

Applicability	Single-Family Residential	Multi-Family Residential
Daily, except Sundays and legal holidays, 7:00 A.M. to 8:00 P.M.	75 dBA	80 dBA
Daily, 8:00 P.M. to 7:00 A.M. and all day Sundays and legal holidays,	60 dBA	64 dBA

Source: City of Carson, Noise Control Ordinance, Section 12.08.440.

b) Maximum noise level, **Table 5.6-6**, *Long-term Operation Construction Equipment Maximum Noise Levels*, for repetitively scheduled and relatively long-term operation of twenty-one (21) days or more for construction equipment:

Table 5.6-6

Long-term Operation Construction Equipment Maximum Noise Levels (21 days or more)

Applicability	Single-Family Residential	Multi-Family Residential
Daily, except Sundays and legal holidays, 7:00 A.M. to 8:00 P.M.	65 dBA	70 dBA
Daily, 8:00 P.M. to 7:00 A.M. and all day Sundays and legal holidays,	55 dBA	60 dBA

Source: City of Carson, Noise Control Ordinance, Section 12.08.440.

2. At Business Structures.

a) Mobile equipment. Maximum noise levels for nonscheduled, intermittent, short-term operation of mobile equipment: Daily, including Sunday and legal holidays, all hours: maximum of 85 dBA.

C. All mobile or stationary internal-combustion-engine powered equipment or machinery shall be equipped with suitable exhaust and air-intake silencers in proper working order.

D. In case of a conflict between this chapter and any other ordinance regulating construction activities, provisions of any specific ordinance regulating construction activities shall control.

12.08.460 Loading and unloading operations.

Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans or similar objects between the hours of 9:00 P.M. and 7:00 A.M. in such a manner as to cause noise disturbance is prohibited.

12.08.560 Vibration.

Operating or permitting the operation of any device that creates vibration which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property, or at 150 feet (46 meters) from the source if on a public space or public right-of-way is prohibited. The perception threshold shall be a motion velocity of 0.01 in/sec over the range of 1 to 100 Hertz.

12.08.580 (H) Variance Procedures.

An appeal shall be considered by the Council as provided in CMC 9173.4, and the fees therefor shall be as specified in CMC 9173.9 thereof.

City of Los Angeles

Although the site is located in the City of Carson, off-site noise sensitive receptors which may be affected by implementation of the RAP are located within the City of Los Angeles. Thus, a discussion of potentially applicable City of Los Angeles regulations and policies is included.

Los Angeles Noise Element

City of Los Angeles Noise Element policies that relate to the proposed project include the following:[12]

- Policy 2.2—Enforce and/or implement applicable city, state and federal regulations intended to mitigate proposed noise producing activities, reduce intrusive noise, and alleviate noise that is deemed a public nuisance.

Los Angeles Municipal Code

The City of Los Angeles Noise Regulation is provided in Chapter XI of the Los Angeles Municipal Code (LAMC). Section 111.02 of the LAMC provides procedures and criteria for the measurement of the sound level of "offending" noise sources. In accordance with the LAMC, a noise level increase of 5 dBA over the existing average ambient noise level at an adjacent property line is considered a noise violation. To account for people's increased tolerance for short-duration noise events, the Noise Regulation provides a 5 dBA allowance for noise source occurring more than five but less than fifteen minutes in any one-hour period and an additional 5 dBA allowance (total of 10 dBA) for noise source occurring five minute or less in any one-hour period.[13]

Section 112.05 of the LAMC sets a maximum noise level for construction equipment of 75 dBA at a distance of 50 feet when operated within 500 feet of a residential zone. Compliance with this standard is only required where "technically feasible."[14] Section 41.40 of the LAMC prohibits construction between the hours of 9:00 P.M. and 7:00 A.M. Monday through Friday, 6:00 P.M. and 8:00 A.M. on Saturday, and at any time on Sunday. (i.e. construction is allowed Monday through Friday between 7:00 a.m. to 9:00 p.m.; and Saturdays and National Holidays between 8:00 a.m. to 6:00 p.m.) In general, the City of Los Angeles Department of Building and Safety enforces noise ordinance provisions relative to equipment and the Los Angeles Police Department enforces provisions relative to noise generated by people.

Ground-Borne Vibration Guidelines

The City of Carson has not adopted policies or guidelines relative to ground-borne vibration for vibration sensitive buildings. Federal Transit Administration's (FTA) ground-borne vibration policies and guidelines were consulted as part of this analysis. With respect to residential structures, FTA's technical publication Transit Noise and Vibration Impacts Assessment (May 2006), provides a vibration damage potential threshold criteria of 0.5 inches per second PPV for residential structures.

Existing Conditions

Noise-Sensitive Receptors and Locations

Some land uses, such as residences, schools, motels and hotels, libraries, and hospitals, are considered more sensitive to intrusive noise than others due to the types of activities typically involved at the receptor

[12] *Noise Element of the Los Angeles City General Plan, adopted February 3, 1999.*

[13] *Los Angeles Municipal Code, Chapter XI, Article I, Section 111.02-(b).*

[14] *In accordance with the City of Los Angeles Noise Ordinances, "technically feasible" means that the established noise limitations can be complied with at a project site, with the use of mufflers, shields, sound barriers, and/or other noise reduction devices or techniques employed during the operation of equipment.*

location. There are residential uses located east, west, north (across the MTA tracks) and south (across Lomita Boulevard) of the site. Existing noise sensitive uses in the project vicinity are described below:

- Off-Site Single-Family Residential Dwellings: Off-site residential neighborhoods including those located along Carmel Drive, Mill Valley Way, Monterey Street, and Highland Way, residences located on Island Avenue and eastward, residences on Realty Street and northwards, and south of Lomita Boulevard.
- On- Site Single-Family Residential Dwellings: The residences within the Carousel Tract, located along Marbella Avenue, Neptune Venue, Ravenna Avenue, Panama Avenue, East 244th Street, East 247th street, East 248th Street, and East 249th Street, are part of the Site.
- School: Wilmington Middle School is located southwest of the site across from Lomita Boulevard.

In addition to the closest off-site sensitive receptors described above, this EIR also considers on-site residences as sensitive receptors. As described in Chapter 2, Project Description, of this EIR excavation associated with implementation of the RAP would be completed in clusters, with each cluster including approximately eight contiguous properties. Based on approximately eight to ten weeks to complete a cluster of eight properties with some overlapping of remediation activities between clusters, restoration of the entire Site, including targeted remediation beneth the streets, is estimated to take approximately 6 years to complete. On-site properties that are not being remediated or restored and that are not vacated but that are near to the cluster of properties in some stage of remediation and/or restoration would be treated as a sensitive receptor.

Ambient Noise Levels

The existing noise environment at the site is dominated primarily by auto traffic on Lomita Boulevard, Neptune Avenue, and Panama Avenue. Other community noise sources include incidental noise from industrial-related and residential activities and railroad related activities. To quantify existing noise levels in the project area, both long-term (Location R1) and short-term (Location R2 through R7) measurements were conducted. Noise monitoring locations, identified as R1 though R7, and sensitive receptors in the vicinity of the site are shown on **Figure 5.6-1**, *Noise Measurement Locations.* The ambient noise measurements were conducted from Tuesday April 1 through Thursday April 3, 2014, and summarized below:

- Measurement Location R1: This location represents the existing noise environment of the on-site single-family residential neighborhood along Marbella Avenue. The noise measuring device (sound level meter) was placed on the east side of Marbella Avenue north of 247th Street. This location is on-site. Because access is controlled to the Monterey Pines neighborhood, west of the site, noise monitoring could not be performed within the adjacent subdivision. Thus, data from this location is assumed to be representative of that off-site residential neighborhood.
- Measurement Location R2: This location represents the existing noise environment of the on-site single-family residential neighborhood along Ravenna Avenue. The sound level meter was placed along Ravenna Avenue at the intersection with 247th Street.
- Measurement Location R3: This location represents the existing noise environment of Wilmington Middle School southwest of the site. The sound level meter was placed at the closest school building along Lomita Boulevard, approximately 690 feet southwest of the site.

PCR

N

0 500 1,000 Feet

Noise Measurement Locations

Former Kast Property Tank Farm Site Remediation Project

Source: Microsoft, 2010; PCR Services Corporation, 2014.

FIGURE

5.6-1

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- Measurement Location R4: This location represents the existing noise environment of Lomita Boulevard south of the site. The sound level meter was placed on the southern central boundary of the site.
- Measurement Location R5: This location represents the existing noise environment of the single-family residential neighborhood to the east of the site along Island Avenue. The sound level meter was placed along Island Avenue at the intersection with 245th Street approximately 130 feet east of the site.
- Measurement Location R6: This location represents the existing noise environment of Avalon Boulevard east of the site. The sound level meter was placed at the intersection of Avalon Boulevard and East 246th Street approximately 1,140 feet east of the site.
- Measurement Location R7: This location represents the existing noise environment north of the site (and north of the rail lines); the nearest homes are on the south side of Realty Street. The sound level meter was placed at the intersection of Realty Street and Neptune Avenue approximately 280 feet north of the site.

The ambient noise measurements were conducted using the Larson-Davis 820 Precision Integrated Sound Level Meter (SLM). The Larson-Davis 820 SLM is a Type 1 standard instrument as defined in the American National Standard Institute (ANSI) S1.4. All instruments were calibrated and operated according to the applicable manufacturer specification. The microphone was placed at a height of 5 feet above the local grade. The sound level meters were set up to collect the 15-minute average noise level, L_{eq} except for R1 which was a 24 hour measurement.

Table 5.6-7, *Summary of Ambient Noise Measurements,* presents the existing noise levels in the vicinity of the site. Based on field observation and measured sound data, the existing noise environment in the vicinity of the site is dominated mainly by auto traffic noise. As indicated on Table 5.6-7, the noise sensitive receptors within the site are currently exposed to noise levels ranging from 51 to 60 dBA, L_{eq} during daytime. The ambient noise levels in the immediate project vicinity are representative of noise levels in a noisy urban area. Sensitive receptors located within the site were exposed to noise measurements 73 dBA, L_{eq} (Location R3). Noise levels ranging from 55 to 56 dBA, L_{eq} near the site's northern and eastern boundaries (Location R5 and R7). Wilmington Middle School (Location R3 and R5) along Lomita Boulevard is exposed to exterior noise levels ranging from 72 to 73 dBA, L_{eq}. Residential uses outside the site (Location R6) along Avalon Boulevard are exposed to exterior noise level of 69 dBA, L_{eq}.

To further characterize the project area's ambient noise environment, the CNEL noise levels attributed to existing traffic on local roadways were calculated using a noise prediction model which was developed based on calculation methodologies provided in the Caltrans Technical Noise Supplement (TeNS) document and traffic data provided by the traffic consultant.[15] The roadway noise calculation procedures provided in the Caltrans TeNS are consistent with Federal Highway Administration RD-77-108 roadway noise prediction methodologies. This methodology, considered an industry standard, allows for the definition of roadway configurations, barrier information (if any), and receiver locations.

[15] *The roadway noise calculation procedures provided in TeNS are consistent with Federal Highway Administration RD-77-108 "industry standard" roadway noise prediction methodologies.*

Table 5.6-7

Summary of Ambient Noise Measurements

Location, Duration, Existing Land Uses and, Date of Measurements	Measured Ambient Noise Levels,[a] (dBA)		
	Daytime (7 A.M. to 10 P.M.) Hourly L_{eq}	Nighttime (10 P.M. to 7 A.M.) Hourly L_{eq}	24-Hour Average, CNEL
R1			
4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	53 – 58	50	N/A
4/2/14 (full 24 hours)/ Wednesday	51 – 60	43 – 55	59
4/3/14 (11 A.M. to 11:59 P.M.)/ Thursday	51 – 61	43 – 52	N/A
Average (4/2/2014) at R1	58	50	
R2 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	50	N/A	N/A
R3 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	73	N/A	N/A
R4 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	72	N/A	N/A
R5 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	55	N/A	N/A
R6 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	69	N/A	N/A
R7 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	56	N/A	N/A

[a] *Detailed measured noise data, including hourly L_{eq} levels, are included in Appendix F-1.*

Source: PCR Services Corporation, 2014.

A traffic model calibration test was performed to establish the noise prediction model's accuracy. The road segments included in the calibration test were along Lomita Boulevard, between Main Street and Neptune Avenue and Avalon Boulevard, between Sepulveda Boulevard and Lomita Boulevard. At the noted locations, 15-minute noise recordings were made concurrent with logging of actual traffic volumes and auto fleet mix (i.e., standard automobile, medium duty truck, or heavy duty truck). The traffic counts were entered into the noise model along with the observed speed, lane configuration, and distance to the roadway to calculate the traffic noise levels. The results of the traffic noise model calibration are provided in **Table 5.6-8**, *Traffic Noise Model Calibration Results*. As indicated, the noise model results are within less than 1 dBA of the measured noise levels, which is within the industry standard tolerance of the noise prediction model. Therefore, the project specific traffic noise prediction model is considered accurate and reflective of the project's physical setting.

Vibration-Sensitive Receptor Locations

Typically, ground-borne vibration generated by man-made activities (i.e., rail and roadway traffic, operation of mechanical equipment and typical construction equipment) diminishes rapidly as the distance from the source of the vibration become greater. The Federal Transportation Association (FTA) uses a screening distance of 100 feet for highly vibration-sensitive buildings (e.g., hospitals with vibration sensitive equipment) and 50 feet for residential uses. When vibration-sensitive uses are located within those

Table 5.6-8

Traffic Noise Model Calibration Results

Road Segment/ Noise Measurements Locations	Traffic Counts during noise readings, 15 minutes			Measured Traffic Noise Levels, L_{eq} (dBA)	Project Traffic Noise Model Predicted Noise Levels, L_{eq} (dBA)	Difference between Predicted and Measured Levels, dBA
	Autos	Medium Trucks [a]	Heavy Trucks [b]			
Lomita Boulevard	223	15	9	71.6	71.3	-0.3
Avalon Boulevard	213	6	2	68.9	68.4	-0.5

[a] *Medium Truck – 2 axle trucks based on field observations.*

[b] *Heavy Truck – 3 or more axle trucks and buses based on field observations.*

Source: PCR Services Corporation, 2014.

distances from a site, vibration impact analysis is required. With respect to structures, vibration-sensitive receptors generally include historic buildings, buildings in poor structural condition, and uses that require precision instruments (e.g., hospital operating rooms or scientific research laboratories). Therefore, this analysis focuses on potential effects on nearby residential uses.

3. METHODOLOGY AND THRESHOLDS

Methodology

Short-term Noise

On-Site Noise Sources

On-site equipment usage, haul truck staging and haul route noise impacts are evaluated by determining the noise levels generated by the different types of construction activity, calculating the RAP-related noise level at nearby sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without construction noise). Pilot studies for the demolition and excavation phases were conducted at 24612 Neptune Avenue, from November 5 to 12, 2012 and at 24533 Ravenna Avenue, on December 5, 2012 to test the feasibility of excavation techniques.[16,17] The noise analysis in this EIR uses the demolition and excavation related activity noise levels, in addition to look-up table values for equipment, to estimate project impacts. More specifically, the following steps were undertaken to calculate noise impacts during implementation of the RAP:

1. Ambient noise levels at surrounding sensitive receptor locations were estimated based on field measurement data (refer to Table 5.6-7);

[16] *Noise Measurement Results –Excavation Operations 24612 Neptune Avenue, URS Corporation, December 2012.*

[17] *Noise Measurement Results –Excavation Operations 24533 Ravenna Avenue, URS Corporation, January 2013..*

2. Composite noise levels for the 8-property clusters were taken from the data collected during the pilot studies, and typical noise levels for other on-site construction equipment were obtained from the Federal Highway Administration's (FHWA) Roadway Construction Noise Model;
3. Distances between construction site locations (noise source) and surrounding sensitive receptors were measured using project drawings, Google Earth™, and site plans; and
4. The project-generated noise level was then calculated for sensitive receptor locations based on the conventional standard point source noise-distance attenuation factor of 6.0 dBA for each doubling of distance.

Off-Site Roadway Noise Sources

Roadway noise impacts were evaluated using the Caltrans Technical Noise Supplement (TeNS) methodology based on data contained in the traffic study. This methodology allows for the definition of roadway configurations, barrier information (if any), and receiver locations.

Ground-Borne Vibration

Ground-borne vibration impacts were evaluated by identifying potential vibration sources, measuring the distance between vibration sources and surrounding structure locations, and making a significance determination based on the thresholds discussed below. Potential vibration sources during implementation of the RAP include heavy duty equipment needed for excavation and hauling of materials. Typical vibration levels expected from each type of equipment were obtained from the published standard vibration data by the FTA. The project would be constructed using heavy-duty construction equipment such as excavators, dozers, and trucks. Construction equipment operated during project implementation would be considered as stationary vibration sources such as auger drill rig, backhoe, paver, etc.

Long-Term Noise

On-Site (Stationary) Noise Sources

After implementation of the RAP, the site would be restored to as close to its current state as possible. Sources of long-term noise would include mechanical equipment related to the gas collection system and occasional vehicular access for periodic service of the equipment and routine maintenance. The current plan is to install the Soil Vapor Extraction (SVE) gas collection system throughout the site, and to locate the treatment system at one of three potential locations within the developed industrial area to the immediate west or northwest of the site, as shown in Figure 2-8.

Off-Site Roadway Noise Sources

The project would not generate off-site vehicular traffic, with the exception of the occasional vehicle trips needed to service the SVE system. Even several vehicles accessing the site simultaneously would produce only negligible noise to off-site receptors, and no quantitative analyses are warranted.

Long-Term Vibration

No sources of ground-borne vibration are expected to remain at the site long-term upon completion of the project. Therefore, analysis of long-term vibration impacts is not warranted.

Thresholds of Significance

Appendix G of the State *CEQA Guidelines* provides a set of screening questions that address impacts with regard to noise. These questions are as follows:

Would the project:

a) Exposure of persons to or generation of noise level in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?

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

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

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

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

As determined in the Initial Study, which is contained in Appendix A of this EIR, the nearest airport to the site is the Torrance Municipal Airport, which is located over 3.3 miles to the west of the site. As such, no further analysis of this issue is necessary (Items e and f above). Based on the Cities' applicable regulations and the Appendix G checklist questions the project would result in a significant noise impact if:

NOISE 1: Activities during implementation of the RAP would result in noise levels above the applicable standard of 65 dBA between the hours of 7:00 A.M. to 8:00 P.M. daily, except Sundays and legal holidays or above the applicable standard of 55 dBA between the hours of 8:00 P.M. to 7:00 A.M. daily at a noise-sensitive property boundary located in the City of Carson; or result in noise levels above the applicable standard of 75 dBA at distance of 50 feet from equipment when construction activities are located within 500 feet of a residential area unless technically feasible mitigation measures are incorporated for noise sensitive receptors located in the City of Los Angeles.

NOISE 2: Project-generated mobile noise source (i.e., off-site traffic) would cause ambient noise levels to increase by 5 dBA.

NOISE 3: Project-related stationary noise sources (e.g., mechanical fans) generate noise levels that would exceed measured ambient noise levels at the designated sensitive receptor locations.

Based on FTA's ground-borne vibration policies and guidelines and the City of Carson's Noise Ordinance (Section 12.08.560) the project would result in a significant vibration impact if:

VIB 1: Project construction activities cause a PPV ground-borne vibration level to exceed 0.5 inches per second at a residential structure in accordance with FTA's technical publication Transit Noise and Vibration Impacts Assessment (May 2006).

VIB 2: Short- or long-term vibration impacts result in the exposure of sensitive receptors to vibration levels that exceed the threshold of 0.01 inch per second (in/sec) in accordance with Section 12.08.560 of the City of Carson's Noise Ordinance.

4. PROJECT ANALYSIS

Project Design Features

The following Project Design Features (PDFs) are intended to reduce project-related noise and are proposed as part of the RP's Proposed Remedy. Therefore, they have been taken into account in the analysis of potential project impacts.

PDF NOISE-1 The project contractor(s) will equip all construction machinery and equipment, fixed or mobile, with properly operating and maintained noise mufflers, consistent with manufacturers' standards.

PDF NOISE-2 Engine idling from construction equipment such as excavators and haul trucks will be limited, to the extent feasible.

PDF NOISE-3 Expected hours for construction equipment use on-site will be 7:30 A.M. to 4:30 P.M. Monday through Friday, with hauling activities from 8:00 A.M. to 4:00 P.M.

PDF NOISE-4 Project-related heavy truck traffic will be limited to specific routes.

PDF NOISE-5 During excavation, acoustical attenuation blankets 12 feet in height will be installed between the excavation site and occupied houses to reduce community noise exposure from stationary sources of substantial noise, such as generators and water buffalos (trailer).

Analysis of Project Impacts

On-Site Noise during Implementation of the RP's Proposed Remedy

Threshold NOISE 1: Activities during implementation of the RAP would result in noise levels above the applicable standard of 65 dBA between the hours of 7:00 A.M. to 8:00 P.M. daily, except Sundays and legal holidays or above the applicable standard of 55 dBA between the hours of 8:00 P.M. to 7:00 A.M. daily at a noise-sensitive property boundary located in the City of Carson; or result in noise levels above the applicable standard of 75 dBA at distance of 50 feet from equipment when construction activities are located within 500 feet of a residential area unless technically feasible mitigation measures are incorporated for noise sensitive receptors located in the City of Los Angeles.

Impact Statement NOISE-1: *Impacts due to noise from on-site construction activity would be significant. Maximum noise associated with the project would exceed the significance threshold of 65 dBA L_{eq} at nearby on-site and off-site residential uses located in the City of Carson. However, maximum noise associated with the project would not exceed the significance threshold of 75 dBA L_{eq} at nearby off-site residential uses located in the City of Los Angeles. Impacts due to noise from on-site construction activity would be less than significant at off-site residential uses located in the City of Los Angeles.*

Short-Term Noise

On-Site Noise Sources

Noise impacts from implementation of the RAP are generally a function of the noise generated by construction equipment, equipment locations, the sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Implementation of the RAP would be undertaken in five stages: (1) demolition; (2) excavation and backfill; (3) street trenching; (4) well installation, and (5) paving. Each stage involves the use of different kinds of construction equipment and, therefore, has its own distinct noise characteristics. Demolition involves the use of equipment such as excavator, bobcat, chain saw, jack hammer, generator, and water pump. Excavation involves the use of excavator, bobcat, and generator. Street trenching construction involves the use of backhoe, air compressor, generator, and concrete saw. Well installation involves the use of drill rig. Paving involves the use of street grinder paver, roller, and street sweeper. The project would be constructed using typical construction techniques; no blasting or impact pile driving would be used. Residents of properties adjacent to those where excavation work is being conducted would be offered relocation as necessary.

Implementation of the remediation activities would commence in Fall 2015. Based on working five days per week remediation on a phase of eight properties could be completed within approximately eight to ten weeks. More specifically, it is estimated that excavation and backfill would take approximately six weeks per property and restoration would take an additional approximately two to four weeks. Work on the second phase of properties (i.e., the next eight properties working down the block), would begin approximately at the end of week six to week eight of work on the first phase. After completion of the remediation on the properties within the Carousel Tract, restoration of the streets would occur. This would involve street grinding and street paving. This phase would last approximately six months.

Project construction would require the use of mobile heavy equipment with high noise level characteristics. Individual pieces of construction equipment that would be used for excavation and installation of the SVE

system produce maximum noise levels of 75 dBA to 90 dBA at a reference distance of 50 feet from the noise source, as shown in **Table 5.6-9**, *Typical Construction Equipment Noise Levels*. These maximum noise levels would occur when equipment is operating under full power conditions. However, equipment used on construction sites often operate intermittently over the course of a day. The estimated usage factor for the equipment is also shown Table 5.6-9. The usage factors are based on FHWA's Roadway Construction Noise Model User's Guide.[18] To more accurately characterize construction-period noise levels, the average (Hourly L_{eq}) noise level associated with each construction stage is calculated based on the quantity, type, and usage factors for each type of equipment that would be used during each construction stage and are typically attributable to multiple pieces of equipment operating simultaneously.

Table 5.6-9

Typical Construction Equipment Noise Levels

Equipment	Estimated Usage Factor, %	Maximum Noise Level at 50 feet from Equipment, dBA (L_{max})
Air Compressor	40	80
Auger Drill Rig	20	85
Backhoe	50	78
Concrete Saw	20	90
Generator Set	50	81
Paver	50	77
Roller	20	80
Vacuum Street Sweeper	10	82

Source: FHWA Roadway Construction Noise Model User's Guide, 2006.

Construction noise levels were estimated based on an industry standard sound attenuation rate of 6 dB per doubling of distance for point sources (e.g., construction equipment). In general, equipment was assumed to operate simultaneously at the construction area nearest to potentially affected residential receptors (at the property boundary). These assumptions represent a worst-case noise scenario as the various activities would typically be dispersed throughout an active remedial area and not operate continuously at one, close-by location.

Off-Site Sensitive Receptors

At the perimeter of the Carousel Tract, nearest to sensitive off-site land uses such as residences and schools. Remedial activities are expected to occur at a maximum of four adjacent on-site properties simultaneously. In general, it would be expected that one property would be undergoing demolition, two properties under active remediation (including but not limited to concrete breaking/sawing, soil excavation, and hauling), and the fourth property undergoing restoration. Detailed noise monitoring was performed during the pilot studies, and used in the following analyses. A summary of the noise impacts at the closest off-site sensitive receptors during the various remedial activities are provided in **Table 5.6-10,** *Estimate of Noise Levels*

[18] *Federal Highway Administration, Roadway Construction Noise Model User's Guide, 2006.*

Table 5.6-10

Estimate of Noise Levels (L_{eq}) During RAP Implementation at Off-Site Sensitive Receiver Locations

Noise Sensitive Receptor	Construction Phases	Distance between Nearest Receptor and Construction Site, feet	Estimated Construction Noise Levels at the Noise Sensitive Receptor by Construction Phase,[a] Hourly L_{eq} (dBA)	Project's Significance Threshold (dBA)[c]	Exceeds Significance Threshold?
	Residential Remediation	450	54		No
	Street Trenching	450	56		No
R3	SVE Well Installation	450	49	75[a]	No
	Paving	450	49		No
	Residential Remediation	110	67		No
	Street Trenching	200	63		No
R4	SVE Well Installation	110	61	75[a]	No
	Paving	200	56		No
	Residential Remediation	5	104		Yes
	Street Trenching	110	68		Yes
R5	SVE Well Installation	25	68	65[b]	Yes
	Paving	110	61		No
	Residential Remediation	150	69		Yes
	Street Trenching	250	61		No
R7	SVE Well Installation	150	63	65[b]	No
	Paving	250	54		No
	Residential Remediation	5	104		Yes
	Street Trenching	30	85[c]		Yes
M1	SVE Well Installation	25	68	65[b]	Yes
	Paving	30	77[c]		Yes

[a] *Sensitive receptors are located in the City of Los Angeles*
[b] *Sensitive receptors are located in the City of Carson*
[c] *Noise reduction by sound blanket/temporary barrier were applied.*
Source: PCR Services Corporation, 2014

During Rap Implementation (L_{eq}) at Off-Site Sensitive Receiver Locations. Detailed noise calculations for remedial activities are provided in Appendix F-2 of this EIR. As shown in Table 5.6-10, the applicable City of Los Angeles threshold is not expected to be exceeded at the sensitive receptors (residences and school) located in the City of Los Angeles (R3 and R4) during any of the phases of remedial activity.

Noise levels at the single-family residences bordering the east of the site, (R5, along Island Avenue) are predicted to exceed the 65 dBA threshold for sensitive receptors located in the City of Carson, during remedial activities at on-site residential properties (104 dBA), during SVE well installation (68 dBA), and during street trenching (68 dBA), but would remain below the threshold during paving (61 dBA). At the residences located to the north of the rail lines that border the site to the north (R7), noise levels are predicted to exceed the 65 dBA threshold, at a maximum of 69 dBA, when work would be performed

simultaneously at four properties on-site, but would remain below the threshold during street trenching, SVE well installation, and paving. Noise levels are estimated to reach a maximum of 104 dBA at the closest Monterey Pines neighborhood residences (M1) when remedial activities would occur at the adjacent Carousel Tract properties, approximately 5 feet away. However, the adjacent sensitive receptors would be exposed to the maximum noise level of 104 dBA for a few hours in a day during peak construction activities. The average noise level during Residential Remediation would be 81 dBA at the receptor location, R5. Street trenching, SVE well installation, and paving could also result in noise levels in excess of the 65 dBA significance threshold at the adjacent Monterey Pines community when those activities occur in close proximity to these off-site residences.

On-Site Sensitive Receptors

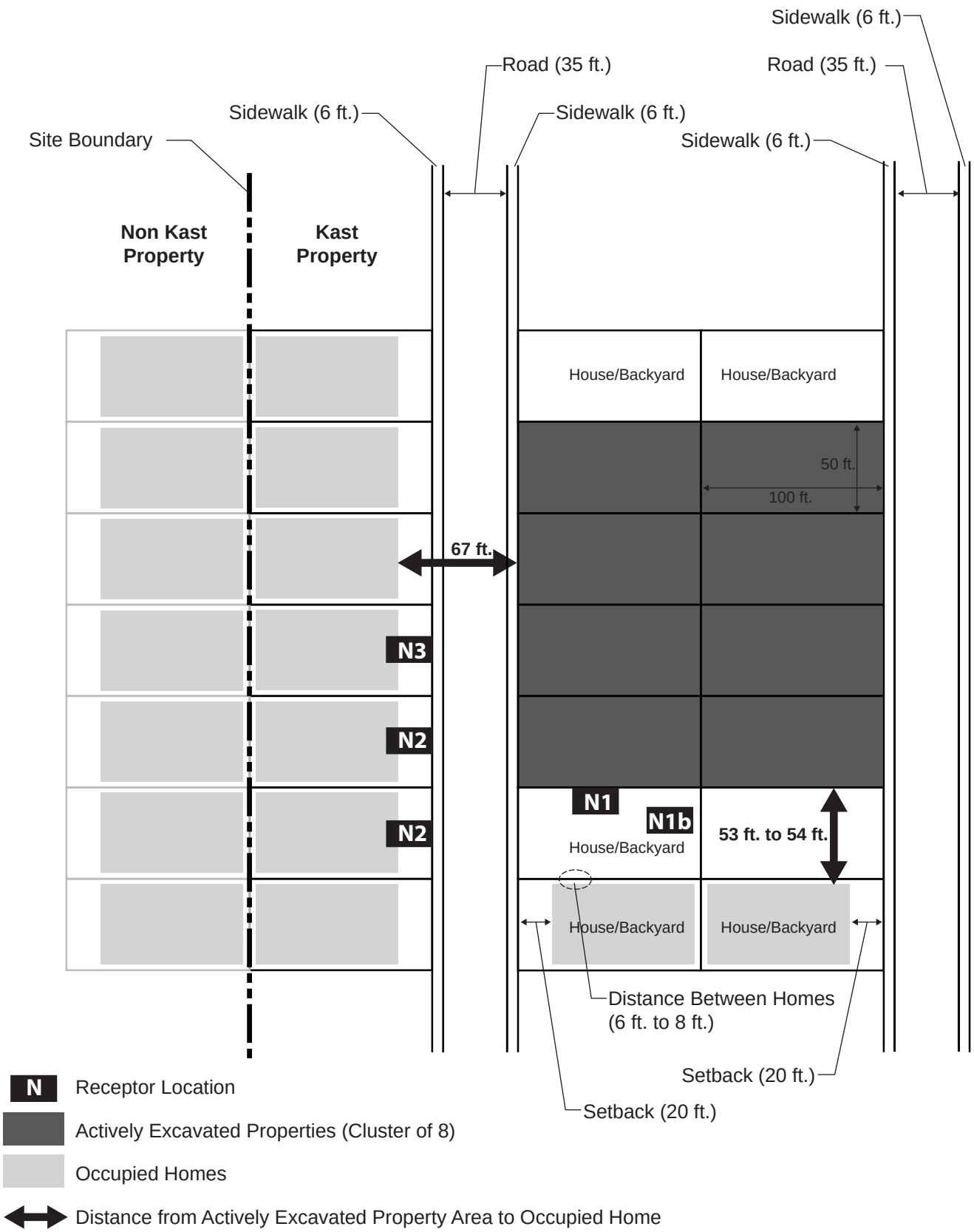
Within the site, remedial activities are expected to occur in a cluster of up to eight properties, four on one street as described above, but with four additional properties on a parallel street, back-to-back. A conceptual 8-property cluster is depicted in **Figure 5.6-2**, *Conceptual Cluster*. Receptor locations were positioned in-line with the cluster (N1 in Figure 5.6-2). Properties adjacent to the cluster were assumed to be vacated since side yard access is limited and fencing between properties are expected to be removed. Also, receptors were positioned to represent the occupied properties (N3) directly across the street from the eight-property cluster, and the property slightly off-center from the cluster, directly across from the vacated properties at the edge of the 8-property cluster (N2).

A summary of the noise impacts at nearby on-site sensitive receptors is provided in **Table 5.6-11,** *Estimate of Noise Levels(L_{eq}) at On-Site Sensitive Receiver Locations During RAP Implementation.* Detailed noise calculations for construction activities are provided in Appendix F-3 of this EIR. As shown in Table 5.6-11, remedial activities at a typical 8-property cluster would result in noise levels of 71 to 88 dBA depending on the activity and distance, all in excess of the 65 dBA threshold for homes across the street directly and off-center from the 8-property cluster, and those located to the side, fully or partially shielded from the remedial activities by one vacated house. Appendix F-8 includes a 65 dBA contour showing the impacted properties surrounding a hypothetical 8-property cluster.

During implementation of the project, remedial activities would be required to comply with the City's construction noise limitations during corresponding hours as described above. As shown in Tables 5.6-10 and 5.6-11, noise resulting from implementation of the RAP would exceed the significance threshold of 65 dBA, L_{eq} at off-site and nearby on-site noise-sensitive receptors in the City of Carson. Therefore, noise resulting from implementation of the RAP would be significant to adjacent residential uses, and mitigation measures such as noise blankets, equipment modification, acoustic protection and relocation of residents would be required.

Expedited Implementation Option

Under the Expedited Implementation Option, rather than a cluster of up to 8 properties, the number being actively remediated could be incrementally increased with up to 16 properties active at one time. Given the overlap in activity with the clusters there could be up to 32 properties in some stage of remediation at one time. Under the Expedited Implementation Option the clusters would not be contiguous but would be located in a different area within the site. Two clusters under active remediation and restoration would be separated by a minimum distance of 64 meters (105 feet) as measured from the closest site boundary of each cluster. The total amount of demolished materials and excavated soils would be the same as under the



Note: This figure provides a conceptual diagram of remediation activities at a representative "cluster of eight" properties at the site. Distances shown above are estimated typical distances at the site.

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On-Site Construction Noise Sensitive Receptor Locations

Former Kast Property Tank Farm Site Remediation Project

Source: PCR Services Corporation, 2014.

FIGURE

5.6-2

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project. The Option would result in a greater level of activity on the site on a given day but would not change the level of activity at an individual property. Therefore, given the separation distance between the clusters, noise levels would be similar within close proximity of the excavation site as shown in Tables 5.6-10 and 5.6-11. Therefore, excavation related noise impacts would be significant on adjacent noise sensitive uses and the same mitigation would be required.

Table 5.6-11

Estimate of Noise Levels (L_{eq}) at On-Site Sensitive Receiver Locations During RAP Implementation

Noise Sensitive Receptor	Construction Phases	Distance between Nearest Receptor and Construction Site, feet	Estimated Construction Noise Levels at the Noise Sensitive Receptor by Construction Phase,[a] Hourly L_{eq} (dBA)	Project's Significance Threshold (dBA)[c]	Exceeds Significance Threshold?
	Residential Remediation	50	70		Yes
	Street Trenching	20	88[b]		Yes
N1	SVE Well Installation	50	78	65	Yes
	Paving	20	81[b]		Yes
	Residential Remediation	80	74		Yes
	Street Trenching	20	88[b]		Yes
N2	SVE Well Installation	80	74	65	Yes
	Paving	20	81[b]		Yes
	Residential Remediation	67	80		Yes
	Street Trenching	20	88[b]		Yes
N3	SVE Well Installation	67	75	65	Yes
	Paving	20	81[b]		Yes

[a] *Estimated construction noise levels represent the worst-case condition when noise generators are located closest to the receptors and are expected to last the entire construction duration.*
[b] *Noise reduction by sound blanket/temporary barrier were applied.*

Source: PCR Services Corporation, 2014

Off-Site Roadway Noise

Threshold NOISE 2: Project-generated mobile noise source (i.e., off-site traffic) would cause ambient noise levels to increase by 5 dBA CNEL or more and the resulting noise falls on a land use within an area categorized as either "normally acceptable" or "conditionally acceptable".

Impact Statement NOISE-2: *Construction impacts from off-site construction traffic would be less than significant. Sound levels would not increase ambient noise levels at residential uses along the haul route by 5 dBA or more.*

Haul trucks using regional freeways regardless of their origin/destination would access local streets to and from I-110 at Sepulveda Boulevard. Incoming trucks would access the site via Sepulveda Boulevard eastbound, Wilmington Avenue southbound, Lomita Boulevard westbound, and a right turn on either

Neptune or Lagoon Avenues. Trucks leaving the site would then travel westbound on Lomita, northbound on Main Street, and westbound on Sepulveda to the I-110. **Table 5.6-12**, *Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations,* provides the estimated haul truck noise levels at noise sensitive receptors along the haul truck route where current sound ambient noise levels were recorded and provides a comparison with the noise impact criteria. The table also provides the ambient noise levels and the change in noise levels with the addition of the haul truck noise.

Table 5.6-12

Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations

	Calculated Traffic Noise Levels at 25 feet from Roadway, dBA, L_{eq}						
Roadway Segment	**Existing (A)**	**Existing with Project [a] (B)**	**Future No Project [b] (C)**	**Future with Project [c] (D)**	**Existing Project Increment [d] (B-A)**	**Future Project Increment [e] (D – C)**	**Cumulative Increment [f] (D – A)**
Sepulveda Boulevard							
Between Figueroa Street and Main Street	69.2	69.3	69.4	69.5	0.1	0.1	0.3
Between Main Street and Avalon Boulevard	69.2	69.2	69.4	69.4	0.0	0.0	0.2
Between Avalon Boulevard and Wilmington Avenue	68.1	68.1	68.3	68.3	0.0	0.0	0.2
Figueroa Street							
North of Sepulveda Boulevard	65.6	65.6	66.2	66.2	0.0	0.0	0.6
Wilmington Avenue							
Between Sepulveda Boulevard and Lomita Boulevard	67.1	67.2	67.5	67.5	0.1	0.0	0.4
Lomita Boulevard							
West of Main Street	69.2	69.2	69.4	69.4	0.0	0.0	0.2
Between Main Street and Neptune Avenue	69.0	69.0	69.2	69.2	0.0	0.0	0.2
Between Neptune Avenue and Lagoon Avenue	69.0	69.1	69.2	69.3	0.1	0.1	0.3
Between Lagoon Avenue and Avalon Boulevard	69.1	69.2	69.2	69.4	0.1	0.2	0.3
Between Avalon Boulevard and Wilmington Avenue	67.3	67.4	67.5	67.6	0.1	0.1	0.3
Main Street							
Between Sepulveda Boulevard and Lomita Boulevard	68.0	68.1	69.0	69.1	0.1	0.1	1.1
Neptune Avenue							
North of Lomita Boulevard	56.2	56.2	56.3	56.3	0.0	0.0	0.1

Table 5.6-12 (Continued)

Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations

Roadway Segment	Calculated Traffic Noise Levels at 25 feet from Roadway, dBA, L_{eq}						
	Existing (A)	Existing with Project [a] (B)	Future No Project [b] (C)	Future with Project [c] (D)	Existing Project Increment [d] (B-A)	Future Project Increment [e] (D – C)	Cumulative Increment [f] (D – A)
Lagoon Avenue							
North of Lomita Boulevard	51.7	51.7	51.9	51.9	0.0	0.0	0.2
Avalon Boulevard							
Between Sepulveda Boulevard and Lomita Boulevard	68.1	68.1	69.5	69.5	0.0	0.0	1.4

[a] *Include existing plus project-generated traffic.*
[b] *Include future growth plus related (cumulative) projects identified in the Traffic Study.*
[c] *Include future growth plus related (cumulative) projects and project-generated traffic.*
[d] *Increase due to project-related traffic only at existing.*
[e] *Increase due to project-related traffic only at project build-out.*
[f] *Increase due to future growth, related (cumulative) projects, and project-generated traffic.*

Source: PCR Services Corporation, September 2014.

It is estimated that during implementation of the project, there would be a maximum of 90 haul truck trips, an average of nine visitors, and a maximum of approximately 32 workers per day. However, the project would strive for the truck traffic and employee traffic not to occur during the same hour. [19]

For existing conditions, as shown in Table 5.6-12, the maximum increase in project-related traffic noise levels over existing traffic noise levels would be 0.1 dBA, which would occur along Sepulveda Boulevard, between Figueroa Street and Main Street, Wilmington Avenue, between Sepulveda Boulevard and Lomita Boulevard, Lomita Boulevard, between Neptune Avenue and Lagoon Avenue, Lomita Boulevard, between Lagoon Avenue and Avalon Boulevard, Lomita Boulevard, between Lagoon Avenue and Avalon Boulevard, Lomita Boulevard, between Avalon Boulevard and Wilmington Avenue, and Main Street, between Sepulveda Boulevard and Lomita Boulevard. In general a change in sound level of 3 dBA is considered barely perceptible by the human ear.[20] Activities associated with the project would be required to comply with the City's allowable hours as described above and would be temporary in nature. Because the noise levels associated with implementation of the project would be 0.1 dBA increase, which is well below the 5 dBA significance threshold, off-site traffic related noise would result in a less than significant noise impact.

[19] *Traffic Study for the Kast Property Remediation Action Plan (RAP) EIR, Fehr & Peers, October, 2014.*

[20] *U.S. Department of Transportation, Federal Highway Administration, Highway Traffic Noise: Analysis and Abatement Guidance, (2011).*

Expedited Implementation Option

The Expedited Implementation Option would incrementally increase the number of properties to 16 properties actively remediated. Given the overlap in activity with the clusters there could be up to 32 properties in some stage of remediation at one time. The total amount of demolished materials and excavated soils would be the same as under the project. The Option would result in a greater level of activity on the site on a given day but would not change the level of activity at an individual property. An average of approximately 118 trucks per day would be used to transport materials during residential excavation and related activities, street trenching/pipe installation, and well installation. On a peak excavation day, approximately 151 trucks per day would be used. During street paving, approximately 24 trucks per day would be used. PDFs would be the same under the Expedited Implementation Option as under the project.

For existing conditions, as shown in **Table 5.6-13**, *Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations Expected Implementation Option (EIO)*, the maximum increase in project-related traffic noise levels over existing traffic noise levels would be 0.2 dBA, which would occur along Sepulveda Boulevard, between Figueroa Street and Main Street, Lomita Boulevard, between Neptune Avenue and Lagoon Avenue, Lomita Boulevard, between Avalon Boulevard and Wilmington Avenue, and Main Street, between Sepulveda Boulevard and Lomita Boulevard. Activities associated with the project would be required to comply with the City's allowable hours as described above and would be temporary in nature. Because the noise levels associated with implementation of the Expedited Implementation Option would be 0.2 dBA increase, which is well below the 5 dBA significance threshold, off-site traffic related noise would result in a less than significant noise impact

Table 5.6-13

Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations Expedited Implementation Option (EIO)

	Calculated Traffic Noise Levels at 25 feet from Roadway, dBA, CNEL						
Roadway Segment	Existing (A)	Existing with EIO [a] (B)	Future No Project [b] (C)	Future with EIO [c] (D)	Existing EIO Increment [d] (B-A)	Future EIO Increment [e] (D – C)	Cumulative EIO Increment [f] (D – A)
Sepulveda Boulevard							
Between Figueroa Street and Main Street	69.2	69.4	69.4	69.5	0.2	0.1	0.3
Between Main Street and Avalon Boulevard	69.2	69.2	69.4	69.4	0.0	0.0	0.2
Between Avalon Boulevard and Wilmington Avenue	68.1	68.1	68.3	68.3	0.0	0.0	0.2
Figueroa Street							
North of Sepulveda Boulevard	65.6	65.6	66.2	66.2	0.0	0.0	0.6
Wilmington Avenue							
Between Sepulveda Boulevard and Lomita Boulevard	67.1	67.2	67.5	67.5	0.1	0.0	0.4

Table 5.6-13 (Continued)

Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations
Expedited Implementation Option (EIO)

Roadway Segment	Calculated Traffic Noise Levels at 25 feet from Roadway, dBA, CNEL				Existing EIO Increment [d] (B-A)	Future EIO Increment [e] (D – C)	Cumulative EIO Increment [f] (D – A)
	Existing (A)	Existing with EIO [a] (B)	Future No Project [b] (C)	Future with EIO [c] (D)			
Lomita Boulevard							
West of Main Street	69.2	69.2	69.4	69.4	0.0	0.0	0.2
Between Main Street and Neptune Avenue	69.0	69.0	69.2	69.2	0.0	0.0	0.2
Between Neptune Avenue and Lagoon Avenue	69.0	69.2	69.3	69.3	0.2	0.0	0.3
Between Lagoon Avenue and Avalon Boulevard	69.1	69.2	69.4	69.4	0.1	0.0	0.3
Between Avalon Boulevard and Wilmington Avenue	67.3	67.5	67.7	67.7	0.2	0.0	0.4
Main Street							
Between Sepulveda Boulevard and Lomita Boulevard	68.0	68.2	69.0	69.1	0.2	0.1	1.1
Neptune Avenue							
North of Lomita Boulevard	56.2	56.2	56.3	56.3	0.0	0.0	0.1
Lagoon Avenue							
North of Lomita Boulevard	51.7	51.7	51.9	51.9	0.0	0.0	0.2
Avalon Boulevard							
Between Sepulveda Boulevard and Lomita Boulevard	68.1	68.1	69.5	69.5	0.0	0.0	1.4

[a] *Include existing plus project-generated traffic.*
[b] *Include future growth plus related (cumulative) projects identified in the Traffic Study.*
[c] *Include future growth plus related (cumulative) projects and project-generated traffic.*
[d] *Increase due to project-related traffic only at existing.*
[e] *Increase due to Project-related traffic only at Project build-out.*
[f] *Increase due to future growth, related (cumulative) projects, and project-generated traffic.*

Source: PCR Services Corporation, September 2014.

Stationary Source Noise

Threshold NOISE 3: The project would result in a significant impact if project-related stationary noise sources (e.g., mechanical fans) generate noise levels that would exceed measured ambient noise levels at the designated sensitive receptor locations.

Impact Statement NOISE-3: *Implementation of the RAP and the Expedited Implementation Option would include stationary mechanical noise sources that may increase noise levels adjacent to noise-sensitive receptors in the project vicinity. However, with the implementation of the recommended mitigation measure the noise generation would not exceed established thresholds. Therefore, long-termimpacts from stationary mechanical noise sources would be mitigated to a less than significant level.*

It is not anticipated that stationary mechanical equipment would be installed during the short-term remediation phases. The use of portable equipment has been accounted for in the analyses above. However, because the SVE process involves inducing airflow in the subsurface with an applied vacuum, mechanical equipment capable of creating noise levels audible to sensitive land uses would be installed. Anticipated equipment include a 3,000 standard cubic feet per minute (scfm) positive displacement blower and oxidation equipment (such as a thermal propane or natural gas burner), and are expected to be operational 30 to 40 years, depending on the rate at which results are achieved. The RP is proposing to locate the SVE unit on one of a few potential industrial sites adjacent to the Carousel Tract. The nearest distance to residential receptors would be 6 feet. There is an existing approximately 30 feet sound wall separating the proposed SVE unit and the Carousel Tract.

Mechanical equipment (e.g., mechanical fans and pumps) for long-term use with the SVE/bioventing system would be housed inside a sound attenuated enclosure that would achieve required sound levels outside the enclosure to comply with the City's Noise Ordinance requirement. Mechanical design documentation would be required once the SVE location is selected to demonstrate that noise generated from the mechanical fan and/or other related mechanical components would not exceed the measured ambient noise levels shown in Table 5.6-7 during daytime hours at each corresponding measurement location and 55 dBA during nighttime hours at each measurement location. Mitigation Measure NOISE-3, which would require a qualified acoustical engineer with expertise in design of sound isolations to evaluate to the design of the SVE/bioventing system (i.e., installation of building enclosure) so as to meet the City's exterior noise limits (55 dBA), is prescribed to ensure that the noise impacts associated with the operation of mechanical equipment would be less than significant.

Ground-Borne Vibration

Threshold VIB 1: Project construction activities cause a PPV ground-borne vibration level to exceed 0.5 inches per second at a residential structure.

Threshold VIB 2: Short- or long-term vibration impacts result in the exposure of sensitive receptors to vibration levels that exceed the threshold of 0.01 inch per second (in/sec) (in accordance with Section 12.08.560 of the City of Carson's Noise Ordinance).

Impact Statement VIB-1 *Implementation of the RAP and the Expedited Implementation Option would result in sporadic, temporary vibration effects adjacent to the project area, which would exceed established thresholds. Therefore, vibration impacts would be significant and mitigation is proposed.*

The vibratory effect on buildings located in the vicinity of active remediation within the site often varies depending on soil type, ground strata, and project characteristics of the receptor buildings. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. With respect to residential

structures, Caltrans' technical publication titled "Transportation- and Construction-Induced Vibration Guidance Manual" dated June 2004, provides a vibration damage potential threshold criteria of 0.5 inches per second PPV for residential structures. The FTA has published standard vibration velocities for construction equipment operations. Table 12-2 of the FTA guidance provides vibration levels of 0.003 inches per second PPV for a small bulldozer at 25 feet, and 0.035 inches per second from a jack hammer at 25 feet. Vibration velocities from jackhammering would be a maximum of 0.21 inch per second at the shortest distance to an adjacent residence, assumed to be 5 feet from the activity.[21] Thus, the use of jack hammers or other equipment is not expected to exceed the standard for nearby residential structures. As this value does not exceed the 0.5 inches per second PPV significance threshold for residential structures, vibration impacts with regard to building damage resulting from implementation of the RAP would be less than significant.

As noted above, jack hammering would produce the maximum vibration velocities. Residents would be located as close as 5 feet from adjacent remedial activities, and could be exposed to a near-constant vibration velocity of 0.0176 inches per second PPV from a small bulldozer during residential remediation at adjacent properties and periodic peak vibration velocity of 0.21 inch per second from jackhammering. Peak velocities fall below the perception threshold at approximately 10 feet for vibration resulting from the mini excavator and at 60 feet for vibration resulting from a jack hammer. As the peak value would exceed the 0.01 inch per second PPV significance threshold, human perception of vibration impacts associated with implementation of the RAP would be significant and mitigation would be necessary (see Mitigation Measures NOISE-1 and VIB-1).

Expedited Implementation Option

Under the Expedited Implementation Option, an increase in the number of properties being remediated at one time could occur. As discussed in Chapter2, *Project Description*, two clusters under active remediation and restoration would be separated by a minimum distance of 64 meters (105 feet) as measured from the closest site boundary of each cluster. As noted above, the FTA guidance provides vibration levels of 0.003 inches per second PPV for a small bulldozer at 25 feet, and 0.035 inches per second from a jack hammer at 25 feet. At a distance of 5 feet, vibration velocities from jackhammering would be a maximum of 0.21 inch per second. Ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Thus, while both clusters could utilize a small bulldozer or a jack hammer, the separation distance would ensure that vibration levels at nearby residential structures would be similar to the levels described above for the RP's Proposed Remedy and would not exceed the 0.5 inches per second PPV significance threshold for residential structures. As a result, vibration impacts with regard to building damage under the Expedited Implementation Option would be less than significant.

With respect to human perception impacts, the minimum separation distance of 64 meters (105 feet) between two clusters would minimize the combined vibration levels at any common sensitive receptor location. Nonetheless, the peak value would be similar to the levels described above for the RP's Proposed Remedy and would exceed the 0.01 inch per second PPV significance threshold. As a result, human

[21] *Vibrations estimates are based on guidance in the Transportation- and Construction-Induced Vibration Guidance Manual, California Department of Transportation, Environmental Program, Environmental Engineering, Noise, Vibration, and Hazardous Waste Management Office, June 2004:* $PPV_{equip} = PPV_{ref} (25/D)^n$; *where* PPV_{ref} *= reference source vibration, D = Distance, n =factor for soil attenuation (n=1.1).*

perception of vibration impacts under the Expedited Implementation Option would be significant and mitigation would be necessary (see Mitigation Measures NOISE-1 and VIB-1).

5. ALTERNATIVES ANALYSIS

Analysis of Impacts Associated with Alternative 1 (No Project Alternative)

The No Project Alternative would not involve any construction or operation activities at the site and would, therefore, avoid any potential noise-related impacts. Therefore, the No Project Alternative would avoid the significant noise impacts that would occur under the RP's Proposed Remedy.

Analysis of Impacts Associated with Alternative 2 (Excavation Beneath Landscape and Hardscape to 10 Feet Alternative)

This Alternative would entail excavation of soils from landscaped and beneath residential hardscape to a depth of 10 feet bgs at all affected properties. While the implementation of Alternative 2 would be longer than the RP's Proposed Remedy, daily demolition and excavation volumes, and worker commutes are anticipated to be the same as the project. However, truck trips would increase by approximately 10 percent under this Alternative. This Alternative would also implement the same PDFs as described previously.

Short-Term Noise

On-Site Noise Sources

This alternative has the potential to increase noise levels through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and construction workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the same as the project. Remedial activities would occur for a greater number of days overall to account for the additional excavated material.

During implementation of this Alternative, construction activities would be temporary in nature and would be required to comply with the City's noise limitations during corresponding hours as described above. As shown in Tables 5.6-10 and 5.6-11, noise resulting from implementation of the project during daytime hours would intermittently exceed the significance threshold of 65 dBA, L_{eq} at noise-sensitive receptor locations. Therefore, excavation activity related noise under Alternative 2 would be significant and unavoidable on adjacent residential uses.

Off-Site Roadway Noise

While the duration to implement Alternative 2 would be more than under the RP's Proposed Remedy and would result in a total increase in truck trips, the daily trips would be the same. As such, off-site roadway noise levels under this Alternative would be similar to the project. Therefore, as with the RP's Proposed Remedy the off-site roadway noise levels under this Alternative would be less than significant.

Long-Term Noise

Mechanical equipment (e.g., mechanical fans and pumps) for long-term use with the SVE/bioventing system would be designed housed inside a sound attenuated enclosure that would achieve required sound levels outside the enclosure to comply with the City's Noise Ordinance requirement. Mechanical design documentation would be required once the SVE location is selected to demonstrate that noise generated from the mechanical fan and/or other related mechanical components noise levels would not exceed the measured ambient noise levels shown in Table 5.6-7 during daytime hours at each corresponding measurement location and 55 dBA during nighttime hours at each measurement location. Mitigation Measure NOISE-3 would apply to Alternative 2 to ensure that the noise impacts associated with the operation of mechanical equipment would be less than significant.

Short-Term Ground-Borne Vibration

This Alternative would be implemented using typical heavy-duty construction equipment such as excavators, dozers, and trucks. As discussed above, residential buildings are not expected to experience vibration velocities in excess of the structural damage threshold. However, residents immediately adjacent to a property with active remedial activity would experience vibration velocities in excess of the human annoyance threshold from the mini excavator. Thus, impacts would be less than significant for this Alternative, similar to the project.

Analysis of Impacts Associated with Alternative 3 – No Excavation Beneath Hardscape - 5 Feet with Targeted 10 Feet

Alternative 3 would entail excavation of soils from accessible areas of the affected residential properties, leaving any hardscape (patios, walkways, driveways, etc.) and the soil beneath it in place. This Alternative would involve removal of landscaping, fencing, etc. Just as with the RP's Proposed Remedy, excavation under this Alternative would be conducted to 5 feet bgs at properties requiring excavation, and up to 10 feet at some targeted locations. Unlike the project, which would require approximately 6 years, this Alternative would require proportionately shorter years since excavation beneath residential hardscape would not occur. Daily demolition and excavation volumes, truck trips, and worker commutes are anticipated to be the same as the project. This Alternative would also implement the same PDFs as described previously.

Short-Term Noise

On-Site Noise Sources

This alternative has the potential to increase noise levels as compared to the existing environment through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and construction workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the similar as the project but concrete saws, jack hammers, and other equipment to remove and replace hardscape would not be utilized during the residential property excavation phase. Therefore, peak construction activity noise levels would be reduced by approximately 10 dBA during the Residential Remediation phase. Remedial activities would occur for a fewer number of days overall as a result of the reduction in the excavated material. Mitigation Measure NOISE-1 would still be required.

However, similar to the project, peak noise impacts under this Alternative are predicted to result during the Street Trenching phase. As shown in Tables 5.6-10 and 5.6-11, noise resulting from this phase would intermittently exceed the significance threshold of 65 dBA, L_{eq} at onsite noise-sensitive receptor locations, even with the use of noise barriers. Therefore, excavation activity related noise would be significant and unavoidable on adjacent residential uses, even with implementation of Mitigation Measure NOISE-2.

Off-Site Roadway Noise

Off-site roadway noise levels under this Alternative would be the same as the project. As a result, impacts related to off-site roadway noise levels under this Alternative would be less than significant.

Long-Term Noise

This Alternative would not materially change the SVE/bioventing system. The SVE/bioventing system under this Alternative would be designed to comply with the City's Noise Ordinance requirement. As with the RP's Proposed Remedy, Mitigation Measure NOISE-3 would apply to Alternative 3 to ensure that the noise impacts associated with the operation of mechanical equipment would be less than significant.

Short-Term Ground-Borne Vibration

Alternative 3 would be implemented using typical heavy-duty construction equipment such as excavators, dozers, and trucks. As discussed above, residential buildings are not expected to experience vibration velocities in excess of the structural damage threshold. Since hardscape would not be removed, equipment which create substantial vibration velocities, such as jack hammers, hydraulic hammers, and the like, would not be used, lessening the peak vibration velocity experienced during residential property remediation. However, the use of a mini excavator within close proximity to neighboring properties would result in vibration velocities in excess of the human annoyance threshold. Thus, impacts would be lessened, but still remain significant for this Alternative, similar to the project.

6. CUMULATIVE IMPACTS

All of the identified related projects (see Chapter 4 of this EIR) have been considered for the purposes of assessing cumulative noise impacts. The potential for noise impacts to occur are specific to the location of each related project as well as the cumulative traffic on the surrounding roadway network. Due to the rapid attenuation characteristics of ground-borne vibration, there is no potential for a cumulative construction- or operational-period impact with respect to ground-borne vibration.

a. Construction-Period Noise

Noise is by definition a localized phenomenon, and significantly reduces in magnitude as the distance from the source increases. As such, only projects and growth due to occur in the immediate project area would be likely to contribute to cumulative noise impacts. The nearest related project is situated over 5,000 feet from the site. All of the related projects are located at a sufficient distance to preclude a cumulative impact on the project or on sensitive receptors near the proposed project. Therefore, cumulative noise impacts on sensitive receptors in the vicinity of the site from concurrent construction of the other development projects would be less than significant. Thus, the RP's Proposed Remedy would not contribute to a cumulative construction noise impact on nearby sensitive receptors.

b. Long-term Noise

The site and surrounding area have been developed with uses that have previously generated, and would continue to generate, noise from a number of community noise sources including vehicle travel, railroad train traffic, mechanical equipment (e.g., HVAC systems), and lawn maintenance activities. Each of the identified related projects that have been identified within the general project vicinity would also generate stationary-source and mobile-source noise due to ongoing day-to-day operations. All related projects are of a residential, retail, commercial, or institutional nature, and these uses are not typically associated with excessive exterior noise; however, each project would produce traffic volumes that are capable of generating a roadway noise impact. As discussed previously, traffic volumes from the proposed project and related projects, combined with ambient growth traffic, were evaluated and presented in Table 5.6-8. Cumulative traffic volumes would result in a maximum increase of 1.4 dBA, L_{eq} along the segment of Wilmington Avenue, between Sepulveda Boulevard and Lomita Avenue for the project and the Expedited Implementation Option. As this noise level increase would be below the 5-dBA significance threshold, roadway noise impacts due to cumulative traffic volumes would be less than significant.

Due to the City's Municipal Code provisions that limit stationary-source noise from items such as mechanical equipment, noise levels would be less than significant at the property line for each related project. For this reason on-site noise produced by any related project would not be additive to project-related noise levels. As the project's composite operational stationary-source impacts would be less than significant, composite stationary-source noise impacts attributable to cumulative development would also be less than significant.

7. MITIGATION MEASURES

Noise from short-term remediation, and long-term operation and maintenance of the SVE system have the potential to result in significant noise impacts at sensitive receptors. Thus, the following mitigation measures are required to minimize construction-related noise impacts for the RP's Proposed Remedy, Alternative 2, and Alternative 3:

MM NOISE-1 Residents of properties shall be offered relocation for the duration of nearby active remediation activities which may create ambient noise levels at their property in excess of 75 dBA, L_{eq}. for 20 days or less or in excess of 65 dBA, L_{eq}. for 21 days or longer. Based on the analyses presented in this EIR, this shall apply to residences located within approximately 90 feet of street trenching or 130 feet from an edge of residential remediation (i.e. a cluster of 4 to 8 homes); these distances may be revised by the Regional Board upon completion of additional monitoring and analysis which could be performed under the direction of an independent acoustician during the implementation of the RAP. Appendix F-8 includes 75 dBA and 65 dBA contours showing the impacted properties surrounding a hypothetical 8-property cluster.

MM NOISE-2 To the maximum extent feasible, the project shall provide noise blanket/temporary noise barriers between the active areas and occupied residential units during street trenching.

MM NOISE-3 The RP shall retain the services of a qualified acoustical engineer with expertise in design of sound isolations to ensure the noise from the SVE/bioventing complies with the City's exterior noise limits (55 dBA).

MM VIB-1 Residents of properties located within 60 feet of the use of jack hammers on private property shall be offered relocation for the duration of jack hammer use.

8. LEVEL OF SIGNIFICANCE AFTER MITIGATION

During remediation of the residential clusters, fencing, landscaping, and hardscape would be removed so that access to impacted soil is unencumbered. Side yards are narrow, and homes are as close as 5 feet from the property line. As such it is infeasible to erect sound barriers to shield the adjacent homes, and traditional temporary sound barriers are not capable of reducing the noise levels sufficiently to levels below the City of Carson's threshold (65 dBA). Erecting noise barriers in the street or on public sidewalks for weeks at a time is not feasible, and those homes with direct line of site to a cluster are predicted to experience high levels of noise. With implementation of Mitigation Measure NOISE-1 for the project, Alternative 2, and Alternative 3, the noise sensitive receptors (single-family residential uses) within 130 feet in all directions from the cluster and areas where noise from active remediation activities would exceed 65 dBA, L_{eq} based on additional noise monitoring during the implementation of the RAP would be offered relocation and, if accepted, those individuals would not be exposed to high noise levels from implementation of the project. However, since relocation is voluntary, residents may choose to remain and would potentially be exposed to noise levels in excess of the thresholds. Thus, the impact is conservatively assumed to remain significant and unavoidable even with implementation of the mitigation measure.

During the street trenching phase of RAP implementation, Mitigation Measure NOISE-2 would reduce noise levels by approximately 10 dBA. However impacts during this phase would remain above the 65 dBA thresholds, and are considered significant and unavoidable under the project, Alternative 2, and Alternative 3.

Mitigation Measure NOISE-3 for the project, Alternative 2, and Alternative 3 would ensure that the SVE system is positioned, designed, built, and operated in a manner so that potential noise impacts from stationary mechanical equipment are less than significant.

Peak velocities fall below the threshold for human perception at approximately 10 feet for vibration resulting from the mini excavator and at 60 feet for vibration resulting from a jack hammer. With the implementation of NOISE-1 during residential property remediation and VIB-1 during other phases involving the use of a jack hammer, vibration impacts could be mitigated to less than significant. However, since relocation is voluntary, residents may choose to remain and would potentially be exposed to vibration levels in excess of the thresholds. Thus, the impact is conservatively assumed to remain significant and unavoidable even with implementation of the Mitigation Measures under the project, Alternative 2, and Alternative 3.

5.7 TRAFFIC AND CIRCULATION

1. INTRODUCTION

This section analyzes the potential effects of truck and worker trips to and from the site during implementation of the RAP. The primary focus is on the potential for haul truck and worker activity to impact intersection service levels compared to the City of Carson and Los Angeles County Congestion Management established standards. The traffic impact analysis is based on the analysis, conclusions, and recommendations of the *Traffic Study for the Kast Property* ("Traffic Study") (Fehr & Peers, October, 2014), which is provided in Appendix G of this EIR.

2. ENVIRONMENTAL SETTING

Regulatory Framework

State

Congestion Management Program

The Congestion Management Program (CMP) is a state-mandated program enacted by the State legislature to address the increasing concern that urban congestion is affecting the economic vitality of the state and diminishing the quality of life in some communities. The 2010 CMP is the eighth CMP adopted for Los Angeles County since the requirement became effective with the passage of Proposition 111 in 1990. The hallmark of the CMP program is that it is intended to address the impact of local growth on the regional transportation system. Statutory requirements of the CMP include monitoring level of service (LOS) on the CMP Highway and Roadway network, measuring frequency and routing of public transit, implementing the Transportation Demand Management and Land Use Analysis Program and helping local jurisdictions meet their responsibilities under the CMP.

The Los Angeles County Metropolitan Transportation Authority (Metro), the local CMP agency, has established a countywide approach to implement the statutory requirements of the CMP in their governing 2010 CMP for Los Angeles County. The countywide approach includes designating a highway network that includes all state highways and principal arterials within the County and monitoring traffic conditions on the designated transportation network; performance measures to evaluate current and future system performance; promotion of alternative transportation methods; analysis of the impact of land use decisions on the transportation network; and mitigation to reduce impacts on the network. If LOS standards deteriorate, then local jurisdictions must prepare a deficiency plan to be in conformance with the countywide plan.

The CMP requires that, when an environmental impact report is prepared for a project, traffic and public transit impact analyses be conducted for select regional facilities based on the quantity of project traffic expected to use those facilities. The CMP guidelines state that areas selected for analysis should be those that include the following locations:

- All CMP arterial monitoring intersections where the proposed project will add 50 or more trips during either the A.M. or P.M. weekday peak hours of adjacent street traffic; and
- Mainline freeway monitoring locations where the project will add 150 or more trips, in either direction, during either the A.M. or P.M. weekday peak hours.

Regional

Southern California Association of Governments Regional Transportation Plan

The Southern California Association of Governments (SCAG) Regional Transportation Plan (RTP) is a long-range plan that provides a vision for transportation investments throughout the region. The RTP envisions a future multi-modal transportation system for the region and provides the basic framework for coordinated, long-term investment in the regional transportation system over the planning horizon of 2035. In compliance with state and federal requirements, SCAG prepares the Regional Transportation Improvement Program (RTIP) to implement projects and programs listed in the RTP. Updated every four years, the RTP contains a listing of transportation projects proposed for the region over a six-year period. Transportation projects proposed in the region are required to be consistent with the RTP and included within the RTIP to be eligible for state or federal funding. The 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) identifies mobility as an important component of a much larger picture with added emphasis on sustainability and integrated planning. In addition, the RTP/SCS includes goals and policies that pertain to mobility, accessibility, safety, productivity of the transportation system, protection of the environment and energy efficiency, and land use and growth patterns that complement the state and region's transportation investments. An integral component of the RTP/SCS is a commitment to reduce emissions from transportation sources, in compliance with Senate Bill 375; to improve public health; and to meet the National Ambient Air Quality Standards as set forth by the Clean Air Act. For further discussion of air quality and greenhouse gas emissions, see Sections 5.1, *Air Quality*, and 5.3, *Greenhouse Gas Emissions*, of this EIR, respectively.

Local

City of Carson General Plan Transportation and Infrastructure Element

The Transportation and Infrastructure Element of the Carson General Plan (adopted October 11, 2004), provides methods and results of the analysis of existing and projected future circulation conditions in the City of Carson. As part of the General Plan, the Transportation and Infrastructure Element outlines policies and describes the future circulation system needed to support the General Plan Land Use Element. The Transportation and Infrastructure Element identifies the existing circulation system, the relationship of the existing system to the regional roadway system, and existing daily traffic volume on the existing street network. It also provides a classification system, which includes local streets, collector streets, secondary highways, major highways, and state highways and freeways.

The Transportation and Infrastructure Element provides a description of designated truck routes. According to the Transportation and Infrastructure Element, the volume of trucks, due to the types of industrial and commercial uses in the City, and conflicts between trucks and other vehicles are major issues for the City.[1]

[1] *City of Carson General Plan, Transportation and Infrastructure Element, October 11, 2004, page II-16.*

The City has designated and regulated truck routes and truck parking zones that provide access for large trucks on streets designed to accommodate them and to protect residential streets from unwanted truck traffic. The Transportation and Infrastructure Element also identifies public transit facilities in the City of Carson.

The Transportation and Infrastructure Element identifies desirable roadway capacities and service levels for each type of facility, based on volume-to-capacity ratio for the roadway level of service. The assumed capacities on roadway links are based on the standards used by the County of Los Angeles and modified for special conditions in Carson. All street intersections within the study area for the RP's Proposed Remedy are located within the jurisdictional control of the City of Carson, even if some street segments are within the City of Los Angeles boundary.

City of Carson Municipal Code

The City of Carson has identified specific arterial roadways as truck routes in their Municipal Code (CMC 3260.2 and 3260.3). Commercial vehicles exceeding a maximum gross weight of six thousand pounds are only permitted to use truck routes identified in the City's Municipal Code. Lomita Boulevard, Main Street, Sepulveda Boulevard, and Avalon Boulevard within the project study area are all listed in CMC 3260.2 as designated truck routes.

Existing Conditions

Existing Roadways

The site is located in the southern portion of the City of Carson, and is generally bounded by Lomita Boulevard to the south, the Monterey Pines residential community and industrial property of the former Turco Products Facility to the west, Los Angeles County Metropolitan Transportation Authority (Metro) railroad tracks to the north, and single-family residential properties to the east. Primary regional access to the site is provided by the Harbor Freeway (I-110) and the San Diego Freeway (I-405). The I-110 runs in a north/south direction approximately one-half mile west of the site; the I-405 runs in a northwest/southeast direction north of the site. The municipal boundary between the cities of Carson and Los Angeles in the project area generally follows Lomita Boulevard. However, the area between Avalon Boulevard and Wilmington Avenue north of Lomita Avenue to the approximate location of Deloras Drive is located within the City of Los Angeles. The following is a brief description of the major streets serving the project site: with functional classifications from the Transportation and Infrastructure Element of the City of Carson General Plan and the Transportation Elements of the Los Angeles General Plan.

- **Lomita Boulevard**, which runs east/west south of the site, provides access to the site. Lomita Boulevard is classified as a Major Highway in the Carson Transportation and Infrastructure Element while the Wilmington Community Plan classifies it as a Secondary Highway. Lomita Boulevard provides two lanes in each direction and is divided by a two-way left-turn lane. Parking is generally permitted on both sides of the roadway and the posted speed limit is 40 MPH. There is a school zone between Main Street and Neptune Avenue, adjacent to Wilmington Middle School, where the speed limit is 25 MPH when children are present.
- **Sepulveda Boulevard**, which runs east/west north of the project site and provides access to I-110, is classified as a Major Highway in the Carson Transportation and Infrastructure Element. Near the

site, Sepulveda Boulevard has two lanes in each direction and is divided by a raised median. Parking is generally allowed on both sides of Sepulveda Boulevard and the posted speed limit is 40 MPH.

- **223rd Street** is classified as a Major Highway and runs east/west north of the project site. It provides two lanes in each direction and is divided by a two-way left-turn lane. Parking is generally allowed on both sides of 223rd Street and the posted speed limit is 40 MPH.
- **Figueroa Street** runs north/south west of the site. North of Lomita Boulevard, in Carson, it is classified as a Major Highway. South of Lomita Boulevard, in Los Angeles, it is classified as a Major Highway Class II. It provides two lanes in each direction and is generally divided by a raised median. Parking is allowed and the posted speed limit is 40 MPH.
- **Main Street** runs north/south just west of the project site. North of Lomita Boulevard, in Carson, it is classified as a Major Highway. South of Lomita Boulevard in Los Angeles, it is named Wilmington Boulevard and, although it is classified as a Secondary Highway, trucks are prohibited from the City limit south towards the Port area.. It provides two lanes in each direction and is divided by raised medians. Parking is generally permitted on both sides of Main Street and the posted speed limit is 40 MPH.
- **Avalon Boulevard** runs north/south east of the site. North of Lomita Boulevard, in Carson, Avalon Boulevard is classified as a Major Highway and is a designated truck route. In Los Angeles, although designated a Major Highway Class II, trucks are prohibited from the city limit south towards the Port area. Avalon Boulevard provides two lanes in each direction and is divided by a raised median. Parking is permitted on both sides of Avalon Boulevard and the posted speed limit is 40 MPH.
- **Wilmington Avenue** runs north/south east of the site and provides access to I-405. Wilmington Avenue north of Lomita Boulevard is classified as a Major Highway and generally provides two travel lanes in each direction and is divided by a raised median north of the railroad crossing. On-street parking is generally allowed on Wilmington Avenue and the posted speed limit is 40 MPH.
- **Neptune Avenue** is a local street and runs north/south within the Carousel Tract. It provides one travel lane in each direction. On-street parking is allowed on Neptune Avenue.
- **Lagoon Street** is a short local street and runs north/south between Lomita Boulevard and 249th Street within the Carousel Tract. It provides one travel lane in each direction. On street parking is allowed on Lagoon Street.

Existing Traffic Conditions

Study Area Intersections

The study area was established in accordance with the City of Carson and covers the area adjacent to the site that would be utilized by project-generated traffic. **Figure 5.7-1**, *Project Site and Study Intersections*, shows the study area and the 14 study intersections, which are as follows:

1. I-110 SB Off-Ramp & Sepulveda Boulevard
2. I-110 NB Off-Ramp & Sepulveda Boulevard
3. Figueroa Street & Sepulveda Boulevard
4. Main Street & Sepulveda Boulevard

PCR

Project Site and Study Intersections

Former Kast Property Tank Farm Site Remediation Project

Source: Fehr & Peers, 2014.

FIGURE

5.7-1

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5. Main Street & Lomita Boulevard
6. Neptune Avenue & Lomita Boulevard
7. Lagoon Avenue & Lomita Boulevard (unsignalized)
8. Avalon Boulevard & Sepulveda Boulevard
9. Avalon Boulevard & Lomita Boulevard
10. Wilmington Avenue & I-405 NB Ramps
11. Wilmington Avenue & I-405 SB Ramps
12. Wilmington Avenue & E 223rd Street
13. Wilmington Avenue & Sepulveda Boulevard
14. Wilmington Avenue & Lomita Boulevard (unsignalized)

Existing Traffic Volumes and Service Levels

The following sections describe the peak hour traffic volumes, the methodology used to analyze the intersection operating conditions, and the resulting levels of service (LOS) for the study intersections under existing conditions. Lane configurations at the study intersections are illustrated in Figure 4 of the Traffic Study, which is contained in Appendix G of this EIR.

Level of Service Methodology

Traffic operations of roadway facilities are described using the term Level of Service (LOS). LOS is a qualitative description of traffic flow based on several factors such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS "A", representing completely free-flow conditions, to LOS "F", representing breakdown in flow resulting in stop-and-go conditions. LOS "E" represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow. Based on the City of Carson's guidelines, the Intersection Capacity Utilization (ICU) methodology was used to determine the intersection volume-to-capacity (V/C) ratio and corresponding LOS for the 12 signalized study intersections. The City of Carson utilizes the 2000 Highway Capacity Manual (HCM 2000) methodology for unsignalized intersections and, for those which are found to operate at LOS E or F, the ICU methodology is also used in order to obtain a V/C ratio for impact assessment purposes.

The ranges of V/C ratios or delay values and corresponding LOS for signalized and unsignalized intersections are included in **Table 5.7-1**, *Level of Service for Signalized Intersections – ICU methodology*, and **Table 5.7-2**, *Level of Service Definitions for Stop-Controlled Intersections*.

Table 5.7-1

Level of Service Standards for Signalized Intersections Intersection Capacity Utilization (ICU) Methodology

Level of Service	Description	Volume/Capacity Ratio
A	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.	0.000 - 0.600
B	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat what restricted within groups of vehicles.	>0.600 - 0.700
C	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.	>0.700 - 0.800
D	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.	>0.800 - 0.900
E	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.	>0.900 - 1.000
F	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths	> 1.000

Source: Highway Capacity Manual Special Report 209, Transportation Research Board, 1994.

Table 5.7-2

Level Of Service Definitions For Stop-Controlled Intersections

Level of Service	Average Control Delay (Seconds/Vehicle)
A	≤10.0
B	>10.0 to 15.0
C	>15.0 to 25.0
D	>25.0 to 35.0
E	>35.0 to 50.0
F	>50.0

Source: Highway Capacity Manual (HCM), Transportation Research Board, 2000.

Existing Traffic Volumes

Traffic volumes at the 14 study intersections were collected during the morning and afternoon peak periods (from 7:00 AM to 9:00 A.M. and 4:00 PM to 6:00 P.M., respectively) in April 2014 and are included in Appendix A of the Traffic Study contained in Appendix G of this EIR. Vehicle classifications are included in the baseline traffic count data. Existing peak hour traffic volumes with passenger-car equivalent (PCE) adjustments are illustrated in Figure 4 of the Traffic Study (Appendix G). The Highway Capacity Manual, 2000 edition (HCM 2000) identifies a 2.0 passenger-car unit equivalent for heavy trucks (within the 10-wheel category) to

account for the additional space occupied by these vehicles and the difference in operating capabilities compared with passenger cars.[2]

Existing Intersection Levels of Service

An assessment of the existing operating conditions at the 14 intersections, including the V/C ratio and corresponding LOS at each of the study intersections during the morning and afternoon peak hours is summarized in **Table 5.7-3**, *Existing Service Levels – Existing (2014) Conditions*. As shown in Table 5.7-3, all 14 study intersections are currently operating at acceptable levels of service (LOS D or better) during both peak hours under ICU methodology shown in Table 5.7-1. The unsignalized intersections, however, operate at LOS E or F using HCM methodology shown in Table 5.7-2. This means that stop-sign-controlled approaches have a higher delay under existing conditions than considered satisfactory. Detailed LOS calculations for existing intersections are provided in Appendix B of the Traffic Study (Appendix G of this EIR).

Existing Transit Services

Public transit services operating in the project area are operated by Metro, City of Los Angeles Department of Transportation (LADOT) Commuter Express, City of Carson, and City of Torrance transit systems. Bus routes and their frequencies during the weekday morning (7:00 to 10:00 A.M.) and weekday afternoon (3:00 to 6:00 PM.) peak periods are detailed in the Traffic Study, Figure 2, contained in Appendix Gof this EIR. A bus stop is located on the north side of Lomita Boulevard at its intersection with Neptune Avenue. There are no bus stops at the intersection of Lomita Boulevard and Lagoon Street. Public transit lines serving the project area include the following:

- Metro Line 205 travels north/south from San Pedro to Willowbrook with stops in Lomita, Harbor City, Carson, Harbor Gateway, Rancho Dominguez, and Carson. Near the project site, Line 205 travels along Vermont Avenue. Line 205 has 30-minute headways during the weekday peak periods, and 50-minute headways on weekends.
- Metro Line 246 travels north/south from San Pedro to Gardena with stops in Wilmington and Carson. Near the project site, Line 246 travels along Avalon Boulevard. Line 246 has 20- to 25-minute headways during the weekday peak periods, and 40-minute headways on weekends.
- Metro Line 450 travels north/south from San Pedro to downtown Los Angeles along I-110 through Wilmington, Carson, Harbor Gateway, and Gardena. Near the project site, Line 450 travels along Sepulveda Boulevard. Line 45 has 20- to 30-minute headways during the weekday peak periods, 40-minute headways on Saturdays, and 60-minute headways on Sundays.
- Metro Line 550 travels north/south from San Pedro to downtown Los Angeles with stops in Harbor City, Harbor Gateway, and Wilmington. Near the project site, Line 550 travels along Vermont Avenue. Line 550 has 30- to 40-minute headways during the weekday peak periods, and 50-minute headways on weekends.

[2] *In addition, the use of a 2.0 PCE is consistent with previous studies in this area, in which PCE factors of 1.0, 1.5, and 2.0 are used for passenger vehicles, bobtail trucks and buses, and heavy trucks, respectively, to account for the influence of heavy vehicles in the traffic stream.*

Table 5.7-3

Intersection Service Levels – Existing (2014) Conditions

NO.	INTERSECTION	PEAK HOUR	EXISTING V/C or Delay	EXISTING LOS
1	I-110 SB Off-Ramp &	AM	0.795	C
	Sepulveda Boulevard	PM	0.830	D
2	I-110 NB Off-Ramp &	AM	0.717	C
	Sepulveda Boulevard	PM	0.615	B
3	Figueroa St &	AM	0.704	C
	Sepulveda Boulevard	PM	0.630	B
4	Main St &	AM	0.682	B
	Sepulveda Boulevard	PM	0.751	C
5	Main St &	AM	0.734	C
	Lomita Boulevard	PM	0.771	C
6	Neptune Ave &	AM	0.547	A
	Lomita Boulevard	PM	0.479	A
7	Lagoon Ave &	AM	0.751	C
	Lomita Boulevard[a]	PM	0.662	B
		AM	80.0s	F
		PM	46.0s	E
8	Avalon Boulevard &	AM	0.684	B
	Sepulveda Boulevard	PM	0.776	C
9	Avalon Boulevard &	AM	0.653	B
	Lomita Boulevard	PM	0.641	B
10	Wilmington Ave &	AM	0.656	B
	I-405 NB Ramps	PM	0.652	B
11	Wilmington Ave &	AM	0.720	C
	I-405 SB Ramps	PM	0.822	D
12	Wilmington Ave &	AM	0.623	B
	E 223rd St	PM	0.740	C
13	Wilmington Ave &	AM	0.666	B
	Sepulveda Boulevard	PM	0.625	B
14	Wilmington Ave &	AM	0.448	A
	Lomita Boulevard[a]	PM	0.422	A
		AM	50.6s	F
		PM	54.8s	F

[a] *Unsignalized intersection operating at LOS E or F per the HCM methodology were also analyzed per the ICU methodology to calculate a V/C ratio, as per City of Carson practices.*

Source: Fehr & Peers, 2014.

- LADOT Commuter Express Line 448 travels north/south from Rancho Palos Verdes to downtown Los Angeles, with stops in Lomita, Harbor City, and Wilmington. Near the project site, Line 448 travels along I-110. Line 448 operates on weekdays only, with 15-minute headways during the peak hours.
- Carson Circuit Route B is a circuitous route through the City of Carson, traveling along Carson Street, Figueroa Street, 234th Street, and Main Street. In the project study area, this line travels along Main Street. Route B operates at 40-minute headways daily.

- Carson Circuit Route C is a circuitous route through the City of Carson, traveling along Avalon Boulevard, 223rd Street, Dolores Street, and Sepulveda Boulevard. In the study area, this line travels along Avalon Boulevard. Route C operates at 40-minute headways daily.
- Carson North/South Shuttle travels north and south through the City of Carson. In the study area, the shuttle travels along Main Street, Sepulveda Boulevard, and Lomita Boulevard. The North/South Shuttle operates twice during the morning peak hour and once during the afternoon peak hour on weekdays only. There is a stop at the intersection of Lomita Boulevard and Neptune Avenue.
- Torrance Transit Line 3/Rapid 3 travels from the South Bay Galleria Transit Center in Torrance to the Metro Blue Line station in Long Beach. Near the project site, Line 3 travels along Avalon Boulevard. Line 3 has 20- to 25-minute headways during the weekday peak periods and Saturdays, and 30-minute headways on Sundays.
- Torrance Transit Line 7 travels between the cities of Redondo Beach and Carson. Near the project site, Line 7 travels along Sepulveda Boulevard. Line 7 has a 1-hour headway daily.
- Torrance Transit Line 9 travels from the Del Amo Mall in Torrance to Carson. Near the project site, Line 9 travels along Lomita Boulevard. Line 9 operates Monday through Saturday with approximately 50-minute headways. The bus stops nearest to the project site are at Lomita Boulevard & Main Street.

3. METHODOLOGY AND THRESHOLDS

Methodology

The Traffic Study evaluates the potential for construction traffic impacts on the street system surrounding the project site. Due to the nature of the RP's Proposed Remedy, a minimal number of trips would occur after the implementation of the RAP for monitoring and any necessary maintenance. The following traffic scenarios are evaluated to assess temporary construction-period impacts:

- Existing Conditions (Year 2014)
- Existing plus Project (Year 2014)
- Existing plus Expedited Implementation Option (Year 2014)
- Cumulative Base (Year 2021)
- Cumulative plus Project (Year 2021)
- Cumulative Base (Year 2019) for Expedited Implementation Project
- Cumulative plus Expedited Implementation Option (Year 2019)

Level of Service Methodology

The existing level of service methodology is described above under Existing Conditions. The following provides the methodology for the other scenarios that are evaluated.

Future Traffic Projections

Potential project impacts are assessed against existing conditions as well as cumulative conditions to evaluate the potential impacts of the RP's Proposed Remedy and Expedited Implementation Option on the surrounding street system. Under cumulative conditions, estimates of future traffic conditions in the study area are estimated with and without the project's traffic. Estimates of traffic growth are developed to forecast future conditions without the project. These forecasts included traffic increases as a result of both regional ambient traffic growth and traffic generated by specific developments in the vicinity of the project (related projects). Traffic expected to be generated by related projects within, or with the potential to affect, the study area is considered in addition to the ambient area wide traffic growth. For this study, related projects within two miles of the project site were identified by the City of Carson and LADOT in Spring 2014.

These projected construction-period traffic volumes (the cumulative base conditions) represent the future study year conditions without the project. The traffic generated by the RP's Proposed Remedy and Expedited Implementation Option is estimated and assigned to the surrounding street system. The project traffic is added to the cumulative base to form the cumulative plus project traffic conditions, which is analyzed to determine the incremental traffic impacts attributable to the project itself.

Implementation of the RP's Proposed Remedy is estimated to be complete in 2021 and under the Expedited Implementation Option it is estimated to be complete in 2019. Project-generated traffic volumes are based on the trip generation estimates and trip distribution patterns described below.

Trip Generation

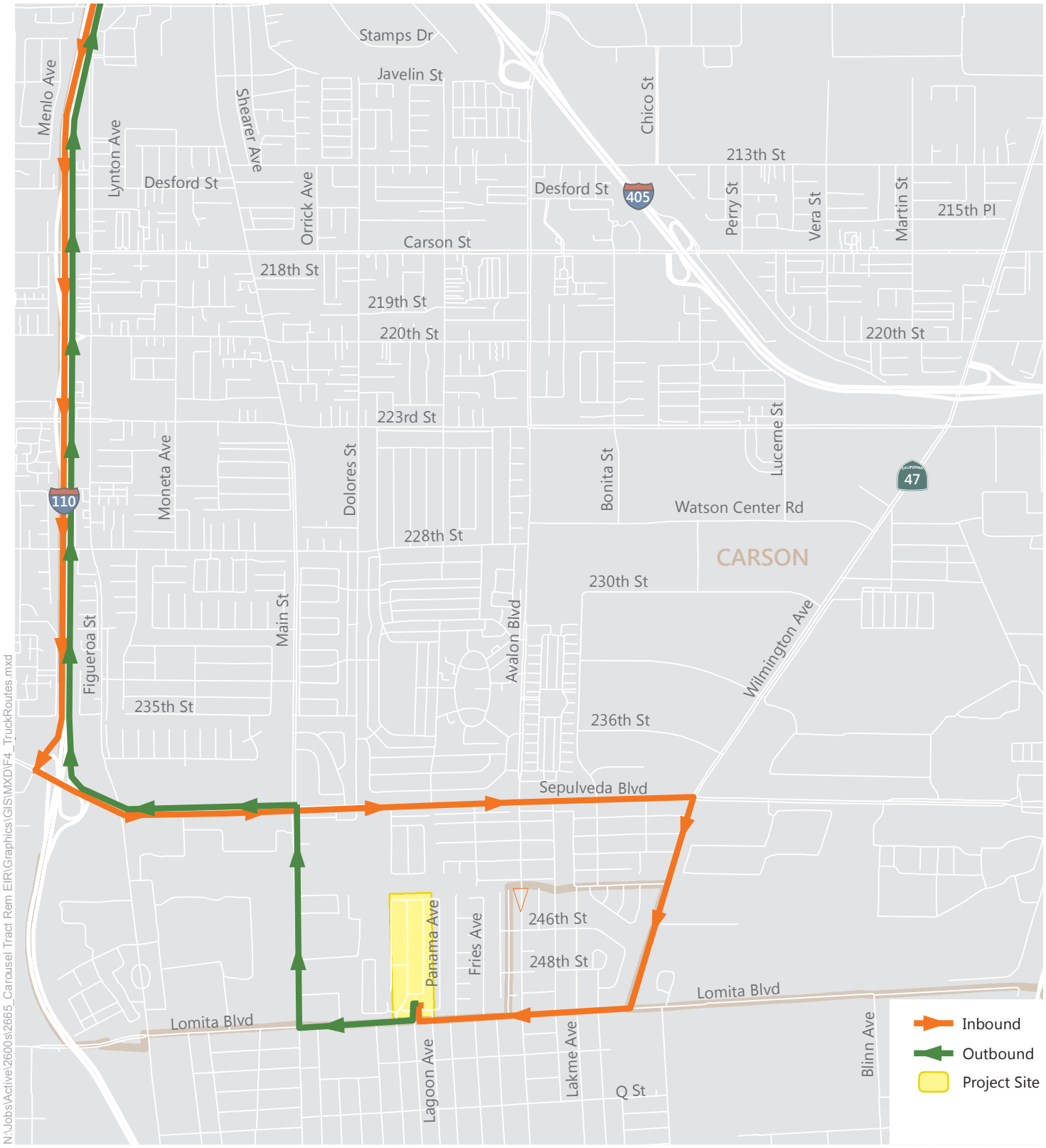
Trip generation is expressed in vehicle trip ends, defined as one-way vehicular movements, either entering or exiting the generating land use. The traffic projections for the proposed project were developed using three steps: estimating the trip generation of the project, determining trip distribution, and assigning the project traffic to the roadway system based on assumptions made about the RAP regarding excavation methods, haul routes, and worker trips, including the shuttle service for workers Maximum trip generation would occur during excavation in residential areas. Therefore, this phase of activity is the basis of the traffic analysis. Other activities, such as the subsequent street grinding and paving which would produce approximately 24 one-way truck trips per day, and periodic activity such as maintenance and monitoring of SVE/bioventing, would result in less vehicle trips.

Trip Distribution and Assignment

The estimated total traffic volumes, including truck, worker, and visitor trips, for the project are illustrated in the Traffic Study, Figure 6A, contained in Appendix G of this EIR. The estimated total volumes, including truck, worker, and visitor trips, for the Expedited Implementation Option are illustrated in Figure 6B of the Traffic Study.

Truck Traffic

Trucks would be coming to the site via I-110 from points north or south of the site. As shown in **Figure 5.7-2**, *Proposed Haul Route*, inbound trucks were assumed to take the I-110 southbound off-ramp at Sepulveda Boulevard and travel eastbound, turn right onto Wilmington Avenue and travel southbound, turn right onto Lomita Boulevard and travel westbound, and turn right onto either Neptune Avenue or Lagoon



PCR

Proposed Haul Route

Former Kast Property Tank Farm Site Remediation Project

Source: Fehr & Peers, 2014.

FIGURE

5.7-2

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Avenue to enter the site. Trucks would exit the site by turning right from either Neptune Avenue or Lagoon Avenue onto Lomita Boulevard and traveling west, turn right onto Main Street and travel north, turn left onto Sepulveda Boulevard and travel west, and turn right onto the I-110 northbound on-ramp. Trucks are expected to access the site no earlier than 8 A.M. and would depart the site no later than 4 P.M.[3]

Worker Traffic

Worker trips would be generally distributed evenly with approximately 50 percent arriving at the site via shuttle and 50 percent arriving via private vehicles. The distribution pattern of workers arriving via private vehicles would depend on the home location of each worker. Based on typical travel patterns in the area, the generalized distribution was used for worker trips.

- 35 percent to and from the south via the I-405 freeway
- 25 percent to and from the north via the I-405 freeway
- 10 percent to and from the south via the I-110 freeway
- 20 percent to and from the north via the I-110 freeway
- 10 percent to and from the east via Sepulveda Boulevard

The off-site location for workers traveling to the site via shuttle van is currently unknown but is assumed to be within five miles of the site. Based on existing land use and the nearby roadway network, it is assumed that the off-site location would be north of the site, with access to the site likely via I-110. As such, and to maintain a conservative analysis, it has been assumed that workers traveling by shuttle van would use the same routes as the truck trips.

Visitor Traffic

Up to nine visitors (such as agency staff, RP personnel) per day could be at the site. It is assumed that six would arrive from points north using the I-110 freeway and the remaining three visitors would likely access the site using surface streets.

Thresholds of Significance

Appendix G of the State CEQA Guidelines provides a set of screening questions that address impacts with regard to transportation. These questions are as follows:

Would the project:

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including

[3] *The traffic analysis evaluates the highest peak hour in the A.M. and P.M. Given that the arrival of workers and trucks would occur within different hours (workers would begin arriving as early as 7:00 A.M. and trucks would arrive no earlier than 8:00 A.M.) it is unlikely that workers and trucks would arrive at the site within the same one-hour during either peak period. However, to maintain a conservative assumption, all employee trips arriving during the A.M. in addition to the first group of truck trips arriving to the site, were analyzed for the A.M. peak with the converse holding true for the P.M. peak. Based on this assumption, the A.M. peak would be 7:30 to 8:30 A.M. and no trucks would be expected to leave the site.*

mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

e) Result in inadequate emergency access?

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities

Based on the City of Carson's circulation system standards and the CMP traffic impact analysis guidelines, the specific thresholds regarding traffic that are used in the analysis are provided below. As determined in the Initial Study, which is contained in Appendix A of this EIR, implementation of the RAP would result in short-term, temporary traffic. As such, the project would not conflict with adopted policies, plans or programs regarding the circulation system or alternative transportation facilities (Item f). As required by the City of Carson, a Construction Traffic Management Plan would be implemented and would include coordination with emergency providers to ensure appropriate emergency access (Item e). In addition, the haul route would follow designated truck routes. The project would not result in any changes to the existing circulation system (Item d). With regard to airports, the nearest airport to the site is the Torrance Municipal Airport, which is located over 3.3 miles to the west of the site (Item c). As such, no further analysis of these topics is necessary.

Intersection Capacity

The project would have a significant impact relative to local intersections if:

TRAF 1: The project-generated traffic causes an increase in the V/C ratio equal to or greater than 0.020 if the intersection is projected to operate at LOS E or F under future plus project conditions (represented by a V/C ratio of 0.901 or greater).

Under these standards, a project would not have a significant impact at an intersection, regardless of the V/C ratio increase, if the intersection is operating at LOS A, B, C or D under the "With Project" traffic conditions. Conversely, if an intersection is or is projected to be operating at LOS E or F, the project would have significant impact if project-generated traffic caused an increase of more than 0.02 in the V/C ratio at any individual intersection.

CMP Traffic Impacts

The CMP traffic impact analysis guidelines indicate that an impact on the regional transportation (freeway) system is considered to be significant under the following conditions:

TRAF 2: The project increases traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C increase of 0.02), causing LOS F (V/C > 1.00) or if the facility is already at LOS F when the project increases traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C increase of 0.02).

4. PROJECT ANALYSIS

Project Design Features

The following Project Design Features (PDFs) are components that would be implemented as part of the RP's Proposed Remedy to minimize the potential impacts regarding traffic and circulation.

PDF TRAF-1 Prior to implementation of the RAP, the project contractor will submit a Haul Route Plan to the City of Carson for review and approval. The proposed haul route will be restricted to the City's designated truck route roadways and will be as shown in Figure 5.7-2 of this EIR.

PDF TRAF-2 Prior to implementation of the RAP, the project contractor will prepare a Construction Traffic Management Plan that will be submitted to the City of Carson for review and approval prior to the start of any work. This plan will comprise site traffic control plans, including but not limited to such elements as the designation of haul routes for construction-related trucks, the sequencing of construction activities, any driveway turning movement restrictions, temporary traffic control devices, travel time restrictions for construction-related traffic, consolidation of construction truck deliveries, flag control, and designated staging and parking areas for workers and equipment.

Because the construction activities occur within a public street right-of-way, the following design features would also apply:

- A site-specific construction work site traffic control plan will be prepared for each construction phase and submitted to the City of Carson for review and approval prior to the start of any construction work. This plan will include such elements as the location and hours of any necessary lane closures, local traffic detours (if any), protective devices and traffic controls (such as barricades, cones, flag persons, lights, warning beacons, temporary traffic signals, warning signs), the location and hours of any necessary access limitations for abutting properties, and provisions to maintain emergency access through construction work areas.
- Generally accepted construction safety standards will be followed to separate pedestrians from construction activity through such measures as protection barriers and signage indicating alternative pedestrian access routes where existing facilities would be affected. This would include the sidewalks around the perimeter of an active excavation site.
- Advance notice of planned construction activities will be provided to any affected residents and property owners in the vicinity of the construction site.
- The project contractor will coordinate with emergency service providers (police/sheriffs, fire, ambulance and paramedic services) to provide advance notice of ongoing construction activity and construction hours.

PDF TRAF-3 One travel lane will be kept open at all times or detours will be provided during residential property remediation, well installation and street trenching phases.

PDF TRAF-4 The project contractor will arrange for off-site parking within 5 miles of the site and will provide shuttle services to the site for approximately 50 percent of on-site workers.

Analysis of Project Impacts

Threshold TRAF-1: The project would have a significant impact on transportation and circulation if it increases traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C increase of 0.02), causing LOS F (V/C > 1.00) or if the facility is already at LOS F when the project increases traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C increase of 0.02).

Impact Statement TRAF-1: *The RP's Proposed Remedy and Expedited Implementation Option would not exceed threshold standards related to V/C ratios at any of the study intersections Therefore, the RP's Proposed Remedy and the Expedited Implementation Option would have a less than significant impact with respect to intersection service levels.*

Implementation of the RAP would begin in 2015 and end in 2021. The RP's Proposed Remedy is expected to generate approximately 32 workers, including 16 workers who would travel from home to the site and contribute approximately 10 additional off-peak round trips to various off-site locations during the course of a typical day. The remaining 16 employees would park at an off-site location and travel to the site in shuttle vans, making one round-trip each in the morning and evening peak hours. Workers would arrive as early as 7:00 A.M. and would depart as late as 5:00 P.M. No specific location for off-site worker parking has been identified at this time, but this analysis assumes that it would be located within five miles of the project site.

An average of 66 one-way trucks and a maximum of 99 trucks would travel to and from the site daily. Applying PCE methodology, in which one truck trip is equivalent to two passenger car trips, truck traffic would be equivalent to a maximum of 396 PCE trip ends on a peak day. Trucks would arrive no earlier than 8:00 A.M. and leave no later than 4:00 P.M. The estimated daily truck trips are assumed to occur fairly evenly over the workday, with a slight inbound peak during the A.M. peak hour and a slight outbound peak during the P.M. peak hour.

As shown in Table **5.7-4**, *Remedial Action Plan Trip Generation Estimates*, it is assumed that the proposed project would generate approximately 478 daily PCE trips, with 61 trips during both the A.M. and P.M. peak hours. During the A.M. peak hour the project would generate 58 inbound trips and 3 outbound trips; during the P.M. peak hour the project would generate 3 inbound trips and 58 outbound trips. This provides a conservatively high estimate for this analysis, as the project truck traffic and employee traffic may not all occur during the same one-hour period.

Project peak hour traffic volumes during implementation of the RAP are compared to existing intersection operating conditions in **Table 5.7-5.** *Existing Plus Project – Intersection Levels of Service and Impact Analysis***.** As shown in Table 5.7-5, under City of Carson's intersection traffic impact significance criteria, the RP's Proposed Remedy would not result in any significant impacts at any of the 14 study intersections.

Table 5.7-4

Remedial Action Plan Trip Generation Estimates

Trip Number and Source	Trip Generation Rates							Estimated Trip Generation						
		AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour		
	Weekday Daily	Rate	% In	% Out	Rate	% In	% Out	Week day Daily	In	Out	Total	In	Out	Total
Trucks (99)[a]	4.00	0.38	100	0	0.38	0	100	396	38	0	38	0	38	38
Employees (16)-Parking On-Site[b]	3.25	1.00	100	0	1.00	0	100	52	16	0	16	0	16	16
Employees - Parking Off-Site (16)[c]	0.75	0.38	50	50	0.38	50	50	12	3	3	6	3	3	6
Visitors (9)[d]	2.00	0.10	50	50	0.10	50	50	18	1	0	1	0	1	1
Total								**478**	**58**	**3**	**61**	**3**	**58**	**61**

[a] *Trip Generation Rates and Estimates reported in Passenger Car Equivalents (PCE); PCE rate of 1 truck = 2 PCEs.*
[b] *16 employees to be parking on-site; trip rate includes trips to various off-site locations not during the peak hour*
[c] *16 employees would arrive using vans. 3 round trip (RT) vans in AM, 3 RT vans in PM. Vans would arrive full/depart empty in AM; arrive empty/depart full in PM.*
[d] *Up to 9 visitors to site daily.*

Source: Fehr & Peers, 2014.

Expedited Implementation Option

Under the Expedited Implementation Option excavation activities would be accelerated and implementation would occur by the end of 2019, approximately two years less than under the basic project. Because of the accelerated schedule, daily traffic would be incrementally greater than under the basic project, A.M. and P.M. peak hour traffic volumes would be incrementally higher than under the basic project. An average of 118 one-way truck trips, and maximum of 151 one-way truck trips, would travel to the site daily. Trucks would arrive no earlier than 8:00 A.M. and leave no later than 4:00 P.M.

As shown in **Table 5.7-6**, *Expedited Implementation Option Trip Generation Estimates*, the Expedited Implementation Option would generate 790 total daily trips and 94 trips during both the A.M. and P.M. peak hours (compared to 61 under the basic project). Total daily PCE truck trips would be 604 (compared to 478 under the basic project) and A.M. and P.M. peak hour truck trips would be 57 (compared to 38 under the basic project). **Table 5.7-7,** *Existing Plus Expedited Implementation Option – Intersection Levels of Service and Impact Analysis* illustrates service levels that would result under the Expedited Implementation Option. As shown in Table 5.7-7, in accordance with City of Carson's intersection traffic impact significance criteria, even with incrementally greater peak hour traffic under the Expedited Implementation Option, the Expedited Implementation Option would not result in any significant impacts at any of the 14 study intersections.

Table 5.7-5

Existing Plus RP's Proposed Remedy Intersection Levels Of Service And Impact Analysis

No.	Intersection	Peak	Existing	Existing Project	V/C	Significant

		Hour	V/C or Delay	Los	V/C or Delay	LOS	Increase	Impact?
1	I-110 SB Off-Ramp & Sepulveda Boulevard	AM	0.795	C	0.795	C	0.000	No
		PM	0.830	D	0.830	D	0.000	No
2	I-110 NB Off-Ramp & Sepulveda Boulevard	AM	0.717	C	0.717	C	0.000	No
		PM	0.615	B	0.625	C	0.010	No
3	Figueroa St & Sepulveda Boulevard	AM	0.704	C	0.705	C	0.001	No
		PM	0.630	B	0.645	B	0.015	No
4	Main St & Sepulveda Boulevard	AM	0.682	B	0.684	B	0.002	No
		PM	0.751	C	0.782	C	0.031	No
5	Main St & Lomita Boulevard	AM	0.734	C	0.735	C	0.001	No
		PM	0.771	C	0.771	C	0.000	No
6	Neptune Ave & Lomita Boulevard	AM	0.547	A	0.562	A	0.015	No
		PM	0.479	A	0.506	A	0.027	No
7	Lagoon Ave & Lomita Boulevard[a]	AM	0.751	C	0.439	C	0.002	No
		PM	0.662	B	0.428	B	0.012	No
		AM	80.0[b]	F	92.8[b]	F	12.8[b]	N/A
		PM	46.0[b]	E	47.5[b]	E	1.5[b]	N/A
8	Avalon Boulevard & Sepulveda Boulevard	AM	0.684	B	0.684	B	0.000	No
		PM	0.776	C	0.776	C	0.000	No
9	Avalon Boulevard & Lomita Boulevard	AM	0.653	B	0.676	B	0.023	No
		PM	0.641	B	0.645	B	0.004	No
10	Wilmington Ave & I-405 NB Ramps	AM	0.656	B	0.659	B	0.003	No
		PM	0.652	B	0.652	B	0.000	No
11	Wilmington Ave & I-405 SB Ramps	AM	0.720	C	0.722	C	0.002	No
		PM	0.822	D	0.826	D	0.004	No
12	Wilmington Ave & E 223rd St	AM	0.623	B	0.623	B	0.000	No
		PM	0.740	C	0.740	C	0.000	No
13	Wilmington Ave & Sepulveda Boulevard	AM	0.666	B	0.666	B	0.000	No
		PM	0.625	B	0.628	B	0.003	No
14	Wilmington Ave & Lomita Boulevard[a]	AM	0.448	A	0.448	A	0.000	No
		PM	0.422	A	0.427	A	0.005	No
		AM	50.6[b]	F	58.0[b]	F	7.4[b]	N/A
		PM	54.8[b]	F	57.1[b]	F	2.3[b]	N/A

[a] *Unsignalized intersection operating at LOS E or F per the HCM methodology were also analyzed per the ICU methodology to calculate a V/C ratio, as per City of Carson practices.*

[b] *Expressed in "seconds of delay" on the most constrained approach.*

Source: Fehr & Peers, 2014.

Table 5.7-6

Expedited Implementation Option Trip Generation Estimates

	Trip Rate							Trip Estimate						
		AM Peak Hour			PM Peak Hour			Week day	AM Peak Hour Trips			PM Peak Hour		
Trip Number and Source	**Weekday Daily**	**Rate**	**% In**	**% Out**	**Rate**	**% In**	**% Out**	**Daily**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Source and Type														
Delivery Trucks (151)[a]	4.00	0.38	100	0	0.38	0	100	604	57	0	57	0	57	57
Employees (24)-Parking On-Site[b]	6.00	1.00	100	0	1.00	0	100	144	24	0	24	0	16	16
Employees - Parking Off-Site (23)[c]	1.04	0.52	50	50	0.38	50	50	24	6	6	12	6	6	12
Visitors (9)[d]	2.00	0.10	50	50	0.10	50	50	18	1	0	1	0	1	1
Total								**790**	**88**	**6**	**94**	**6**	**88**	**94**

[a] *Trip Generation Rates and Estimates reported in Passenger Car Equivalents (PCE); PCE rate of 1 truck = 2 PCEs.*
[b] *Per Project Description, 24 employees to be parking on-site; trip rate includes trips to various off-site locations not during the peak hour*
[d] *Per Project Description, 23 employees would arrive using vans. 3 RT vans in AM, 3 RT vans in PM. Vans would arrive full/depart empty in AM; arrive empty/depart full in PM.*
[d] *Per Project Description, up to 9 visitors to site daily.*

Source: Fehr and Peers, 2014.

Threshold TRAF-2: The project increases traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C increase of 0.02), causing LOS F (V/C > 1.00) or if the facility is already at LOS F when the project increases traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C increase of 0.02).

Impact Statement TRAF-2*: The RP's Proposed Remedy and Expedited Implementation Option would not exceed threshold standards related to CMP facilities because they do not exceed minimum volumes of peak traffic at any CMP arterial or freeway monitoring stations to warrant analysis under the CMP. In addition, the RP's Proposed Remedy and Expedited Implementation Option would not adversely impact ridership or operation of transit lines in the area. Therefore, impacts related to CMP service levels would be less than significant.*

CMP Roadway Analysis

A project would impact CMP arterial monitoring intersections if it added 50 or more trips during either the A.M. or P.M. weekday peak hours at CMP arterial intersection monitoring locations or if it added 150 or more trips, in either direction, during either the A.M. or P.M. weekday peak hours at CMP freeway monitoring locations. The CMP arterial monitoring intersection nearest to the site is located at Figueroa Street and Sepulveda Boulevard, approximately one mile west of the site. Based on the RP's Proposed Remedy's trip generation described in Table 5.7-4, and distribution of all haul trucks along the proposed haul route within

Table 5-7

Existing Plus Expedited Implementation Option Intersection Levels Of Service And Impact Analysis

No.	Intersection	Peak Hour	Existing V/C or Delay	Existing LOS	Existing Plus Project V/C or Delay	Existing Plus Project LOS	V/C Increase	Significant Impact?
1	I-110 SB Off-Ramp & Sepulveda Boulevard	AM	0.795	C	0.795	C	0.000	No
		PM	0.830	D	0.830	D	0.000	No
2	I-110 NB Off-Ramp & Sepulveda Boulevard	AM	0.717	C	0.718	C	0.001	No
		PM	0.615	B	0.630	C	0.015	No
3	Figueroa St & Sepulveda Boulevard	AM	0.704	C	0.706	C	0.002	No
		PM	0.630	B	0.652	B	0.022	No
4	Main St & Sepulveda Boulevard	AM	0.682	B	0.686	B	0.004	No
		PM	0.751	C	0.798	C	0.047	No
5	Main St & Lomita Boulevard	AM	0.734	C	0.736	C	0.002	No
		PM	0.771	C	0.771	C	0.000	No
6	Neptune Ave & Lomita Boulevard	AM	0.547	A	0.571	A	0.024	No
		PM	0.479	A	0.521	A	0.042	No
7	Lagoon Ave & Lomita Boulevard[a]	AM	0.751	C	0.448	A	0.011	No
		PM	0.662	B	0.433	A	0.017	No
		AM	80.0[b]	F	100.9[b]	F	20.9[b]	N/A
		PM	46.0[b]	E	48.3[b]	E	2.3[b]	N/A
8	Avalon Boulevard & Sepulveda Boulevard	AM	0.684	B	0.684	B	0.000	No
		PM	0.776	C	0.776	C	0.000	No
9	Avalon Boulevard & Lomita Boulevard	AM	0.653	B	0.692	B	0.039	No
		PM	0.641	B	0.647	B	0.006	No
10	Wilmington Ave & I-405 NB Ramps	AM	0.656	B	0.659	B	0.003	No
		PM	0.652	B	0.652	B	0.000	No
11	Wilmington Ave & I-405 SB Ramps	AM	0.720	C	0.723	C	0.003	No
		PM	0.822	D	0.827	D	0.005	No
12	Wilmington Ave & E 223rd St	AM	0.623	B	0.623	B	0.000	No
		PM	0.740	C	0.740	C	0.000	No
13	Wilmington Ave & Sepulveda Boulevard	AM	0.666	B	0.666	B	0.000	No
		PM	0.625	B	0.630	B	0.005	No
14	Wilmington Ave & Lomita Boulevard[a]	AM	0.448	A	0.448	A	0.000	No
		PM	0.422	A	0.429	A	0.007	No
		AM	50.6[b]	F	62.5[b]	F	11.9[b]	N/A
		PM	54.8[b]	F	56.1[b]	F	1.3[b]	N/A

[a] *Unsignalized intersection operating at LOS E or F per the HCM methodology were also analyzed per the ICU methodology to calculate a V/C ratio, as per City of Carson practices.*

[b] *Expressed in "seconds of delay" on the most constrained approach.*

Source: Fehr & Peers, 2014.

the City of Carson, the RP's Proposed Remedy would minimally affect the intersection of Figueroa Street and Sepulveda Boulevard. Therefore, the RP's Proposed Remedy would not add more than 50 vehicles per hour ("vph") at any CMP arterial monitoring location during the A.M. or P.M. weekday peak hours. In addition, the total estimated project-related traffic in any direction during the weekday peak hour is projected to be 61 vph, which is below the minimum criteria of 150 vph at freeway monitoring locations. Because the RP's Proposed Remedy would not meet the minimum trips required for analysis at CMP monitoring locations, it would not exceed CMP guideline criteria. Impacts with respect to CMP monitoring locations would, thus, be less than significant.

CMP Transit

The CMP transit guidelines, which establish standards related to transit ridership, assume 3.5 percent transit use for a work force. Based on the approximately 32 workers a day, including 16 workers who would travel from home to site and the remaining 16 employees who would park at an off-site location and travel to the project site in shuttle vans, it is estimated that the project could add one new transit person trip in both the A.M. and P.M. peak hours. The project site is served by several established public transit routes which provide connectivity to public transit services throughout the surrounding area. Existing transit lines are located on Lomita Boulevard, Main Street, Sepulveda Boulevard, and Avalon Boulevard, which also would serve as the RP's Proposed Remedy's haul route. Although the RP's Proposed Remedy would share common roadways with transit lines, it would not increase traffic in a manner that would cause new congestion or conditions (significant traffic impacts) that would affect operation of these streets. The Carson North-South Shuttle, which is located on the north side of Lomita Boulevard just west of Neptune Boulevard, is the nearest stop to the project site. No construction would occur along Lomita Boulevard or other truck route streets and, thus, no bus stops would be adversely affected by construction activities. Therefore, the RP's Proposed Remedy's traffic and construction activities would not adversely affect the operation of these existing lines. Because of the low estimated ridership generated by the RP's Proposed Remedy and adequacy of the affected roadway system during construction (2015-2021) to serve existing transit, the RP's Proposed Remedy would not adversely affect existing transit facilities. Impacts with respect to CMP transit guidelines would be less than significant.

Expedited Implementation Option

CMP Roadway Analysis

Based on the Expedited Implementation Option's trip generation described in Table 5.7-6, above, and primary distribution of trips along the designated truck route in the City of Carson, the Expedited Implementation Option would minimally affect the nearest CMP arterial monitoring location of Sepulveda Boulevard and Pacific Coast Highway during the A.M. or P.M. weekday peak hours. In addition, the total estimated traffic in any direction during the weekday peak hour under the Expedited Implementation Option is projected to be 94 vph, which is below the minimum criteria of 150 vph at freeway monitoring locations. Because the Expedited Implementation Option would not meet the minimum trips required for analysis at CMP monitoring locations, it would not exceed CMP guideline criteria. Impacts with respect to CMP monitoring locations would, thus, be less than significant.

CMP Transit

The Expedited Implementation Option would generate approximately 47 workers a day, including 24 workers who would travel from home to site and the remaining 23 employees who would park at an off-site

location and travel to the project site in shuttle vans, it is estimated that the project could add one new transit person trip in both the A.M. and P.M. peak hours. Construction activities and traffic would not adversely affect street service levels or bus stops. Because of the low estimated ridership generated by the Expedited Implementation Option and adequacy of the affected roadway system during construction (2015-2019) to serve existing transit, the RP's Proposed Remedy would not adversely affect existing transit facilities. Impacts with respect to CMP transit guidelines under the Expedited Implementation Option would be less than significant.

5. ALTERNATIVES ANALYSIS

Analysis of Impacts Associated with Alternative 1 (No Project)

The No Project Alternative would not involve any excavation or construction activities and, thus, would not result in the generation of additional vehicle trips relative to existing conditions. Impacts related to traffic and circulation would be less than significant.

Analysis of Impacts Associated with Alternative 2 (Excavation Beneath Landscape and Hardscape to 10 Feet Alternative)

Alternative 2 would generate the same hourly and daily traffic as the RP's Proposed Remedy. However, total truck loads would be increased under the RP's Proposed Remedy. Thus, remedial activities that could affect local roadways and sidewalks would occur over a longer time frame (approximately 7.8 years compared to 6 years under the RP's Proposed Remedy or 4 years under the Expedited Implementation Option). As with the RP's Proposed Remedy, impacts on study area intersections would be less than significant.

Analysis of Impacts Associated with Alternative 3 (No Excavation Beneath Hardscape – 5 Feet to Targeted 10 Feet)

Alternative 3 would generate the same hourly and daily traffic as the RP's Proposed Remedy. Because less total material would be removed from the site, remedial activities that could affect local roadways and sidewalks would occur over a shorter time frame (approximately 4 years compared to 6 years under the RP's Proposed Remedy). As with the RP's Proposed Remedy, impacts on study area intersections would be less than significant.

6. CUMULATIVE IMPACTS

Cumulative impacts associated with the RP's Proposed Remedy are based on year 2021 cumulative growth, which includes ambient yearly growth to 2021 and the addition of related projects. The respective trip generation estimates for each of related projects is shown in **Table 5.7-8**, *Related Projects Trip Generation*. The location of related project is illustrated in Figure 4.1, Locations of Related Projects in Chapter 4, *Basis of Cumulative Analysis,* in this EIR.

Table 5.7-9, *Cumulative Year (2021) Plus Project Intersection Levels of Service and Impact Analysis* provides a summary of the cumulative base scenario, which is shown as "Future." This designation does not include traffic generated under the RP's Proposed Remedy. As shown in Table 5.7-9, four of the 14 study

Table 5.7-8

Related Projects Trip Generation

Project	Address	Size	Unit	Use	Trip Generation Daily	AM	PM
1. Kaiser South Bay Hospital Expansion	25825 Vermont Ave, Los Angeles	234.407	ksf	Medical Office	2,971	200	320
		77.5	ksf	Records/office/warehouse			
		286	beds	Hospital			
2. 1311 W Sepulveda Apartments	1311 W Sepulveda Boulevard, Los Angeles	352	units	Apartments	1,434	19	55
		17.904	ksf	Retail			
3. Daycare Facility	25621 S Normandie Ave, Los Angeles	84	child	Daycare	376	67	69
4. Del Lago Apartments	1450 Pacific Coast Highway, Los Angeles	204	units	Apartments	1,357	104	126
5. Carson Marketplace/The Boulevards at South Bay	Del Amo Ave west of I-405, Carson	Mixed Use Development			68,951	2,510	5,761
6. Carson Shell Revitalization	20945 S Wilmington Ave, Carson	10	employee	Office	6,357	408	580
		90	ksf	Industrial/Commercial			
		83	ksf	Community Retail			
7. Ponte Vista Residential Project	26900 S Western Ave, Los Angeles	143	DU	Single Family Residential	7,458	571	699
		600	DU	Condominium			
		392	DU	Apartments			
		2.8	AC	Park			

1. *Traffic Impact Study & Technical Memorandum for the Kaiser Permanente South Bay Medical Center (2006, with amendment 2009), Fehr & Peers/Kaku Associates*
2. *Traffic Impact Study for the 1311 W. Sepulveda Boulevard Project (2009), Linscott, Law & Greenspan, Engineers*
3. *Memorandum of Understanding (MOU) for the 25621 S Normandie Avenue Child Care Facility (2010), Arch Beach Consulting*
4. *Traffic Impact Study for the Proposed Del Lago Apartment Project (2012), Crain & Associates*
5. *Traffic Study for the Carson Marketplace (2005), Kaku Associates*
6. *Traffic Study for the Carson Shell Revitalization (2012, with amendment 2014), Fehr & Peers*
7. *Traffic Impact Study: Ponte Vista at San Pedro (2012), Linscott, Law & Greenspan, Engineers*

Source: Fehr & Peers, 2014.

Table 5.7-9

Cumulative Year (2021) Plus Project Intersection Levels Of Service And Impact Analysis

			Future		Future +Project			
No.	Intersection	Peak Hour	V/C or Delay	LOS	V/C or Delay	LOS	V/C Increase	Significant Impact?
1	I-110 SB Off-Ramp & Sepulveda Boulevard	AM	0.827	D	0.827	D	0.000	No
		PM	0.862	D	0.862	D	0.000	No
2	I-110 NB Off-Ramp & Sepulveda Boulevard	AM	0.735	C	0.735	C	0.000	No
		PM	0.645	B	0.654	B	0.009	No
3	Figueroa St & Sepulveda Boulevard	AM	0.727	C	0.728	C	0.001	No
		PM	0.674	B	0.689	B	0.015	No
4	Main St & Sepulveda Boulevard	AM	0.703	B	0.704	C	0.001	No
		PM	0.813	D	0.843	D	0.030	No
5	Main St & Lomita Boulevard	AM	0.760	C	0.761	C	0.001	No
		PM	0.930	E	0.930	E	0.000	No
6	Neptune Ave & Lomita Boulevard	AM	0.565	A	0.580	A	0.015	No
		PM	0.500	A	0.527	A	0.027	No
7	Lagoon Ave & Lomita Boulevard[a]	AM	0.782	C	0.456	A	0.001	No
		PM	0.693	B	0.445	A	0.011	No
		AM	101.0[b]	F	118.6[b]	F	17.6[b]	N/A
		PM	53.3[b]	F	55.2[b]	F	1.9[b]	N/A
8	Avalon Boulevard & Sepulveda Boulevard	AM	0.751	C	0.751	C	0.000	No
		PM	0.923	E	0.923	E	0.000	No
9	Avalon Boulevard & Lomita Boulevard	AM	0.705	C	0.718	C	0.013	No
		PM	0.744	C	0.749	C	0.005	No
10	Wilmington Ave & I-405 NB Ramps	AM	0.670	B	0.673	B	0.003	No
		PM	0.716	C	0.716	C	0.000	No
11	Wilmington Ave & I-405 SB Ramps	AM	0.493	C	0.497	A	0.004	No
		PM	0.536	D	0.538	B	0.002	No
12	Wilmington Ave &	AM	0.644	B	0.644	B	0.000	No

Table 5.7-9 (Continued)

Cumulative Year (2021) Plus Project Intersection Levels Of Service And Impact Analysis

	E 223rd St	PM	0.765	C	0.765	C	0.000	No
13	Wilmington Ave & Sepulveda Boulevard	AM	0.693	B	0.693	B	0.000	No
		PM	0.659	B	0.663	B	0.004	No
14	Wilmington Ave & Lomita Boulevard[a]	AM	0.474	A	0.474	A	0.000	No
		PM	0.468	A	0.472	A	0.004	No
		AM	68.4[b]	F	78.0[b]	F	9.6[b]	N/A
		PM	77.6[b]	F	80.2[b]	F	2.6[b]	N/A

[a] *Unsignalized intersection operating at LOS E or F per the HCM methodology were also analyzed per the ICU methodology to calculate a V/C ratio, as per City of Carson practices.*
[b] *Expressed in "seconds of delay" on the most constrained approach.*

Source: Fehr & Peers, 2014.

intersections are projected to operate at LOS E during the peak hour. The poor LOS calculated at study intersections No. 7, Lagoon Avenue and Lomita Boulevard and No. 14, Wilmington Avenue and Lomita Boulevard are the result of relatively high levels of delay on the most constrained approach, rather than the volume of vehicles traveling through these stop-controlled intersections.

- Intersection No. 5: Main Street and Lomita Boulevard
- Intersection No. 7. Lagoon Avenue and Lomita Boulevard
- Intersection No. 8. Avalon Boulevard and Lomita Boulevard
- Intersection No. 14. Wilmington Avenue and Lomita Boulevard

As also shown in Table 5.7-9, peak hour traffic generated by the RP's Proposed Remedy is added to the year 2021 base peak hour traffic to create cumulative traffic levels in 2021 ("Future + Project"). Detailed LOS calculations are provided in the Traffic Study, Appendix B, contained in Appendix G of this EIR. The difference between the "Future" and "Future Plus Project" represents the relative increase associated with the RP's Proposed Remedy. The increases illustrated under "V/C" increase under the RP's Proposed Remedy would not exceed City of Carson intersection capacity service thresholds at any of the 14 study intersections. Therefore, cumulative impacts under the RP's Proposed Remedy would be less than significant.

Expedited Implementation Option

Cumulative impacts associated with the Expedited Implementation Option are based on year 2019 cumulative growth, which includes ambient yearly growth to 2019 and the addition of related projects. **Table 5.7-10**, *Cumulative Year (2019) Plus Expedited Implementation Option Intersection Levels of Service and Impact Analysis* provides a summary of the cumulative base scenario, which is shown as "Future." This designation does not include traffic generated under the Expedited Implementation Option. As shown in Table 5.7-9, four of the 14 study intersections are projected to operate at LOS E during the peak hour. The poor LOS calculated at study intersections No. 7, Lagoon Avenue and Lomita Boulevard and No. 14, Wilmington Avenue and Lomita Boulevard, are the result of relatively high levels of delay on the most constrained approach, rather than the volume of vehicles traveling through these stop-controlled intersections.

- Intersection No. 5: Main Street and Lomita Boulevard
- Intersection No. 7. Lagoon Avenue and Lomita Boulevard
- Intersection No. 8. Avalon Boulevard and Lomita Boulevard
- Intersection No. 14. Wilmington Avenue and Lomita Boulevard

Also as shown in Table 5.7-10, peak hour traffic generated by the Expedited Implementation Option is added to the year 2019 base peak hour traffic ("Future + Project"). Detailed LOS calculations are provided in the Traffic Study, Appendix B, contained in Appendix G of this EIR. Vehicle trips associated with the Expedited Implementation Option are compared to the cumulative base intersection conditions to determine impacts. The difference between the "Future" and "Future Plus Project" quantities represents the relative increase associated with the Expedited Implementation Option. The increases illustrated under "V/C" increase under the Expedited Implementation Option would not exceed City of Carson intersection capacity service thresholds at any of the 14 study intersections.

Table 5.7-10

Cumulative Year (2019) Plus Expedited Implementation Option Intersection Levels Of Service And Impact Analysis

			Future		Future +Project			
No.	Intersection	Peak Hour	V/C or Delay	LOS	V/C or Delay	LOS	V/C Increase	Significant Impact?
1	I-110 SB Off-Ramp & Sepulveda Boulevard	AM	0.819	D	0.819	D	0.000	No
		PM	0.854	D	0.854	D	0.000	No
2	I-110 NB Off-Ramp & Sepulveda Boulevard	AM	0.727	C	0.729	C	0.002	No
		PM	0.638	B	0.653	B	0.015	No
3	Figueroa St & Sepulveda Boulevard	AM	0.719	C	0.720	C	0.001	No
		PM	0.668	B	0.690	B	0.022	No
4	Main St & Sepulveda Boulevard	AM	0.697	B	0.701	C	0.004	No
		PM	0.808	D	0.854	D	0.046	No
5	Main St & Lomita Boulevard	AM	0.751	C	0.753	C	0.002	No
		PM	0.922	E	0.922	E	0.000	No
6	Neptune Ave & Lomita Boulevard	AM	0.561	A	0.585	A	0.024	No
		PM	0.494	A	0.536	A	0.042	No
7	Lagoon Ave & Lomita Boulevard[a]	AM	0.451	A	0.458	A	0.007	No
		PM	0.430	A	0.447	A	0.017	No
		AM	95.3[b]	F	121.9[b]	F	26.6[b]	N/A
		PM	51.7[b]	F	54.5[b]	F	2.8[b]	N/A
8	Avalon Boulevard & Sepulveda Boulevard	AM	0.744	C	0.744	C	0.000	No
		PM	0.917	E	0.917	E	0.000	No
9	Avalon Boulevard & Lomita Boulevard	AM	0.698	B	0.718	C	0.020	No
		PM	0.738	C	0.744	C	0.006	No
10	Wilmington Ave & I-405 NB Ramps	AM	0.665	B	0.668	B	0.003	No
		PM	0.709	C	0.709	C	0.000	No
11	Wilmington Ave & I-405 SB Ramps	AM	0.489	A	0.495	A	0.006	No
		PM	0.531	B	0.534	A	0.003	No
12	Wilmington Ave & E 223rd St	AM	0.639	B	0.639	B	0.000	No
		PM	0.758	C	0.758	C	0.000	No
13	Wilmington Ave & Sepulveda Boulevard	AM	0.686	B	0.686	B	0.000	No
		PM	0.654	B	0.659	B	0.005	No
14	Wilmington Ave & Lomita Boulevard[a]	AM	0.469	A	0.469	A	0.000	No
		PM	0.464	A	0.471	A	0.007	No
		AM	65.5[b]	F	79.8[b]	F	13.3	N/A
		PM	74.5[b]	F	78.2[b]	F	3.7[b]	N/A

[a] *Unsignalized intersection operating at LOS E or F under HCM conditions; Analyzed under ICU per City of Carson criteria.*
[b] *Expressed in "seconds of delay" on the most constrained approach.*

Source: Fehr & Peers, September 2014.

Therefore, cumulative impacts under the Expedited Implementation Option would be less than significant. However, under the Expedited Implementation Option, the "Future + Project" and "V/C Increases" are slightly higher because peak hour traffic under this option are incrementally higher than under the RP's Proposed Remedy.

Based on the City of Carson's intersection traffic impact significance criteria, the project would not result in any adverse impacts at any of the 14 study intersections.

7. MITIGATION MEASURES

Impacts associated with intersection capacity, CMP monitored locations and transit would be less than significant under the RP's Proposed Remedy and the Expedited Implementation Option. Alternative 1 would result in no increase in traffic and therefore, no significant impacts would occur. As with the RP's Proposed Remedy, Alternative 2 and Alternative 3 would not result in significant impacts on intersection capacities, CMP roadway and transit service levels. Therefore, no mitigation measures would be required.

8. LEVEL OF SIGNIFICANCE AFTER MITIGATION

No significant impacts would occur under the RP's Proposed Remedy or under the Expedited Implementation Option. In addition, Alternative 1 would not result in any increase in traffic and Alternatives 2 and 3 would have less than significant impacts related to transportation and circulation. Therefore, no mitigation measures would be required and impacts would be less than significant for the Base Case, the Expedited Implementation Option, and Alternatives 1, 2, and 3 with regard to traffic and circulation issues.

5.8 UTILITIES AND SERVICE SYSTEMS (SOLID WASTE)

1. INTRODUCTION

The Utilities and Service Systems section of the Initial Study addresses water, wastewater, stormwater, and solid waste. Given that water, wastewater, and stormwater were determined in the Initial Study to result in no impact or a less than significant impact, this section provides an analysis of solid waste issues. This section addresses potential impacts on existing and planned capacity of permitted landfills and solid waste treatment facilities. The section evaluates whether sufficient capacity is available to accommodate materials removed from the site, including green waste, inert debris, and impacted soil.

2. ENVIRONMENTAL SETTING

Regulatory Framework

State Regulations

Porter-Cologne Water Quality Control Act

California Water Code Section 13172 requires the State Water Resources Control Board to adopt standards and regulations to regulate disposal of wastes to assure protection of water quality. Those regulations are set forth in California Code of Regulations, Title 23, Division 3, Chapter 15 (for hazardous waste), and Title 27, Division 2 (for non-hazardous waste). The regulations include provisions addressing cleanup actions. The regulations provide that wastes, pollutants, or contaminated materials removed from a site being cleaned up at the direction of a public agency must be classified and then disposed of in a location appropriate to its classification.

Assembly Bill 939 - California Integrated Waste Management Act of 1989

The State Legislature passed the California Integrated Waste Management Act of 1989 (AB 939) to improve solid waste disposal management with respect to (1) source reduction, (2) recycling and composting, and (3) environmentally safe transformation and land disposal. AB 939 mandates jurisdictions to meet a diversion goal of 50 percent by 2000 and thereafter.

AB 939 requires that all counties and cities develop a comprehensive solid waste management program that includes a Source Reduction and Recycling Element (SRRE) to address waste characterization, source reduction, recycling, composting, solid waste facility capacity, education and public information, funding, special waste (asbestos, sewage sludge, etc.), and household hazardous waste. It also requires counties to develop a Siting Element that addresses the need for landfill/transformation facilities for 15-year intervals; and it also mandates all cities and counties to prepare and submit Annual Reports that summarize the jurisdictions' progress in reducing solid waste. Oversight of these activities, which was set up under the aegis of the California Integrated Waste Management Board (CIWMB), was transferred to the California Department of Resources Recycling and Recovery (CalRecycle) as of January 1, 2010.

Senate Bill 1374 – Construction and Demolition Waste Materials Diversion Requirements

Senate Bill 1374 was signed into law in 2002 to assist jurisdictions with diverting construction and demolition waste material. California Code of Regulations (CCR) 14, Division 7, Chapter 3, Article 5.9 sets forth minimum standards for construction and demolition debris and inert debris transfer and processing and provides definitions for construction and demolition waste and inert materials. Under this regulation, construction debris and inert debris are defined as specific types of solid waste that present a different potential threat to public health and safety and the environment than typical municipal solid waste, thus, can be handled with different regulatory oversight. "Construction and demolition debris" means source separated or separated for reuse solid waste and recyclable materials, including commingled and separated materials, that result from construction work, that are not hazardous, as defined in CCR, Title 22, Section 66261.3 et seq., and that contain no more than one percent purtrescible wastes by volume calculated on a monthly basis and the putrescible wastes do not constitute a nuisance. Construction and demolition debris includes only the following items:

A) Components of the building or structure that is the subject of the construction work including, but not limited to, lumber and wood, gypsum wallboard, glass, metal, roofing material, tile, carpeting and floor coverings, window coverings, plastic pipe, concrete, fully cured asphalt, heating, ventilating, and air conditioning systems and their components, lighting fixtures, appliances, equipment, furnishings, and fixtures;

B) Tools and building materials consumed or partially consumed in the course of the construction work including material generated at construction trailers, such as blueprints, plans, and other similar wastes;

C) Cardboard and other packaging materials derived from materials installed in or applied to the building or structure or from tools and equipment used in the course of the construction work; and

D) Plant materials resulting from construction work when commingled with dirt, rock, inert debris or construction and demolition debris

As defined under CCR 14, Division 7, "inert debris" means solid waste and recyclable materials that are source separated or separated for reuse, do not contain hazardous waste (as defined in CCR, Title 22, Section 66261.3 et seq.) or soluble pollutants at concentrations in excess of applicable water quality objectives and do not contain significant quantities of decomposable waste. Inert debris may not contain more than one percent putrescible wastes by volume calculated on a monthly basis and the putrescible wastes shall not constitute a nuisance. "Type A inert debris" includes but is not limited to concrete, fully cured asphalt, glass, fiberglass, asphalt or fiberglass roofing shingles, brick, slag, ceramics, plaster, clay and clay products. Type A inert debris is waste that does not contain soluble pollutants at concentrations in excess of water quality objectives and has not been treated in order to reduce pollutants.

As defined under CCR 14, Division 7 "Inert Debris Engineered Fill Operation" means a disposal activity exceeding one year in duration in which fully cured asphalt, uncontaminated concrete, brick, ceramics, clay and clay products, which may be mixed with rock and soil, are spread on land in lifts and compacted under controlled conditions to achieve a uniform and dense mass which is capable of supporting structural loading

as necessary, and having other characteristics appropriate for an end use approved by all governmental agencies having jurisdiction (e.g., roads, building sites, or other improvements) where an engineered fill is required to facilitate productive use of the land. The engineered fill shall be constructed and compacted in accordance with all applicable laws and ordinances and shall be certified by a Civil Engineer, Certified Engineering Geologist, or similar professional licensed by the State of California.

Los Angeles County

Pursuant to AB 939, each County is required to prepare and administer a Countywide Integrated Waste Management Plan (ColWMP), including preparation of an Annual Report. The ColWMP is comprised of the County's and cities' solid waste reduction planning documents plus an Integrated Waste Management Summary Plan (Summary Plan) and a Countywide Siting Element (CSE). The Summary Plan describes the steps to be taken by local agencies, acting independently and in concert, to achieve the mandated state diversion rate by integrating strategies aimed toward reducing, reusing, recycling, diverting, and marketing solid waste generated within the County. The County's Department of Public Works (Public Works) is responsible for preparing and administering the Summary Plan and the CSE. The Summary Plan for the County was approved by CalRecycle on June 23, 1999. The CSE was approved by CalRecycle on June 24, 1998. A revised CSE was completed in 2012. An EIR for this document is expected to be available for public review in 2014, with submission to CalRecycle in 2016.

In addition, as part of its regulatory efforts, the County has prepared a long-term master plan which describes how the County will manage solid waste through the year 2050. The 2050 Plan identifies measures to meet the landfill needs over the time horizon, such as conserving in-County disposal capacity, implementing waste diversion programs, fostering alternatives to landfills, and identifying funding resources to carry out the plan.

City of Carson Solid Waste Management Plan

The City of Carson Solid Waste Management Policy Plan (CiSWMPP), adopted in 1994, established a goal of reaching a 70 percent solid waste diversion rate by 2020. The City and the private sector operating within the City, have developed waste management infrastructure programs and facilities and, through the Bureau of Sanitation and private sector, have implemented a myriad of innovative source reduction, recycling, composting, and reuse programs. Due to the strength of the City's waste management infrastructure and programs, the City achieved a 49 percent waste diversion rate in 1999 and, currently, the Bureau of Sanitation is conducting a waste stream analysis to validate that the City has reached the AB 939 diversion mandate of 50 percent. According to the City, reaching the 70 percent diversion rate would require continued evaluation, planning, and implementation of comprehensive, new, and innovative diversion programs.[1] This waste stream analysis is the tool the City will use to analyze, quantify and identify new opportunities to promote and increase source reduction, reuse, recycling, composting, and other solid waste diversion efforts to reach the 70 percent diversion rate. Interim goals include the following:

1. Maximize waste diversion: All recycling, source reduction, and re-use programs operated by the Bureau of Sanitation and the General Services Department will need to be continued and expanded. The Bureau's Targeted Materials Strategy must be enhanced and new materials added.

[1] *City of Carson, http://www.californiawasteservicies.com/carson.html, accessed May 20, 2014.*

The proposed Waste Hauler Permit Ordinance should be acted upon and its attendant recycling programs developed and implemented.

2. Provide adequate recycling facility development: The Bureau of Sanitation's Solid Waste Resources Infrastructure Strategy Facilities Plan addresses the facilities the Bureau requires to support its current and future solid resources management activities.

3. Provide adequate collection, transfer, and disposal of mixed solid and household hazardous waste: The Bureau of Sanitation will continue its residential curbside waste, household hazardous waste, and small business hazardous waste collection programs.

4. Project and environmentally sound management operation: General Services Department will continue to operate its vehicle maintenance and inspection program. The Bureau will comply with alternative fuel regulations by taking actions including purchasing alternative fuel trucks to replace fleet vehicles as they are retired, and modifying fuel stations and maintenance facilities to accommodate the new vehicles.

5. Provide cost-effective waste management: Maximize diversion at the lowest cost through purchasing power with Recycled Content Procurement and Purchasing Price Preferences Ordinances and Buy Recycled Challenge 2000 and Prima 2000 programs.

6. Sustainable development: All City departments will lend their support and promote implementation of sustainable development policies and guidelines coordinated and developed by the Bureau of Engineering's expanded Citywide Sustainable Development Program and the City Departments' Sustainable Design Task Force.

Existing Conditions

This section describes existing conditions on-site and the local and regional existing solid waste treatment and management facilities that receive or treat impacted solid waste, green waste and inert construction debris.

On-Site Conditions

The approximately 44-acre site is developed with 285 single-family homes. Residential properties are generally landscaped with plantings, walls and fences, and hardscape, such as patios and walkways. Results of environmental investigations show that the site has been impacted with petroleum hydrocarbons and related constituents and non-petroleum related constituents associated with former crude oil storage during the period prior to residential redevelopment. Prior to development, three concrete oil storage reservoirs, with a total capacity of 3.5 million barrels, were located on the property. The reservoirs were partially in-ground and partially aboveground with earthen berms. Petroleum hydrocarbon and related volatile organic compound (VOC) and semi-volatile organic compound (SVOC) constituents occur in shallow and deep soils and VOCs and methane resulting from degradation of petroleum hydrocarbons are present in subsurface soil vapor. Remnants of concrete slabs from the demolished oil storage tanks are also buried on the site.

Waste Treatment Facility

Soil Safe, Adelanto, California

The RP intends to transfer impacted soil to a permitted waste treatment facility. More specifically, the impacted soil would be transported to the Soil Safe facility in Adelanto, which is located approximately 97 miles northeast of the City of Carson. The facility has the largest volume thermal treatment capacity in California. The facility and the Soil Safe thermal desorption process are designed to treat organic soil contaminants. Disposal requirements include composite sampling, with five samples for 1,000 cubic yards (CY) and one additional sample for each additional 500 CY greater than 1,000 CY. Sampling and analysis requirements for sites contaminated by waste oil or some other non-virgin petroleum product or virgin petroleum products from something other than a leaking underground storage tank is as follows:

- Total metals (TTLC test)
- TPH (EPA test 418.1 or 8015 modified)
- BTEX/VOC (EPA test 8020 and 8010 or 8260)
- PCBs (waste oil impacted only)
- Additional data as required

Thermal desorption is a technology that utilizes heat to increase the volatility of contaminants thereby separating the contaminants from the solid matrix (typically soil, sludge or filter cake). Thermal desorption is not incineration, and it is frequently referred to as "low temp" thermal desorption to differentiate it from high temperature incineration. The volatilized contaminants are then either collected or thermally destroyed. A thermal desorption system has two major components; the desorber and the off-gas treatment.

Direct fired rotary desorbers have been used extensively over the years for petroleum contaminated soils and soils contaminated with Resource Conservation and Recovery Act (RCRA) hazardous wastes as defined by the USEPA. The majority of these systems use a secondary combustion chamber (afterburner) or catalytic oxidizer to thermally destroy the volatilized organics. The maximum practical solids temperature for these systems is approximately 750 to 900°F depending on the material of construction of the cylinder. Total residence time in this type of desorber normally ranges from 3 to 15 minutes. Treatment capacity at the Soil Safe, Adelanto, facility is approximately 1,480 tons or 1,096 CY per day. The weekly treatment capacity, assuming a 5-day week, would be 5,480 CY.

In addition, the Adelanto facility has an approximately 37,500-squarefoot warehouse that provides storage for soils, if needed, prior to treatment. The warehouse serves to eliminate rainwater contact and run-off. In addition, the warehouse has a floor construction system composed of two geosynthetic liners and a one–foot-thick concrete and a leachate collection system with built in monitors for identifying any potential subsurface leaks, a custom engineered thermal unit to remove and destroy organic contaminants with minimal impact on greenhouse gas emissions. Storage capacity is approximately 30,000 tons or approximately 22,222 CY.

Solid Waste Management Facilities

Green Waste Management

The RP intends to transfer green waste to a permitted waste treatment facility, specifically the Carson Transfer Station and Materials Recovery Management, Inc. facility located at 321 Francisco Street. This transfer station, which operates in a partnership between Waste Management, Inc. and the City of Carson, has the capacity to process approximately 333 tons or approximately 247 CY of green waste per day. Green waste consists of cuttings, shrubs, brushes, tree trimmings, and wood waste such as branches and stumps, which can be chipped, composted, or used as daily cover at landfills. Green waste may also be used at landfill sites as alternative daily cover to reduce the use of virgin soil covers. From the Carson Transfer Station, green waste is transferred to one of the County's several composting sites. In Los Angeles County, grinding and composting facilities have the capacity to process approximately 3,783 tons or 2,802 CY of green waste per day.[2]

Inert Debris Management

Inert waste, such as the hardscape removed from residential properties, is waste that is neither chemically nor biologically reactive and will not decompose. Over the last decade the County has encouraged waste diversion and recycling activities at landfills through Waste Plan Conformance Agreements. These agreements, which require a landfill operator to implement specific waste diversion and recycling programs to assist jurisdictions in achieving the mandates of AB 939, may include programs and activities such as salvaging demolition and construction wastes for road construction, erosion control, and other uses. Active landfills that have Waste Conformance Agreements with the County include Chiquita Canyon, Lancaster, and Sunshine Canyon City/County Landfills. The Azusa Land Reclamation Landfill is the County's one permitted Inert Waste Landfill. As of 2011, the remaining capacity of this landfill is estimated at 64.2 million tons or 53.5 million cubic yards. Azusa has an average daily disposal rate of 300 CY and a maximum permitted daily capacity of 5,462 CY.[3] Given the remaining permitted capacity and at the average disposal rate of 357 tons per day in 2011, this capacity would be exhausted in 576 years.[4]

Several Inert Debris Engineered Fill Operation (IDEFO) facilities also operate under State permit provisions throughout Los Angeles County. An IDEFO means an activity that compacts inert debris under controlled conditions to achieve a uniform and dense mass capable of supporting structural loading. End uses include roads, building sites, or other improvements where an engineered fill is required to facilitate productive use of the land.[5] State-permitted IDEFOs in Los Angeles County include the following:

- Atkinson Brick Company
- Chandler's Palos Verdes Sand & Gravel
- Nu-Way Arrow
- Peck Road Gravel Pit

[2] *Los Angeles County Department of Public Works, Green Waste Management Resources, Guide for Los Angeles County Residents and Businesses, April 24, 2013, page 5.*

[3] *Los Angeles County Department of Public Works, 2011 Annual Report, Los Angeles County Countywide Integrated Waste Management Plan, page 48 August 2012.*

[4] *Los Angeles County Department of Public Works, 2011 Annual Report, Los Angeles County Countywide Integrated Waste Management Plan, page 26, August 2012.*

[5] *CCR Title 14, Division 7, Chapter 3, Article 5.95, Section 17388(l).*

- Durbin Inert Debris Engineered Fill Site
- Hanson Aggregates (Livingston-Graham)
- Lower Azusa Reclamation Project
- Montebello Land & Water Company
- Reliance Landfill
- Sun Valley Landfill
- United Rock

CalRecycle reclassified Nu-Way Arrow Reclamation, Inc., Nu-Way Live Oak Reclamation, Inc. and Calmat Reliance Pit #2, and Peck Gravel Road Pit to an IDEFO in 2006. These facilities and other IDEFO handled approximately 1.86 million CY in 2011, with a maximum daily Solid Waste Facility Permit (SWFP) capacity of 24,129 CY.[6] The average daily disposal in 2011 was approximately 6,112 CY, which indicates an excess maximum daily disposal capacity of approximately 18,017 CY.[7]

3. METHODOLOGY AND THRESHOLDS

Methodology

The analysis of impacts related to disposal of materials removed from the site is based on the evaluation of existing treatment and recycling facilities' capacity to accommodate the demand of the RP's Proposed Project and other alternatives. Because the RAP entails the excavation and disposal of impacted soils as well as green waste, construction waste, and inert debris, the analysis describes the amount of waste that would be generated by implementation of the RAP and whether sufficient landfill or treatment capacity is available to receive the generated waste. The amount of waste is determined by multiplying the estimated soil, hardscape, and green waste removed per single-family lot and estimating the maximum daily export of these materials.

Thresholds of Significance

Appendix G of the CEQA Guidelines provides a set of screening questions that address impacts with regard to solid waste. These questions are as follows:

Would the project:

a) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs; and

b) Comply with federal, state, and local statutes and regulations related to solid waste.

As determined in the Initial Study, which is contained in Appendix A of this EIR, the project would comply with federal, state, and local statutes and regulations related to solid waste transport and disposal. As such, no further analysis of this topic is necessary.

[6] *Los Angeles County Department of Public Works, 2011 Annual Report, Los Angeles County Countywide Integrated Waste Management Plan, Appendix E-2, Table 2, August 2012.*

[7] *Ibid.*

For purposes of this analysis, the project would have a significant impact on solid waste if:

SW-1 The project generates solid waste in excess of the permitted capacity of the disposal facilities serving the project.

4. PROJECT ANALYSIS

Project Design Features

Under the RP's Proposed Remedy, soils would be excavated from residential properties where results of the previous site assessments indicate that RAOs and the more stringent of the health risk-based or leaching to groundwater criteria are not met under existing conditions. Soils would be excavated to a depth of 5 feet below existing grade with targeted excavation to 10 feet below existing grade at some properties from both landscaped areas and areas currently covered by hardscape, including walkways, driveways, patio areas, and hardscape associated with landscaping Table 2-2, *Volumes of Material by Activity*, in Chapter 2, Project Description, provides a summary of the quantities of materials anticipated to be removed during remediation activities. During the preparation of the Property-Specific Remediation Plans (PSRPs), the specific excavation areas for each property would be identified. In some cases, the volume of soil to be excavated for a property would be less than the average value.

Excavated soils would be loaded directly into an awaiting transport vehicle (i.e., end-dump truck, dump truck, or covered soil bin) using an excavator, front-end loader or skid-steer mini-loader. To the extent possible, impacted soil would be direct loaded into approved waste containers using the excavator for transport to the appropriate recycling, treatment, or disposal facility. Loaded trucks would be covered with tarps prior to leaving the site. In the unlikely event that it is necessary to temporarily stockpile soil onsite the soils would be placed on plastic sheeting and covered with plastic, or would be temporarily placed in a covered bin. Care would be taken to ensure that all loose soil would be brushed off the transporter and properly managed prior to covering with a tarp.[8] Vehicles would be decontaminated before leaving the site. Impacted soils would be transported to Soil Safe's Thermal Desorption facility located in Adelanto, California or a closer equivalent treatment/disposal facility subject to regulations subject waste tracking manifests. During transportation, the excavated soils would be properly containerized and secured to ensure that the any solid waste or hazardous materials would not be accessible by the general public.

In addition to the excavated soils, other materials consisting of construction and demolition debris and inert debris, such as fencing material, residual concrete, and cured asphalt would be removed as part of the excavation process, where necessary. Construction and demolition debris and inert debris would generate a maximum daily export as shown in Table 2-2 in Chapter 2 of this EIR. Inert concrete and asphalt debris would be processed at Dan Copp Crushing in Santa Fe Springs, where it would be crushed and recycled for roadbed. Lesser quantities ofinert materials, such as demolished fencing, would be disposed at a state-permitted IDEFO or the Azusa Land Reclamation Landfill, which receive construction and demolition debris and inert debris for re-use.

It is anticipated that an average of approximately one truck load of green waste would be removed from each property (see Table 2-2 in Chapter 2 of this EIR for volumes). Green waste would likely be loaded into roll

[8] *The purpose of covering materials with a tarp is to manage exposed impacted soil from spreading on the site, to prevent discharge to storm drains or other drainage areas, and to prevent any unacceptable emissions of dust or VOCs.*

off bins provided by the City of Carson's contracted/franchise waste company or placed in bins provided by the contractor and hauled to an appropriate facility.

Analysis of Project Impacts

Threshold SW-1: The project would have a significant impact on solid waste if it generates solid waste in excess of the permitted capacity of the disposal facilities serving the project.

Impact Statement SW-1: *Excavated soils would be treated to remove COCs and re-used; construction waste and inert debris would be recycled through a permitted IDEFO or similar recycling process; and green waste would be mulched and re-used. Adequate treatment and re-use and recycling capacities exist to accommodate maximum daily waste exports under the project and the Expedited Implementation Option. Because waste generated by ground clearing and excavation would be diverted from landfills, the RP's Proposed Remedy and the Expedited Implementation Option would have a less than significant impact with respect to the permitted capacity of disposal facilities.*

The RP's Proposed Remedy would result in excavated soil transported off site for treatment. The maximum generation rate of waste soil export would be approximately 293 CY per day under the base remedy. Because impacted soils are COC-containing, they would require treatment or disposal by an appropriate approved facility. These materials would not be accepted at Class III landfills, which are intended for municipal wastes. It is anticipated that excavated soils would be treated (cleaned) at the Soil Safe facility in Adelanto, California or similar facility. As described above, this facility has a daily treatment capacity of approximately 1,096 CY and a weekly capacity of approximately 5,480 CY. The anticipated demand (293 CY per day) would not exceed the Adelanto facility's treatment capacity of 1,096 CY per day. Because the soils would be decontaminated and available for re-use, excavated soils would not require disposal at a solid waste facility. Therefore, impacts on the permitted capacity of disposal facilities with respect to impacted soils would be less than significant.

The RP's Proposed Remedy would remove demolition waste, ,such as fencing, concrete, and cured asphalt, which are considered construction and demolition debris or inert debris. The total generation of demolition debris would be 9,855 CY (219 properties x 45 CY). The maximum daily generation of construction and demolition debris or inert debris would be approximately 56 CY. The majority of inert waste would be concrete and asphalt debris, which would be processed at the Dan Copp crushing facility. The resulting materials would be re-used in roadbed and, thus, diverted from landfills. The daily processing capacity of the Copp facility is approximately 1,300 CY.[9] The project's maximum daily output of insert waste would be 56 CY, which would not exceed the daily capacity of the processing facility. A lesser amount of construction debris, such as fencing would also be generated. Because the quantity of other inert construction debris would be minor, and would not exceed 56 CY per day, it would be miniscule compared to available capacity for inert materials in the County. For instance, the Azusa Land Reclamation Landfill has an average daily disposal rate of 300 CY and a maximum permitted daily capacity of 5,462 CY.[10] The Countywide Waste Management Plan Annual Report estimates that, at the average disposal rate of 300 CY per day, the remaining capacity of the Azusa Land Reclamation Landfill of 53,512,000 CY would be exhausted in 576

[9] *Telephone interview with dispatcher at the Dan Copp Corporate Headquarters, Yorba Linda, CA, October 24, 2014. The dispatcher stated that the Santa Fe Springs facility has the capacity to process over 2,000 tons per day (approximately 1,333 CY).*

[10] *Los Angeles County Department of Public Works, 2011 Annual Report, Los Angeles County Countywide Integrated Waste Management Plan, page 48, August 2012.*

years.[11] Because of the available remaining capacity at County facilities, the estimated volume of inert waste from the RP's Proposed Remedy would not exceed the County's permitted daily or long-term capacity to receive inert waste at any landfill site. Inert waste could also be processed at IDEFOs, which handle approximately 212 CY of inert debris per day. Because inert debris generated by the implementation of the RAP would not require disposal at a solid waste facility, impacts on the permitted capacity of disposal facilities with respect to construction and demolition debris and inert debris would be less than significant.

The implementation of the RAP would generate green waste (landscaping plants, sod, etc.) with a maximum generation of approximately 60 CY per day. Green waste would be delivered to the Carson Transfer Station and Materials Recovery Management facility in the City of Carson, which has the capacity to manage approximately 247 CY per day. These materials are then transferred to a composting site. In Los Angeles County, grinding and composting facilities have the capacity to process approximately 3,783 tons or 2,802 CY of green waste per day.

The maximum generated green waste would not exceed the daily capacity of the facility to manage green waste. In addition, green waste would most likely be re-used as composting material (although other re-uses are possible) and would not require disposal at a solid waste facility. Therefore, impacts on the permitted capacity of disposal facilities with respect to green waste would be less than significant.

Remediation activities would also generate relatively small amounts of daily waste associated with recyclable and non-recyclable packaging materials from piping and construction supplies, debris from the restoration process (e.g., plant containers, pallets), employee lunches and other minor sources. Cardboards, recyclable plastics, metals, and glass would be placed in bins and disposed of as recyclable materials. Contractors would be responsible to arrange for appropriate trash removal from the site. Materials would be recycled to the extent feasible. Residential properties would not be occupied during remediation and, as such, the general (recyclable and non-recyclable) household waste stream would be eliminated at the remediation sites. Because of the minor volume of non-recyclable materials and short-term, approximately six-yearremediation activity, non-recyclable materials from the site are not anticipated to exceed the permitted capacity of Los Angeles County landfills. Therefore, these materials generated by the RP's Proposed Remedy would have a less than significant impact on landfill capacity.

Expedited Implementation Option

Under the Expedited Implementation Option, the number of properties being remediated at one time could increase. The expedited schedule would result in a higher daily rate of disposal demand because more clearing and excavation would occur concurrently; however total soil and ground-related wastes would remain the same at approximately 186,090 CY. Total hardscape debris and green waste would also be the same. However, because demolition and excavation would be expedited at twice the daily activity as the base remedy, the maximum daily export of cleared debris (green waste) is expected to increase to approximately 120 CY. Maximum daily export of inert hardscape (inert) waste is anticipated to be approximately 112 CY, and maximum daily export of excavated impacted soils is expected to be 586 CY. As described, above, the Soil Safe facility in Adelanto, California has a daily treatment capacity of approximately 1,096 CY and a weekly capacity of approximately 5,480 CY. Inert concrete and asphalt waste (up to 112 CY per day) would not exceed the capacity of the Copp facility, which can process approximately 1,300 CY per

[11] *Los Angeles County Department of Public Works, 2011 Annual Report, Los Angeles County Countywide Integrated Waste Management Plan, pages 26 and 48, August 2012.*

day.[12] A lesser amount of construction debris, such as fencing would also be generated. The quantity of these inert construction debris items would be minor, would not exceed 56 CY per day, and would be miniscule compared to the County's capacity to receive these inert materials. The anticipated demand of 586 CY of soil per day would not exceed the Adelanto facility's treatment capacity of 1,096 CY per day. State-permitted IDEFO facilities in Los Angeles County handle approximately 212 CY of inert debris per day. Waste generated by the removal of inert materials under the Expedited Implementation Option would not exceed the capacity of the available facilities. Green waste would be delivered to the Carson Transfer Station and Materials Recovery Management facility in the City of Carson, which has the capacity to manage approximately 247 CY per day. As such, the daily demand for green waste disposal would not exceed the capacity of existing waste management facilities. As with the RP's Proposed Remedy, debris generated under the Expedited Implementation Option would not require disposal at a solid waste facility and impacts on the permitted capacity of disposal facilities with respect to construction and demolition debris and inert debris would be less than significant.

5. ALTERNATIVES ANALYSIS

Analysis of Impacts Associated with Alternative 1 (No Project Alternative)

The No Project Alternative would not involve any removal of hardscape, excavation of soils or change to existing ground conditions that would require disposal of materials at any facilities. Therefore, the No Project Alternative would avoid any effects on the daily or overall capacity of existing facilities. Although the No Project Alternative would avoid the RAP's less than significant effects on disposal capacity, this Alternative would not meet the statutory requirements of the RAP.

Analysis of Impacts Associated with Alternative 2 (Excavation Beneath Landscape and Hardscape to 10 Feet Alternative)

Alternative 2 would involve excavation of soils to a depth of 10 feet at all properties requiring excavation. This Alternative would entail, on average, excavation of 1,222 CY of soil per property, for a total of approximately 294,600 CY of COC-containing soils. The maximum generation rate would be approximately 293 CY per day. Because these soils are COC-containing, they would require treatment or disposal by an appropriate approved facility, and it is anticipated that excavated soils would be treated (cleaned) at the Soil Safe facility in Adelanto, California or similar facility. As described above, this facility has a daily treatment capacity of approximately 1,096 CY and a weekly capacity of approximately 5,480 CY. The anticipated demand (293 CY per day) would not exceed the Adelanto facility's treatment capacity of 1,096 CY per day. Because the soils would be decontaminated and available for re-use, excavated soils would not require disposal at a solid waste facility. Therefore, Alternative 2 would not exceed the capacity of disposal facilities with respect to impacted soils.

Alternative 2 would remove approximately 10,845 CY (45 CY x 241 properties) of hardscape materials, such as fencing, concrete, and cured asphalt, which are considered construction and demolition debris or inert debris. The maximum daily generation of construction and demolition debris or inert debris would be approximately 56 CY. Inert concrete and asphalt waste would not exceed the capacity of the Copp facility,

[12] *Telephone interview with dispatcher at the Dan Copp Corporate Headquarters, Yorba Linda, CA, October 24, 2014. The dispatcher stated that the Santa Fe Springs facility has the capacity to process over 2,000 tons per day (approximately 1,333 CY).*

which can process approximately 1,300 CY per day.[13] A lesser amount of construction debris, such as fencing would also be generated. The volume of other inert construction debris items (such as fencing) would be minor, would not exceed 56 CY per day, and would be miniscule compared to the County's capacity to receive these inert materials. Inert debris can be managed at the Azusa Land Reclamation Landfill or an IDEFO. As an example of capacity, the Azusa Landfill has an average daily disposal rate of 300 CY and a maximum permitted daily capacity of 5,462 CY.[14] Inert waste could also be processed at IDEFOs, which handle approximately 212 CY of inert debris per day. The estimated volume of inert waste from Alternative 2 would not exceed the permitted capacity of Los Angeles County's existing permitted Inert Debris Engineered Fill Operations or the Azusa Land Reclamation Landfill. Because the inert debris generated by Alternative 2 would not require disposal at a solid waste facility, impacts on the permitted capacity of disposal facilities with respect to construction and demolition debris and inert debris would be less than significant.

The implementation of Alternative 2 would generate a total of approximately 3,374 CY of green waste (14 CY X 241 properties), with a maximum generation of approximately 60 CY per day. Green waste would be delivered to the Carson Transfer Station and Materials Recovery Management facility in the City of Carson, which has the capacity to manage approximately 247 CY per day. These materials are then transferred to a composting site. In Los Angeles County, grinding and composting facilities have the capacity to process approximately 3,783 tons or 2,802 CY of green waste per day. The maximum generated green waste would not exceed the daily capacity of the Carson facility or County facilities to manage green waste. Therefore, impacts on the permitted capacity of disposal facilities with respect to green waste would be less than significant.

Remediation activities would also generate relatively small amounts of daily waste associated with recyclable and non-recyclable packaging materials from piping and construction supplies, debris from the restoration process (e.g., plant containers, pallets), employee lunches and other minor sources. Cardboards, recyclable plastics, metals, and glass would be placed in bins and disposed of as recyclable materials. As with the RP's Proposed Remedy, the contractor would be responsible to arrange for appropriate trash removal. Materials would be recycled to the extent feasible. Because of the minor volume that would be generated, non-recyclable materials from the site are not anticipated to exceed the permitted capacity of Los Angeles County landfills. Therefore, Alternative 2 would have a less than significant impact on landfill capacity.

Analysis of Impacts Associated with Alternative 3 (No Excavation Beneath Hardscape – 5 Foot and Targeted 10 Foot Alternative)

Alternative 3 would involve excavation of soils to a depth of 10 feet at 219 properties. This Alternative would entail a total of approximately 83,930 CY of COC-containing soils. The maximum generation rate would be approximately 293 CY per day. As with the RP's Proposed Remedy, excavated soils would be treated (cleaned) at the Soil Safe facility in Adelanto, California or similar facility. As described above, this facility has a daily treatment capacity of approximately 1,096 CY and a weekly capacity of approximately 5,480 CY. The anticipated demand (293 CY per day) would not exceed the Adelanto facility's treatment capacity of 1,096 CY per day. Because the soils would be decontaminated and available for re-use, excavated

[13] *Telephone interviewer with dispatcher at the Dan Copp Corporate Headquarters, Yorba Linda, CA, October 24, 2014. The dispatcher stated that the Santa Fe Springs facility has the capacity to process over 2,000 tons per day (approximately 1,333 CY).*

[14] *The Countywide Waste Management Plan Annual Report estimates that, at the average disposal rate of 300 CY per day, the remaining capacity of the Azusa Land Reclamation Landfill of 53,512,000 CY would be exhausted in 576 years.*

soils would not require disposal at a solid waste facility. Therefore, Alternative 3 would not exceed the capacity of disposal facilities with respect to impacted soils.

With minor exceptions, such as some at-grade fencing materials, Alternative 3 would not remove hardscape materials. Thus, Alternative 3 would avoid the need for the disposal of approximately 9,855 CY (219 x 45 CY) of inert hardscape materials that would occur under the RP's Proposed Remedy. Therefore, Alternative 3 would have minimal effects on the Azusa Land Reclamation Landfill, which receives inert waste, or IDEFOs, which process inert waste.

The implementation of Alternative 3 would generate a total of approximately 3,066 CY of green waste (14 CY x 219 properties), with a maximum generation of approximately 60 CY per day. Green waste would be delivered to the Carson Transfer Station and Materials Recovery Management facility in the City of Carson, which has the capacity to manage approximately 247 CY per day. These materials are then transferred to a composting site. In Los Angeles County, grinding and composting facilities have the capacity to process approximately 3,783 tons or 2,802 CY of green waste per day. The maximum generated green waste would not exceed the daily capacity of the Carson facility or County facilities to manage green waste. Therefore, impacts on the permitted capacity of disposal facilities with respect to green waste would be less than significant.

Remediation activities would also generate relatively small amounts of daily waste associated with recyclable and non-recyclable packaging materials from piping and construction supplies, debris from the restoration process (e.g., plant containers, pallets), employee lunches and other minor sources. Cardboards, recyclable plastics, metals, and glass would be placed in bins and disposed of as recyclable materials. Because of the minor volume, non-recyclable materials from the site are not anticipated to exceed the permitted capacity of Los Angeles County landfills. Therefore, Alternative 3 would have a less than significant impact on landfill capacity.

6. CUMULATIVE IMPACTS

Seven related projects have been identified in the project study area. These development projects include the expansion of the Kaiser South Bay Hospital; the 676-unit Ponte Vista Mixed Use Residential development; the 204-unit Del Lago Apartments; the 352-unit 1311 Sepulveda Apartments; the Carson Shell Revitalization industrial/commercial complex; Carson Marketplace and The Boulevards at South Bay mixed-use project; and a day care facility. Excavations for pilings, basements, building pads, and other foundation features for residential and related uses are anticipated. With the exception of the Carson Shell Revitalization Project, any excavated soils that would not be balanced on site (exported) would likely be disposed of at inert facilities or used as fill at other building sites.

The Carson Shell Revitalization Project involves the re-use or expansion of the approximately 448-acre existing Carson Distribution Facility, approximately 155 acres of which is occupied by storage tanks and service facilities. The Revitalization Project is expected to occur over an approximately five-to-seven year period. Redevelopment would require the removal or relocation of certain pipes, pumps, storage tanks, and control facilities. It is anticipated that many of these facilities would be cleaned and disposed of at landfills that accept inert debris or, if not cleaned, disposed of at Class I landfills that accept potentially hazardous debris. Because the RP's Proposed Remedy does not anticipate the use of Class I landfills, no cumulative impacts with respect to Class I facilities is anticipated. The Shell Revitalization Project site is currently undergoing remediation (CAO 97-120), which involves excavations of tar and soil and the on- or off-site

management of excavated soil.[15] Off-site treatment of soils would be similar to that of the RP's Proposed Remedy, which involves cleaning at the Soil Safe facility in Adelanto, California or a similar facility. As described above, this facility has a daily treatment capacity of approximately 1,096 CY and a weekly capacity of approximately 5,480 CY. With handling constraints (i.e., the amount of cubic yardage that could reasonably be extracted and shipped daily from the Revitalization Site); the phased time period of this alternative, which would occur over several years; and the excess capacity of 803 CY per day of the Adelanto facility (1,096 CY minus the project's 293 CY), it is expected that demand for treatment of the combined Shell Revitalization Project and the RP's Proposed Remedy would not exceed the capacity of the Adelanto facility.

Demolition and construction activities at other related projects (i.e., the Ponte Vista Project) would involve the removal or relocation of existing residential and commercial uses. The ensuing demolition debris would be categorized as inert materials and eligible for disposal at the County's inert waste facilities. The existing capacity of the County's inert waste management facilities includes the Azusa Land Reclamation Landfill, which has a remaining capacity of 53,512,000 CY and, at existing average daily disposal rate, is not expected to be exhausted for approximately 576 years. The inert debris from cumulative construction debris is not expected to exceed the County's permitted daily or long-term capacity to receive inert waste. Other waste associated with construction activities would be a combination of inert construction waste and non-recyclable debris from certain packaging materials, employee lunches, and other minor debris.

The long-term occupation of new residential units and commercial uses would also generate waste and create demand for solid waste disposal. These projects, in combination with the RP's Proposed Remedy, would contribute to the overall cumulative demand for landfill disposal. However, as discussed above, the RP's Proposed Remedy, which would generate demand for inert facilities, recycling of green waste, and treatment of soils, would have a very minor effect on municipal landfills. The County has a currently available capacity in municipal landfills of 129 million tons (in 2017) and an available capacity of approximately 78.7 million tons of capacity to serve cumulative development.[16] The 2012 daily disposal rate in the County landfills was 19,997 tons per day versus a maximum daily capacity of 41,749 tons per day, resulting in an additional daily capacity of 21,752 tons per day.[17] In addition, according to the Countywide Integrated Waste Management Plan 2011 Annual Report (published in August 2012), future disposal needs to 2027 which anticipates regional growth throughout the County, would be adequately met through the use of in-County and out-of-County facilities through a number of strategies that would carried out over the years.[18] Therefore, it is anticipated that the solid waste demand of related projects in combination with the RP's Proposed Alternative would not exceed the capacity of disposal facilities and would not be cumulatively significant.

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[15] *City of Carson, Carson Revitalization Project Specific Plan EIR (SCH No. 2010101015), February 2014, pages 3-25 to 3-26.*

[16] *Los Angeles County Department of Public Works, Los Angeles County Integrated Waste Management Plan, 2011 Annual Report, August 2012, Page 18.*

[17] Ibid.

[18] *Los Angeles County Department of Public Works, Los Angeles County Integrated Waste Management Plan, 2012 Annual Report, August 2013, Page 31.*

7. MITIGATION MEASURES

The RP's Proposed Remedy as well as Alternative 1, Alternative 2, and Alternative 3 would result in less than significant impacts with regard to solid waste management. Therefore, no mitigation measures are required.

8. LEVEL OF SIGNIFICANCE AFTER MITIGATION

With the implementation of the project design features, the RP's Proposed Remedy would result in less than significant impacts with regard to solid waste management.

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6. Comparison of Alternatives

6.0 COMPARISON OF ALTERNATIVES

INTRODUCTION

This chapter provides a summary comparison of the RP's Proposed Remedy (base remedy) with the Expedited Implementation Option and a comparison of the RP's Proposed Remedy with the three alternatives. Under the *CEQA Guidelines*, the identification and analysis of alternatives is a fundamental part of the environmental review process. As discussed in Section 3.1, *Development of Alternatives to the RP's Proposed Remedy*, of this EIR, the Regional Board considered of a range of alternatives based on information from the pilot tests conducted at the site, information contained in the Feasibility Study Report (FS), and independent review of the FS and Human Health Risk Assessment by the State Office of Environmental Health Hazard Assessment (OEHHA) and the University of California Los Angeles (UCLA) Expert Panel, respectively. Selected Alternatives include (1) Alternative 1: No Project Alternative, (2) Alternative 2: Excavation Beneath Landscape and Hardscape to 10 Feet Alternative and (3) No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative. These alternatives are described in Chapter 3 of this EIR.

In addition to providing a summary comparison of alternatives, this chapter contains an environmentally superior comparison of the alternatives with the RP's Proposed Remedy. *CEQA Guidelines* Section 15126.6(e)(2) states that "If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives." The environmentally superior alternative is typically the alternative that meets the overall project goals and objectives and can avoid or substantially lessen one or more of the significant effects of a project when compared to other project alternatives, including the No Project Alternative.

1. OBJECTIVES OF THE PROPOSED PROJECT

Section 15124(b) of the *CEQA Guidelines* states that the Project Description shall contain "a statement of the objectives sought by the proposed project." The underlying purpose of the proposed RAP is to remediate the site consistent with the Regional Board's CAO R4-2011-0046 dated March 11, 2011, as amended, and applicable laws and policies. In accordance with the provisions of the CAO and as required by Section 15124(b) of the CEQA Guidelines, the following are the objectives for the proposed RAP:

1. Implement a RAP that complies with the CAO and meets the media-specific (i.e. soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) developed for the site. (See Table 6-2 for a list of the RAOs for the site.)
2. Maintain the residential land use of the site and avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community.
3. Minimize short-term disruption to residents.
4. Allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils (i.e., landscaping, hardscape, gardening, etc.) on their properties.
5. Limit or minimize environmental impacts associated with the cleanup activities.

2. SUMMARY COMPARISON

Table 6-1, Summary of *Comparison of Impacts Associated with the Option and the Alternatives Relative to Impacts of the Project*, provides a comparative summary of the environmental impacts anticipated under each Alternative to the environmental impacts associated with the project. Pursuant to Section 15126.6(c) of the CEQA Guidelines, the analysis below addresses the ability of the Alternatives to "avoid or substantially lessen one or more of the significant effects" of the project.

As shown in Table 6-1, most environmental impacts from the RP's Proposed Remedy would be less than significant, as determined in the analyses in Chapter 5, Environmental Impact Analysis, of this EIR. However, impacts generated by the Expedited Implementation Option, and the three Alternatives (the No Project Alternative, Excavate Beneath Landscape and Hardscape to 10 Feet Alternative, and No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative) have the potential to be incrementally greater, less, or the same as under the base remedy with respect to a particular threshold. The comparative differences between the Expedited Implementation Option and the three alternatives are indicated as in Table 6-1. Potentially significant environmental effects for the RP's Proposed Remedy and the three alternatives are discussed below. In addition, a discussion regarding the ability of the alternatives to meet the project objectives is provided. Table 6-2, Summary Comparison of the Project's and Alternatives' Ability to Meet Project Objectives, summarizes the comparison.

RP's Proposed Remedy – Expedited Implementation Option

The RP's Proposed Remedy includes an Expedited Implementation Option that is described in Chapter 3 and evaluated throughout Chapter 5 of this EIR. The Expedited Implementation Option would result in more activity at the site as two clusters would be remediated simultaneously. While not an alternative to the project, a comparison of impacts of the Option relative to the project is provided below and in Table 6-1.

As with the base remedy, the Expedited Implementation Option would meet all the project objectives listed above.

Air Quality

The Expedited Implementation Option would involve approximately twice the daily activity of the RP's Proposed Remedy and, therefore, would generate approximately twice the remediation-related emissions associated with the base remedy during peak periods. Although incrementally greater than under the base remedy, peak emissions would not exceed threshold levels and would be less than significant. Although the Expedited Implementation Option would increase daily emissions, the duration of remediation activities would approximately 4 years compared to approximately 6 years under the RP's Proposed Remedy.

Geology and Soils

The total amount of excavated soils would be the same as under the RP's Proposed Remedy; however, excavation activity occurring concurrently would increase peak activity and soils and grading management. As such, the peak potential exposure of soils to geology-related erosion forces, would be greater. As described in Section 5.2, Geology and Soils, of this EIR, approved grading plans and erosion control would be the same as under the RP's Proposed Remedy and impacts would be less than significant However, impacts would be incrementally greater under the Expedited Implementation Option because of higher peak activity.

Impacts associated with seismic forces, ground stability, and expansive soils would be the same as under the base remedy and less than significant.

Greenhouse Gas Emissions

The Expedited Implementation Option would take approximately 4 years and would require the same types of heavy-duty equipment as the RP's Proposed Remedy. While the Expedited Implementation Option would result in increased daily activities at the site, the total amount of activity (fuel and energy use) that would generate GHG emissions would remain the same as the RP's Proposed Remedy. Therefore, the Expedited Implementation Option would result in the same total short-term GHG-emitting fuel and energy use as discussed for the RP's Proposed Remedy. Impacts related to greenhouse gas emissions would be less than significant.

Hazardous Materials

The Expedited Implementation Option would result in a greater level of activity on the site at one time but would not increase the total level of activities site-wide. By working on multiple clusters simultaneously, the Expedited Implementation Option would reduce the duration of remediation activities to approximately 4 years compared to approximately 6 years under the RP's Proposed Remedy. Although incrementally greater than under the Proposed Remedy, acute (maximum hour) and chronic (annual) non-cancer health risks would not exceed threshold levels and would be less than significant. The incremental increase in lifetime cancer risk would be similar to the RP's Proposed Remedy because the exposure to TACs, which is directly proportional to the amount of excavation and hauling, would be the same as under the RP's Proposed Remedy. Similar to the Proposed Remedy, cancer health risks would be less than significant. In addition, the risk of accidental release through the routine transport, use, or disposal of hazardous materials and through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment would be the same as the RP's Proposed Remedy because the total amount of demolished materials and excavated soils and total number of transport truck trips would be the same as under the RP's Proposed Remedy. Similar to the Proposed Remedy, accidental release impacts would be less than significant.

Hydrology and Water Quality

The Expedited Implementation Option would result in a greater level of activity on the site at one time but would not change the activity at an individual property or increase the level of activities site-wide. With accelerated excavation activities, the potential for greater exposure to erosion forces, such as rainfall, at one time of residual soils or replacement soils exists. As with the RP's Proposed Remedy, the Expedited Implementation Option would comply with PDFs and BMPs related to protection of surface and groundwater during excavation and soil replacement and, although incrementally greater than under the base remedy, the Expedited Implementation Option would have a less than significant impact regarding remediation effects on water quality. Because remediation would occur over a shorter time period than under the base remedy, it would improve COC conditions in a shorter time frame. The Expedited Implementation Option have the same effect as the RP's Proposed Remedy regarding the rate or change the direction of movement of existing As with the RP's Proposed Remedy, impacts regarding groundwater quality would be less than significant.

Noise and Vibration

The Expedited Implementation Option would result in a greater level of activity on the site on a given day but would not change the level of activity at an individual property. Therefore, noise levels and vibration associated with demolition of hardscape and excavation would be similar within close proximity of the excavation site as under the base remedy. As under the base remedy, noise and vibration impacts would be potentially significant. Mitigation measures involving the relocation of impacted residents would reduce noise levels to a less than significant level. However, because such relocation would be voluntary, the mitigation is not assured. Therefore, as with the base remedy, noise and vibration impacts would be conservatively considered to be potentially significant and unavoidable.

Traffic and Circulation

Expedited Implementation Option excavation activities would be accelerated and implementation would occur by the end of 2019, approximately two years less than under the basic remedy. The Expedited Implementation Option would generate 790 total daily trips (compared to 478 under the basic project) and 94 trips during each A.M. and P.M. peak hour (compared to 61 under the basic project). Total daily PCE truck trips would be 604 (compared to 478 under the basic project) and A.M. and P.M. peak hour truck trips would be 57 (compared to 38 under the basic project). Although trip generation and peak hour traffic would be incrementally greater than under the base remedy, the Expedited Implementation Option would result in less than significant impacts at the 14 study intersections.

Utilities and Service Systems (Solid Waste)

The Expedited Implementation Option would increase daily demolition and excavation at twice the daily activity rate as the base remedy (586 CY per day compared to 293 CY per day under the base remedy). Project peak solid waste daily exports under the base remedy would be 293 CY of excavated soils, 60 CY of green waste, and 56 CY of inert construction materials. Under the Expedited Implementation Option, daily solid waste exports would be 586 CY of excavated soil, 120 CY of green waste, and 112 CY of inert construction materials. However, total excavated soil, inert construction debris, and green waste would be the same as under the base remedy and would not exceed the daily capacities of treatment or disposal facilities. As under the base remedy, treated excavated soils and green waste would not be deposited in landfills, nor would they impact landfill capacities. Inert concrete and asphalt waste would be processed at the Copp facility and would not exceed the capacity of the facility. The volume of other inert construction debris items (such as fencing) would be minor compared to the County's capacity to receive these inert materials. Inert debris can be managed at the Azusa Land Reclamation Landfill or an IDEFO. Because the facilities would have the daily and long-term capacity to receive the Expedited Implementation Option's construction debris disposal demand, as with the base remedy, solid waste impacts would be less than significant.

Alternative 1: No Project Alternative

Under Alternative 1, No Project Alternative, the existing conditions would remain and the RAP would not be implemented at the site. No excavation would occur and no SVE wells and SVE system or sub-slab mitigation would be installed. However, monitoring of the site would continue. All existing site features, such as residences, landscaping, hardscape, fences, patios, and ancillary structures would remain. No relocation of residents would occur. In other words, the residential subdivision would remain as it currently exists today without remediation of site impacts. A comparison of the No Project Alternative's impacts to the base

remedy is presented below. Although the No Project Alternative would avoid the RAP's less than significant effects, this Alternative would not meet the statutory requirements of the RAP or the project objectives listed above.

Air Quality

The No Project Alternative would not involve any excavation of soils or change to existing conditions that would result in new sources of emissions or emissions controls at the site. The No Project Alternative would avoid the excavation-related impacts associated with the use of heavy equipment needed for the implementation of the RAP. Therefore, the No Project Alternative would avoid the less than significant emissions that would occur under the RP's Proposed Remedy.

Geology and Soils

The No Project Alternative would not involve any excavation of soils or changes to existing ground conditions that would require grading permits or geotechnical analysis of activities at the site and would, thus, avoid any potential excavation-related impacts associated with peak potential exposure of soils to geology-related erosion forces , such as seismic events, which were determined to be less than significant under the RP's Proposed Remedy with the implementation of project design features. This Alternative would have no impact relative to seismic forces, ground stability, and expansive soils compared to a less than significant impact under the base remedy.

Greenhouse Gas Emissions

The No Project Alternative would not involve any excavation of soils or changes to existing conditions that would result in new sources of GHG emissions at the site. The No Project Alternative would avoid any potential GHG excavation-related impacts, which were determined to be less than significant under the RAP with the implementation of PDFs.

Hazardous Materials

The No Project Alternative would not result in the release of TACs from remediation activities, and therefore would not create a significant hazard to the public or environment through the routine transport, use or disposal of hazardous materials during excavation and hauling, because these activities would not occur. However the No Project Alternative would not fulfill the requirements of the CAO. The No Project Alternative would avoid the RP's Proposed Remedy's less than significant impacts related to short-term exposure of TACs from remediation of the site and would avoid the less than significant risk of upset related to the transport of impacted material from the site. However, the No Project Alternative would fail to reduce the long-term risk of exposure to residents and on-site utility workers and long term risks would remain the same as existing conditions. Therefore, overall impacts under the No Project Alternative with respect to hazardous materials would be less than under the RP's Proposed Remedy.

Hydrology and Water Quality

The No Project Alternative would not involve any excavation and, therefore, would avoid any potential direct contact between contaminated materials and on- or off-site surface water that would occur as a result of excavation. However, this Alternative would not provide for SVE/bioventing, which is intended to promote degradation of residual hydrocarbon concentrations in soils, or for excavation of COC-containing soils.

Therefore the benefit of bioventing in concert with SVE to increase oxygen levels in subsurface soils and promote microbial activity and degradation of longer-chain petroleum hydrocarbons would not occur. Because COC-containing soils would not be removed or vented, the potential for runoff (surface water) to enter and flow out of these materials would continue as under existing conditions. As such, surface water would potentially violate regulatory standards, as defined in the applicable NPDES stormwater permit for the receiving water body. Impacts with respect to surface water quality would be potentially significant and greater than the less than significant water quality impacts under the RP's Proposed Remedy.

Noise and Vibration

The No Project Alternative would not involve any remediation or operation activities at the site and would, therefore, avoid any potential remediation noise and vibration impacts. Therefore, the No Project Alternative would avoid the potentially significant and unavoidable noise and vibration impacts that would occur under the RP's Proposed Remedy.

Traffic and Circulation

The No Project Alternative would not involve any excavation or construction activities and, thus, would not result in generation of additional vehicle trips relative to existing conditions. The No Project Alternative would not affect the function of the local and regional traffic network. Because no remediation or construction traffic would be generated this Alternative would have less impact than the less than significant impacts that would occur under the RP's Proposed Remedy.

Utilities and Service Systems (Solid Waste)

The No Project Alternative would not involve any removal of hardscape, excavation of soils or change to existing ground conditions that would require disposal of materials at any facilities. Therefore, the No Project Alternative would avoid the less than significant impacts that would occur under the RP's Proposed Remedy.

Relationship of the Alternative to Project Objectives

Table 6-2, *Summary Comparison of the Project and Alternatives Ability to Meet Project Objectives,* summarizes the relationship of the No Project Alternative to the objectives of the RP's Proposed Remedy. As shown in Table 6-2, the No Project Alternative would not implement the RAP or meet long-term objectives of the RP's Proposed Remedy, including Objective 1 to implement a RAP that complies with the CAO and meets the media-specific RAOs developed for the site and Objective 4 to allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into site soils (i.e., landscaping, hardscape, gardening etc.) on their properties. The No Project Alternative would maintain the residential land use of the site and would avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community (Objective 2); however, because the No Project Alternative would not provide for remediation, this Alternative would not meet the long term objectives. However, because no excavation associated with remediation would occur, the No Project Alternative would minimize short-term disruption to residents (Objective 3) and would limit or minimize environmental impacts associated with the cleanup activities. However, because it would not result in remediation, the No Project Alternative is considered to not meet the primary objective of the RP's Proposed Remedy.

Alternative 2: Excavation Beneath Landscape and Hardscape to 10 Feet Alternative

Alternative 2 would include the same remedial technologies as the project, but would excavate soils to a depth of 10 feet below ground surface (bgs) at 224 residential properties (compared to 5 feet with targeted excavation to 10 feet bgs at 219 residential properties under the RP's Proposed Remedy). Alternative 2 would require on average, excavation of 1,222 CY of soil per property (compared to 611 to 867 CY per property under the RP's Proposed Remedy). Approximately 274,700 CY of impacted soils would be excavated from the residential properties and approximately 43,900 CY of impacted soils would be excavated from other areas on the site. Alternative 2 would result in the hauling of approximately 318,600 CY of impacted soil (compared to approximately 186,090 CY under the RP's Proposed Alternative). Alternative 2 would occur over an approximately 7.8-year timeframe, compared to approximately 6-year timeframe under the RP's Proposed Remedy. As with the RP's Proposed Remedy, Alternative 2 would meet all the project objectives listed above.

Air Quality

Alternative 2 would involve the same daily demolition and excavation volumes, truck trips, and worker commutes as anticipated under the RP's Proposed Remedy (base remedy). Therefore, peak emissions would be the same as under the base remedy. As with the RP's Proposed Remedy, air quality impacts would be less than significant.

Geology and Soils

Alternative 2 would increase the number of properties being remediated from 219 (under the RP's Proposed Remedy) to 224 and the total excavated soil (318,600 CY compared to 186,090 CY under the RP's Proposed Remedy). Excavations to 10 feet bgs would require incrementally more shoring of cut areas, setbacks from structures, and other supports compared to shallower excavations under the RP's Proposed Remedy. As with the RP's Proposed Remedy, geologic hazards from seismic forces, landslides, settlement, or slippage would be less than significant. Although daily impacts would be the same as under the RP's Proposed Remedy, the greater duration of activity (approximately 7.8 years compared to approximately 6 years under the RP's Proposed Remedy), potential for exposure of soils to geology-related erosion forces would be greater. Although erosion control and implementation of approved grading plans would be the same as under the RP's Proposed Remedy and impacts would be less than significant, impacts would be incrementally greater under Alternative 2 because of the longer remediation timeframe. Impacts associated with seismic forces, ground stability, and expansive soils would be the same as under the base remedy and less than significant.

Greenhouse Gas Emissions

Alternative 2 would take approximately 7.8 years and would require the same types of heavy-duty equipment as the RP's Proposed Remedy. Alternative 2 has the potential to create short-term GHG impacts through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and remediation workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the same as the project. Remedial activities would occur for a greater number of days overall to account for the additional excavated material and would be greater than under the RP's Proposed Remedy. Although Alternative 2 would not exceed threshold standards pertinent to GHG and would have a less than significant impact related to GHG emissions, would require the use of additional transportation fuels to transport the increased amounts of excavation and backfill materials to and from the

site as compared to the RP's Proposed Remedy. From a transportation energy perspective, this Alternative would be less efficient than the RP's Proposed Remedy due to the need to transport materials that do not warrant excavation as per the SSCGs.

Hazardous Materials

Alternative 2 would result in a greater increase in short-term TAC emissions and potential for accidental release compared to the RP's Proposed Remedy because of the longer period required for remediation and increase in materials to be excavated and hauled. This Alternative would incorporate the same PDFs as the RP's Proposed Remedy, which would reduce short-term emissions from heavy equipment, trucks, fugitive dust and volatiles. However, Alternative 2 would result in an increase in short-term exposure which would increase lifetime cancer risks for sensitive receptors. Because of the greater volume of excavated soils and duration of excavation and hauling, short-term impacts related to health risk would be greater than under the RP's Proposed Remedy. Given the increase in duration and activities, health risks resulting from Alternative 2 would be proportionally larger than those predicted under the RP's Proposed Remedy, and impacts would be potentially significant requiring the implementation of mitigation measures. MM HAZ-1, MM HAZ-2 and MM HAZ-3, as described in Section 5.4, *Hazardous Materials*, of this EIR would reduce health risks resulting from Alternative 2 to less than significant levels.

As with the RP's Proposed Remedy, Alternative 2 would result in restoration of affected properties and infrastructure, including yards, landscaping, and streets. Following implementation of the RAP, negligible long-term emissions would result from the SVE/bioventing system, sub-slab vapor mitigation system, and from periodic monitoring and maintenance activities, as under the RP's Proposed Remedy. Therefore, Alternative 2 would result in less than significant impacts with regard to hazards to the public or environment and hazards impacts would be less (benefits would be greater) than under the RP's Proposed Remedy.

Hydrology and Water Quality

Alternative 2 would result in the same level of daily activity on the site as the RP's Proposed Remedy. As with the RP's Proposed Remedy, Alternative 2 would comply with PDFs and BMPs related to protection of surface and groundwater during excavation. Thus, daily water quality impacts with respect to the effects of remediation soils would be the same as under the RP's Proposed Remedy and less than significant. However, remediation would occur over a longer time period than under the RP's Proposed Remedy and, as such, potential exposure of soils to surface water during remediation would be incrementally greater. With regard to COCs that could enter groundwater, Alternative 2 would remove incrementally more COC-containing soil than under the RP's Proposed Remedy. However, because COC's would be removed, as with RP's Proposed Remedy, effects with respect to the direction of movement of existing COCs or expansion of the area affected by COCs would be less than significant.

Noise and Vibration

Alternative 2 would result in the same daily activity as under the RP's Proposed Remedy and, as with the RP's Proposed Remedy, would intermittently exceed the significance threshold of 65 dBA, L_{eq} at noise-sensitive receptor locations. Therefore, noise and vibration levels associated with demolition of hardscape and excavation would be similar within close proximity of the excavation site as under the base remedy. As under the base remedy, noise and vibration impacts would be potentially significant. Mitigation measures

involving the relocation of impacted residents would reduce noise and vibration levels to a less than significant level. However, because such relocation would be voluntary, the mitigation is not assured. Therefore, as with the base remedy, noise and vibration impacts under Alternative 2 would be conservatively considered to be potentially significant and unavoidable.

Traffic and Circulation

Alternative 2 would result in the same daily peak hour activity and traffic as under the RP's Proposed Remedy. Therefore, traffic impacts, which would be less than significant, would be the same as under the RP's Proposed Alternative.

Utilities and Service Systems (Solid Waste)

Alternative 2 would have the same daily demolition and excavation rates as under the RP's Proposed Remedy. However, total excavated soils would be greater (a total of 318,600 CY compared to 186,090 CY under the RP's Proposed Alternative). Total green waste and inert construction debris would be the same as under the RP's Proposed Remedy. As with the base remedy, excavated soil would be treated (cleaned) at the Soil Safe facility in Adelanto, California or similar facility. The anticipated demand (293 CY per day) would not exceed the Adelanto facility's treatment capacity of 1,096 CY per day. As under the base remedy, treated excavated soils and green waste would not be deposited in landfills, nor would they impact landfill capacities. Inert concrete and asphalt waste would be processed at the Copp facility and would not exceed the capacity of the facility. The volume of other inert construction debris items (such as fencing) would be minor compared to the County's capacity to receive these inert materials. Inert debris can be managed at the Azusa Land Reclamation Landfill or an IDEFO. As with the RP's Proposed Remedy, impacts relative to solid waste would be less than significant. However, because output would be greater, impacts to solid waste facilities would be incrementally greater.

Relationship of the Alternative to Project Objectives

Table 6-2, *Summary Comparison of the Project and Alternatives Ability to Meet Project Objectives,* summarizes the relationship of Alternative 2 to the objectives of the RP's Proposed Remedy. As shown in Table 6-2, Alternative 2 would meet long-term objectives of the RP's Proposed Remedy, including Objective 1 to implement a RAP that complies with the CAO and meets the media-specific RAOs developed for the site; Objective 2 to maintain the residential land use of the site and avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community; and Objective 4 to allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils on their properties. Alternative 2 would result in greater short-term TAC emissions associated with excavation and haul trips, resulting in TAC emissions and potential accidental release, than under the RP's Proposed Alternative. Because of greater short-term excavation activity, hauling, and duration of these activities than under the RP's Proposed Remedy, Alternative 2 would not meet Objective 3 to minimize short-term disruption to residents or Objective 5 to limit or minimize environmental impacts associated with the cleanup activities to the same extent as the RP's Proposed Remedy. However, Alternative 2 would better meet Objective 1 to implement a RAP that complies with the CAO and meets media specific RAOs and Objective 4 to allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils to a greater extent than under the RP's Proposed Remedy.

Alternative 3: No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative

Alternative 3 would include the same remedial technologies as the RP's Proposed Remedy, but would avoid excavating below hardscape features, such as sidewalks. Approximately 92,150 CY of impacted soil (compared to approximately 186,090 CY under the RP's Proposed Remedy) would be excavated. Alternative 3 would occur over an approximately 4-year timeframe, compared to approximately 6-year timeframe under the RP's Proposed Remedy. As with the RP's Proposed Remedy, Alternative 3 would meet all the project objectives listed above.

Air Quality

Alternative 3 would involve the same daily demolition and excavation volumes, truck trips, and worker commutes as anticipated under the RP's Proposed Remedy (base remedy). Therefore, peak emissions would be the same as under the base remedy. As with the RP's Proposed Remedy, air quality impacts would be less than significant.

Geology and Soils

As with the RP's Proposed Remedy, geologic hazards from landslides, settlement, or slippage would be less than significant. Daily excavation activities would be the same as under the RP's Proposed Remedy; however, the shorter duration of activity (approximately 4 years compared to approximately 6 years under the RP's Proposed Remedy), potential for exposure of soils to erosion forces, such as siltation or slumping would be less. As with the RP's Proposed Remedy, geologic hazards from seismic forces, landslides, settlement, or slippage would be less than significant. Although daily impacts would be the same as under the RP's Proposed Remedy, the shorter duration of activity would incrementally reduce the potential for exposure of soils to geology-related erosion forces. Impacts associated with seismic forces, ground stability, and expansive soils would be the same as under the base remedy and less than significant.

Greenhouse Gas Emissions

Alternative 3 would take approximately 4 years and would require the same types of heavy-duty equipment as the RP's Proposed Remedy. Alternative 3 has the potential to create short-term GHG impacts through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and remediation workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the same as the project. Remedial activities would occur for fewer days overall because of less excavated material and would be less than under the RP's Proposed Remedy. Alternative 3 would not exceed threshold standards pertinent to GHG and would have a less than significant impact related to GHG emissions. However, because it would require the use of less transportation fuel to transport the increased amounts of excavation and backfill materials to and from the site, this Alternative would be more efficient than the RP's Proposed Remedy from a transportation energy perspective.

Hazardous Materials

Alternative 3 would result in less short-term TAC emissions and potential for accidental release compared to the RP's Proposed Remedy because of the shorter period required for remediation and reduced volume of material excavated and hauled. This Alternative would incorporate the same PDFs as the RP's Proposed

Remedy, which would reduce short-term emissions from heavy equipment, trucks, fugitive dust and volatiles. Alternative 3 would result in a reduction in short-term exposure which would reduce lifetime cancer risks for sensitive receptors. Because of the reduced volume of excavated soils and duration of excavation and hauling, short-term impacts related to health risk would be less than under the RP's Proposed Remedy and would be less than significant.

As with the RP's Proposed Remedy, Alternative 3 would result in restoration of affected properties and infrastructure, including yards, landscaping, and streets. Following implementation of the RAP, negligible long-term emissions would result from the SVE/bioventing system, sub-slab vapor mitigation system, and from periodic monitoring and maintenance activities, as under the RP's Proposed Remedy. Therefore, although Alternative 3 would result in less than significant impacts with regard to hazards to the public or environment, impacts would be greater (benefits would be less) than under the RP's Proposed Remedy.

Hydrology and Water Quality

Alternative 3 would result in the same level of daily activity on the site as the RP's Proposed Remedy. As with the RP's Proposed Remedy, Alternative 3 would comply with PDFs and BMPs related to protection of surface and groundwater during excavation. Thus, water quality impacts with respect to the effects of remediation soils would be the same as under the RP's Proposed Remedy and less than significant. However, remediation would occur over a shorter time period than under the RP's Proposed Remedy and, as such, potential exposure of soils to surface water during remediation would be incrementally less. With regard to COCs that could enter groundwater, because COC's would be removed, as with RP's Proposed Remedy, effects with respect to the direction of movement of existing COCs or expansion of the area affected by COCs would be less than significant.

Noise and Vibration

Alternative 3 would involve excavation activity similar to the RP's Proposed Remedy and, as with the RP's Proposed Remedy, would intermittently exceed the significance threshold of 65 dBA, L_{eq} at noise-sensitive receptor locations. Alternative 3 has the potential to increase noise levels compared to the existing environment through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, remediation workers, and visitors traveling to and from the site. However, because concrete saws, jack hammers, other equipment to remove hardscape and concrete mixer trucks would not be utilized during the residential property excavation phase, remediation activity noise levels would be reduced by approximately 10 dBA during the residential remediation phase compared to the RP's Proposed Remedy. Remedial activities would also occur for a fewer number of days overall to account for less excavated material. Similar to the RP's Proposed Remedy, peak noise impacts under Alternative 3 are predicted to result during the street trenching phase. Noise resulting from this phase would intermittently exceed the significance threshold of 65 dBA, L_{eq} at noise-sensitive receptor locations. Mitigation measures involving the relocation of impacted residents would reduce noise and vibration levels to a less than significant level. However, because such relocation would be voluntary, the mitigation is not assured. Therefore, as with the base remedy, noise and vibration impacts under Alternative 3 would be conservatively considered to be potentially significant and unavoidable.

Residents immediately adjacent to a property with active remedial activity would experience vibration velocities in excess of the human annoyance threshold from the mini excavator. As with the RP's Proposed Remedy, impacts associated with vibration would be lessened, but would still remain significant under this

Alternative. Unless relocation were accepted as a mitigation option by affected residents, vibration impacts would not be reduced to below a level of significance.

Traffic and Circulation

Alternative 3 would result in the same daily peak hour activity and traffic as under the RP's Proposed Remedy. Therefore, traffic impacts, which would be less than significant, would be the same as under the RP's Proposed Remedy.

Utilities and Service Systems (Solid Waste)

Alternative 3 would have similar daily demolition and excavation rates to those of the base remedy. However, total excavated soils would be less (a total of 92,150 CY compared to 186,090 CY under the base remedy). Also, because hardscape, such as sidewalks, driveways, and patios, would not be demolished, total inert construction debris would be considerably reduced. Total green waste would be the same as under the base remedy. As under the base remedy, treated excavated soil and green waste would not be deposited in landfills, nor would they impact landfill capacities. The volume of inert construction debris, such as fencing, would be minor compared to the County's capacity to receive these inert materials. Inert debris can be managed at the Azusa Land Reclamation Landfill or an IDEFO. The minimal quantity of inert debris would not affect the County's capacity. Impacts with regard to solid waste would be less than the under the RP's Proposed Remedy and would be less than significant.

Relationship of the Alternative to Project Objectives

Table 6-2, *Summary Comparison of the Project and Alternatives Ability to Meet Project Objectives,* summarizes the relationship of Alternative 3 to the objectives of the RP's Proposed Remedy. As shown in Table 6-2, because Alternative 3 would require less intensive excavation than under the RP's Proposed Remedy and, therefore, reduce overall remediation impacts, it would meet Objective 3 to minimize short-term disruption to residents; Objective 2 to maintain the residential land use of the site and avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community; and Objective 5 to limit or minimize environmental impacts associated with the cleanup activities to a greater extent than under the RP's Proposed Remedy. Although it is anticipated that Alternative 3 would meet the objectives of the project, such as Objective 1 to implement a RAP that complies with the CAO and meets the media-specific RAOs developed for the site and Objective 4 to allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils on their properties. Alternative 3 would not meet Objectives 1 and 4 to the same extent as the RP's Proposed Remedy.

3. ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA Guidelines section 15126.6(e)(2) states that "If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives." The environmentally superior alternative is typically the alternative that meets the overall project goals and objectives and can avoid or substantially lessen one or more of the significant effects of a project when compared to other project alternatives, including the No Project Alternative. With respect to identifying an Environmentally Superior Alternative among those analyzed in this EIR, the range of feasible alternatives considered includes Alternative 1, the No Project Alternative; Alternative 2, Excavation Beneath

Landscape and Hardscape to 10 Feet Alternative; and Alternative 3, No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative.

Table 6-1, *Summary of Comparison of Impacts Associated with the Option and the Alternatives Relative to Impacts of the Project*, provides a summary comparison of the impacts associated with the Expedited Implementation Option and the impacts of the project as well as with each of the alternatives and the impacts of the project. A comparative summary of the ability of the project and the Alternatives to meet the stated objectives of the project is provided in Table 6-2, *Summary Comparison of the Project's and Alternatives' Ability to Meet the Project Objectives*.

The No Project Alternative is not the environmentally superior alternative because it would not result in the removal of any waste from the site, and therefore, would not achieve the project's underlying purpose, which is to remediate the site consistent with the Regional Board's CAO R4-2011-0046 dated March 11, 2011, as amended. While the No Project Alternative would reduce the short-term environmental impacts when compared to the RP's Proposed Remedy, site remediation would not occur under the No Project Alternative. Thus, existing hazards and health risk effects occurring under existing conditions would continue. No long-term benefits to the environment or the surrounding community would occur under the No Project Alternative.

Alternative 2 is not environmentally superior to the RP's Proposed Remedy with respect to short-term impacts (i.e., hazards, noise and vibration) associated with excavation and hauling since Alternative 2 would require a greater volume of excavation and would require a longer time period for completion than the project. Alternative 2 is not environmentally superior with respect to greenhouse gas emissions, hazards, and noise and vibration. Alternative 2 would result in greater greenhouse gas emissions as well as short-term TAC emissions associated with excavation and haul trips, and would result in greater potential for accidental release (related to hazards), than under the RP's Proposed Remedy. In addition, Alternative 2 would not reduce or mitigate the significant and unavoidable noise and vibration impacts of the proposed project. Alternative 2 would not meet some of the objectives of the project, such as Objective 3 to minimize short-term disruption to residents and Objective 5 to limit or minimize environmental impacts associated with the cleanup activities to the same extent as the RP's Proposed Remedy. With the removal of greater volumes of COCs the SVE/bioventing system would likely be operational for a shorter period of time. Thus, Alternative 2 would meet Objective 1 to implement a RAP that complies with the COA and meets the media-specific RAOs and Objective 4 to allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils on their properties to a greater extent than the RP's Proposed Remedy. Because these objectives apply to long-term environmental effects, Alternative 2 would have a greater long-term beneficial effect and would meet the primary purpose of the RAP to a greater extent than the RP's Proposed Remedy.

Alternative 3 is environmentally superior to the proposed project with respect to impacts associated with excavation because it would result in less noise, vibration and short-term hazards associated with excavation and hauling since Alternative 3 would not result in the removal of hardscape on residential properties. Therefore, Alternative 3 would require less excavation and a shorter time period for completion compared with the project. However, Alternative 3 would not reduce or mitigate all of the impacts of the proposed project and still would result in significant and unavoidable impacts with respect to noise and vibration. Alternative 3 would meet Objective 3 to minimize short-term disruption to residents and Objective 5 to limit or minimize environmental impacts associated with the cleanup activities to a greater extent than the RP's Proposed Remedy. While Alternative 3 would meet Objective 1 to implement a RAP that complies with the

CAO and meets the media-specific RAOs and Objective 4 to allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils on their properties, Alternative 3 would do so to a lesser extent than the RP's Proposed Remedy. Therefore, Alternative 3 would potentially result in a greater risk of long-term exposure than under the RP's Proposed Remedy.

Table 6-1

Summary of Comparison of Impacts Associated with the Option and the Alternatives Relative to Impacts of the Project

Impact Threshold	RP's Proposed Remedy		Alternative 1	Alternative 2	Alternative 3
	Base Remedy	Expedited Implementation Option	No Project Alternative	Excavation Beneath Landscape and Hardscape to 10 Feet Alternative	No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative
Air Quality					
Conflict with or obstruct implementation of the applicable air quality plan	Less than Significant	Similar (Less than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)
Violate any air quality standard or contribute substantially to an existing or projected air quality violation	Less than Significant	Greater (Less than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)
Cumulatively considerable net increase of any criteria pollutant for which the region is non-attainment	Less than Significant	Greater (Less than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)
Expose sensitive receptors to substantial pollutant concentrations	Less than Significant	Greater (Less than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)
Objectionable odors affecting a substantial number of people	Less than Significant	Greater (Less than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)
Conflict with or obstruct implementation of the applicable policies in the City of Carson General Plan Air Quality Element	Less than Significant	Similar (Less than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)

Table 6-1 (Continued)

Comparison of Alternatives

Impact Threshold	RP's Proposed Remedy		Alternative 1	Alternative 2	Alternative 3
	Base Remedy	Expedited Implementation Option	No Project Alternative	Excavation Beneath Landscape and Hardscape to 10 Feet Alternative	No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative
Geology and Soils					
Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death, involving: (1) Strong seismic ground shaking, or (2) Seismic-related ground failure, including liquefaction	Less than Significant	Similar (Less Than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)
Geologic unit or soil that is unstable, or that would become unstable	Less than Significant	Similar (Less Than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)
Soil erosion or loss of topsoil	Less than Significant	Greater (Less than Significant)	Less (No Impact)	Greater (Less than Significant)	Less (Less than Significant)
Expansive soil	Less than Significant	Similar (Less Than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)
Greenhouse Gas Emissions					
Generate greenhouse gas emissions that would exceed 10,000 $MTCO_2e$ per year	Less than Significant	Similar (Less Than Significant)	Less (No Impact)	Greater (Less than Significant)	Less (Less than Significant)
Conflict with the greenhouse gas emissions reductions goals and strategies of AB 32	Less than Significant	Similar (Less Than Significant)	Less (No Impact)	Greater (Less than Significant)	Less (Less than Significant)

Table 6-1 (Continued)

Comparison of Alternatives

Impact Threshold	RP's Proposed Remedy		Alternative 1	Alternative 2	Alternative 3
	Base Remedy	Expedited Implementation Option	No Project Alternative	Excavation Beneath Landscape and Hardscape to 10 Feet Alternative	No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative
Hazardous Materials					
Result in an incremental increase in cumulative lifetime potential cancer risk from exposure to project-related TACs and COCs emitted as a direct result of implementation of the RAP in excess of one in one million (1 x 10-6), or in excess of 10 in one million (1 x 10-5) if Best Available Control Technologies (BACT) are implemented	Less than Significant	Similar (Less than Significant)	Less (No Impact)	Greater (Less than Significant with Mitigation Measures)	Less (Less than Significant)
Result in an incremental increase in cumulative lifetime potential cancer risk from exposure to COCs in soil, soil vapor, and indoor air for residences in excess of 1 x 10-6 and for on-site construction and utility maintenance workers an incremental increase in cumulative lifetime potential cancer risk outside of the NCP risk range of 1 x 10-6 to 1 x 10-4	Less than Significant	Similar (Less than Significant)	Greater (Less than Significant)	Less (Less than Significant)	Greater (Less than Significant)

Table 6-1 (Continued)

Comparison of Alternatives

Impact Threshold	RP's Proposed Remedy		Alternative 1	Alternative 2	Alternative 3
	Base Remedy	Expedited Implementation Option	No Project Alternative	Excavation Beneath Landscape and Hardscape to 10 Feet Alternative	No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative
Result in a chronic or acute non-cancer hazard index (HI) of greater than 1.0	Less than Significant	Greater (Less than Significant)	Less (Less than Significant)	Greater (Less than Significant)	Less (Less than Significant)
In accordance with the SSCGs, create conditions leading to, or otherwise allowing, building interiors to accumulate and or be exposed to methane concentrations exceeding 5 percent of the Lower Explosive Limit (LEL) for methane	Less than Significant	Similar (Less than Significant)	Greater (Less than Significant)	Less (Less than Significant)	Greater (Less than Significant)
Create a risk of accidental release which exceeds the "acceptable with controls" category through the routine transport, use, or disposal of hazardous materials	Acceptable Level of Risk	Similar (Acceptable Level of Risk)	Less (No Impact)	Greater (Less than Significant)	Less (Less than Significant)
Create a risk of accidental release which exceeds the "acceptable with controls" category through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment	Acceptable Level of Risk	Similar (Acceptable Level of Risk)	Less (No Impact)	Greater (Less than Significant)	Less (Less than Significant)

Table 6-1 (Continued)

Comparison of Alternatives

Impact Threshold	RP's Proposed Remedy		Alternative 1	Alternative 2	Alternative 3
	Base Remedy	Expedited Implementation Option	No Project Alternative	Excavation Beneath Landscape and Hardscape to 10 Feet Alternative	No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative
Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school	Less than Significant	Similar (Less than Significant)	Less (Less than Significant)	Greater (Less than Significant)	Less (Less than Significant)
Hydrology and Water Quality					
Result in discharges that would create pollution, contamination or nuisance or cause regulatory standards to be violated.	Less than Significant	Greater (Less than Significant)	Less (Potentially Significant)	Similar (Less than Significant)	Less (Less Than Significant)
Affect the rate or change the direction of movement of existing COCs or expand the area affected by COCs	Less than Significant	Similar (Less Than Significant)	Greater (Potentially Significant)	Similar (Less Than Significant)	Similar (Less than Significant)
Increase level of concentrations of COCs in groundwater or violate any federal, state, or local groundwater quality standard, including the water quality objectives in the Basin Plan	Less than Significant	Similar (Less Than Significant)	Greater (Potentially Significant)	Similar (Less Than Significant)	Similar (Less than Significant)

Table 6-1 (Continued)

Comparison of Alternatives

Impact Threshold	RP's Proposed Remedy		Alternative 1	Alternative 2	Alternative 3
	Base Remedy	Expedited Implementation Option	No Project Alternative	Excavation Beneath Landscape and Hardscape to 10 Feet Alternative	No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative
Noise and Vibration					
Result in exposure of persons to or generation of noise levels in excess of local standards; result in a substantial permanent increase in ambient noise levels in the project vicinity above existing levels; or result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above existing levels	Significant and Unavoidable	Similar (Significant and Unavoidable)	Less (No Impact)	Similar (Significant and Unavoidable)	Less (Significant and Unavoidable)
Result in exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels	Significant and Unavoidable	Similar (Significant and Unavoidable)	Less (No Impact)	Similar (Significant and Unavoidable)	Less (Significant and Unavoidable)
Traffic and Circulation					
Increase in traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C increase of 0.02), causing LOS F (V/C > 1.00) or if the facility is already at LOS F when the project increases traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C	Less than Significant	Greater (Less than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)

Table 6-1 (Continued)

Comparison of Alternatives

Impact Threshold	RP's Proposed Remedy		Alternative 1	Alternative 2	Alternative 3
	Base Remedy	Expedited Implementation Option	No Project Alternative	Excavation Beneath Landscape and Hardscape to 10 Feet Alternative	No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative
increase of 0.02).					
Increase in traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C increase of 0.02), causing LOS F (V/C > 1.00) or if the facility is already at LOS F when the project increases traffic demand on a CMP facility by 2 percent of capacity (i.e., V/C increase of 0.02).	Less than Significant	Greater (Less than Significant)	Less (No Impact)	Similar (Less Than Significant)	Similar (Less Than Significant)
Utilities and Service Systems (Solid Waste)					
Generate solid waste in excess of the permitted capacity of the disposal facilities serving the project	Less than Significant	Greater (Less than Significant)	Less (No Impact)	Similar (Less Than Significant)	Less (Less than Significant)

Source: PCR Services Corporation, 2014

Table 6-2

Summary Comparison of the Project's and Alternatives' Ability to Meet Project Objectives

Project Objective	Ability to Meet Project Objective			
	RP's Proposed Remedy	**Alternative 1 No Project Alternative**	**Alternative 2 Excavation Beneath Landscape and Hardscape to 10 Feet Alternative**	**Alternative 3 No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative**
1. Implement a RAP that complies with the CAO and meets the media-specific (i.e. soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) developed for the site. (See RAO #1 through RAO #4 below.)	Meets Objective	Does Not Meet Objective	Meets Objective (Better meets Objective than project)	Meets Objective (To lesser extent than project)
RAO #1. Prevent human exposures to concentrations of COCs in soil, soil vapor, and indoor air such that total (i.e., cumulative) lifetime incremental carcinogenic risks are within the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) risk range of 1×10-6 to 1×10-4 and noncancer hazard indices are less than 1 or concentrations are below background, whichever is higher. Potential human exposures include on-site residents and construction and utility maintenance workers. For on-site residents, the lower end of the NCP risk range (i.e., 1×10-6) and a noncancer hazard index less than 1 are used. Prevent direct contact exposure to COCs at concentrations above applicable risk-based SSCGs in soil for on-site residents and construction and utility maintenance workers.	Meets Objective	Does Not Meet Objective	Meets Objective (Better meets Objective than project)	Meets Objective (To lesser extent than project)
RAO #2. Prevent fire/explosion risks in indoor air and/or enclosed spaces (e.g., utility vaults) due to the accumulation of methane generated from the anaerobic biodegradation of petroleum hydrocarbons in soils. Eliminate methane in the subsurface to the extent technologically and economically feasible.	Meets Objective	Does Not Meet Objective	Meets Objective	Meets Objective

Table 6-2 (Continued)

Summary Comparison of the Project's and Alternatives' Ability to Meet Project Objectives

Project Objective	Ability to Meet Project Objective			
	RP's Proposed Remedy	Alternative 1 No Project Alternative	Alternative 2 Excavation Beneath Landscape and Hardscape to 10 Feet Alternative	Alternative 3 No Excavation Beneath Hardscape – 5 Feet With Targeted 10 Feet Alternative
RAO #3. Remove or treat LNAPL to the extent technologically and economically feasible, and where a significant reduction in current and future threat to groundwater will result.	Meets Objective	Does Not Meet Objective	Meets Objective	Meets Objective
RAO #4. Reduce COCs in groundwater to the extent technologically and economically feasible to achieve, at a minimum, SSCGs and the water quality objectives in the Regional Board Basin Plan to protect the designated beneficial uses, including municipal supply.	Meets Objective	Does Not Meet Objective	Meets Objective (Better meets Objective than project)	Meets Objective (To lesser extent than project)
2. Maintain the residential land use of the site and avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community.	Meets Objective	Meets Objective	Meets Objective	Meets Objective
3. Minimize short-term disruption to residents.	Meets Objective	Meets Objective	Meets Objective (To lesser extent than project)	Meets Objective (Better meets objective than project)
4. Allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils (i.e., landscaping, hardscape, gardening, etc.) on their properties.	Meets Objective	Does Not Meet Objective	Meets Objective (Better meets objective than project)	Meets Objective (To lesser extent than project)
5. Limit or minimize environmental impacts associated with the cleanup activities.	Meets Objective	Meets Objective	Meets Objective (To lesser extent than project)	Meets Objective (to greater extent than project)

Source: PCR Services Corporation, 2014

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7. Other Mandatory CEQA Considerations

7.0 OTHER MANDATORY CEQA CONSIDERATIONS

INTRODUCTION

This section summarizes the findings with respect to growth inducing impacts; significant, unavoidable environmental impacts; irreversible environmental changes; potential secondary effects; and less than significant impacts of the project.

1. CONSIDERATION AND DISCUSSION OF SIGNIFCIANT ENVIRONMENTAL IMPACTS

Section 15126.2(b) of the State CEQA Guidelines requires that an EIR describe significant environmental impacts that cannot be avoided, including those effects that can be mitigated but not reduced to a less than significant level. Following is a summary of the impacts associated with the project that were concluded to be significant and unavoidable. These impacts are also described in detail in Chapter 5, Environmental Impact Analysis, of this EIR.

Noise and Vibration: As evaluated in Section 5.6, Noise and Vibration, implementation of the RAP would result in noise levels (Impact Statement Noise-1) and vibration (Impact Statement Vib-1) that would exceed the thresholds of significance. Given that side yards are narrow and residences are located within close proximity, it is infeasible to erect sound barriers to shield the adjacent homes, and traditional temporary sound barriers are not capable of reducing the noise levels sufficiently to levels below the City of Carson's threshold (65 dBA). Erecting noise barriers in the street or on public sidewalks for weeks at a time is not feasible, and those homes with direct line of site to a cluster are predicted to experience high levels of noise. With implementation of MM NOISE-1, the noise sensitive receptors (single-family residential uses) within approximately 90 feet of street trenching or 130 feet from an edge of residential remediation would be offered relocation and, if accepted, those individuals would not be exposed to high noise levels from implementation of the project. However, since relocation is voluntary, residents may choose to remain and would potentially be exposed to noise levels in excess of the thresholds. Thus, the impact is conservatively assumed to remain significant and unavoidable even with implementation of the mitigation measure.

In addition, during the street trenching phase of RAP implementation, MM NOISE-2 would reduce noise levels by approximately 10 dBA. However impacts during this phase would remain above the 65 dBA thresholds, and are considered significant and unavoidable.

With regard to vibration, peak velocities fall below the threshold for human annoyance at approximately 10 feet from the mini excavator and at 60 from a jack hammer. With the implementation of MM NOISE-1 during residential property remediation and MM VIB-1 during other phases involving the use of a jack hammer, human annoyance vibration impacts could be mitigated to less than significant. However, since relocation is voluntary, residents may choose to remain and would potentially be exposed to vibration levels in excess of the thresholds. Thus, the impact is conservatively assumed to remain significant and unavoidable even with implementation of the mitigation measures.

2. REASONS WHY THE PROJECT IS BEING PROPOSED, NOTWITHSTANDING SIGNIFICANT UNAVOIDABLE IMPACTS

In addition to identification of the project's significant unavoidable impacts, Section 15126.2(b) of the State CEQA Guidelines also requires a description of the reasons why the project is being proposed, notwithstanding significant unavoidable impacts associated with the project. The project is the Los Angeles Regional Water Quality Control Board's (Regional Board's) action to consider approval of a Remedial Action Plan (RAP) for the cleanup of the site in response to a Cleanup and Abatement Order (CAO) R4-2011-0046 dated March 11, 2011, as amended issued to Shell Oil Company by the Regional Board. Primary constituents of concern are methane, benzene and petroleum hydrocarbons.

The project is being proposed, notwithstanding its significant unavoidable impacts, because remediation of the site is required by the CAO with the intent of achieving Site-Specific Cleanup Goals established by the Regional Board on January 23, 2014. Additional site characterization investigations, remediation pilot tests, a Human Health Risk Assessment (HHRA) and a Feasibility Study have been completed for the site.

The reasons why the project is being proposed, notwithstanding its significant unavoidable impacts, are tied to the purpose and objectives of the project, which are described in Chapter 2, Project Description, of this EIR. The primary purpose and objective of the project is to remediate the site consistent with the Regional Board's CAO R4-2011-0046. Regarding individual project objectives, the RAP would comply with the CAO and would meet the media-specific (i.e., soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) developed for the site. The project would maintain the residential land use of the site and would avoid permanently displacing residents from their homes or physically dividing the established Carousel Tract community. Implementation of the RAP would also allow residents the long-term ability to safely and efficiently make improvements requiring excavation or penetration into shallow site soils (i.e., landscaping, hardscape, gardening, etc.) on their properties. The project (base remedy) would minimize short-term disruption to residents to the extent feasible. While implementation of the RAP under the base remedy would take approximately six years, the RAP would be implemented in clusters so as to minimize disruption to residents. The project would incorporate project design features (PDFs) that would serve to minimize environmental impacts that could occur with the implementation of the RAP.

Three alternatives to the project were selected for evaluation in the EIR. Chapter 3, Description of Alternatives, discusses the selection of alternatives and provides a description of the three alternatives that are evaluated in Chapter 5 of this EIR. Chapter 6 of this EIR provides a comparison of the alternatives relative to the project in terms of impacts as well as the ability of each to meet the project objectives. While Alternative 1, No Project Alternative, would reduce the significant and unavoidable noise impacts, the No Project Alternative would not comply with the CAO nor meet the media-specific (i.e. soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) developed for the site. Alternative 2, Excavation Beneath Landscape and Hardscape to 10 Feet Alternative, would require a greater volume of excavation and would require a longer time period for completion than the project. While Alternative 2 would remove greater volumes of COCs and could result in a greater decrease in the risk of long-term exposure of TACs for onsite residents, Alternative 2 results in an increase in lifetime cancer risks in excess of thresholds, requiring mitigation. With implementation of mitigation, the health risks would be less than significant. Alternative 2 would not reduce or mitigate the significant and unavoidable noise and vibration impacts of the proposed project and would take approximately 2.4 years longer to implement. Alternative 3, No Excavation Beneath Hardscape – 5 Feet to Targeted 10 Feet, would require less excavation and a shorter time period for

completion compared with the project. While Alternative 3 would result in less noise and vibration associated with excavation and hauling, Alternative 3 would not reduce or mitigate the impacts of the proposed project. While Alternative 3 would comply with the CAO and meet the media-specific RAOs, Alternative 3 would potentially result in a greater risk of long-term exposure than under the RP's Proposed Remedy.

While the project would result in significant and unavoidable noise and vibration impacts, alternatives have not been identified that would avoid these impacts and comply with the CAO and meet the media-specific RAOs. Thus, the project would provide a balance between compliance with the CAO and meeting the media-specific (i.e., soil, soil vapor, and groundwater) RAOs developed for the site and the environmental impacts that would occur with the implementation of the RAP.

3. SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

According to Sections 15126(c) and 15126.2(c) of the *CEQA Guidelines*, an EIR is required to address any significant irreversible environmental changes that would occur should the project be implemented. As stated in CEQA Guidelines Section 15126.2(c) indicates:

> *"[u]ses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter likely. Primary impacts and, particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also, irreversible damage can result from environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified."*

The project would necessarily consume limited, slowly renewable and non-renewable resources. This consumption would occur during the active construction remediation activities and would continue throughout the operational lifetime of the SVE and sub-slab vapor systems. Project remediation activities would require a commitment of resources that would include: (1) building materials, (2) fuel and operational materials/resources, and (3) the transportation of goods and people to and from the site. Project activities would require the consumption of resources that are not replenishable or which may renew so slowly as to be considered non-renewable. These resources could include the following construction supplies: certain types of lumber and other forest products; aggregate materials used in landscape and hardscape areas, and road and parking surfaces (i.e., city streets and driveways when re-paving occurs) such as sand, gravel and stone; metals such as steel, copper, and lead; petrochemical construction materials such as plastics; and water. Fossil fuels such as gasoline and oil would also be consumed in the use of construction vehicles and equipment, as well as the transportation of goods and people to and from the site.

The resources that would be used following the active construction remediation activities would be similar to those currently used within the City of Carson and greater County of Los Angeles. These would include energy resources and fossil fuels such as electricity and natural gas, petroleum-based fuels required for vehicle-trips and operation of the SVE and sub-slab vapor systems. Fossil fuels would represent the primary energy source associated with both construction and operational activities at the site, and the existing, finite

supplies of these natural resources would be incrementally reduced. The energy requirements associated with the project would nonetheless, represent a commitment of essentially non-renewable resources.

Limited use of potentially hazardous materials typical of urbanized uses (i.e., cleaning supplies, oil, and grease) would occur during the operation and maintenance of the SVE and sub-slab vapor systems. The use of these materials would be in small quantities and used, handled, stored, and disposed of in accordance with the manufacturer's instructions and applicable government regulations and standards.

In summary, implementation of the remediation plan and associated long-term operational activities would result in the irretrievable commitment of limited, slowly renewable, and nonrenewable resources, which would incrementally limit the availability of these particular resource quantities for future generations or for other uses during the life of the project. However, continued use of such resources would be on a very small scale and consistent with regional and local growth forecasts in the area. As such, although irreversible environmental changes would result from the project, such changes would not be considered significant.

4. GROWTH INDUCING IMPACTS

Section 15126.2(d) of the CEQA Guidelines requires agencies to address potential growth inducing effects of their actions. Growth-inducing effects are defined as those effects that could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Growth-inducing impacts include the removal of obstacles to population growth (e.g., the expansion of a wastewater treatment plant allowing more development in a service area) and the development and construction of new service facilities that could significantly affect the environment individually or cumulatively. In addition, growth must not be assumed as beneficial, detrimental, or of little significance to the environment.

The proposed RAP for the site would include the implementation and installation of various remediation features (i.e., soil excavation and removal, SVE/bioventing and sub-slab vapor systems) to address contaminated soils and groundwater resulting from former on-site oil storage facilities. The site, which is currently developed with 285 single family residences known as the Carousel Tract, is designated for residential land uses in the City of Carson General Plan. Following completion of the active construction remediation activities, the same 285 residences would remain on the site. No new residential land uses or infrastructure beyond what currently exists would occur following project implementation. Therefore, the project would not enable direct or indirect population growth. Accordingly, the project would not result in growth inducing impacts.

5. POTENTIAL SECONDARY EFFECTS

Section 15126.4(a)(1)(D) of the CEQA Guidelines requires that if mitigation measures would cause one or more significant effects in addition to those that would be caused by the project as proposed, that the effects of the measures be discussed, but in less detail than the significant effects of the project. The following provides a discussion of the potential secondary effects that could occur as a result of implementation of the project mitigation measures contained in the EIR. The EIR contains mitigation measures for noise and vibration as discussed below.

Noise and Vibration

Mitigation Measure NOISE-1 requires that the RP offer relocation to residents of properties within approximately 90 feet of street trenching or 130 feet from an edge of residential remediation. If people were to relocate, no secondary physical impacts would occur as a result of the relocation. Mitigation Measure NOISE-2 requires the use of noise blankets/temporary noise barriers to be installed between the street trenching and occupied residences. Noise and vibration from the installation of noise barriers would be negligible and would be short-term. Mitigation Measure NOISE-3 requires the RP to retain the services of a qualified acoustical engineer with expertise in design of sound isolations to ensure the mechanical fans and/or other related mechanical components to the cap system installed for long-term use is designed so as to meet the City's exterior noise limits (55 dBA). The sound isolation would be installed at the time of construction of the equipment. With regard to vibration, Mitigation Measure VIB-1 requires that the RP offer relocation to residents of properties located within 60 feet of the use of jack hammers. As with Mitigation Measure NOISE-1, no secondary physical impacts would occur if people were to relocate.

6. EFFECTS FOUND NOT TO BE SIGNIFICANT

Section 15128 of the CEQA Guidelines states that an EIR shall contain a brief statement indicating reasons that various possible significant effects of a project were determined not to be significant and not discussed in detail in the Draft EIR. An Initial Study was prepared for the project and is included in Appendix A of this EIR. The Initial Study provides a discussion of the potential environmental impact areas and the reasons that each topical area is or is not analyzed further in the Draft EIR. The Regional Board determined that the project would not result in potentially significant impacts related to Aesthetics, Agricultural and Forestry Resources, Biological Resources, Cultural Resources, Geology and Soils (septic tanks) Hazards and Hazardous Materials (airports), Hydrology and Water Quality (groundwater recharge, drainage patterns, flooding, streams, floodplain), Land Use and Planning, Mineral Resources, Noise (permanent increase in ambient levels, airport noise), Population and Housing, Public Services, Recreation, Traffic/Circulation (airport, emergency access, alternative transportation), and Utilities (Water and Wastewater). The basis for these conclusions is discussed below.

Aesthetics

There are no scenic vistas or designated state scenic highways in the project area. In addition, no scenic resources, including historic buildings, are located on the site. Thus, no impacts regarding scenic vistas or scenic resources would occur as a result of project implementation.

The remediation activities would result in temporary changes to the visual environment in the residential neighborhood due to the staging of materials and equipment on site during excavation and installation of remediation systems. Equipment that may be used on the site include drill rigs, backhoes, mini-excavators, rubber-tired loaders, water buffalo trailers and soil vapor extraction equipment. Stockpiling of excavated soils would be minimized and if possible excavated soils would be loaded and transported off site the same day. Although the project would create minor short-term changes to the visual character during implementation of the RAP, the disturbed area would be restored and the visual character of the site and surroundings would not be substantially degraded. Thus, impacts regarding the visual quality and character of the site and its surroundings would be less than significant.

The RP's Proposed Remedy would prevent human exposures to concentrations of COCs in soil, soil vapor, and indoor air such that total (i.e., cumulative) lifetime incremental carcinogenic risks are within the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) risk range and prevent fire/explosion risks in indoor air and/or enclosed spaces (e.g., utility vaults) due to the accumulation of methane generated from the anaerobic biodegradation of petroleum hydrocarbons in soils. By improving such environmental conditions, the RP's Proposed Remedy would reduce the potential for abandonment of homes and a blighted condition that would, otherwise, affect the aesthetic character of the area.

Construction remediation activities would be scheduled during daytime hours and would generally occur Monday through Friday, starting as early as 7:00 a.m., with employee arrival, safety meetings, and work day preparations (e.g., equipment inspections), ending as late as 5:00 p.m. If extended hours were necessary, such activity would occur with necessary City approvals. Any lighting associated with these activities would be temporary and directed to the working area with shielding applied to lighting, as feasible. Overall, project implementation would not introduce substantial new sources of light or glare on the site.

Agricultural and Forestry Resources

The site is a residential subdivision in a highly urban area with no agricultural or forestry resources on the site or within proximity of the site. The project would not conflict with existing zoning for agricultural use or convert agricultural or forest land to non-agricultural or non-forest use. Therefore, no impacts regarding agricultural and forestry resources would occur.

Biological Resources

The project site is a residential subdivision in a highly urbanized area. The site does not contain sensitive plant or wildlife species, riparian habitat, a sensitive natural community, federally protected wetlands, migratory wildlife corridors, or native wildlife nursery sites. No impacts to sensitive biological resources would occur with project implementation.

Cultural Resources

There are no known historic, archaeological, paleontological or unique geologic resources that exist at the site or near the site as described in a technical report entitled *Cultural Resources Investigations, Former Kast Property, Carson, California, Site Cleanup No. 1230, Site ID 2040330*, prepared by URS Corporation in 2011. The remediation activities would result in excavation of shallow soils. However, given that the site has been previously disturbed with the removal/demolition of the reservoirs and development of homes and remediation activities would occur in these already disturbed areas, the likelihood of encountering cultural resources is considered low. Therefore, there would be no significant cultural resources impacts resulting from project implementation.

Geology and Soils

The site is located in an urbanized area that is served by existing sanitary sewer infrastructure. The project would not involve the use of septic tanks or alternative wastewater disposal systems. Thus, no impact would occur regarding the ability of soils to adequately support the use of septic tanks or alternative waste disposal systems.

Hazards and Hazardous Materials

The nearest airport to the site is the Torrance Municipal Airport, located over 3.3 miles to the west of the site. Therefore, no public or private airport-related safety hazards would occur to people working or residing in the project area.

With regards to potential conflicts with an adopted emergency response plan or emergency evacuation plan, there may be temporary street blockage for several minutes at a time as trucks maneuver to dump loads (backfill soil as an example), but no long-term street closures are expected. Drilling and trenching in the streets for well and piping installation would be required for installation of the soil vapor extraction system. Similar to installation of water and sewer lines, there may be short-term blockages of driveways to individual residential properties for less than a day. Trenching that interferes with access would be covered with steel plates to allow access at night and if construction activities are delayed. It is not uncommon in the City of Carson or elsewhere for construction activities to result in temporary lane closures or blockages. All lane closures needed during the soil excavation portion of the RAP would be done in accordance with the Construction Traffic Management Plan and Encroachment Permits issued from the City of Carson, which would ensure that project implementation would comply with the City's applicable fire and safety codes that require adequate access for fire and police personnel and equipment in and out of the site. Therefore, less than significant impacts regarding emergency response plans or evacuation plans would occur with project implementation.

The site is also located in an urbanized area and does not interface with any wildland areas. Thus, there is no potential for wildland fires to occur as a result of project implementation.

Hydrology and Water Quality

The project would not directly deplete groundwater supplies as no groundwater extractions are proposed. Implementation of the RAP would remove existing impervious surfaces (i.e., residential hardscape and paved sidewalk/street surfaces) during the excavation and installation of the project's remediation components. These existing impermeable surfaces would be replaced with similar surfaces such that there would be minimal change to the overall extent of impervious surfaces on the site. Also, implementation of the RAP would result in beneficial impacts to groundwater beneath the site by removing or treating LNAPL to the extent technologically and economically feasible and reduction in concentrations of wastes in groundwater. Based on these considerations, the project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the level of the local groundwater table.

Currently, the generally flat site is developed with single-family residential properties as part of the Carousel Tract. No streams or rivers occur on the site. The project, which would involve the replacement and restoration of remediated areas back to generally similar existing conditions, would not substantively change the amount of impervious surface area or drainage patterns/conditions on the site. Thus, the project would not result in substantial erosion or siltation on- or off-site, nor would it substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. Furthermore, as post-remediation runoff quantities would not increase over those of existing conditions, the project would not create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

The site is not located within a 100-year flood plain or within an inundation area associated with the failure of a levee or dam. Thus, no impact would occur with regard to flood flows. In addition, the site is located approximately five (5) miles north of the Pacific Ocean and is not in close proximity to an enclosed body of water. As such, there is no potential for exposure of people to a seiche or a tsunami. In addition, the site is not positioned in an area of potential mudflow. Potential impacts associated with inundation by seiche, tsunami, or mudflows would not occur.

Land Use and Planning

The project proposes to implement a remediation plan to address contamination within an existing single-family residential neighborhood. Thus, the project does not have the potential to physically divide an established community.

As the project would not change the existing land designation or use of the site, the project would not conflict with applicable land use plans, policies or regulations applicable to the site.

Also, the site is not located within the boundaries on any habitat conservation plan or natural community conservation plan. As such, the project would not conflict with such a plan.

Mineral Resources

The site has no known mineral resources and implementation of the RAP would not change the availability of mineral resources at the site. Thus, no mineral resources impacts would occur with project implementation.

Noise

Following completion of the active construction remediation activities, the SVE/bioventing treatment system(s) would be the only stationary noise source constructed by the project. Although the specific location has not yet been selected, the system(s) would likely be located outside of the residential Carousel Tract within the developed industrial area to the immediate west or northwest of the site. The SVE system would be installed in an enclosed structure constructed with sound attenuation insulation to reduce operating noise levels in accordance with City of Carson Noise Ordinance. Thus, the system would not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

The nearest airport to the site is the Torrance Municipal Airport, located over 3.3 miles to the west of the site. Therefore, no airport-related noise impacts would occur to people working or residing in the project area.

Population and Housing

Displacement of housing would not occur from the project as the excavation would be conducted in landscaped and hardscaped areas of identified residences (e.g., uncovered patios, walkways, etc.). While some temporary relocation of residents may be required during excavation activities, there are a substantial number of hotel/motel rooms in the area and construction of replacement housing is not expected.

The site, which is developed with 285 single family residences, is designated for residential land uses in the City of Carson General Plan. Following completion of the active construction remediation activities, the existing residences would remain on the site. No new residential land uses or infrastructure beyond existing conditions to support new land uses would occur following project implementation. Therefore, the project would not enable direct or indirect population growth. Accordingly, the project has no growth-inducing element and the project would not result in impacts to population or housing.

Public Services

The project would not generate an increase in the demand for public services as the demand for public services is generally associated with population or employment growth. No new housing would be constructed that would generate a need for additional schools or parks. The RAP has no component or activity that would cause substantial adverse physical impacts requiring changes or impacts to fire, police, schools, parks or other public services facilities. The nature and extent of the project would not generate a need for any new or physically altered governmental facilities. Therefore, no significant impacts to public services would occur.

Recreation

No recreational facilities are located on the site and project activities would not require new/expanded recreational facilities or increase the use of existing facilities. The nature and extent of the proposed project would not generate a need for any new or physically altered recreational facilities. Therefore, no impact relative to recreation would occur.

Traffic and Circulation

The nearest airport to the site is the Torrance Municipal Airport, located over 3.3 miles to the west of the site. As such, the project would not result in a change in air traffic patterns including increases in traffic levels or changes in location that would result in substantial safety risks.

The project does not propose new or modified roads or access ways. The project would not result in a new or modified land uses that would be incompatible with the existing roadways, in that upon completion of the remediation activities, the site would remain in its current residential state. Therefore, project implementation would not substantially increase hazards due to a design feature or incompatible uses.

The project would include the implementation of a Construction Traffic Management Plan, which would set forth requirements for the management of truck traffic and coordination with emergency providers, including flagmen to coordinate truck movements from Neptune Avenue or Lagoon Avenue onto Lomita Boulevard or at other turning points within the residential subdivision. The Construction Traffic Management Plan would require the project contractor to provide emergency access through construction work areas by maintaining at least one travel lane at all times or the provision of detours and to coordinate with emergency providers (sheriff, fire, ambulance and paramedic services) regarding any lane closures or other construction activities that would impact emergency access. The project's plans would be subject to review and approval by the City of Carson and Los Angeles County Fire Department, including site access and circulation plans, which would serve to ensure that adequate vehicular access for emergency vehicles is provided. Any recommendations or other requirements pertaining to emergency access would be stipulated in a Construction Traffic Management Plan to be issued by the City prior to project implementation. Thus, impacts regarding emergency access would be less than significant.

The project would be consistent with City of Carson Transportation and Infrastructure Element Goal T1-1 since haul trucks would access the project site through City's currently designated truck routes on Lomita Boulevard, Wilmington Avenue, Sepulveda Boulevard, and Main Street.

The project would not impede the use of alternative forms of transportation, such as buses, bicycles, and walking since the project would not adversely affect street service levels along transit lines, or impact existing bus stops. In addition, the project would not conflict with the Safe Routes to Schools. The proposed haul route streets (Lomita Boulevard, Wilmington Avenue, Sepulveda Boulevard, and Main Street) are designated truck routes under Municipal Code Section 35701, and are all proposed Class II bicycle facilities. It is anticipated that designated truck routes would accommodate truck traffic and that any future Class II lanes for cyclists would accommodate bicycle traffic concurrently with truck traffic. The separation of these uses would support bicycle safety on these roadways. In addition, the project would not increase traffic in a manner that would exceed service level thresholds that would significantly affect the operation of study area streets and as such, would not be a detriment to the movement of bicycle traffic in adjacent bike lanes. In addition, the project would include the implementation of a Traffic Construction Management Plan that would ensure pedestrian separation from hazardous areas and other traffic control measures that would allow pedestrian access throughout the area. The project would not create pedestrian hazards with regard to the Safe Routes to Schools with the implementation of the Traffic Construction Management Plan. The project does not propose to alter any existing bus turnouts or established alternative transportation programs within the City. In addition, sidewalks within the neighborhood would not be subject to remediation activities. Thus, pedestrian routes within the neighborhood would be available. Overall, given the nature and extent of the project, it would not conflict with adopted policies, plans, or programs supporting alternative transportation. Thus, less than significant impacts regarding alternative transportation facilities would occur with project implementation.

Utilities and Service Systems

Project implementation would not include the development of uses that would generate new wastewater flows. The project does not propose a change in land use that would result in greater average daily flows than are currently produced. Thus, no significant impacts regarding wastewater would occur with project implementation.

The project could result in a marginal increase in water demand during the implementation of the active construction remediation activities over what currently is experienced at the site. However, the amount of water usage is expected to be nominal as it would be limited primarily to watering down the site for dust control and irrigation of newly planted vegetation, and it would be short-term, lasting only through the duration of the active remediation activities. However, the increase in water use for dust control would be offset by the reduction in water use for irrigation of landscaping. Thus, it is expected that the City's municipal water sources can accommodate the project's water requirement. Furthermore, upon completion of the RAP, land uses are not expected to change from current uses, and therefore, no change to water demand would result that would generate a long-term effect to available water supplies provided by the City. As such, a less than significant impact would occur related to water supplies.

The capacity of facilities for the materials excavated from the site is evaluated in this EIR. The impacted soil that would be excavated from the site would be transported to a facility that would treat the soil to remove the VOCs. Any such materials would be examined and/or profiled before leaving the site to ensure they are suitable for treatment at the designated facility. Landscape materials would also be removed from the site

and disposed in accordance with applicable regulations. Accordingly, the project would comply with federal, state, and local statutes and regulations related to solid waste. Thus, the EIR will include an evaluation of the capacity of facilities to treat impacted soils and for disposal of materials. Since the project would comply with applicable federal, state, and local statutes and regulations related to solid waste no further analysis of the regulations is necessary.

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Appendix A: NOP and Initial Study and Comment Letters

NOTICE OF PREPARATION
OF A DRAFT ENVIRONMENTAL IMPACT REPORT

ORIGINAL FILED

MAR 19 2014

LOS ANGELES, COUNTY CLERK

Date: March 19, 2014

To: State Clearinghouse
Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

and

Responsible Agencies, Trustee Agencies, Federal Agencies, and Interested Organizations and Individuals (see Attachment 1 for list of agencies)

Lead Agency: State of California Regional Water Quality Control Board, Los Angeles Region

Contact: Paula Rasmussen, Assistant Executive Officer
Regional Water Quality Control Board
320 West 4th Street, Suite #200
Los Angeles, CA 90013
Phone: (213) 213-576-6791
E-mail: paula.rasmussen@waterboards.ca.gov

Project Title: Former Kast Property Tank Farm Site Remediation Project - Environmental Impact Report

Project Applicant: Shell Oil Products US

Project Location: The Former Kast Property Tank Farm (Site) is a 44-acre site located in Carson, California. The site is bounded to the north by East 244th Street, Lomita Boulevard to the south, Marbella Avenue to the west, and Panama Avenue to the east (see Figure 1 attached). The Site currently is a residential neighborhood known as the Carousel Tract. Lomita Boulevard forms the jurisdictional boundary between the City of Los Angeles and the City of Carson (see Figure 2 attached).

Project Description: See Attachment 2 for a description of the Former Kast Property Tank Farm Remediation Project.

Purpose of the Notice of Preparation: The California Environmental Quality Act (CEQA) specifies that a public agency must prepare an Environmental Impact Report (EIR) for any project that it proposes to carry out or approve that may have a significant direct or indirect impact on the environment (Public Resources Code Section 21100[a]). The California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board) is the lead agency for the Former Kast Property Tank Farm Site Remediation Project. The Los Angeles Water Board has determined that this project may have a significant impact on the environment and has determined that an EIR will be necessary to fully evaluate the potential environmental effects.

Comments on the Notice of Preparation: Responsible agencies, trustee agencies, Federal agencies, Native American Tribes, and interested organizations and individuals are encouraged to submit comments regarding the scope and content of the Draft EIR for the Los Angeles Water Board's consideration. This Notice of Preparation (NOP) is being circulated for the required 30-day comment period. Comments on this NOP should be submitted as soon as possible and must be received no later than 5:00 p.m. on April 18, 2014. Please send written comments to: Dr. Teklewold Ayalew, Los Angeles Water Board Project Manager, 320 W. 4th Street, Suite 200, Los Angeles, CA 90013, or electronically to teklewold.ayalew@waterboards.ca.gov.

Los Angeles County Registrar / Recorder
12400 Imperial Highway, Norwalk, CA
(800)201-8999

Business Filings

NORWALK

Cashier: B. EVANS

20140319125000 4

Wednesday, March 19, 2014 9:24 AM

Item(s)

Fee	Qty	Total
NoP - County Posting Fee 2014073096	1	$75.00

Total **$75.00**

Total Documents: 1

Customer payment(s):

Prior studies, technical reports, the CEQA Initial Study and other documents related to the proposed project are available for review on the internet at http://www.swrcb.ca.gov/rwqcb4/Kast/index.shtml and at the following location(s):

Carson Public Library
151 E. Carson St.
Carson, CA 90745-2797
(310) 830-0901
Tuesday - Thursday: 10 am - 8 pm, Saturday: 8 am - 6 pm, Monday/Friday/Sunday: Closed

California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013
(213) 576-6600

Electronic copies of the documents are also available on the Regional Board's website at:

http://www.waterboards.ca.gov/losangeles/ under "Announcements"

Contact: If you have any questions or wish to discuss the project, please contact:

Susana Lagudis
Public Participation Specialist
Los Angeles Regional
Water Quality Control Board
(213) 576-6694
susana.lagudis@waterboards.ca.gov

Dr. Teklewold Ayalew
Project Manager
Los Angeles Regional Water Quality Control Board
(213) 576-6739
teklewold.ayalew@waterboards.ca.gov

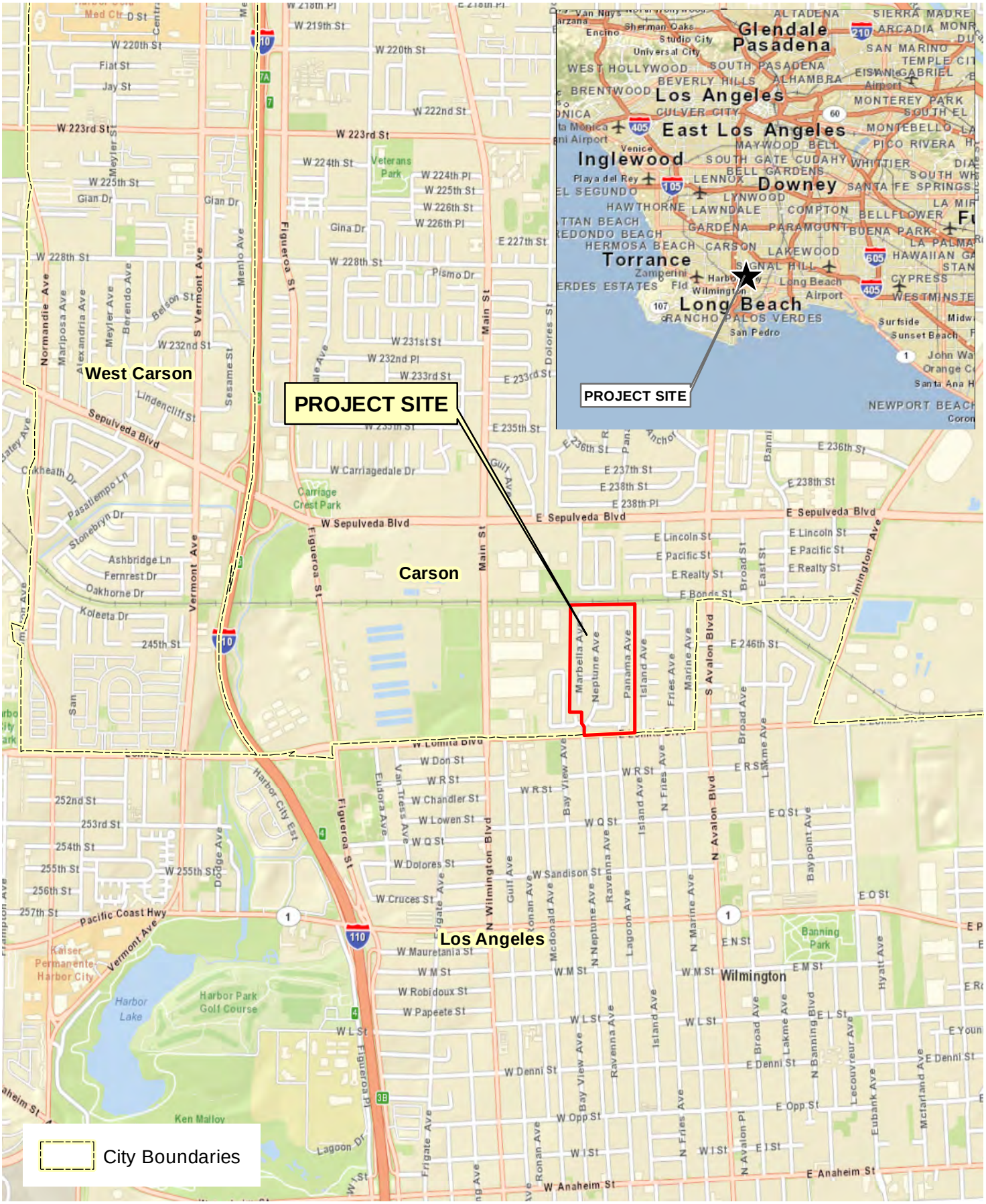
Information for the Disabled and Hearing Impaired

Persons with hearing or speech impairments can contact us by using the California Relay Service Telecommunications Device for the Deaf (TDD). TDD is reachable only from phones equipped with a TDD Device. HEARING IMPAIRED REPLAY SERVICE: TDD to voice 1-(800)-735-2929; voice to TDD 1-(800)-735-2922.

Environmental Effects To Be Evaluated in the Draft EIR

The purpose of an EIR is to identify and consider the potentially significant adverse environmental effects of a proposed project and identify measures that can reduce, avoid, or mitigate significant adverse impacts. The Los Angeles Water Board has conducted consultations with interested parties, including an inter-agency scoping conference call held on September 11, 2013, a written public comment period from September 9 through October 8, 2013 related to the Site-Specific Cleanup Goals, and a Community Open House conducted on September 24, 2013 at the Carson Community Center. In addition, the Los Angeles Water Board prepared an Initial Study on the Draft RAP, which is available at http://www.swrcb.ca.gov/rwqcb4/Kast/index.shtml. See Attachment 2 for a Project Description. Based on input received from previous public meetings and the Initial Study, the Los Angeles Water Board has determined that the proposed project may have a significant impact on the following resource areas:

- Air Quality
- Greenhouse Gas
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Noise
- Transportation/Traffic
- Utilities (Solid Waste)



0 1,000 2,000 Feet

Regional and Location Map

KastSite RAP

Source: ESRI Street Map, 2009; PCR Services Corporation, 2013.

FIGURE

1

PCR

N

0 500 1,000 Feet

Aerial Photograph

KastSite RAP

Source: Microsoft, 2010; PCR Services Corporation, 2014.

FIGURE

2

ATTACHMENT 1
DISTRIBUTION LIST FOR NOP - AGENCIES AND RPS

Hard Copy

State of California
Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

California Emergency Management Agency
4671 Liberty Avenue
Los Alamitos, CA. 90720

Native American Heritage Commission
1550 Harbor Blvd., Suite 100
West Sacramento, CA. 95691

CalTrans
P.O. Box 942873
Sacramento, CA. 94273-0001

Electronic Distribution:

California State Assembly
derrick.mims@asm.ca.gov

United States House of Representative
ericf.boyd@mail.house.gov

State of California Office of Environmental Health Hazard Assessment
Jim.Carlisle@oehha.ca.gov

State of California Department of Toxic Substances Control
Robert.Romero@dtsc.ca.gov
Wendy.Arano@dtsc.ca.gov

County of Los Angeles Board of Supervisors
kkatona@bos.lacounty.gov
rtahara@bos.lacounty.gov
vharris@bos.lacounty.gov

Los Angeles County Department of Public Health
abellomo@ph.lacounty.gov
clandowski@ph.lacounty.gov
crangan@ph.lacounty.gov
eramirez@ph.lacounty.gov

Attachment 1 – Distribution List for NOP – Agencies and RPs

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anthony.espinoza@lausd.net
gwenn.godek@lausd.net
timothy.popejoy@lausd.net

City of Carson
ktruong@carson.ca.us
Mayor Jim Dear
jdear@carson.city.us.

South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4178
Ian MacMillan, Program Supervisor,
Inter-Governmental Review, Planning, Rule Development & Area Sources
imacmillan@aqmd.gov

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Sara.Oneill@shell.com
allen_blodgett@urscorp.com
Christian_Osterberg@urscorp.com
roy.patterson@urs.com
nancy.meilahn.fowler@urs.com
rettinger@geosyntec.com
dmarx@geosyntec.com
Mark.Caffee@edelman.com
Soojin.Yoon@edelman.com
zaft@caldwell-leslie.com

ATTACHMENT 2
PROJECT DESCRIPTION

Site History

The Kast Property Tank Farm was owned and operated by Shell Oil Company (Shell) from 1924 through 1966. In 1966, Shell sold the Site to Lomita Development Company (Lomita), an affiliate of Richard Barclay and Barclay-Hollander-Curci, which developed the property into a residential neighborhood. The Site included three crude oil storage reservoirs with a total capacity of 3.5 million barrels. Reservoirs had concrete-lined bottoms and sidewalls with frame roofs on wood posts, surrounded by earth levees averaging 20 feet in height. Demolition of the three crude oil reservoirs by the Lomita began in 1966. Site redevelopment into a single family residential neighborhood began in approximately 1967, referred to as the Carousel Tract.

In 2008, residual oil was discovered in soil and groundwater at the Site. Subsequently, the Los Angeles Water Board issued orders to Shell requiring investigation and cleanup of the Site pursuant to the Porter-Cologne Water Quality Control Act (Porter-Cologne Act, California Water Code §§13000 et seq.). Comprehensive multi-media Site investigations have been underway since 2008 and have included assessments of soil, soil vapor, sub-slab soil vapor, indoor air, and groundwater impacts. To date, investigations have been conducted in city streets within the Carousel Tract, at 270 of the 285 residential properties in the Carousel Tract, the adjacent Monterey Pines and Island Avenue Tracts, the adjacent railroad right-of-way north of the Site, and at the Wilmington Middle School.

In 2011 the Los Angeles Water Board issued a Cleanup and Abatement Order (CAO) that required Shell to propose and submit a Remedial Action Plan (RAP) for the cleanup of the Carousel Tract and conduct additional site characterization and remediation pilot tests. Primary constituents of concern are methane, benzene and petroleum hydrocarbons. Shell has completed the additional site characterization and remediation pilot tests and submitted a proposed RAP, a Human Health Risk Assessment (HHRA), and a Feasibility Study Report that are currently under review by the Los Angeles Water Board. The RAP proposes how the Site will be cleaned up to achieve Site-Specific Cleanup Goals, how long the cleanup will take, and how the waste in the soil, soil vapor, and groundwater will be managed.

Proposed Project

The proposed project is the approval of the RAP and requires environmental review in compliance with the California Environmental Quality Act (CEQA). The Los Angeles Water Board will be evaluating the potential environmental impacts associated with the implementation of the RAP, in particular, the short-term impacts associated with the possible cleanup or control methods to be used and the extent of the cleanup. Shell evaluated several different methods during pilot tests for site cleanup, including:

- Soil vapor extraction (SVE);
- Excavation of soils impacted by petroleum hydrocarbons;
- Bioventing to biodegrade petroleum hydrocarbons in shallow soils;
- In-Situ chemical oxidation using ozone gas for cleanup of shallow soil; and
- Other technologies for cleanup of constituents of concern (COCs) in groundwater.

The proposed site remedy in the RAP includes shallow soil excavation, installation and long-term operation of a SVE and bioventing system, sub-slab vapor mitigation, recovery of light non-aqueous phase liquid (LNAPL) hydrocarbons from groundwater wells, monitored natural attenuation of groundwater, and implementation of a soil management plan. The proposed remediation activities are described as follows:

- Excavation of shallow soils is proposed to occur at impacted residential properties identified based on the HHRA completed for the project. Excavation would be conducted in landscaped and hardscaped areas of

identified residences (e.g., uncovered patios, walkways, etc.). Following excavation, hardscape and landscaping would be restored to like conditions. Based on findings of the HHRA and distribution of total petroleum hydrocarbon concentrations, approximately 180-185 properties have been identified for remedial excavation.

- Installation and operation of a SVE/bioventing system is proposed to address volatile petroleum hydrocarbons, volatile organic compounds (VOCs), and methane in soil vapor and soils in areas beneath existing paved areas and concrete foundations of homes, soils remaining below the depth of excavation, and the deeper vadose zone. SVE wells and piping would be installed in City streets and on residential properties. The treatment system equipment would either be located onsite or offsite at a yet to be determined location.
- Installation of a system is proposed to vent soil vapor from beneath the slabs of approximately 30 properties based on the HHRA completed for the project.
- Recovery of LNAPL to the extent technologically and economically feasible using dedicated pumps installed in the wells is proposed to remove LNAPL that has accumulated in two monitoring wells (MW-3 and MW-12) located in City streets. The pumping would be conducted periodically (currently monthly).

Environmental Checklist Form

1. Project Title: Former Kast Property Tank Farm Site Remedial Action Plan

2. Lead Agency Name and Address: Los Angeles Regional Water Quality Control Board, 320 West 4th Street, Suite 200, Los Angeles, CA 90013

3. Contact Person and Phone Number: Paula Rasmussen, Assistant Executive Officer, (213)-576-6607

4. Project Location: City of Carson, CA; the Former Kast Property Tank Farm (Site) is a 44 acre site located in Carson, California. The Site is bounded to the north by East 244th Street, Lomita Boulevard to the south, Marbella Avenue to the west, and Panama Avenue to the east (see Figure 1 attached). The Site currently is a residential neighborhood known as the Carousel Tract (see Figure 2 attached). Lomita Boulevard forms the jurisdictional boundary between the City of Los Angeles and the City of Carson.

5. Project Sponsor's Name and Address:
   Shell Oil Products US,
   Attn: Douglas Weimer
   20945 S. Wilmington Ave
   Carson, CA 90810

6. General Plan Designation: Low Density Residential

7. Zoning: Residential

8. Description of Project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)
   The project is the Los Angeles Regional Water Quality Control Board's (Water Board's) approval of a Remedial Action Plan (RAP) for the cleanup of the Site submitted by Shell in response to a Cleanup and Abatement Order (CAO) issued by the Water Board in 2011. Primary constituents of concern (COCs) are methane, benzene and petroleum hydrocarbons. Additional site characterization investigations, remediation pilot tests, a Human Health Risk Assessment (HHRA) and a Feasibility Study have been completed for the Site. Additionally, Site-specific Cleanup Goals (SSCGs) for soil, soil vapor, and groundwater were established in response to the Regional Board's Review of the Revised Site-Specific Cleanup Goal Report and Directive dated January 23, 2014. The Former Kast Property Tank Farm Site Remediation Project, i.e., the RAP, has been proposed to remediate the site with the intent of achieving the SSCGs.

   See Attachment A, Project Description, for a more detailed description.

9. Surrounding Land Uses and Setting: Briefly describe the project's surroundings:
   The Site includes a residential community known as the Carousel Tract in an urban area within the southern portion of the City of Carson. Residential uses are located to the north, east, and south of the Site. Commercial and light manufacturing uses are located adjacent to the northwestern portion of the Site with residential uses adjacent to the southwestern portion of the Site. The BNSF railroad right-of-way is on the northern boundary of the Site. The Wilmington Middle School is located approximately 600 feet from the southwest corner of the Site.

10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)
    South Coast Air Quality Management District (SCAQMD), the City of Carson, and the Occupational Safety and Health Administration (OSHA).

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

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

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

DETERMINATION: (To be completed by the Lead Agency) On the basis of this initial evaluation:

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

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

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

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

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

Signature	Printed Name	Date
Paula Rasmussen	Paula Rasmussen	3-17-14

EVALUATION OF ENVIRONMENTAL IMPACTS:

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

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

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

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

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

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

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

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

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

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

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

9) The explanation of each issue should identify:

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

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

Issues:

I. **AESTHETICS** -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Discussion: The proposed remediation would occur in various locations within an existing residential neighborhood. Since the proposed work will be on residential properties and public streets, residents at this area will have a view and therefore there may be aesthetic impact on a temporary basis. Existing landscaping will be replaced in kind upon completion of excavation and soil vapor extraction (SVE) system piping installation activities.

However, there are no scenic vistas or designated state scenic highways in the project area. No historic buildings are located on the site. The remediation activities would result in temporary changes to the visual environment in the residential neighborhood due to the staging of materials and equipment on site during excavation and installation of remediation systems. Equipment that may be used on the site include drill rigs, backhoes, mini-excavators, rubber-tired loaders, water buffalo trailers and soil vapor extraction equipment. Stockpiling of excavated soils would be minimized and if possible excavated soils would be loaded and transported off site the same day. Although the project would create minor short-term changes to the visual character during implementation of the remedy, the disturbed area would be restored and the visual character of the site and surroundings would not be substantially degraded.

II. **AGRICULTURE AND FOREST RESOURCES:**	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. -- Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non- agricultural use?	☐	☐	☐	☒

II. AGRICULTURE AND FOREST RESOURCES:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion: The site is a residential development in a highly urban area with no agriculture or forest resources. The project would not conflict with existing zoning for agricultural use or convert agricultural or forest land to non-agricultural or non-forest use. Therefore, no impact would occur.

III. AIR QUALITY -- Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☒	☐	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☒	☐	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☒	☐	☐

Discussion: The Site is located within the jurisdiction of the South Coast Air Quality Management District (SCAQMD).

The implementation of the RAP would result in the release of volatile organic compounds (VOCs) and/or dust due to excavation of soils impacted with VOC and semi volatile organic compounds (SVOC) and SVE system piping and bioventing installation and operation. The project proponent will be required to comply with applicable SCAQMD rules and permits to mitigate air quality impacts.

Air quality impacts and feasible mitigation will be assessed in the EIR to be prepared for the project.

IV. **BIOLOGICAL RESOURCES** -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Discussion: The project site is a residential development in a highly urbanized area. The site does not contain riparian habitat, a sensitive natural community, federally protected wetlands, migratory wildlife corridors, or native wildlife nursery sites.

V. **CULTURAL RESOURCES** -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

Discussion: There are no known historic, archaeological, paleontological or unique geologic resources that exist at the site or near the site as described in a technical report entitled Cultural Resources Investigations, Former Kast Property, Carson, California, Site Cleanup No. 1230, Site ID 2040330 (URS, 2011). The remediation would result in excavation of shallow soils. However, given that the site has been previously disturbed with the removal/demolition of the reservoirs and development of homes and remediation activities would occur in these already disturbed areas, the likelihood of encountering cultural resources is considered low. Therefore, there would be no known significant cultural resources impacted by the project.

VI. GEOLOGY AND SOILS -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☒	☐	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

Discussion: The project would remediate impacted soil in an existing residential development. The exposure of people or structures to adverse effects associated with ground shaking, ground failure, liquefaction, expansive soils, impacts and mitigation related to soil erosion and soil stability will be assessed in the EIR to be prepared for the project.

VII. GREENHOUSE GAS EMISSIONS -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

Discussion: Implementation of the RAP will involve the use of equipment used in soil removal excavation, SVE and bioventing wells installation, SVE piping trench excavation, loading and transporting of soil, SVE system compound construction, SVE system operation, and personnel vehicle movement that will generate greenhouse gas emissions (i.e., carbon dioxide) from combustion of fossil fuels in engine-powered equipment.

Impacts and mitigation related to GHG emissions will be assessed in the EIR to be prepared for the project.

VIII. HAZARDS AND HAZARDOUS MATERIALS -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☒	☐	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☒	☐	☐	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☒	☐	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

Discussion: Implementation of the RAP will involve excavation of impacted soil and soil vapor extraction (SVE) of volatile organic compounds that are or may be considered hazardous.

Items a – d: Impacts and mitigation related to potential exposure to hazardous materials will be assessed in the EIR to be prepared for the project. The nearest school is the Wilmington Middle School located approximately 600 feet southwest from the southwest corner of the site. Therefore, these issues will be evaluated in the EIR that will be prepared for the project.

Items e and f: The nearest airport to the site is the Torrance Municipal Airport, located over 3.3 miles to the west of the site. Therefore, no impacts would occur and no further evaluation is necessary.

Item g: Lane closures needed during the soil excavation portion of the remedy would be done in accordance with the Traffic Management Plan and Encroachment Permits from the City of Carson. These temporary lane closures are not expected to interfere with emergency access or emergency evacuation plans. There may be temporary street blockage for several minutes at a time as trucks manuveur to dump loads (backfill soil as an example), but no long-term closures are expected. Drilling and trenching in the streets for well and piping installation would be required for installation of the soil vapor extraction system. Similar to installation of water and sewer lines, there may be short-term blockages of driveways to individual residential properties for less than a day. Trenching that interferes with access would be covered with steel plates to allow access at night and if construction activities are delayed. Therefore, impacts would be less than significant and no further evaluation is necessary.

IX. **HYDROLOGY AND WATER QUALITY** -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	☒	☐	☐	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre- existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☒
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☒
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Otherwise substantially degrade water quality?	☒	☐	☐	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

Discussion: The site is not located in a 100-year floodplain and implementation of the RAP would not change drainage patterns within the Tract. The implementation of the RAP would not result in a substantial alteration of existing drainage patterns, nor would it increase the rate or amount of surface runoff such that flooding would result. Potential impacts to storm water may occur if storm water is exposed to contaminated soil during excavation activities. However, implementation of required best management practices would mitigate this potential impact. Impacts relative to water quality (Items a. and f.) will be assessed in the EIR to be prepared for the project.

X. **LAND USE AND PLANNING** -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒

X. LAND USE AND PLANNING -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

Discussion: The implementation of the RAP would not change the existing land use within the Carousel Tract. Therefore, the project would have no impact with regard to land use and planning.

XI. MINERAL RESOURCES -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally- important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Discussion: The site has no known mineral resources and implementation of the RAP would not change the availability of mineral resources at the site. Therefore, no impact to mineral resources would occur and no further evaluation is necessary.

XII. NOISE -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☒	☐	☐	☐
b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?	☒	☐	☐	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

XII. NOISE -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Discussion: The implementation of the RAP may result in temporary changes in noise and vibration levels. Noise producing equipment that may be used over the course of the project includes construction vehicles, excavation equipment, power tools, vacuum blowers and off-gas treatment units. Specific drilling and excavation equipment has not been selected at this time. The use of equipment on-site during soil removal excavation, SVE piping trench excavation, SVE well installation, as well as the temporary increase in construction vehicles, would result in a change to the existing noise levels at the Site.

Items a., b., and d.: Impacts and mitigation related to potential noise and vibration exposure will be assessed in the EIR to be prepared for the project.

Item c.: The implementation of the RAP would not result in a substantial permanent increase in ambient noise levels in the vicinity since the cleanup is a short-term project. Thus, long-term noise analysis is not warranted. However, Item d. will be evaluated in the EIR as indicated below.

Items e. and f.: The nearest airport to the site is the Torrance Municipal Airport, located over 3.3 miles to the west of the site. There is no private airstrip within the vicinity of the site. Therefore, no noise impacts relative to airports would occur and no further evaluation is necessary.

XIII. POPULATION AND HOUSING -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion: The remediation project has no growth-inducing element and the project would not result in any impacts to population or housing. Population growth would not be affected and displacement of housing would not occur as the excavation would be conducted in landscaped and hardscaped areas of identified residences (e.g., uncovered patios, walkways, etc.). While some temporary relocation of residents may be required during excavation activities, there are a substantial number of hotel/motel rooms in the area and construction of replacement housing is not expected. Therefore, no significant impact with regards to population and housing would occur under the recommended project scope and no further analysis of the issue is necessary.

XIV. **PUBLIC SERVICES** -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

Discussion: The project would not generate an increase in the demand for public services as the demand for public services is generally associated with population or employment growth. No new housing would be constructed that would generate a need for additional schools or parks. The RAP has no component or activity that would cause substantial adverse physical impacts requiring changes or impacts to fire, police, schools, parks or other public services facilities. The nature and extent of the proposed project would not generate a need for any new or physically altered governmental facilities. Therefore, no impact to public services would occur.

XV. **RECREATION** -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

Discussion: No recreational facilities are on the project site and project activities would notl require new/expanded recreational facilities or increase the use of existing facilities. The nature and extent of the proposed project would not generate a need for any new or physically altered recreational facilities. Therefore, no impact relative to recreation would occur and no further analysis is necessary.

XVI. TRANSPORTATION/TRAFFIC -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☒	☐	☐	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☒	☐
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☒	☐

Discussion: Items a., e., and f.: Implementation of the RAP would result in short-term, temporary traffic. Due to the nature of the project, conflicts with adopted policies, plans or programs regarding the circulation system or alternative transportation facilities would not occur because these plans address the long-term status and maintenance of the circulation systems. As such, impacts would be less than significant and no further analysis of the plans is necessary.

Item b.: Implementation of the RAP would require the exportation of impacted soil from the site and would therefore, generate truck trips. Thus, construction activities could adversely impact the circulation system. A traffic study will be prepared and will be included and summarized in the EIR to be prepared for the project.

Item c: As indicated under Section VIII, Hazards and Hazardous Materials, the nearest airport to the site is the Torrance Municipal Airport, located over 3.3 miles to the west of the site. Therefore, no impacts with regard to air traffic patterns would occur and no further evaluation is necessary.

Item d: The project would not result in any changes to the existing circulation system. Therefore, the project would not increase hazards due to a design feature and no further evaluation is necessary.

XVII. UTILITIES AND SERVICE SYSTEMS -- Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒

c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☒	☐	☐	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

Discussion: Items a.-c. and e.: The implementation of the RAP would not include the development of uses that would generate new wastewater flows. The Project does not propose a change in land use that would result in greater average daily flows than are currently produced. Thus, no impacts regarding wastewater would occur with Project implementation. Further analysis of this issue in the EIR is not necessary. Potential impacts regarding runoff during the proposed remediation activities are addressed in Section IX, Hydrology and Water Quality, above.

Item d: The project could result in a marginal increase in water demand during the implementation of the RAP over what currently is experienced at the site. However, the amount of water usage is expected to be nominal as it would be limited primarily to watering down the site for dust control and irrigation of newly planted vegetation, and it would be short-term, lasting only through the duration of the project. It is expected that the City's municipal water sources can accommodate the project's water requirement. Furthermore, upon completion of the RAP, land uses are not expected to change from current uses, and therefore, no change to water deman would result that would generate a long-term effect to available water supplies provided by the City. As such, a less than significant impact would occur related to water supplies. Further analysis of this issue in the EIR is not necessary.

Items f. and g.: The impacted soil that would excavated at the site would be disposed of at a facility that can accept such waste. The landfill disposal capacity for the materials will be assessed in the EIR to be prepared for the project. The project would comply with federal, state, and locat statutes and regulations related to solid waste. Therefore, no further evaluation of consistency with the regulations would be necessary.

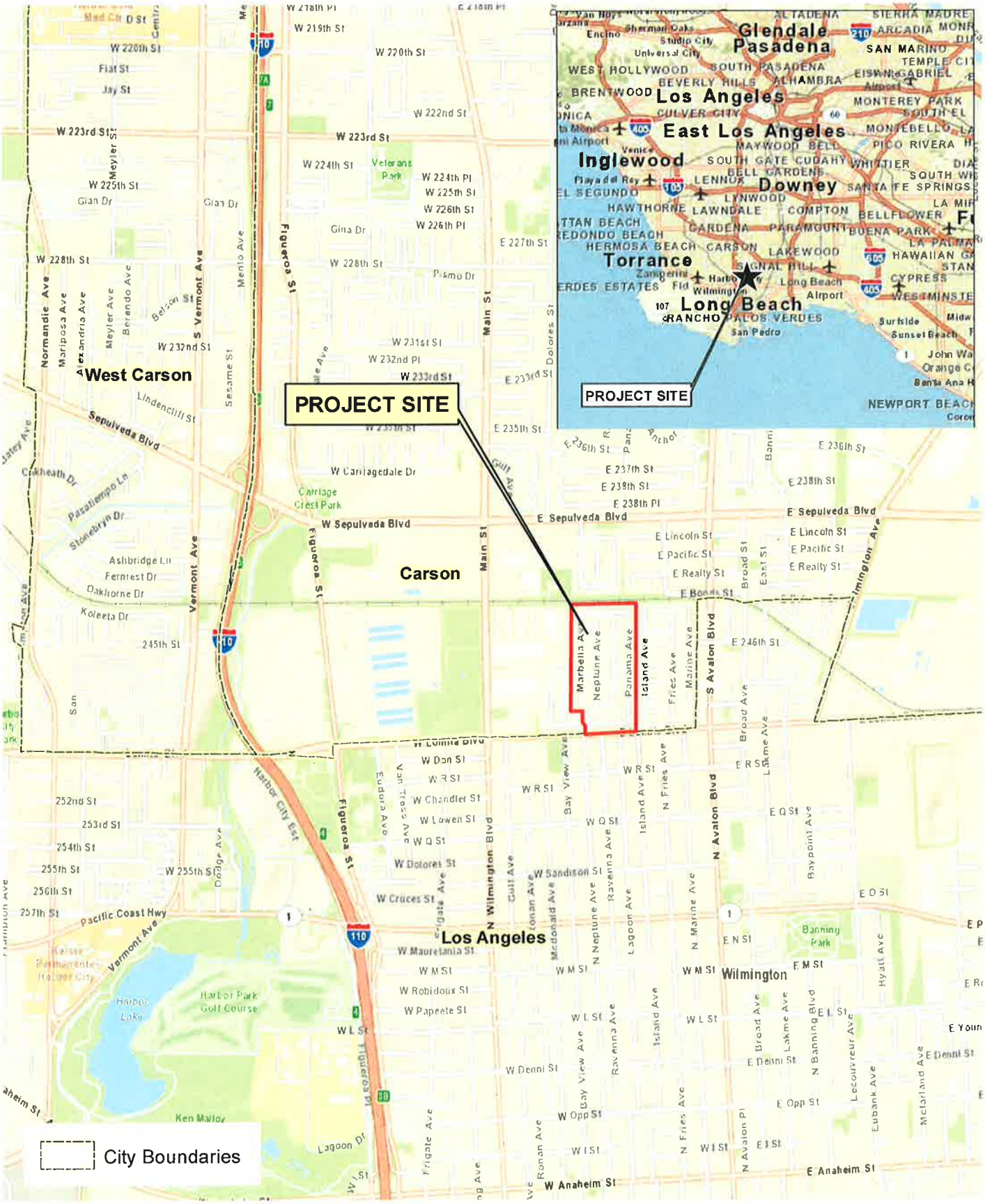
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☒	☐	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

Discussion: Item a.: As analyzed in this Initial Study, the project could result in environmental impacts that would have the potential to degrade the quality of the environment. As such, an EIR will be prepared to further analyze and document the project's potentially significant impacts.

Item b.: The project is not growth inducing and would not itself result in an increase in area population, employment, or new infrastructure. The issues relevant to this project are localized and primarily limited to the immediate vicinity of the site, with the exception of impacts regarding air quality, greenhouse gas emissions, noise, and truck traffic. Cumulative impacts for these issues will be assessed in the EIR to be prepared for the project.

Item c.: Based on the preceding responses, the project could result in environmental effects that could result in substantial adverse impacts to human beings, either directly or indirectly, which requires further analysis within the EIR.

Note: Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; Sundstrom v. County of Mendocino,(1988) 202 Cal.App.3d 296; Leonoff v. Monterey Board of Supervisors, (1990) 222 Cal.App.3d 1337; Eureka Citizens for Responsible Govt. v. City of Eureka (2007) 147 Cal.App.4th 357; Protect the Historic Amador Waterways v. Amador Water Agency (2004) 116 Cal.App.4th at 1109; San Franciscans Upholding the Downtown Plan v. City and County of San Francisco (2002) 102 Cal.App.4th 656.



0 1,000 2,000 Feet

Regional and Location Map

KastSite RAP

Source: ESRI Street Map, 2009; PCR Services Corporation, 2013.

FIGURE

1

PCR

0 500 1,000 Feet

Aerial Photograph

KastSite RAP

Source: Microsoft, 2010; PCR Services Corporation, 2014.

FIGURE

2

ATTACHMENT A
PROJECT DESCRIPTION

Site History

The Kast Property Tank Farm was owned and operated by Shell Oil Company (Shell) from 1924 through 1966. In 1966, Shell sold the Site to Lomita Development Company (Lomita), an affiliate of Richard Barclay and Barclay-Hollander-Curci , which developed the property into a residential neighborhood. The Site included three crude oil storage reservoirs with a total capacity of 3.5 million barrels. Reservoirs had concrete-lined bottoms and sidewalls with frame roofs on wood posts, surrounded by earth levees averaging 20 feet in height. Demolition of the three crude oil reservoirs by the Lomita began in 1966. Site redevelopment into a single family residential neighborhood began in approximately 1967, referred to as the Carousel Tract.

In 2008, residual oil was discovered in soil and groundwater at the Site. Subsequently, the Los Angeles Water Board issued orders to Shell requiring investigation and cleanup of the Site pursuant to the Porter-Cologne Water Quality Control Act (Porter-Cologne Act, California Water Code §§13000 et seq.). Comprehensive multi-media Site investigations have been underway since 2008 and have included assessments of soil, soil vapor, sub-slab soil vapor, indoor air, and groundwater impacts. To date, investigations have been conducted in city streets within the Carousel Tract, at 270 of the 285 residential properties in the Carousel Tract, the adjacent Monterey Pines and Island Avenue Tracts, the adjacent railroad right-of-way north of the Site, and at the Wilmington Middle School.

In 2011 the Los Angeles Water Board issued a Cleanup and Abatement Order (CAO) that required Shell to propose and submit a Remedial Action Plan (RAP) for the cleanup of the Carousel Tract and conduct additional site characterization and remediation pilot tests. Primary constituents of concern are methane, benzene and petroleum hydrocarbons. Shell has completed the additional site characterization and remediation pilot tests and submitted a proposed RAP, a Human Health Risk Assessment (HHRA), and a Feasibility Study Report that are currently under review by the Los Angeles Water Board. The RAP proposes how the Site will be cleaned up to achieve Site-Specific Cleanup Goals, how long the cleanup will take, and how the waste in the soil, soil vapor, and groundwater will be managed.

Proposed Project

The proposed project is the approval of RAP and requires environmental review in compliance with the California Environmental Quality Act (CEQA). The Los Angeles Water Board will be evaluating the potential environmental impacts associated with the implementation of the RAP, in particular, the short-term impacts associated with the possible cleanup or control methods to be used and the extent of the cleanup. Shell evaluated several different methods during pilot tests for site cleanup, including:

- Soil vapor extraction (SVE);
- Excavation of soils impacted by petroleum hydrocarbons;
- Bioventing to biodegrade petroleum hydrocarbons in shallow soils;
- In-Situ chemical oxidation using ozone gas for cleanup of shallow soil; and
- Other technologies for cleanup of constituents of concern (COCs) in groundwater.

The proposed site remedy in the RAP includes shallow soil excavation, installation and long-term operation of a SVE and bioventing system, sub-slab vapor mitigation, recovery of light non-aqueous phase liquid (LNAPL) hydrocarbons from groundwater wells, monitored natural attenuation of groundwater, and implementation of a soil management plan. The proposed remediation activities are described as follows:

- Excavation of shallow soils is proposed to occur at impacted residential properties identified based on the HHRA completed for the project. Excavation would be conducted in landscaped and hardscaped areas of identified residences (e.g., uncovered patios, walkways, etc.). Following excavation, hardscape and

landscaping would be restored to like conditions. Based on findings of the HHRA and distribution of total petroleum hydrocarbon concentrations, approximately 180-185 properties have been identified for remedial excavation.

- Installation and operation of a SVE/bioventing system is proposed to address volatile petroleum hydrocarbons, volatile organic compounds (VOCs), and methane in soil vapor and soils in areas beneath existing paved areas and concrete foundations of homes, soils remaining below the depth of excavation, and the deeper vadose zone. SVE wells and piping would be installed in City streets and on residential properties. The treatment system equipment would either be located onsite or offsite at a yet to be determined location.
- Installation of a system is proposed to vent soil vapor from beneath the slabs of approximately 30 properties based on the HHRA completed for the project.
- Recovery of LNAPL to the extent technologically and economically feasible using dedicated pumps installed in the wells is proposed to remove LNAPL that has accumulated in two monitoring wells (MW-3 and MW-12) located in City streets. The pumping would be conducted periodically (currently monthly) and where a significant reduction in current and future risk to groundwater will result.

CITY OF CARSON

October 8, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 West Fourth Street, Suite 200
Los Angeles, CA 90013

Subject:: Proposed California Environmental Quality Act (CEQA) Scoping Comments
CAO R-4-2011-046 Shell Oil Kast Tank Farm Site

Dear Mr. Unger,

In response to the Los Angeles Regional Water Quality Control Board's (Regional Board) request for comments on the scope of the CEQA document, the City of Carson respectfully submits the following comments:

Following the discovery in 2008 of wide-spread contamination in the Carousel Tract, the Regional Board issued a Cleanup and Abatement Order No. R-4-2011-046 directing Shell Oil Company to investigate the Carousel Tract (former Kast Tank Farm Property) and provide remedial action to cleanup and abate the contamination from the former tank farm. The CEQA document will evaluate the types of cleanup and the extent of cleanup and is expected to fully evaluate air quality, traffic and transportation, geology and soils, greenhouse gas emissions, hydrology and water quality, noise, public services and utilities and service systems.

It is not known at this time the extent of potential excavation or other remedial activities. As such, there needs to be careful consideration to the phasing of remedial actions to ensure that basic services are maintained to the Carousel Tract and adjoining Monterey Pines development.

During the implementation of the approved remedial action, the ability to occupy the homes and maintain a semblance of normalcy may be greatly compromised. The potential for residents to move from their homes on a temporary or long term basis needs to be evaluated. Reduction in property values may also contribute to increased vacancy. The potential for a significant number of vacant or abandoned properties may create a blighted condition and increase the demand for law enforcement and fire services.

The remedial actions may necessitate a significant amount of plan review and inspection service associated with permits issued by the city, including but not limited to the Building and Safety Division, Engineering Division, and Public Works Division. Early coordination is recommended to determine the extent of inspection services that may be required. The CEQA document should evaluate the potential need to augment normal plan review and inspection services.

During pilot tests involving excavation, residents reported strong odors that were offensive to some. With the potential for a large amount of excavation to be conducted over an extended period of time, the CEQA document should provide a detailed analysis of potential odors and identify measures to minimize such impacts within the Carousel Tract and surrounding area.

City staff recommends that the CEQA document include a discussion of the health effects of air pollution (especially on sensitive receptors) due to grading and excavation, operation of equipment, mobile emissions and other activities associated with the remedial action. Such an evaluation should promote effective strategies for reducing exposure.

The City of Carson supports the efforts of the Regional Board to complete the CEQA process in a timely manner. We will extend the assistance of our staff to provide information and to answer questions as they may arise. If there are any questions, I may be reached at (310) 952-1773.

Sincerely,

Sheri Repp Loadsman
Planning Officer

cc: Mayor and City Council
Acting City Manager
Girardi & Keese
Integrated Resource Management, Inc.

Los Angeles Unified School District

Office of Environmental Health and Safety

JOHN E. DEASY, Ph.D.
Superintendent of Schools

ENRIQUE G. BOULL'T
Chief Operating Officer

JOHN STERRITT
Director, Environmental Health and Safety

April 18, 2014

Dr. Teklewold Ayalew
Los Angeles Water Board Project Manager
320 W. 4th Street
Suite 200, Los Angeles, CA 90013
teklewold.ayalew@waterboards.ca.gov.

Sent via Electronic Mail

SUBJECT: LAUSD COMMENTS ON THE NOTICE OF PREPARATION (NOP) FOR THE ENVIRONMENTAL IMPACT REPORT (EIR) FOR THE FORMER KAST PROPERTY TANK FARM SIT REMEDIATION PROJECT

Presented below are comments submitted on behalf of the Los Angeles Unified School District (LAUSD), Office of Environmental Health and Safety (OEHS), regarding the Notice of Preparation for an Environmental Impact Report (EIR) for the Former Kast Property Tank Farm Sit Remediation Project.

Overall, LAUSD is supportive of the Project, which will remediate existing and potential environmental impacts in an area approximate to LAUSD schools and the community it serves. We look forward to working with the project team and oversight agencies to ensure all measures are implemented to protect the health and safety of LAUSD students and their families, teachers, and staff.

Our comments are as follows:

1. Wilmington Middle School, located at 1700 Gulf Ave, Wilmington, CA 90744, is approximately 300' southwest of the Project Site. The school's northerly border abuts Lomita Boulevard, which is the southerly border of the Project Site. The school has approximately 2,181 students in grades 6-8.

2. The EIR should identify the Wilmington School site as an area of "sensitive receptors." The site houses children who would be more sensitive than the general population to exposures of any chemical or volatile elements. The EIR should address issues of air quality, dust, construction vehicle traffic, noise, water quality and the other significant impact areas identified in the NOP specifically to this site. In other words, LAUSD strongly recommends that analysis and findings for the significant resource areas include site specific analysis of impacts on Wilmington Middle School.

The two schools identified below are less proximate to the Project Site. However, depending on the range of potential environmental impacts, they should be identified and pertinent analysis performed regarding project impacts on students and staff.

3. Broad Avenue Elementary School, located at 24815 Broad Ave, Wilmington, CA 90744, is approximately 1,200' east of the Project Site. The school has approximately 890 students in grades PK-5. The school should be identified as an area of "sensitive receptors."

4. Banning High School, located at 1527 Lakme Ave, Wilmington, CA 90744, is approximately 1,775' southeast of the Project Site. The school has approximately 3,200 students in grades 9-12. The school should be identified as an area of "sensitive receptors."

5. We also recommend that construction traffic plans and truck haul routes be integrated with District Safe School Plans for the above mentioned schools for the protection of student-pedestrians who are present during school pick-up and drop-off times on school days.

Thank you for the opportunity to comment on this important project. If you need additional information please contact Pat Schanen at (213)241-3921or the undersigned at (213)241-3913.

Sincerely,

Timothy Popejoy
CEQA Project Manager
OEHS

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
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West Sacramento, CA 95691
(916) 373-3715
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April 23, 2014

Ms. Paula Rasmussen, Assistant Executive Officer
Regional Water Quality Control Board, Region 4 (Los Angeles)
320 West 4th Street, Suite 200
Los Angeles, CA 90013

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Sent by U.S. Mail
No. of Pages: 4

RE: SCH#2014031053; CEQA Notice of Preparation (NOP)n; draft Environmental Impact Report (DEIR) for the **"Former KAST Property Tank Farm Site Remediation Project;"** located on a 44-acre parcel in in the City of Carson; Los Angeles County, California

Dear Ms. Rasmussen

The Native American Heritage Commission (NAHC) has reviewed the above-referenced environmental document.

The California Environmental Quality Act (CEQA) states that any project which includes archeological resources, is a significant effect requiring the preparation of an EIR (CEQA guidelines 15064.5(b).. To adequately comply with this provision and mitigate project-related impacts on archaeological resources, the Commission recommends the following actions be required:

Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, pursuant to California Environmental Quality Act (CEQA) §15064.5(f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities. Also, California Public Resources Code Section 21083.2 require documentation and analysis of archaeological items that meet the standard in Section 15064.5 (a)(b)(f).

If there is federal jurisdiction of this project due to funding or regulatory provisions; then the following may apply: the National Environmental Policy Act (NEPA 42 U.S.C 4321-43351) and Section 106 of the National Historic Preservation Act (16 U.S.C 470 *et seq.*) and 36 CFR Part 800.14(b) require consultation with culturally affiliated Native American tribes to determine if the proposed project may have an adverse impact on cultural resources

We suggest that this (additional archaeological activity) be coordinated with the NAHC, if possible. The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. Any information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure pursuant to California Government Code Section 6254.10.

A list of appropriate Native American Contacts for consultation concerning the project site has been provided and is attached to this letter to determine if the proposed active might impinge on any cultural resources.

California Government Code Section 65040.12(e) defines "environmental justice" to provide "fair treatment of People...with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations and policies." (The California Code is consistent with the Federal Executive Order 12898 regarding 'environmental justice.' Also, applicable to state agencies is Executive Order B-10-11 requires consultation with Native American tribes their elected officials and other representatives of tribal governments to provide meaningful input into the development of legislation, regulations, rules, and policies on matters that may affect tribal communities.

Lead agencies should consider first, avoidance for sacred and/or historical sites, pursuant to CEQA Guidelines 15370(a). Then if the project goes ahead then, lead agencies include in their mitigation and monitoring plan provisions for the analysis and disposition of recovered artifacts, pursuant to California Public Resources Code Section 21083.2 in consultation with culturally affiliated Native Americans.

Lead agencies should include provisions for discovery of Native American human remains in their mitigation plan. Health and Safety Code §7050.5, CEQA §15064.5(e), and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

Sincerely,

Dave Singleton
Program Analyst

CC: State Clearinghouse

Attachment: Native American Contacts list

Native American Contacts
Los Angeles County California
April 23, 2014

LA City/County Native American Indian Comm
Ron Andrade, Director
3175 West 6th St, Rm. 403
Los Angeles , CA 90020
randrade@css.lacounty.gov
(213) 351-5324
(213) 386-3995 FAX

Gabrielino Tongva Indians of California Tribal Council
Robert F. Dorame, Tribal Chair/Cultural Resources
P.O. Box 490 Gabrielino Tongva
Bellflower , CA 90707
gtongva@verizon.net
562-761-6417 - voice
562-761-6417- fax

Tongva Ancestral Territorial Tribal Nation
John Tommy Rosas, Tribal Admin.
Private Address Gabrielino Tongva
,
tattnlaw@gmail.com
310-570-6567

Gabrielino-Tongva Tribe
Bernie Acuna, Co-Chairperson
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Bonsall , CA 92003
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(310) 428-5690 - cell
(760) 636-0854- FAX
bacuna1@gabrielinotribe.org

Gabrieleno/Tongva San Gabriel Band of Mission
Anthony Morales, Chairperson
PO Box 693 Gabrielino Tongva
San Gabriel , CA 91778
GTTribalcouncil@aol.com
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(626) 286-1758 - Home
(626) 286-1262 -FAX

Gabrielino-Tongva Tribe
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Bonsall , CA 92003
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626-676-1184- cell
(760) 636-0854 - FAX

Gabrielino /Tongva Nation
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sgoad@gabrielino-tongva.com
951-845-0443

Gabrieleno Band of Mission Indians
Andrew Salas, Chairperson
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Covina , CA 91723
gabrielenoindians@yahoo.
(626) 926-4131

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list s only applicable for contacting locative Americans with regard to cultural resources for the proposed SCH#2014031053; CEQA Notice of Preparation (NOP); draft Environmental Impact Report (DIEIR) for the Former KAST Property Tank Farm Remediation Project; located in the City of Carson; Los Angeles County, California

Native American Contacts
Los Angeles County California
April 23, 2014

Gabrielino-Tongva Tribe
Conrad Acuna,
P.O. Box 180 Gabrielino
Bonsall , CA 92003

760-636-0854 - FAX

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Sam Dunlap, Cultural Resorces Director
P.O. Box 86908 Gabrielino Tongva
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samdunlap@earthlink.net
909-262-9351

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list s only applicable for contacting locative Americans with regard to cultural resources for the proposed SCH#2014031053; CEQA Notice of Preparation (NOP); draft Environmental Impact Report (DIEIR) for the Former KAST Property Tank Farm Remediation Project; located in the City of Carson; Los Angeles County, California

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

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LOS ANGELES REGION

April 25, 2014

Dr. Teklewold Ayalew
Los Angeles Water Board Project Manager
320 W. 4th Street, Suite 200
Los Angeles, CA 90013

Notice of Preparation of a CEQA Document for the
Former Kast Property Tank Farm Site Remediation Project

The South Coast Air Quality Management District (SCAQMD) staff appreciates the opportunity to comment on the above-mentioned document. The SCAQMD staff's comments are recommendations regarding the analysis of potential air quality impacts from the proposed project that should be included in the draft CEQA document. Please send the SCAQMD a copy of the Draft EIR upon its completion. Note that copies of the Draft EIR that are submitted to the State Clearinghouse are not forwarded to the SCAQMD. Please forward a copy of the Draft EIR directly to SCAQMD at the address in our letterhead. **In addition, please send with the draft EIR all appendices or technical documents related to the air quality and greenhouse gas analyses and electronic versions of all air quality modeling and health risk assessment files. These include original emission calculation spreadsheets and modeling files (not Adobe PDF files). Without all files and supporting air quality documentation, the SCAQMD will be unable to complete its review of the air quality analysis in a timely manner. Any delays in providing all supporting air quality documentation will require additional time for review beyond the end of the comment period.**

Air Quality Analysis

The SCAQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. The SCAQMD recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from the SCAQMD's Subscription Services Department by calling (909) 396-3720. More recent guidance developed since this Handbook was published is also available on SCAQMD's website here: www.aqmd.gov/ceqa/hdbk.html. SCAQMD staff also recommends that the lead agency use the CalEEMod land use emissions software. This software has recently been updated to incorporate up-to-date state and locally approved emission factors and methodologies for estimating pollutant emissions from typical land use development. CalEEMod is the only software model maintained by the California Air Pollution Control Officers Association (CAPCOA) and replaces the now outdated URBEMIS. This model is available free of charge at: www.caleemod.com.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the project and all air pollutant sources related to the project. Air quality impacts from both construction (including demolition, if any) and operations should be calculated. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, that is, sources that generate or attract vehicular trips should be included in the analysis.

The SCAQMD has also developed both regional and localized significance thresholds. The SCAQMD staff requests that the lead agency quantify criteria pollutant emissions and compare the results to the recommended regional significance thresholds found here: http://www.aqmd.gov/ceqa/handbook/signthres.pdf. In addition to analyzing regional air quality impacts, the SCAQMD staff recommends calculating localized air quality impacts and comparing the results to localized significance thresholds (LSTs). LST's can be used in addition to the recommended regional significance thresholds as a second indication of air quality impacts when preparing a CEQA document. Therefore,

when preparing the air quality analysis for the proposed project, it is recommended that the lead agency perform a localized analysis by either using the LSTs developed by the SCAQMD or performing dispersion modeling as necessary. Guidance for performing a localized air quality analysis can be found at: http://www.aqmd.gov/ceqa/handbook/LST/LST.html.

In the event that the proposed project generates or attracts vehicular trips, especially heavy-duty diesel-fueled vehicles, it is recommended that the lead agency perform a mobile source health risk assessment. Guidance for performing a mobile source health risk assessment ("*Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis*") can be found at: http://www.aqmd.gov/ceqa/handbook/mobile_toxic/mobile_toxic.html. An analysis of all toxic air contaminant impacts due to the use of equipment potentially generating such air pollutants should also be included.

In addition, guidance on siting incompatible land uses (such as placing homes near freeways) can be found in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Perspective*, which can be found at the following internet address: http://www.arb.ca.gov/ch/handbook.pdf. CARB's Land Use Handbook is a general reference guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process.

Mitigation Measures

In the event that the project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized during project construction and operation to minimize or eliminate these impacts. Pursuant to state CEQA Guidelines §15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed. Several resources are available to assist the Lead Agency with identifying possible mitigation measures for the project, including:

- Chapter 11 of the SCAQMD *CEQA Air Quality Handbook*
- SCAQMD's CEQA web pages at: www.aqmd.gov/ceqa/handbook/mitigation/MM_intro.html
- CAPCOA's *Quantifying Greenhouse Gas Mitigation Measures* available here: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.
- SCAQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook for controlling construction-related emissions
- Other measures to reduce air quality impacts from land use projects can be found in the SCAQMD's Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning. This document can be found at the following internet address: http://www.aqmd.gov/prdas/aqguide/aqguide.html.

Data Sources

SCAQMD rules and relevant air quality reports and data are available by calling the SCAQMD's Public Information Center at (909) 396-2039. Much of the information available through the Public Information Center is also available via the SCAQMD's webpage (http://www.aqmd.gov).

The SCAQMD staff is available to work with the Lead Agency to ensure that project emissions are accurately evaluated and mitigated where feasible. If you have any questions regarding this letter, please contact me at imacmillan@aqmd.gov or call me at (909) 396-3244.

Sincerely,

Ian V. MacMillan

Ian MacMillan
Program Supervisor, CEQA Inter-Governmental Review
Planning, Rule Development & Area Sources

LAC130319-07
Control Number

Appendix B: RAP and Addendum

Revised Remedial Action Plan

REVISED REMEDIAL ACTION PLAN

REVISED REMEDIAL ACTION PLAN

FORMER KAST PROPERTY
CARSON, CALIFORNIA

Prepared for

Shell Oil Products US
20945 S. Wilmington Avenue
Carson, California 90810

June 30, 2014

Prepared by

URS Corporation
2020 East First Street, Suite 400
Santa Ana, CA 92705
(714) 835-6886 Fax: (714) 433-7701

and

Geosyntec consultants
engineers | scientists | innovators
Geosyntec Consultants
924 Anacapa Street, Suite 4A
Santa Barbara, California 93101

REVISED REMEDIAL ACTION PLAN

FORMER KAST PROPERTY
CARSON, CALIFORNIA
Site Cleanup No. 1230
Site ID 2040330
Cleanup and Abatement Order No. R4-2011-0046

This Revised Remedial Action Plan (Revised RAP) for the former Kast Property was prepared on behalf of Equilon Enterprises LLC, doing business as Shell Oil Products US (Shell or SOPUS), by URS Corporation (URS) and Geosyntec Consultants, Inc. (Geosyntec). URS prepared the majority of this document, including Sections 1 through 5, most of Section 8 and Sections 9 and 10; Geosyntec prepared Sections 6 and 7 and the sub-slab mitigation, bioventing, and groundwater portions of Section 8. This Revised RAP is being submitted in response to Cleanup and Abatement Order No. R4-2011-0046 issued by the California Regional Water Quality Control Board, Los Angeles Region (RWQCB or Regional Board) on March 11, 2011, the RWQCB's letter dated January 23, 2014 directing Shell to submit a Remedial Action Plan and Human Health Risk Assessment pursuant to California Water Code Section 13304, and the Regional Board's letter dated April 30, 2014 and attachments that provided review comments on the RAP, Feasibility Study (FS), and Human Health Risk Assessment (HHRA) dated March 10, 2014.

The scope of services performed in preparation of this RAP may not be appropriate to satisfy the needs of other users, and any use or reuse of this document or the information contained herein is at the sole risk of said user. No express or implied representation or warranty is included or intended in this Revised RAP or the companion Revised FS and HHRA except that the work was performed within the limits prescribed by the client with the customary thoroughness and competence of professionals working in the same are on similar projects. This report was prepared under the technical direction of the undersigned.

URS Corporation

Roy H. Patterson, P.G.
Vice President and Principal Geologist
June 30, 2014

Nancy E. Meilahn Fowler, PE
Senior Project Engineer

Glen T. Davis, PE
Senior Project Engineer

Geosyntec Consultants

Mark Grivetti, P.G., C.Hg.
Principal Hydrogeologist
June 30, 2014

Robert Ettinger
Principal

Ruth Custance
Principal

CERTIFICATION
REVISED REMEDIAL ACTION PLAN

FORMER KAST PROPERTY
CARSON, CALIFORNIA

I am the Senior Project Manager for Equilon Enterprises LLC, doing business as Shell Oil Products US, for this project. I am informed and believe that the matters stated in the this Revised Remedial Action Plan for the former Kast Property, Carson, California are true, and on that ground I declare, under penalty of perjury in accordance with Water Code section 13267, that the statements contained therein are true and correct.

Douglas Weimer
Sr. Principle Program Manager
Shell Oil Products US
June 30, 2014

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LIST OF ACRONYMS AND ABBREVIATIONS

1:1 H:V	One horizontal to one vertical
ARARs	Applicable or relevant and appropriate requirements
ASP	Activated sodium persulfate
ASTM	American Society for Testing and Materials
ASTs	Aboveground storage tanks
Bbls	Barrels of oil (= 42 US gallons)
bgs	Below ground surface
BHC	Barclay Hollander Corporation
BMPs	Best management practices
BTEX	Benzene, toluene, ethylbenzene, xylenes
Cal-EPA	California Environmental Protection Agency
Cal/OSHA	State of California – Division of Occupational Safety and Health
Cal-Water	California Water Services Company
CAO	Cleanup and Abatement Order
CCR	California Code of Regulations
CDOGGR	California Division of Oil, Gas and Geothermal Resources
CDWR	California Department of Water Resources
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cm	Centimeters
CO_2	Carbon dioxide
COCs	Constituents of Concern
COPCs	Constituents of Potential Concern
CWS	California Water Services Company
cy	Cubic yard
dB	Decibel
DBS	Department of Building and Safety
DIPE	Diisopropyl ether
Dole	Dole Foods Company
DPW	Department of Public Works
DTSC	Department of Toxic Substances Control
EIR	Environmental Impact Report
EPCs	Exposure point concentrations
ESLs	Environmental Screening Levels
FEMA	Federal Emergency Management Agency
FID	Flame ionization detector
FORCO	Fletcher Oil and Refining Company
FS	Feasibility Study
ft	Foot or feet
g	Grams
GAC	Granular activated carbon
Geosyntec	Geosyntec Consultants, Inc.
HAZWOPER	40-Hour hazardous waste operations
HHRA	Human Health Risk Assessment
HI	Hazard Index

HQ	Hazard quotient
HSC	Health and Safety Code
HSP	Health and Safety Plan
HSAA	Hazardous Substances Account Act
ILCR	Incremental lifetime cancer risk
in/sec	Inches per second
in-Hg	Inches of mercury
in-WC	Inches water column
IRAP	Interim Remedial Action Plan
ISCO	In-situ chemical oxidation
JSAs	Job Safety Analyses
L	Liter
LA	Los Angeles
LACDPW	Los Angeles County Department of Public Works
Landtec	Landtec GEM 2000
lb	Pound
LEL	Lower explosive limit
LNAPL	Light non-aqueous phase liquid
m	Meter
MCLs	Maximum Contaminant Levels
met station	Meteorological station
mg/kg	Milligrams per kilogram
mph	Miles per hour
msl	Mean sea level
MTA	Los Angeles County Metropolitan Transportation Authority
NAAQS	National Ambient Air Quality Standard
NAPL	Non-aqueous phase liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NELAP	National Environmental Laboratory Accreditation Program
NIOSH	National Institute for Occupational Safety and Health
NLs	Notification Levels
O_3	Ozone
O&M	Operations and maintenance
OD	Outer Diameter
OEHHA	Office of Environmental Health Hazard Assessment
OES	State of California Governor's Office of Emergency Services
OSHA	Occupational Safety and Health Administration
OTC	Oil Transportation Company
OVA	Organic vapor analyzer
PAHs	Polycyclic aromatic hydrocarbons
PCE	Tetrachloroethene
PEL	Permissible Exposure Limit
PID	Photoionization detector
PM10	Particulate matter with an aerodynamic diameter of 10 microns or less
PPE	Personnel protection equipment
ppm	Parts per million
PPP	Public Participation Plan
PSE	Pacific Soils Engineering, Inc.

PSI	Pounds per square inch
PSIG	Pound-force per square inch gauge
PSRP	Property-specific Remediation Plan
PVC	Polyvinyl chloride
RAP	Remedial Action Plan
RAOs	Remedial Action Objectives
RDIP	Remedial Design and Implementation Plan
Regional Board	Regional Water Quality Control Board
RI	Risk Index
ROVI	Radius of vacuum influence
RQs	Reportable Quantities
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
scfm	Standard cubic feet per minute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SIM	Selected Ion Monitoring
Site	Former Kast Property, Carson, California
SOD	Soil oxidant demand
SOPUS	Shell Oil Products United States
SP	Sodium persulfate
SSCGs	Site-specific cleanup goals
SSD	Sub-slab depressurization
SSO	Site Safety Officer
SVE	Soil vapor extraction
SVOCs	Semi-volatile organic compounds
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TBA	Tert-butyl alcohol
TCE	Trichloroethene
THMs	Trihalomethanes
TPH	Total petroleum hydrocarbons
TPHd	Total petroleum hydrocarbons as diesel
TPHg	Total petroleum hydrocarbons as gasoline
TPHmo	Total petroleum hydrocarbons as motor oil
UEL	Upper explosive limit
URS	URS Corporation
USA	Underground Service Alert
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
USTs	Underground storage tanks
VdB	Root mean square velocity in decibels
VEW	Vapor extraction well
VOCs	Volatile organic compounds
VPH	Volatile petroleum hydrocarbons
WRD	Water Replenishment District of Southern California
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
$\mu g/m^3$	Micrograms per cubic meter
%	Percent

EXECUTIVE SUMMARY

This Revised Remedial Action Plan (Revised RAP) for the former Kast Property (Site) in Carson, California was prepared by URS Corporation (URS) and Geosyntec Consultants, Inc. (Geosyntec) on behalf of Equilon Enterprises LLC, doing business as Shell Oil Products US (Shell or SOPUS) in accordance with Cleanup and Abatement Order (CAO) No. R4-2011-0046 issued to Shell by the California Regional Water Quality Control Board – Los Angeles Region (RWQCB or Regional Board) on March 11, 2011 and the RWQCB's letter dated January 23, 2014 directing Shell to submit a RAP and Human Health Risk Assessment (HHRA) pursuant to California Water Code Section 13304. A RAP, Feasibility Study (FS) and HHRA were timely submitted to the Regional Board on March 10, 2014 as directed in the RWQCB's January 23, 2014 letter. The Regional Board, along with the Office of Environmental Health Hazard Assessment (OEHHA) and UCLA Expert Panel reviewed these documents, and the Regional Board provided comments in its letter dated April 30, 2014. The April 30, 2014 letter directed Shell to submit a Revised RAP, FS, and HHRA addressing the RWQCB, OEHHA and the Expert Panel's comments and directives by June 16, 2014. Per the Regional Board's letter dated June 4, 2014, the submittal date was revised to June 30, 2014. This Revised RAP is being submitted in partial satisfaction of that directive. The Revised HHRA (Geosyntec, 2014c) and Revised FS (Geosyntec, 2014d) are being submitted concurrently as separate documents.

This Revised RAP, along with the Revised HHRA and Revised FS, were prepared to fully address the Regional Board's directives provided beginning on Page 15 of the April 30, 2014 letter. The Revised RAP summarizes the remedial alternative evaluation process provided in the companion Revised FS and identifies and describes recommended full-scale remedial actions for impacted shallow soil and other media at the Site in accordance with requirements of the CAO and directives in the Regional Board's January 23 and April 30, 2014 letters. The Revised RAP and the recommended remedy comply with applicable provisions of the California Health and Safety Code, California Water Code, and State Water Resources Control Board (SWRCB) Resolution 92-49, and in particular, the Regional Board and Expert Panel's comments on the previously submitted RAP dated March 10, 2014. A cross-reference table, included as Appendix A, summarizes where in the Revised RAP and companion Revised HHRA and Revised FS, comments and directives from the Regional Board's April 30, 2014 letter are addressed.

This Revised RAP and the companion HHRA and FS were prepared following extensive multimedia investigations at the Site from 2008 to present. Key assessment work completed at the Site includes:

- Assessment in public rights-of-way, the adjacent railroad right-of-way, and other non-residential areas including soil, soil vapor, groundwater, and outdoor air media;
- Assessment at 95% of the individual residential properties, including soil, sub-slab soil vapor, and indoor air testing;
- Assessment of environmental impact and feasibility of removal of residual concrete reservoir slabs;
- Pilot testing to evaluate different potential remedies for Site impacts, and

- Development of Site-Specific Cleanup Goals.

The Site has been impacted with petroleum hydrocarbons associated with crude oil storage during the period prior to residential redevelopment. Total petroleum hydrocarbon (TPH) impacts occur in shallow and deep soils together with volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs). VOCs, including benzene, and methane resulting from degradation of petroleum hydrocarbons are present in soil vapor[1]; dissolved-phase VOC and TPH impacts are present in groundwater, and LNAPL consisting of crude oil is locally present in the groundwater underlying a portion of the Site. In addition to hydrocarbon-related impacts, the Site is also locally impacted by chlorinated solvents, such as tetrachloroethene (PCE) and trichloroethene (TCE), and from a class of chlorinated compounds associated with potable water treatment referred to as trihalomethanes (THMs). Because THMs are related to residential water use, they are not considered constituents of concern (COCs) at the Site.

Some of these compounds, referred to as COCs, are present at concentrations that may pose an incremental cancer risk or human health hazard greater than the *de minimis* risk level of one in a million or Hazard Index greater than 1. Although it does not present a human health risk based on exposure, methane can potentially pose an explosion hazard where present in an enclosed space at a concentration between 5 and 15% in air and there is a source of ignition. In addition, concentrations for some COCs exceed criteria for the potential leaching to groundwater pathway.

A set of final recommended Site-Specific Cleanup Goals (SSCGs) was developed in the HHRA. SSCGs were developed for COCs in soil, soil vapor, and groundwater and are provided in Tables 5-1, 5-2 and 5-3 of this RAP. The Regional Board commented on certain of these SSCGs, and this Revised RAP has been modified to incorporate RWQCB-directed and approved SSCGs.

Medium-specific (i.e. soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) were developed. These RAOs include:

- Prevent human exposures to concentrations of COCs in soil, soil vapor, and indoor air such that total (i.e., cumulative) lifetime incremental cancer risks are within the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) risk range of one in one million to one hundred in one million (1×10^{-6} to 1×10^{-4}) and noncancer Hazard Indices are less than 1 or concentrations are below background, whichever is higher. Potential human exposures include onsite residents and construction and utility maintenance workers. For onsite residents, the lower end of the NCP risk range (i.e., 1×10^{-6}) and a noncancer Hazard Index less than 1 have been used.
- Prevent fire/explosion risks in indoor air and/or enclosed spaces (e.g., utility vaults) due to the accumulation of methane generated from the anaerobic biodegradation of petroleum

[1] Unless otherwise specified in this document, the term "soil vapor" is used to address both sub-slab and deeper soil vapor.

hydrocarbons in soils. Eliminate methane in the subsurface to the extent technologically and economically feasible.

- Remove or treat LNAPL to the extent technologically and economically feasible, and where a significant reduction in current and future risk to groundwater will result.

- Reduce COCs in groundwater to the extent technologically and economically feasible to achieve, at a minimum, water quality objectives in the Basin Plan to protect the designated beneficial uses, including municipal supply.

A further consideration is to maintain residential land-use of the Site and avoid displacing residents from their homes or physically dividing the established Carousel community.

The Revised FS identified and screened a range of remedial technologies potentially applicable to site cleanup. Remediation technologies were screened and then assembled into remedial alternatives that were subjected to initial screening and detailed evaluation for cleanup of the Site. Detailed evaluation conducted for the Revised FS included evaluation of costs associated with each of the alternatives considered and incremental costs vs. benefits of different alternatives in accordance with SWRCB Resolution 92-49. Estimates of mass proposed to be left in place and the basis for estimating the time and cost to reduce the concentrations of constituents of concern is detailed in the Revised FS and formed a part of the basis for selecting the recommended Alternative 4D. The estimated cost for the recommended remedy is $132 million. The detailed evaluation of alternatives, along with the April 30, 2014 comments and consideration of State Acceptance, led to selection of the following recommended alternative and multi-media remedial action approach:

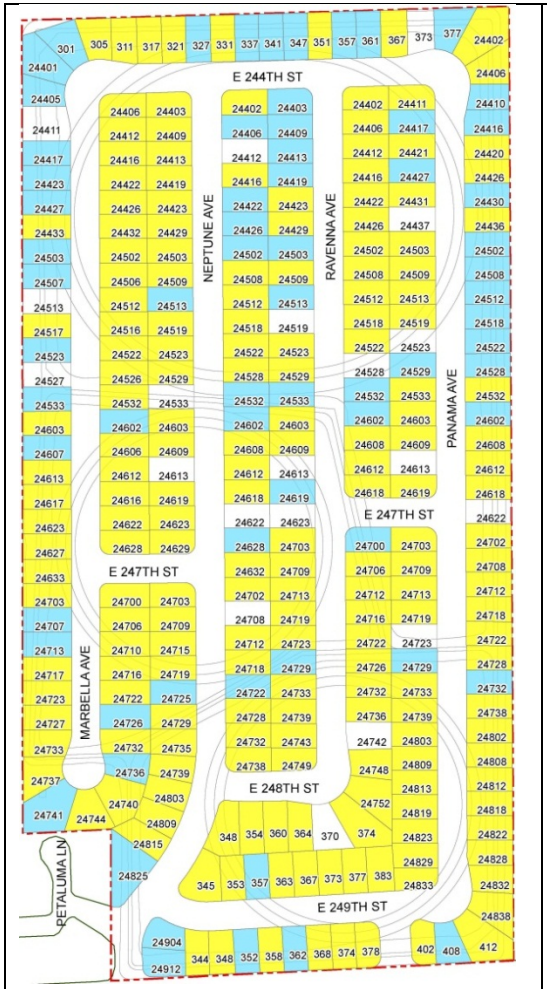
- Excavation of shallow soils from both landscaped and hardscaped areas of residential yards at impacted residential properties where RAOs are not met under existing conditions. Excavation will be conducted to a depth of 5 feet below ground surface (bgs) throughout the accessible areas of front and back yards at approximately 202 properties identified based on Site characterization data, the soil concentration contour maps, results of the HHRA, and where groundwater protection SSCGs are exceeded, subject to setbacks to protect structures and sensitive utilities. The excavation will also remove residual concrete slabs, to the extent practicable, if encountered within the depth excavated. The 202 properties identified for excavation to 5 feet bgs are shown on the figure on page ES-5:

- Excavation of deeper soils between 5 and approximately 10 feet bgs at approximately 82 properties where TPH concentrations exceed 10 times SSCGs or the residual NAPL soil concentration and significant hydrocarbon mass can be reduced based on the distribution and concentration of hydrocarbons detected. This targeted deeper excavation will be conducted where equipment access is feasible and excavation can be achieved safely, subject to allowable setbacks from structures and sensitive utilities. The 82 properties identified for targeted excavation from 5 to 10 feet bgs are shown on the figure on Page ES-5.

- Excavation may be accomplished using a variety of methods, including track-mounted excavators, backhoes, track-mounted limited access auger drill rigs, and by hand, where necessary. Specific equipment to be used will be identified in the Remedial Design and

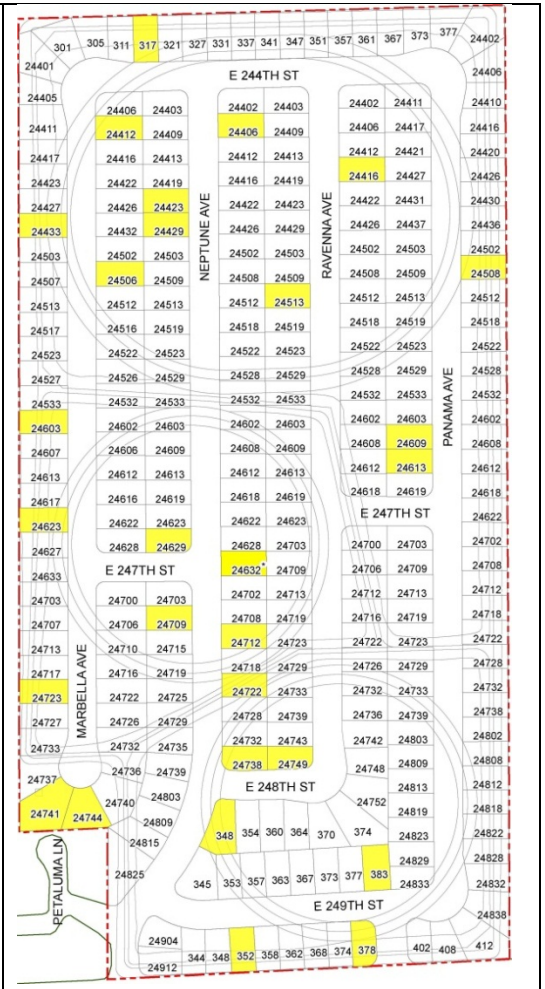
Implementation Plan (RDIP) and in Property-specific Remediation Plans (PSRPs) to be developed after approval of the RAP.

- The possibility of exposure to soils remaining below 5 feet bgs and impacted soils beneath City streets and sidewalks is addressed through existing institutional controls that require a Grading Permit be issued by the City of Carson for excavations deeper than 3 feet and a Surface Containment and Soil Management Plan to address notifications, management, and handling of residual soils that are impacted by COCs at concentrations greater than risk-based levels. This plan is included in Appendix C.
- Shell will implement a community outreach program to inform and educate residents in the community of residual impacted soils and of the notification procedures for management of these materials via the Surface Containment and Soil Management Plan.
- Following excavation, a combination of soil vapor extraction (SVE) and bioventing will be used to address residual petroleum hydrocarbons and VOCs in soils below the depth of excavation and areas not excavated. Soil vapor, including methane, will be addressed by active extraction using SVE and subsequent treatment by promoting degradation of residual hydrocarbon concentrations via bioventing where RAOs are not met following shallow soil excavation. SVE wells will be installed in City streets and on approximately 221 residential properties, as appropriate.
- Bioventing will be conducted via cyclical operation of SVE wells to increase oxygen levels in subsurface soils and promote microbial activity and degradation of longer-chain petroleum hydrocarbons. The same wells will be used for SVE and bioventing through cyclical operation of SVE, which will enhance oxygen flow to the subsurface to promote biodegradation of hydrocarbons during periods when SVE is not active. If intermediate products are generated from biodegradation of hydrocarbons, they will be removed via SVE operation and treated in the SVE treatment system.
- Sub-slab mitigation will be implemented at 28 properties where RAOs are not met and calculated vapor intrusion risk is greater than 1×10^{-6} calculated using an attenuation factor of 0.002 or methane concentrations in sub-slab soil vapor exceed the upper RAO for methane of 0.5%. The 28 locations where sub-slab mitigation systems will be installed are shown on the figure on Page ES-5. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site.



Properties identified for excavation to 5 ft bgs shown in (yellow)
Properties shown in blue not excavated; Properties shown in white not investigated
(see Figure 6-1 for details)

Properties identified for targeted excavation from 5 to 10 feet bgs shown in Orange
(see Figure 6-3 for details)



Properties identified for sub-slab mitigation as part of remediation shown in yellow
(see Figure 6-4 for details)

- LNAPL will be recovered where LNAPL has accumulated in monitoring wells MW-3 and MW-12 and in additional wells if it accumulates at a measurable thickness to the extent technologically and economically feasible, and where a significant reduction in current and future risk to groundwater will result. The goal for LNAPL recovery will be an end point of no measurable LNAPL accumulation in monitoring wells at the Site.
- COCs in groundwater will be reduced to the extent technologically and economically feasible via source reduction and monitored natural attenuation (MNA). MNA could be paired with contingency groundwater remediation of oxidant injection in areas where Site-related COCs exceed 100x MCL if, after a five-year review following start of SVE/bioventing operations, the groundwater plume is not stable or decreasing. In addition, upgradient sources would need to be addressed by the overseeing agencies.
- The recommended remedy includes a comprehensive long-term monitoring plan that will include monitoring of:
    - Sub-slab soil vapor probes at properties scheduled for remedial excavation until the SVE/bioventing system becomes operational and periodically thereafter;
    - Select soil vapor probe locations in City streets until the SVE/bioventing system becomes operational; thereafter, monitoring will be conducted at newly installed shallow and multi-depth soil vapor probes;
    - Utility boxes and other Site features previously monitored until the SVE/bioventing system becomes operational;
    - SVE/bioventing system operations and maintenance (O&M) and system effectiveness sampling will be conducted periodically.

For at the 202 locations where soils will be excavated to 5 feet bgs, 82 locations identified for targeted deeper excavation, and at 28 locations where sub-slab depressurization will be conducted, potential exposures and potential nuisance concerns will be addressed in the short term. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site. Deeper soil, soil vapor, and groundwater risk reduction will be implemented over a longer period of time through SVE/bioventing and MNA. These remedial actions are intended to achieve the RAOs and the SSCGs for soil, soil vapor, and groundwater as directed in the Regional Board's Review of the Revised SSCG Report and Directive dated January 23, 2014, comments received on the March 10, 2014 HHRA, FS, and RAP on April 30, 2014, and in accordance with RWQCB-directed and corrected SSCGs.

Although there is no indication that there are any long-term health risks, water quality, or nuisance concerns caused by COCs associated with residual concrete slabs, residual concrete slabs will be removed where practicable and where they can be removed safely when encountered during excavation. SVE/bioventing would address any concerns at the Site related to impacted soils that may be associated with the residual reservoir slabs left in place.

Following approval of the RAP, a Site-wide Remedial Design and Implementation Plan (RDIP) will be prepared. The Site-wide RDIP will provide details on the design and implementation of the planned remedy, including excavation, SVE/bioventing, and sub-slab vapor mitigation activities. It will include detailed plans for installation of the site-wide components of the SVE/bioventing system. In addition, Property Specific Remediation Plans (PSRPs) will be prepared for each property where remedial work will occur that will present detailed plans for remedial activities on a property-by-property basis, including site restoration. Property owners will be consulted regarding scheduling and logistics, particularly regarding site restoration, including any necessary removal and replacement of hardscape and landscaping features.

A tentative schedule of actions to implement the RAP has been developed and is discussed in Section 9. Certain items, including agency review of the RDIP and PSRPs, review of grading plans and permit applications by the City of Carson, Los Angeles County Department of Public Works (LACDPW) and South Coast Air Quality Management District (SCAQMD), and obtaining access at the individual properties, may take longer than estimated and are outside the control of Shell and its consultants. Following agency approval of the RDIP and PSRPs, issuance of Grading Permits by the City of Carson and the Permit to Operate/Construct for the SVE/bioventing treatment system by the SCAQMD, and granting of access, the construction phase of Site remediation, including installation of the SVE/bioventing system is expected to take approximately 5.6 years. Following the active construction phase, operations and maintenance of the SVE/bioventing system will occur for approximately 30 to 40 years. SVE/bioventing system and other monitoring activities, as required, will occur for an estimated 30 to 40 years.

1.0 INTRODUCTION

1.1 REGULATORY BASIS

URS Corporation (URS) and Geosyntec Consultants, Inc. (Geosyntec) prepared this Revised Remedial Action Plan (Revised RAP) for the former Kast Property (Site) in Carson, California on behalf of Equilon Enterprises LLC, doing business as Shell Oil Products US (Shell or SOPUS) in accordance with Cleanup and Abatement Order (CAO) No. R4-2011-0046 issued to Shell by the California Regional Water Quality Control Board – Los Angeles Region (RWQCB or Regional Board) on March 11, 2011 and the RWQCB's letter dated January 23, 2014 directing Shell to submit a RAP and Human Health Risk Assessment (HHRA) pursuant to California Water Code Section 13304. URS and Geosyntec timely submitted a RAP, Feasibility Study (FS) and HHRA on March 10, 2014 in accordance with the Regional Board's January 23, 2014 directive. The Regional Board, along with the Office of Environmental Health Hazard Assessment (OEHHA) and UCLA Expert Panel, reviewed these documents, and the Regional Board provided comments in its letter dated April 30, 2014. The April 30, 2014 letter directed Shell to submit a Revised RAP, Revised FS, and Revised HHRA addressing the RWQCB, OEHHA and the Expert Panel's comments and directives by June 16, 2014. Per the Regional Board's letter dated June 4, 2014, the submittal date was revised to June 30, 2014. This Revised RAP is being submitted in partial satisfaction of that directive.

The Revised RAP and companion Revised HHRA (Geosyntec, 2014c) and Revised FS (Geosyntec, 2014d) are being submitted concurrently as separate documents. Preparation of these documents follows a series of environmental investigations performed by URS and Geosyntec on Shell's behalf in response to Section 13267 letters issued to SOPUS by the Regional Board on May 8 and October 1, 2008 and November 18, 2009, Section 13304 letter dated October 15, 2009, CAO R4-2011-0046 dated March 11, 2011, and directives contained in the Regional Board's letter of April 30, 2014. This Revised RAP is generally consistent with:

- California Health and Safety Code (HSC) Section 25356.1;
- California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC) *Remedial Action Plan (RAP) Policy*, Guidance Document No. EO-95-007-PP;
- State Water Resources Control Board (SWRCB) Resolution 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304*;
- CAO No. R4-2011-0046; and
- The Regional Board's directives in its January 23, 2014 and April 30, 2014 letters to Shell.

Shell submitted a Revised Site-Specific Cleanup Goal Report (Revised SSCG Report) on October 21, 2013 (Geosyntec, 2013c) in response to the Regional Board's directive in its letter of August 21, 2013. The Regional Board reviewed the Revised SSCG Report, provided comments on the report on January 23, 2014, and directed Shell to use RWQCB-revised SSCGs for soil, soil vapor, and groundwater provided in Tables 1, 2, and 3 of the January 23 letter, respectively, in preparing the

RAP and HHRA. In the HHRA submitted on Shell's behalf by Geosyntec on March 10, 2014, Shell proposed modifications to certain of the soil SSCGs for total petroleum hydrocarbons (TPH) and VOCs to protect groundwater based on the Regional Board's 1996 *Interim Site Assessment & Cleanup* Guidebook (RWQCB, 1996a). The RWQCB did not concur with the proposed modifications and directed Shell to use the RWQCB-revised SSCGs in preparing the Revised RAP and Revised HHRA (RWQCB, 2014d) and provided corrections for the SSCGs for total petroleum hydrocarbons as motor oil (TPHmo) and benzene in subsequent correspondence (RWQCB, 2014e). The RWQCB-directed and approved SSCGs are presented in Tables 5-1 (Soil), 5-2 (Soil Vapor), and 5-3 (Groundwater) of this RAP and support unrestricted residential land use for the Site.

In accordance with the California Environmental Quality Act (CEQA), an Environmental Impact Report (EIR) is being prepared by the RWQCB as the lead agency. The EIR will analyze the potential environmental impacts associated with the recommended remediation alternative. In addition, elements of the selected remedy will require separate approvals and permits from various agencies, including the South Coast Air Quality Management District (SCAQMD), City of Carson, and Los Angeles County Department of Public Works (LACDPW; multiple divisions).

1.2 OBJECTIVES

The objectives of this Revised RAP are to summarize the remedial alternative evaluation process conducted during the Revised FS and identify and describe the recommended full-scale remedial actions for impacted shallow soil and other media at the Site in accordance with Section 3.c of the CAO and directives in the Regional Board's January 23, 2014 and April 30, 2014 letters. The Revised RAP, the companion Revised FS and the selected remedy comply with applicable provisions of the California HSC, California Water Code (CWC), and SWRCB Resolution 92-49, and in particular, the Regional Board and Expert Panel's comments on the previously submitted RAP dated March 10, 2014.

Specifically, Section 3.c of the CAO requires:

- A detailed plan for remediation of wastes in shallow soil that will incorporate the results from the soil vapor extraction (SVE) pilot test;
- A plan to address any impacted area beneath any existing paved areas and concrete foundations of the homes, if warranted;
- A detailed Surface Containment and Soil Management Plan;
- An evaluation of all available options including proposed selected methods for remediation of shallow soil and soil vapor;
- Continuation of interim measures for mitigation according to the Regional Board approved Interim Remediation Action Plan; and
- A schedule of actions to implement the RAP.

A cross-reference table, included as Appendix A, summarizes where in the Revised RAP and companion Revised HHRA and Revised FS, comments and directives from the Regional Board's April 30, 2014 letter are addressed.

The CAO also requires that a number of listed guidelines and policies be applied in preparing the RAP. These guidelines and policies were used in developing the SSCGs presented in the Revised SSCG Report (Geosyntec, 2013c). In particular, the CAO and subsequent Regional Board directives require that setting of site cleanup goals and evaluation and selection of remedial alternatives be based on technological and economic feasibility as prescribed in SWRCB Resolution 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304.* The Revised FS, presented under separate cover and summarized in Section 7 below, addresses this directive. Per the Regional Board's directive dated January 23, 2014, the Revised RAP and companion Revised FS include:

- An evaluation of remedial alternatives, including all technologies that were pilot tested. These alternatives, including Alternatives 3B and 4B identified in the Revised SSCG Report, were evaluated with respect to effectiveness, feasibility and cost.
- A Preliminary Relocation Plan for residents in the Carousel Tract during implementation of remedial actions at individual properties (included as Appendix D in this Revised RAP). Future revisions to the Preliminary Relocation Plan may be submitted to address the scope of the approved remedy.
- Soil remediation boundaries that are identified based on findings from the HHRA, updated concentration contour maps for select COCs (update of contour maps transmitted on April 29, 2011), SSCGs for protection of groundwater, and overall findings from comprehensive investigations completed at the Site.
- Addressing the residual concrete reservoir slabs consistent with the Regional Board's clarification letter dated February 10, 2014.
- A proposed Surface Containment and Soil Management Plan (provided in Appendix C) to address residual COCs that will be left in place following soil excavation.

1.3 PUBLIC REVIEW PROCESS

In accordance with the CAO, Shell prepared and submitted a draft Public Participation Plan (PPP) dated September 17, 2013 (SOPUS, 2013). As described in the CAO and in the PPP, "the RAP will be made available for public review for a minimum 30-day period to allow for public comment on proposed remedies." The Regional Board will hold a public meeting to advise the public regarding planned remedial actions as part of this review process. It is intended that the public comment period and public meeting for the RAP will be concurrent with the public comment period and public meeting to be conducted for the EIR to be prepared for the project.

1.4 ORGANIZATION OF THE RAP

The remainder of this RAP is organized as follows:

- **Section 2** provides Site background information.
- **Section 3** briefly summarizes previous investigations and their findings.
- **Section 4** provides a summary of pilot tests conducted and interim actions implemented at the Site.
- **Section 5** outlines Remedial Action Objectives (RAOs).
- **Section 6** provides a summary of the HHRA.
- **Section 7** summarizes the Feasibility Study conducted to evaluate remedial alternatives and recommend a preferred alternative.
- **Section 8** presents the proposed remedial actions for the Site.
- **Section 9** describes the planned Remedial Design and Implementation Plan (RDIP) process and provides an estimated schedule for implementation of the RAP.
- **Section 10** provides an overall summary of the RAP.
- **Section 11** lists references cited.

As noted above, a cross reference table showing where in the Revised RAP, Revised HHRA and Revised FS the Regional Board's, OEHHA's and Expert Panel's comments and directives from the April 30, 2014 letter to Shell were addressed is included as Appendix A.

2.0 SITE BACKGROUND

2.1 SITE HISTORY

The Kast Property is a former petroleum storage facility that was operated by a Shell Oil Company predecessor from the mid-1920s to the mid-1960s. The property was sold to real estate developers who redeveloped it into the Carousel Community residential housing tract in the late 1960s and early 1970s. Today the Site consists of approximately 44 acres occupied by 285 single-family residential properties and City streets collectively referred to as the Carousel Tract. The Site is located in the City of Carson in the area inclusive of Marbella Avenue on the west, Panama Avenue on the east, E. 244th Street on the north, and E. 249th Street on the south (Figure 2-1). The Site is bordered by the Los Angeles County Metropolitan Transportation Authority (MTA) railroad tracks to the north (formerly owned by the BNSF Railway Company), Lomita Boulevard to the south, residential properties of the Monterey Pines Community and industrial property of the former Turco Products Facility to the west, and residential properties to the east (Figure 2-2).

Detailed Site background information, including information on historical Site operations, onsite structures formerly present, Site demolition, and development was provided in the Plume Delineation Report (URS, 2010a) and the Site Conceptual Model (SCM, Geosyntec, 2010b), included as Appendix A to the Plume Delineation Report. The Site was not developed until 1923 when Shell Company of California purchased the 44-acre property from Mary Kast and constructed three oil storage reservoirs. Two of the reservoirs (the central and southern Reservoirs No. 5 and 6) had capacities of 750,000 barrels each, and the third reservoir (northern Reservoir No. 7) had a capacity of 2 million barrels. The reservoirs were partially in-ground and partially aboveground with earthen berms constructed using soils excavated from the belowground portions of the reservoirs. The reservoirs had wire-mesh reinforced concrete-lined floors and side walls, and were covered with wood frame roofs supported by wooden posts on concrete pedestals (URS, 2010a). The outer berms were 15 to 20 feet above surrounding grade, and the outer walls of the berms are believed to have been covered with asphalt. The oil storage reservoirs were primarily used to store crude oil. Historical records cited in the Plume Delineation Report (URS, 2010a) indicate that bunker oil or heavier intermediate refinery streams may also have been stored in the reservoirs at one time, but the time and quantity of bunker oil storage is unknown. There is no indication that the reservoirs were used to store any other chemicals or compounds (SOPUS, 2010).

Site use remained as an active oil storage facility until the 1950s, when the Site was kept on a standby reserve basis. In October of 1965, Shell Oil Company entered into a Purchase Option Agreement to sell the Site, with the oil storage reservoirs intact, to Richard Barclay or his nominee. Richard Barclay was a principal in Barclay Hollander Curci, later renamed Barclay Hollander Corporation (BHC), and Lomita Development Company (Lomita Development). Lomita Development was subsequently merged into BHC. BHC is now a wholly-owned subsidiary of Dole Food Company, Inc. (Dole).

In December 1965, Richard Barclay designated Lomita Development as his nominee for purchase of the Site. The property was evaluated for BHC and Lomita Development by Pacific Soils Engineering, a BHC-owned company, which performed soil borings and developed engineering

studies and grading plans for the Site. In 1966, BHC and its contractors conducted these studies, removed the remaining residual oil and water from the reservoirs, demolished the reservoirs and graded the Site. Lomita Development's request to rezone the Site from industrial to residential was approved by Los Angeles County in October 1966, and in the same month, title was transferred to Lomita Development under the Purchase Option Agreement. Construction of homes began in 1967 and was apparently completed by the early 1970s. The Site has remained residential since that time. More detailed information on the Site background is included in Appendix A (Geosyntec, 2010b) of the Plume Delineation Report (URS, 2010a).

2.2 REGULATORY INVOLVEMENT

The Site came under the attention of the Regional Board in 2008 when environmental investigations for the neighboring former Turco Products Facility, located directly west of the Site, discovered contamination by petroleum hydrocarbons at sample locations within the former Kast Property. The Department of Toxic Substances Control (DTSC) communicated these findings to the Regional Board in March 2008, and in April 2008 the Regional Board sent an inquiry to Shell regarding the status of any environmental investigations at the Site. This inquiry was followed by the Regional Board's CWC Section 13267 Order to Conduct an Environmental Investigation at the former Kast Property issued to Shell on May 8, 2008. Shell has conducted a series of investigations, pilot studies, and other environmental evaluations of the Site in response to that Order and subsequent 13267 Orders issued on October 1, 2008 and November 18, 2009, Section 13304 Order dated October 15, 2009, and CAO R4-2011-0046 dated March 11, 2011, as amended.

This Revised RAP is being submitted in response to the CAO and subsequent RWQCB comments and directives issued as modifications to the CAO, particularly the RWQCB's letter dated January 23, 2014 directing Shell to submit a RAP and HHRA, pursuant to CWC Section 13304, and the Regional Board's letter dated April 30, 2014 providing review comments and further directives on the RAP, HHRA and FS submitted on March 10, 2014.

2.3 SUMMARY OF SITE CONDITIONS AND STATEMENT OF THE ISSUE

As described below in Section 3, the Site has been impacted with petroleum hydrocarbons associated with crude oil storage during the period prior to residential redevelopment. The distribution of hydrocarbons was significantly affected by reservoir demolition and Site grading activities by the developer.

Crude oil is a complex mixture of various petroleum hydrocarbon compounds. Total petroleum hydrocarbon (TPH) impacts, reported in general hydrocarbon chain ranges corresponding to gasoline (TPHg), diesel (TPHd), and motor oil (TPHmo), occur in shallow and deep soils at the Site together with volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs). VOCs, including benzene, and methane resulting from

degradation of petroleum hydrocarbons are present in soil vapor[2] (also referred to as soil gas); dissolved-phase VOC and TPH impacts quantified as TPHg, TPHd, and TPHmo-range hydrocarbons are present in groundwater, and LNAPL consisting of crude oil is locally present in groundwater underlying a portion of the Site. In addition to hydrocarbon-related impacts, the Site is locally impacted by chlorinated solvents, such as tetrachloroethene (PCE) and trichloroethene (TCE), and from a class of chlorinated compounds associated with treatment of potable water supplied to the community referred to as trihalomethanes (THMs).

As summarized in Section 6 and discussed in detail in the Revised HHRA (Geosyntec, 2014c), some of these chemical constituents, referred to as COCs, are present at concentrations that may pose an incremental cancer risk greater than the *de minimis* risk level of one in a million or a human health Hazard Index (HI) greater than 1. Although it does not present a human health risk based on toxicity, methane can potentially pose an explosion hazard where present in an enclosed space at a concentration between 5 and 15% in air and there is a source of ignition. In addition, concentrations of some COCs exceed criteria for the potential leaching to groundwater pathway.

Medium-specific (i.e. soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) have been developed based on Site characterization investigations completed at the Site. Numerical SSCGs for the COCs, where applicable, have been developed to achieve the medium-specific RAOs. The SSCGs are presented in Tables 5-1 (Soil), 5-2 (Soil Vapor), and 5-3 (Groundwater) of this Revised RAP for soils from 0 to 10 feet and support unrestricted residential land use for the Site. These medium-specific RAOs and SSCGs were used in conducting the Revised FS (Geosyntec 2014d). The Revised FS includes an analysis of technological and economic feasibility and incremental cost/benefit analysis in accordance with SWRCB Resolution 92-49 and other Applicable or Relevant and Appropriate Requirements (ARARs). Based on the analysis in the Revised FS, the response actions described in this Revised RAP were developed.

2.4 SITE SETTING, GEOLOGY AND HYDROGEOLOGY

The Site is located within the West Coast Basin of the Los Angeles Coastal Plain, approximately 3 miles northwest of Long Beach Harbor. The Site is relatively flat, with a gradual slope to the northwest. The elevation across the Site ranges from approximately 30 to 40 feet above mean sea level (msl). The Site is not located within a 100- or a 500-year Federal Emergency Management Agency (FEMA) designated flood zone (URS, 2008). Historically, the Site area has been an oil production area, and active oil production wells are still present to the west and northwest of the Site. Due to historical oil production, the area directly south of the Site across Lomita Boulevard is designated as within the City of Los Angeles methane mitigation zone.

Geologically, the Basin consists of a very thick sequence of unconsolidated marine and continental sediments overlying consolidated sedimentary rocks that range in age from a few thousand years to tens of million years. Based on Site investigations, the upper 10 feet of soil beneath the Site is

[2] Unless otherwise specified in this document, the term "soil vapor" is used to address both sub-slab and deeper soil vapor.

dominantly fine grained and consists of silt with layers or lenses of silty fine sand. Soils between 10 and 15 feet bgs consist primarily of silt and silty fine sand. From 15 to 85 feet bgs Site soils consist of fine sands to silty fine sand. Soils encountered between 85 and approximately 180 feet bgs consist of silt, silty sand, and fine to medium sand.

The shallowest groundwater encountered beneath the Site occurs within the Bellflower aquitard, an overall fine-grained unit that locally has sandy intervals. First groundwater occurs at a depth of approximately 53 feet beneath the Site, with a groundwater flow direction to the northeast (URS, 2014a).

The Gage aquifer occurs beneath the Bellflower aquitard and extends from approximately 90 to 170 feet bgs. Groundwater flow direction in the Gage aquifer is to the east-northeast. The Lynwood aquifer, also known as the "400-foot Gravel," and the deeper Silverado aquifer are located below the Gage aquifer and may be merged in the Site vicinity (CDWR, 1961). The Lynwood aquifer is dominated by coarse sand and gravel in the Site vicinity (Equilon, 2001). These two aquifers extend from approximately 200 feet bgs to at least 550 feet bgs in the Site vicinity. The Lynwood and Silverado aquifers are major sources of groundwater for municipal drinking water wells in the Los Angeles Basin (Equilon, 2001). However, neither the Gage aquifer, nor the shallow Bellflower aquitard (in which the first regional unconfined groundwater was encountered at the Site) is a known source for drinking water in the Site area and future use is unlikely due: 1) high total dissolved solids and other water quality issues unrelated to Site conditions, (2) is present in a low yield, thin aquifer, (3) restrictions on groundwater pumping in the basin due to the adjudication of the groundwater resource; and, (4) the overlying land use is completely residential without the needed open space for water production infrastructure.

The nearest drinking water well, CWS Well 275, is located 435 feet west of the western Site boundary, upgradient of the Site and downgradient of the Former Fletcher Oil Refinery (Figure 2-2). CWS Well 275 produces water from the Lynwood and Silverado aquifers which are below 200 feet bgs in this area. Drinking water is supplied to the Carousel neighborhood and surrounding communities by California Water Services Company (Cal-Water), which regularly tests the drinking water to ensure that it meets state and federal drinking water standards. Information on the quality of water provided by Cal-Water is available from https://www.calwater.com/waterquality/water-quality-reports/rd/ Background Information on Surrounding Properties

Summarized below is information regarding surrounding impacted properties that have documented releases and are potential contributors to impacts at the Site. These former facilities are being investigated under the direction of either the DTSC or the RWQCB. Their locations are shown on Figure 2-2. Additional information regarding these sites is provided in the SCM (Geosyntec, 2010b), included as Appendix A to the Plume Delineation Report (URS, 2010a) and the Revised SSCG Report (Geosyntec, 2013c).

2.4.1 Former Turco Products/Purex Facility

The former Turco Products/Purex Facility (Turco) is located directly west of the northern half of the Site. From 1960 to 1989, Turco processed industrial and janitorial chemicals and conducted chemical milling operations at the facility. Activities associated with Turco's operations resulted in

contamination of soil and groundwater by VOCs. In addition, Turco had an underground gasoline storage tank. Remediation of the property is being conducted by the current property owner, Pedro First Ltd., under DTSC oversight.

Investigations at the former Turco Facility detected volatile compounds, including benzene, toluene and chlorinated VOCs (e.g. PCE and TCE), in the groundwater (DTSC letter to Regional Board, March 2008). According to data contained in the second semi-annual groundwater monitoring report (Leymaster, 2013), both diisopropyl ether (DIPE) and tert-butyl alcohol (TBA) have been detected in Turco wells in the past; however, the data indicate that oxygenated solvents are infrequently analyzed in groundwater samples. The groundwater flow direction on the Turco property is generally to the northeast, thus the Turco property is upgradient from the Site, and it is possible that some contaminants have migrated from the former Turco facility property onto the Former Kast Site.

2.4.2 Former Fletcher Oil and Refining Company

Fletcher Oil and Refining Company (FORCO) operated an oil refinery from approximately 1939 to 1992 on a property currently owned by the Los Angeles County Sanitation District about one-third mile west and upgradient of the Site. FORCO also owned an approximately nine-acre parcel of property known as the Fletcher Oil Storage Yard on the east side of Main Street from 1976 to 1989.

FORCO conducted refining and storage of petroleum products, including crude oil, light distillates (gasoline, naphtha), heavier distillates (diesel fuel, heavy fuel oils and asphalt), and jet fuel. During Fletcher's use of the land east of Main Street as a storage yard, a cluster of nine directional oil production wells, drilled from the same platform, was located on the western edge of the parcel. Aerial photographs indicate the presence of what appeared to be sumps or ponds, as well as several aboveground storage tanks (ASTs) on the property in the past.

The FORCO site is being investigated and remediated under RWQCB oversight under a CWC Section 13267 Order (Site Cleanup No. 0451A, Site ID No. 2040074). Soil and groundwater at the Fletcher Oil site are impacted by petroleum hydrocarbons with impacted groundwater extending offsite to the east of the FORCO property. Two draft cross sections recently prepared by Regional Board staff show contoured benzene concentrations in groundwater emanating from the former FORCO refinery extending beneath the former Turco property, and further extending beneath the former Kast Property (Figures 4 and 5 attached to draft letter to Sanitation District No. 8 from Greg Bishop, P.G., RWQCB project manager for the former Fletcher refinery site dated January 14, 2014; RWQCB, 2014a).

2.4.3 Oil Transport Company Inc.

From 1953 through approximately 1995, Oil Transport Company Inc. (OTC) occupied the property adjacent and to the southwest of the former Kast Property. The OTC site was originally two properties with different uses. The smaller area (approximately 0.93 acres) was developed with several structures, including a chicken processing plant. On the larger portion of the property (approximately 8.2 acres), OTC operated a trucking firm that specialized in the transportation of crude oil and asphalt and also conducted truck washing operations on the property. OTC's reported operations included seven single-walled USTs for fuel and waste oil in four areas on the property, an

oil well, several ASTs for crude oil storage and the associated conveyance piping. At least one clarifier is known to have existed on the property.

In about 1995 the property was acquired by Blue Jay Housing Partners for redevelopment as the Monterey Pines community of single-family homes. The USTs were removed, along with one of the clarifiers, in September 1995. Three of the seven USTs had corrosion holes and contamination was evident in the soils surrounding the tanks (PIC Environmental Services, 1995a). Impacted soils were subsequently excavated and stockpiled onsite and treated through vapor extraction or used onsite as base material for asphalt (PIC Environmental Services, 1995b). OTC was issued a closure letter in 1996 (RWQCB, 1996b).

More recently, the U.S. Environmental Protection Agency (USEPA) conducted an investigation of the Monterey Pines community in response to a request from DTSC. US EPA's report (Ecology & Environment, 2013) states that the former OTC facility included use of chlorinated solvents in a three-stage clarifier, which resulted in PCE-impacted soils at the Site. Ecology & Environment's field investigation documented the presence of PCE and its breakdown products in soil and soil vapor beneath the Monterey Pines and Carousel communities.

2.4.4 Oil Wells

A number of oil wells are shown in the Site vicinity on California Department of Conservation Division of Oil, Gas and Geothermal Resources maps (CDOGGR Map No. 128, 1998). The CDOGGR records did not identify wells on the former Kast Property. However, six wells were identified west of the Site between the western Site boundary and South Main Street, and three wells were identified east of the Site. One of the wells located west of the Site is located at the current location of the Monterey Pines Community directly west of the southern portion of the Site. That well has been abandoned, and a vent pipe for the well is visible near the intersection of Monterey Drive and Petaluma Lane. Two of the wells located east of the Site, referred to as Morton & Dolley Nos. 45 and 46, were located in close proximity to the current location of Island Avenue. Note that Los Angeles County Code requires evaluation of methane hazards for any new construction located within 300 feet and additions or alterations to existing buildings or structures located within 200 feet of active, abandoned or idle oil or gas well(s).

2.4.5 Dry Cleaners

City of Carson documents indicate that several dry cleaner/laundry facilities were present along E. Lomita Blvd at different times from 1971 and 1997 and along S. Main St between 1998 and 2002. Chemicals typically used at dry cleaner and laundry facilities are known to contain PCE.

Because of their proximity to the Site, it is possible that facility operations have impacted the Site through groundwater flow in a northeasterly direction from Lomita, and the area immediately north of the Site from the Main Street locations.

2.4.6 Pipelines

Based on a Los Angeles County Road Department pipeline map (LAC Sheet W-312, undated), there are 10 petroleum lines within the right-of-way in Lomita Avenue, directly south of the Site. Four of

these are shown as abandoned on the map. Most are located in the northern half of Lomita Avenue, adjacent to the Site. Three petroleum pipelines are shown in the railroad right-of-way directly north of the Site running parallel to the railroad tracks. Two are located north of the railroad lines and one is located south of the railroad line, adjacent to the Site (LAC Sheet W-301, undated).

3.0 PREVIOUS INVESTIGATIONS

URS and Geosyntec have conducted extensive multimedia sampling at the Site during multiple investigations from 2008 to present. All of Shell's work at the Site has been conducted with RWQCB approval and oversight following work plans reviewed and approved by the RWQCB. All of these work plans and reports documenting findings of the work conducted are available to the public on the SWRCB GeoTracker website at http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T10000000228.

Investigations at the Site included:

- Assessment in public rights-of-way, the adjacent railroad right-of-way, and other non-residential areas consisting of:
  - Shallow and deep soil sampling;
  - Shallow and deep soil vapor sampling;
  - Advancing CPT/ROST and CPT/UVOST soundings for LNAPL assessment;
  - Groundwater monitoring well installation and sampling;
  - Background outdoor air sampling; and
  - Background soil sampling;
- Assessment at individual residential properties consisting of:
  - Methane screening;
  - Sub-slab soil vapor probe installation and sampling;
  - Shallow soil sampling, and
  - Indoor and outdoor air sampling.
- Assessment of environmental impact and feasibility of removal of residual concrete reservoir slabs.
- Pilot testing to evaluate different potential remedies for Site impacts (discussed in Section 4).

3.1 ASSESSMENTS IN NON-RESIDENTIAL AREAS, PUBLIC STREETS, AND RAILROAD RIGHT-OF-WAY

Assessments in the public streets and railroad right-of-way were conducted in multiple events starting in 2008 and extending into 2014, although the bulk of this assessment work was conducted between 2009 and 2012. Boring and soil vapor probe locations are shown on Figure 3-1, and groundwater monitoring well locations are shown on Figure 3-2.

The initial assessment work was designed to investigate soil, soil vapor, and groundwater conditions onsite and was then expanded to include assessment work directly offsite. Additional soil vapor probes were also installed to better delineate some areas with higher impacts.

As of May 1, 2014, 614 soil samples were collected from 108 locations in public streets and in the railroad right-of-way at depths ranging from 1 to 80 feet bgs. In addition, 356 soil vapor samples

have been collected from 171 soil vapor probe locations in public streets and the railroad right-of-way. Soil vapor sample depths range from 1 to 60 feet bgs although most sample depths are in the upper 5 feet bgs. Soil vapor continues to be sampled quarterly from 5 feet bgs in 10 soil vapor probes. Additionally, as permitted by Site conditions, samples are collected at eight paired 1-foot probes and four paired 1.5-foot probes. These probes are paired with 5-foot probes for shallow, sub-slab equivalent assessment. In addition, URS conducted monthly methane monitoring of 69 utility vault locations onsite from January through June 2012, quarterly for the second half of 2012, twice in 2013, and in the first two quarters of 2014. The vaults are currently monitored on a quarterly basis.

Groundwater monitoring wells screened in the shallow zone (water table) aquifer were installed onsite in the initial assessment work. Additional water table wells were installed on and offsite and four onsite dual-completion (two wells in one borehole) Gage aquifer wells were installed to better define the lateral and vertical extent of hydrocarbon related impacts. Depth to first water (shallow zone aquifer) onsite ranges from approximately 51 to 65 feet bgs. As mentioned in Section 2.4, the Gage aquifer extends from approximately 90 to 170 feet bgs. Each of the four dual-completion Gage aquifer wells were installed so that one well is screened in the lower Gage and the other in the upper Gage aquifer (URS, 2011c).

There are currently 25 groundwater monitoring wells that have been installed and are monitored quarterly. Quarterly groundwater monitoring started in August 2009 after the first set of wells was installed. Groundwater flow direction in the water table aquifer is to the northeast and is east-northeast in the Gage aquifer.

Street assessment work and the results were documented in reports that were submitted to the RWQCB. The primary assessment reports for this work are:

- Final Phase I Site Characterization Report (URS, 2009c);
- IRAP Further Site Characterization Report (URS, 2010b);
- Plume Delineation Report (URS, 2010a);
- Supplemental Site Delineation Report (URS, 2011b); and
- Gage Aquifer Investigation Report (URS, 2011c).

Additionally, individual reports have been submitted for the periodic monitoring of soil vapor in the streets, for monitoring of utility vaults, and for groundwater monitoring.

3.2 ASSESSMENT AT INDIVIDUAL RESIDENTIAL PROPERTIES

Residential Site characterization activities, referred to as the Phase II Site Characterization, focus on assessing conditions at individual residential properties and include screening of indoor air for methane, sampling and analysis of soils to a depth of 10 feet bgs, and installation, sampling and analysis of exterior and interior sub-slab soil vapor probes. These investigations are being conducted in accordance with the RWQCB-approved *Work Plan for Phase II Site Characterization* (URS, 2009b). Indoor air sampling was subsequently added to the residential investigation program and is being conducted in accordance with the *Indoor Air Sampling and Analysis Work Plan* (Geosyntec,

2009a). URS has and continues to sample residential properties as access becomes available. Data for each sampling event at each property are documented and evaluated in an interim residential sampling report and submitted to the RWQCB within 45 days of the receipt of all data from the laboratory.

Through May 23, 2014, 95% of the residences have had some sampling and 79% have completed the required sampling including two rounds of indoor air sampling. Over 800 residential sampling reports have been submitted to the RWQCB. A copy of the residential sampling report is also sent to the homeowner or the homeowner's representative.

3.2.1 Methane Screening

Methane can occur from the natural breakdown of organic materials, including petroleum hydrocarbons. Methane is also the primary component of natural gas used for heating and cooking. URS conducted methane screening inside each house, as access was granted, using a hand held methane meter and a flame ionization detector (FID). Methane screening is conducted throughout each room of the house, inside closets and cabinets and other enclosed spaces where methane could potentially accumulate, at utility connections, wall sockets, drains and around toilets. Most houses have been screened multiple times. This method offers a real-time evaluation of whether methane concentrations in the explosive/combustible ranges are present in the home.

As of May 23, 2014, 270 of the 285 homes onsite have been screened for methane. Methane due to the presence of petroleum hydrocarbons in the subsurface was not detected in any of the homes screened. Fire and explosion hazards have not been identified at any residence due to methane concentrations from degradation of hydrocarbons in soil vapor.

Since 2009, URS has identified natural gas leaks at over 100 utility connections that range from small to significant. The fire department has been called six times to report leaking gas lines in homes where concentrations exceeded 2 to 10% of the lower explosive limit (LEL). None of these were related to soil or soil vapor conditions. The Gas Company was contacted over 50 times to check and repair leaks after URS recommended to the homeowner or the homeowner's representative that they call the Gas Company to have them check a leak.

3.2.2 Soil Sampling

Soil samples generally were collected from multiple locations at each property sampled at depths of 0.5, 2, 5 and 10 feet bgs, where feasible. Samples were also collected at other depths when field observations or field instrument readings indicated possible impacts. The number of locations at each property targeted a sampling density of one boring per approximately 200 square feet of area of exposed soil or vegetation in the front and back yards of residential properties in accordance with the *Addendum Work Plan for Phase II Site Characterization* dated April 19, 2010 (URS, 2010d). As of May 23, 2014, 10,360 soil samples have been collected at 270 of the 285 properties.

3.2.3 Sub-Slab Soil Vapor Sampling

Sub-slab soil vapor probes have been installed through concrete hardscape near the house in the front and back yard and through the floor slab of the home when access was granted. Sub-slab soil vapor

sampling is being done to assist in evaluating VOC and methane impacts and the potential for vapor migration to indoor air. Sub-slab vapor samples have been obtained from nearly every property tested, with many homes having three or four rounds of sample collection. As of May 23, 2014, 2,401 sub-slab soil vapor samples have been collected and analyzed from 271 of the 285 properties. Sub-slab soil vapor samples have been collected at most of these properties on at least three occasions.

3.2.4 Indoor Air Sampling

Shell agreed to sample indoor air at every residence onsite regardless of whether indoor air sampling was indicated by sub-slab soil vapor results. Prior to sampling, a chemical inventory of the residence is conducted at least two days before indoor air sampling begins. Household items with the potential to influence sampling results are removed from inside the house and either stored in the garage or in a storage pod outside the house. Indoor air samples are collected at two locations inside the house and one location in the garage, and outdoor air samples are collected in the front yard and back yard at the same time. The air samples are each collected over a 24-hour period.

Two rounds of indoor air sampling are recommended for each residence to evaluate potential temporal variation. As of May 23, 2014, indoor air sampling has been conducted at least once at 255 properties and has been conducted twice at 234 properties. Through May 23, 2014, 1,470 indoor air samples and 975 outdoor air samples have been collected from the 255 properties tested for indoor air.

3.2.5 Human Health Screening Risk Evaluation (HHSRE)

A Human Health Screening Risk Evaluation (HHSRE) was conducted after each sampling event at each property. The HHSRE is a preliminary conservative evaluation, not to be confused with the HHRA, which has been prepared as a part of the remedial planning for the Site and is summarized in Section 6 and concurrently submitted as a separate document (Geosyntec, 2014c). Both the HHSRE and the HHRA use very conservative, health-protective criteria for purposes of determining whether any further actions are warranted; an exceedance in either of these analyses does not necessarily mean that a health risk will occur. Each HHSRE evaluates available analytical results of the indoor air, soil, and sub-slab soil vapor samples collected at an individual property. The purpose of the HHSRE is to provide a preliminary evaluation of potential human health risks associated with detected constituents of potential concern (COPCs) at the property to identify if interim actions are warranted. The results for the HHSRE are summarized in residential sampling reports for individual properties. Copies of residential sampling reports are provided to the Regional Board and to the residents or to the residents' legal representative. Results of the HHSRE are presented in terms of a Risk Index (RI) for potential exposure to cancer-causing chemicals and a Hazard Index (HI) for exposure to non-cancer-causing chemicals based on chronic effects. A RI or HI value of greater than 1 has been used to identify if further action (e.g., additional investigation, data analysis, or interim measures) may be warranted at the property.

As presented in the *Data Evaluation and Decision* Matrix (Geosyntec, 2010a), as a precautionary measure in advance of the results of the full HHRA, if surface (0 to 2 feet bgs) or subsurface (2 to 10 feet bgs) soil concentrations of COPCs at a property exceeded screening levels such that the RI was

greater than 1 and less than 100 or cumulative HI or TPH HI was greater than 1 and less than 10, residents were advised to minimize contact with and disturbance of soils. If the RI was equal to or greater than 100 or the HI or TPH HI was greater than or equal to 10 for surface soils, residents were advised to avoid contact with surface soils and that interim institutional and/or engineering controls be implemented. For subsurface soils, since contact can only occur through bringing the subsurface soil to the surface, residents were advised to avoid disturbance of subsurface soil and that interim institutional and/or engineering controls be evaluated. If sub-slab soil vapor concentrations resulted in a RI or HI of 1 or greater, collection of indoor air samples was recommended to evaluate the potential for vapor intrusion. (As noted above, Shell agreed to perform indoor air sampling at each residence regardless of whether it was indicated by soil vapor sampling results.)

An evaluation was conducted using multiple lines of evidence to assess whether constituents detected in indoor air were a result of background sources or subsurface vapor intrusion. Detected indoor air concentrations were compared to: (1) outdoor air and garage air concentrations, (2) individual constituents detected in sub-slab soil vapor; and, (3) the typical range of concentrations found in homes due to common household sources. As of May 23, 2014, Geosyntec and URS have concluded that constituents detected in indoor air are reflective of background sources. In their review of Follow-up Indoor Air Reports and Final Interim Reports, the Regional Board and OEHHA generally have agreed with these findings.

3.3 FINDINGS OF ASSESSMENT WORK

Sampling completed during Site characterization confirms that there were petroleum releases at the Site. In addition, there appears to be evidence of offsite sources for chlorinated compounds detected in all Site media and for certain groundwater impacts (e.g., fuel oxygenates and chlorinated VOCs). Petroleum hydrocarbon and related VOC and SVOC impacts occur in shallow and deep soils; VOCs and methane resulting from degradation of petroleum hydrocarbons are present in subsurface soil vapor; dissolved-phase VOC and TPH impacts are present in groundwater, and LNAPL is locally present above groundwater.

In addition to hydrocarbon-related impacts, impacts are also locally present from chlorinated solvents, such as PCE and TCE, and from THMs. Although the chlorinated solvents TCE and PCE are found sporadically around the Site in shallow soils, their presence in groundwater is related to offsite sources. THMs are commonly found in drinking water that has been treated with chlorine or chloramines and form when chlorine reacts with organic matter in the water (California Water Service Company; https://www.calwater.com/help/water-quality/). THMs have all been detected in Site soils, soil vapor, and groundwater. Because their source is related to drinking water delivered to the Site by Cal-Water, THMs are not considered Site-related COCs.

Although petroleum hydrocarbons in the subsurface have likely fermented to produce methane at depth, such methane is generally not present in the shallow subsurface and has not been detected in residences or enclosed areas of the Site at levels that pose a hazard. Methane generated at depth typically migrates very slowly through soils because it is not under significant pressure. Transport is primarily through diffusion, and methane moving upward from depth is typically biologically degraded and/or significantly attenuated in the aerobic shallow soils before it reaches the surface.

This bio-attenuation in the vadose zone is evident in the soil vapor data collected at the Site that has been reported in the Interim Residential Reports and the Street Soil Vapor Monitoring Reports. These natural mechanisms explain the lack of elevated methane levels in the sub-slab soil vapor samples and in indoor air within the residences that have been tested.

As summarized in Section 6 and discussed in detail in the Revised HHRA (Geosyntec 2014c), some COCs detected at the Site are present at concentrations that result in estimates of incremental lifetime cancer risk (ILCR) and noncancer hazard that are above regulatory thresholds or may pose a concern for the potential leaching to groundwater pathway. Although exposure to methane does not, by itself, pose a risk to human health, if methane accumulates in an enclosed space at a concentration between approximately 5% or 50,000 parts per million by volume (ppmv, termed the lower explosive limit, LEL) and 15% or 150,000 ppmv (termed the upper explosive limit, UEL) in the presence of sufficient oxygen and a source of ignition is present, methane may pose a combustion or explosion hazard. Methane in soil vapor at depth does not pose a combustion or explosion hazard regardless of concentration or oxygen content due to the small dimension of pore spaces that effectively acts as a flame arrestor (Sepich, 2013).

The discussion below is intended to highlight predominant risk driving compounds and is not intended to be exhaustive. More detailed discussions are included in the individual site assessment and monitoring reports for the different sets of data.

3.3.1 Impacts in Soil

Elevated TPH and other VOCs and SVOCs related to petroleum releases were found in Site soils: (1) beneath the footprint of the former reservoirs; (2) within the fill material above the base level of the former reservoirs (the source of these impacts appears to be from the developer's reuse of petroleum-impacted fill from other portions of the Site, such as berm areas), and (3) in areas outside the footprints of the former reservoirs. The impacts outside the former reservoirs are potentially from a combination of sources, including possible former onsite or offsite pipelines or spills during operation of the storage facility, the developer's grading activities, offsite sources, and shallow soil sources associated with residential activities. The specific analytes TPHg, TPHd, TPHmo, benzene, naphthalene, and other PAHs (shown as benzo(a)pyrene (BAP)-equivalents[3]), are representative of Site COCs with elevated concentrations in soil. The overall distribution of these analytes at 2, 5 and 10 feet bgs is shown on Figures 3-3 through 3-8. As can be seen on these figures, detections at 2 feet are much less frequent and lower in concentration than detections at 5 and 10 feet bgs. Additionally, to assist in remedial action planning, updated contour plots of this group of analytes in soil have been created and are provided on Figures 3-9 through 3-14[4]. These contour plots have been provided in

[3] Benzo(a)pyrene equivalents are concentrations estimated by summing the detected carcinogenic PAH concentration multiplied by a toxicity equivalency factor that relates the toxicity of individual carcinogenic PAHs to that of benzo(a)pyrene. See HHRA Report (Geosyntec, 2014a) for additional details.

[4] The concentration contours were prepared using Mining Visualization System (MVS) Premier software (version 9.52, C Tech Development Corporation). MVS is an analysis and visualization software package, commonly used by environmental practitioners to assist in the interpolation and visualization of spatial information.

response to a directive from the RWQCB in their January 23, 2014 letter to consider the contour plots in defining soil remediation boundaries. The contour maps shown in Figures 3-9 through 3-14 are updates of contour maps previously submitted to the Regional Board on April 29, 2011 in response to the Regional Board's February 18, 2011 comments approving a step-out sampling work plan that was prepared subsequent to the Site Delineation Report, and updates of the contour maps provided in Appendix B of the March 10, 2014 RAP. Due to the interpolation inherent in the software used to extrapolate between data points to generate the contours, these maps are not necessarily representative of the actual distribution of impacts. Also, it should be noted that these maps interpolate data from known sample points to areas where no sampling has been conducted and therefore show the presence of impacts based on extrapolation where there are not data to confirm whether impacts actually exist.

Higher concentrations of petroleum hydrocarbons tend to be located inside and closer to the edges of the former reservoir footprints. The distribution of TPHd at 2 feet bgs correlates with the reservoir footprints but TPHd is also detected outside the reservoir footprints, particularly in the southern and eastern portion of the Site (Figures 3-4 and 3-10). At 5 and 10 feet bgs, TPHd detections are more common with higher concentrations inside the footprints of the former reservoirs. There are also detections outside the reservoir boundaries, including the area where the former sump was located in the eastern part of the Site.

Concrete slabs, interpreted to be reservoir bottoms, were encountered in some of the borings at depths ranging from approximately 8 to 10 feet bgs. Soil just above the concrete was generally moist to wet but there was no evidence of significant ponding on top of the slabs. Where cored for deeper borings, the concrete was in good condition with staining on the top and, on some cores, bottom surfaces. The interpreted distribution of residual concrete reservoir slabs based on historical information and data collected during Site investigations is shown on Figure 3-21.

3.3.2 Impacts in Soil Vapor

A number of constituents have been detected in soil vapor at the Site. Methane, benzene, and naphthalene are representative of Site-related COCs detected in soil vapor. The chlorinated solvents PCE and TCE and THMs have also been detected locally in soil vapor.

Methane has been detected in subsurface soil vapor samples, particularly deeper soil vapor samples, collected at the Site. Methane screening conducted in indoor structures at the Site and utility vaults, storm drains, and sewer manholes at and surrounding the Site has not identified methane concentrations in enclosed spaces that indicate a potential safety risk.

Very few instances of methane detection above 1% (i.e., 20% of the LEL) have been found in sub-slab soil vapor, and in all but one location, the results of methane speciation indicate the source was either a natural gas pipeline leak or sewer leak. Methane resulting from biodegradation of residual

petroleum hydrocarbons has been identified in one sub-slab garage probe at one property[5]; however, methane was either not detected or at very low (less than 0.01%) in the two other sub-slab soil vapor probes at this property. Furthermore, no methane exceedances were found at this property during the indoor air screening, and methane has not been detected in indoor air samples analyzed by the laboratory. Engineering controls have been installed to mitigate potential risks due to methane detected at this location.

Through May 23, 2014, methane concentrations slightly above the interim action levels of 0.1% and 0.5% were detected in one sub-slab probe during one sampling event at five different properties. At four of these properties, methane concentrations were above the lower methane SSCG of 0.1% but were not above the upper methane SSCG of 0.5%. In all four cases, the methane detections were not reproducible in subsequent sampling events. At one location, a methane concentration of 0.58%, slightly above the upper methane SSCG, was detected in a single sampling event. Because it was a replacement probe, that sub-slab probe has only been sampled once. This location is considered for sub-slab mitigation as part of the recommended Site remedy discussed in Section 8. Methane concentrations detected in sub-slab soil vapor and in soil vapor at depths of 5 and 15 feet bgs are shown on Figure 3-15.

Benzene concentrations in sub-slab soil vapor and in soil vapor at depths of 5 and 15 feet bgs are shown on Figure 3-16. Benzene detections in sub-slab soil vapor are scattered and generally much lower than soil vapor detections at 5 feet bgs and deeper. As with methane, transport is primarily through diffusion, and benzene moving upward from depth is typically biologically degraded and/or significantly attenuated in the aerobic shallow soils before it reaches the surface. Elevated benzene concentrations at 5 and 15 feet bgs are present inside the footprint of the former reservoirs as well as outside.

Naphthalene concentrations in sub-slab soil vapor and in soil vapor at depths of 5 and 15 feet bgs are shown on Figure 3-17. Elevated naphthalene concentrations in sub-slab soil vapor samples are few and scattered. Elevated naphthalene concentrations at 5 feet bgs appear to be concentrated along 244th Street and scattered along Marbella Avenue. Naphthalene was not detected in soil vapor samples from 15 feet bgs.

3.3.3 Impacts in Indoor and Outdoor Air

As discussed above, constituents detected in indoor air were evaluated based on multiple lines of evidence. They were compared to outdoor air and garage air concentrations, to individual COCs detected in sub-slab soil vapor during the sampling event or during previous sub-slab soil vapor sampling events, and to the typical range of concentrations found in homes due to common household sources. As of May 23, 2014, based upon a multiple lines of evidence evaluation, Geosyntec and URS have concluded that constituents detected in indoor air are reflective of

[5] Sub-slab soil vapor methane concentrations exceeding interim action levels have been identified as a result of leaking natural gas utility lines, which were found at several of the residential properties, and a leaking sewer line at two residential properties.

background sources. In their review of Follow-up Indoor Air Reports and Final Interim Reports, the Regional Board and OEHHA generally have agreed with these findings.

An outdoor air background study was conducted that included upwind, downwind, and onsite sampling during four separate 24-hour events between July 31 and September 17, 2010 (Geosyntec and URS, 2010a; Geosyntec, 2013d). The outdoor air samples were collected at four locations west of the Site boundary, four locations east of the Site boundary, and four locations within the interior of the Site for each of the four separate events. The data collected were used to assess whether outdoor air contaminant concentrations within the Site boundary are statistically similar to upwind and downwind locations. Based on the statistical evaluation, all tests show that there is no evidence that the Site or downwind concentrations are different from the upwind concentrations. In their letter dated January 23, 2014, the Regional Board concurred with OEHHA's comments on this report, which included a statement that the outdoor air concentrations are similar to concentrations measured in regional studied conducted in the area and do not indicate that the Site or downwind concentrations are significantly different from upwind concentrations.

3.3.4 Impacts in Groundwater

Groundwater monitoring wells have been sampled quarterly since installation. Groundwater results from the most recent sampling event in the Second Quarter 2014 are included in Appendix B. Most of the groundwater monitoring wells are screened in the water table aquifer, the top of which ranges from approximately 51 to 65 feet bgs onsite. The remaining wells are screened in the Upper and Lower Gage aquifer onsite. The Gage aquifer extends from approximately 90 to 170 feet bgs. Groundwater results from the Second Quarter 2014 are generally consistent with previously reported results. Groundwater is impacted with Site COCs as well as with those attributed to upgradient sources; COCs attributed to offsite sources are discussed in detail in the Revised SSCG Report (Geosyntec, 2013c). These non-Site related COCs include tert-butyl alcohol (TBA) and chlorinated compounds (including TCE and PCE). Again, detailed rationale for these COCs originating from offsite sources is presented in Geosyntec (2013c).

Site-related COCs in groundwater exceeding California drinking water standards (Maximum Contaminant Levels [MCLs] or Department of Human Health Notification Levels [NLs]) are benzene, naphthalene, and arsenic. TPH also exceeds the Regional Water Quality Control Board, San Francisco Region (SFRWQCB) December 2013 Environmental Screening Levels (ESLs). These compounds and LNAPL are discussed below.

It should be noted that the drinking water supplied to the Carousel community by the water provider is screened in a lower aquifer than the impacted groundwater at the Site and is tested according to state standards and is safe to drink (California Water Service Company, 2013). No current or future use of the shallow zone and Gage aquifer at or near the Site is anticipated due to: (1) high total dissolved solids and other water quality issues unrelated to Site conditions, (2) is present in a low yield, thin aquifer, (3) there are restrictions on groundwater pumping in the basin due to the adjudication of the groundwater resource; and, (4) the overlying land use is completely residential without the needed open space for water production infrastructure.

3.3.4.1 LNAPL

If petroleum hydrocarbons from crude are present at sufficiently high concentration they may occur as a non-aqueous phase liquid (NAPL), which typically has lower density than water and is often referred to as "light NAPL" or LNAPL. The Interstate Technology & Regulatory Council (ITRC) defines mobile LNAPL as LNAPL that exists in the soil matrix in amounts that exceed residual saturation and thus can accumulate in monitoring wells (ITRC, 2009). Mobile LNAPL is not necessarily migrating. Further reference to LNAPL in this document refers to mobile LNAPL.

LNAPL has been detected at a measurable thickness in groundwater at the Site in two wells, MW-3 and MW-12, located approximately 43 feet from each other in Marbella Avenue. An LNAPL sample collected from Site monitoring well MW-3 and analyzed was characterized as a relatively unweathered crude oil. URS currently removes LNAPL from these wells monthly using dedicated pumps installed in the wells. To date, approximately 120 gallons of LNAPL have been recovered from MW-3 and MW-12. LNAPL has not been detected in any of the other groundwater monitoring wells at the Site.

3.3.4.2 Benzene

The distribution of benzene in Site groundwater is depicted on Figures 3-18, 3-19 and 3-20; these figures are based on data from the Second Quarter 2014 groundwater sampling event. The Second Quarter 2014 Groundwater Monitoring Report will be submitted by July 15, 2014.

As shown on Figure 3-18, benzene is present beneath much of the Site in the shallow groundwater zone. Benzene in Site groundwater is attributed to one or more of the following: leaching of benzene from hydrocarbon-impacted Site soils; leaching of benzene from LNAPL locally present at or near the water table beneath the Site; and/or migration onto the Site from upgradient sources, including the former Turco Products Facility and former FORCO refinery property (RWQCB, 2014a).

The highest concentrations of benzene detected in the shallow zone during the Second Quarter 2014 were in wells MW-13 and MW-6 (510 µg/L and 150 µg/L, respectively). Both monitoring wells are located in the northeastern portion of the Site. Offsite to the northeast (downgradient), benzene was detected in one downgradient well, MW-10, at a concentration of 9.7 µg/L.

Concentrations of benzene attenuate markedly in the underlying Gage aquifer as shown on Figures 3-19 and 3-20. The benzene concentration in MW-G04S, located directly downgradient of the former Turco Facility, is anomalously high in the Upper Gage and likely is due to impacts related to former operations at the Turco or FORCO sites as indicated by the presence of TBA, which is a fuel oxygenate historically added to refined gasoline. TBA may also occur as a breakdown product of methyl tert-butyl ether, which is also a gasoline additive, and is not a component of crude oil. As discussed in Section 2.5.2, two draft cross sections recently prepared by Regional Board staff show benzene concentrations in groundwater emanating from the former FORCO refinery and extending beneath the former Kast Property (RWQCB, 2014a).

Benzene was not detected in samples collected in the deeper portion of the Gage aquifer during recent monitoring events (Figure 3-20). As shown on Figures 3-18 through 3-20, the lateral and

vertical distributions of benzene at the Site are well defined. The Gage aquifer wells define the vertical benzene distribution, with the exception of the anomalously high benzene detection in shallow Gage well MW-G04S which, as discussed above, is attributed to an offsite source, and benzene was not detected in the lower Gage aquifer well at this location.

As discussed in the Revised SSCG Report (Geosyntec, 2013c), Geosyntec used public domain Monitoring and Remediation Optimization System (MAROS) software to model and evaluate the stability of the benzene groundwater plume at the Site. The MAROS analysis indicated it is likely that the benzene in Site groundwater is being attenuated through natural biodegradation processes and is a stable or decreasing plume. Model simulations predict a reduction of benzene concentrations to MCLs in 70 to several hundred years depending on the level of source removal. This conclusion is supported by the current observed distribution of benzene in the plume, which shows significant attenuation (to non-detect or near non-detect concentrations) at the downgradient plume edge near the property boundary. The conclusion is also supported by the significant age of the plume source (~50 years or more).

3.3.4.3 Naphthalene

Naphthalene has been detected in groundwater from the majority of Site wells. However, during the Second Quarter 2014 only well MW-13, located in the northern portion of the Site, had detected concentration that exceed the NL of 17 µg/L. Naphthalene historically was detected at a maximum concentration of 82 µg/L in MW-13 and has been detected in MW-14 at an historical high concentration of 35 µg/L (detected at 4.0J µg/L below the NL during the Second Quarter 2014). Concentrations of naphthalene historically exceeding the NL are limited to these two areas. MW-13 is the monitoring well with the highest detected concentration of benzene and other hydrocarbon-related VOCs at the Site.

3.3.4.4 Total Petroleum Hydrocarbons (TPH)

MCLs and NLs have not been established for TPH in groundwater. The SFRWQCB has established ESLs for TPHg, TPHd, and TPHmo in groundwater of 100 µg/L (latest update December 2013). TPH has been detected in Site monitoring wells at concentrations exceeding SFRWQCB groundwater ESLs. Based on Second Quarter 2014 data, the TPHg ESL was exceeded in eight wells, the TPHd ESL was exceeded in eight wells, and TPHmo ESL was exceeded in six wells (two of these TPHmo detections were at J-flagged estimated concentrations below the reporting limit). Monitoring well MW-13, located in 244th Street near Ravenna Avenue, consistently has had the highest TPH and VOC concentrations.

3.3.4.5 Arsenic

Arsenic has been detected in most of the Site monitoring wells. During the most recent groundwater monitoring event in which arsenic was sampled (Second Quarter 2014), arsenic concentrations exceeding the MCL of 10 µg/L were detected in four wells. Overall, arsenic concentrations have been declining in most wells with historic arsenic concentrations above MCLs. Arsenic was not detected above the MCL in the three offsite shallow zone downgradient wells. Dissolved arsenic

concentrations in the deeper Gage wells are significantly lower and the concentration in only one well, MW-G04S at a concentration of 19.6 µg/L, was above the MCL.

Although arsenic is identified as a Site COC, it is likely that a portion, if not all, of the arsenic present in groundwater is derived from native Site soils. Arsenic is a natural trace element that occurs in soils. Because arsenic is naturally soluble, dissolved arsenic is a common contaminant in southern California groundwater. Out of all wells sampled by the Water Replenishment District of Southern California (WRD) in the West and Central Groundwater Basins in the Los Angeles area, arsenic exceeds its MCL more than any other constituent (WRD, 2008). WRD (2008) reports that arsenic concentrations as high as 205 µg/L were detected in the wells they monitor.

In summary, it is known that arsenic is a regional contaminant in southern California. It is likely that at least a portion, if not all, of the dissolved arsenic beneath the Site is derived from natural sediments beneath the Site. Petroleum hydrocarbon impacts at the Site may enhance the solubility of arsenic by lowering oxygen levels in the subsurface, thus increasing the mobility of arsenic in soils beneath the Site. Once petroleum hydrocarbons are depleted, elevated arsenic would be expected to return to background concentrations. Based on groundwater monitoring well data, relatively elevated arsenic concentrations are localized in the central western portion of the Site and are attenuated significantly in the downgradient direction.

3.4 RESIDUAL CONCRETE RESERVOIR SLAB ASSESSMENT

Per requirements in the CAO, URS and Geosyntec prepared an assessment of the environmental impact and the feasibility of removal of residual concrete reservoir slabs (URS, 2013e). This assessment summarized historical information regarding activities of the developer during demolition of the residual concrete slabs and reservoir sidewalls, and findings from investigations that provide information on the location, depth and condition of the slabs. A map showing the interpreted lateral extent of the former reservoir slabs is provided as Figure 3-21.

The concrete reservoir slab assessment concluded that there is nothing unique about the former reservoir slabs that would indicate a specific need for their removal. During one of the excavation pilot tests, portions of the concrete reservoir slab beneath the front yard of a property were excavated, broken up and removed. The report concluded that removal of slabs beneath paved areas or homes would require the demolition of City streets and homes, which would have significant social, economic and environmental impacts on the residents of the Carousel tract and the local community. It was URS and Geosyntec's conclusion that the concrete reservoir slabs do not require removal from an environmental or human health perspective and the impacts associated with their removal far outweigh the benefits of removal.

The Regional Board commented on the reservoir slab assessment report in its letter dated January 8, 2014. The Regional Board clarified its position and revised its comments on the reservoir slab assessment in its letter of February 10, 2014. The reservoir slabs are addressed in this RAP based on the Regional Board's clarification letter.

4.0 SUMMARY OF INTERIM ACTIONS COMPLETED AND PILOT TESTING

Based upon findings of HHSREs conducted as part of Phase II Site Investigations of residential properties, evaluations of interim actions were conducted if RI or HI estimates exceeded criteria identified in the Decision Matrix (Geosyntec, 2010a). These evaluations are described in Section 4.1 below.

Multiple bench-scale and field pilot tests were completed to evaluate the effectiveness of using a number of technologies to treat COCs and methane in Site soils and soil vapor. These pilot tests were performed in accordance with the RWQCB-approved work plans *Addendum to the IRAP Further Site Characterization Report and SVE Pilot Test Work Plan* dated April 30, 2010 (URS, 2010d), *Pilot Test Work Plan for Remedial Excavation and In-situ Treatment Pilot Testing, Former Kast Property, Carson, California* dated May 10, 2011 (Work Plan, URS and Geosyntec, 2011) and *Phase II ISCO Bench-scale Test Work Plan* dated March 15, 2013 (Phase II Work Plan, Geosyntec, 2013a).

4.1 EVALUATIONS OF NEED FOR INTERIM ACTIONS

HHSREs were conducted for each property using very conservative and health-protective criteria as part of the Phase II Site Investigation process. Based on HHSRE findings presented in residential sampling reports, as a precautionary measure in advance of the preparation of the full HHRA, if shallow soil (0 to 2 feet bgs) concentrations of COCs exceeded screening levels such that the RI was greater than 1 and less than 100 or cumulative HI or TPH HI was greater than 1 and less than 10, residents were advised to minimize contact with and disturbance of soils. If the RI was equal to or greater than 100 or the HI or TPH HI was greater than or equal to 10, residents were advised to avoid contact with surface soils and that interim institutional and/or engineering controls be implemented. An exceedance of a criterion does not mean that there is a health concern, but that conservative interim measures may be warranted. For subsurface soils, since contact can only occur through bringing the subsurface soil to the surface, residents were advised to avoid disturbance of subsurface soil and that interim institutional and/or engineering controls be evaluated. If sub-slab soil vapor concentrations resulted in a RI or HI that exceeded 100, an evaluation of the need for interim engineering controls was conducted and collection of indoor air samples within 30 days was recommended to evaluate the potential for vapor intrusion. Based upon these recommendations and Regional Board review comments on individual Phase II Interim Reports, interim response actions for COCs exceeding screening levels in soils were further evaluated at 21 properties and reported in the Evaluation of Interim Institutional and/or Engineering Control Letters submitted to the Regional Board. For two residences, additional interim controls were recommended and implemented.

4.1.1 Summary of Interim Actions Completed

At 378 E. 249th Street, where elevated methane related to petroleum hydrocarbon degradation was detected in soil vapor under the attached garage, interim actions including institutional and/or engineering controls were evaluated. Because the methane in the sub-slab vapor probes was of limited extent, not under pressure, and methane was not detected during screening of the ambient air

in either the home or garage, or in indoor air samples collected from both the garage and home and analyzed by an independent laboratory, the methane observed in the garage sub-slab soil vapor probe does not pose a safety concern. As a precautionary measure, SOPUS proposed to implement a methane mitigation system at this property. The methane mitigation system was installed in December 2012 in accordance with a work plan and engineering design approved by the RWQCB and L.A. County Department of Public Works Environmental Programs Division. Monitoring of the system has been performed upon installation, monthly for the first three months, and quarterly for the remainder of the first year. Testing has shown no methane hazard at that residence.

At 24533 Ravenna Avenue, due to the isolated location and depths of samples with detected concentrations of COCs exceeding screening levels, engineering controls consisting of providing a barrier through alternative landscaping was proposed for this residence. Subsequently surgical excavation of the elevated risk area was recommended as part of the excavation pilot test program, which is discussed below in Section 4.3.3. Following completion of the excavation pilot test, a follow up HHSRE of the remaining soils data indicated no significant risks to human health at this property.

4.2 SUPPORT TO UTILITY EXCAVATIONS AND HOMEOWNERS' ACTIVITIES

As part of interim institutional controls, on behalf of SOPUS URS is a member of Underground Service Alert (USA) and receives dig alerts for the Site when USA is notified by parties conducting subsurface work at the Site. URS calls the contact person to discuss the upcoming work and to notify him or her that impacted soil at the Site may be encountered. URS provides field monitoring during the work, if requested, and arranges for soil disposal as needed. URS has provided field monitoring when AT&T has conducted underground line repairs within the Carousel Community. Additionally, field support has been provided to individual homeowners and their contractors when they have notified Shell of planned activities on their properties, such as plumbing repairs, driveway replacement, and landscaping improvements. Field support activities include monitoring for organic vapors, collection and analysis of soil samples when potential impacts are identified in excavations, and coordination with appropriate contractors for proper disposal of the excavated soils. These activities will continue as discussed in the Surface Containment and Soil Management Plan (Appendix C).

4.3 SUMMARY OF PILOT TESTING

Pilot tests have been completed in accordance with RWQCB-approved work plans to evaluate potential remedial actions for the Site. Several remedial technologies have been pilot tested to evaluate the effectiveness of each technology in addressing Site-related compounds, including:

- Soil vapor extraction (SVE) pilot testing at three locations;
- Bioventing pilot testing at six locations;
- Excavation pilot testing at two locations; and
- In-situ chemical oxidation (ISCO) bench testing using persulfate and ozone in two phases.

Detailed pilot testing procedures and results were provided in individual pilot test reports prepared by URS and Geosyntec and are summarized in the *Final Pilot Test Summary Report – Part 1* dated May 30, 2013 (URS and Geosyntec, 2013) and *Final Pilot Test Summary Report – Part 2* dated August 30, 2013 (URS, 2013d).

4.3.1 SVE Pilot Testing

SVE pilot tests were conducted to evaluate the potential effectiveness of using SVE to remove vapor-phase VOCs from subsurface soils in accordance with the RWQCB-approved Work Plan (URS, 2010d). Details of the SVE pilot test activities and results are in the S*oil Vapor Extraction Pilot Test Report* (URS, 2010f).

Three areas were selected for SVE pilot testing at shallow (5 to 10 feet bgs), intermediate (15 to 25 feet bgs), and deep (30 to 40 feet bgs) depth intervals. The effective radius of vacuum influence (ROVI) in the shallow zone (5 to 10 feet bgs) ranged from 24 to 78 feet with an average of approximately 50 feet. The effective ROVI in the intermediate zone (15 to 25 feet bgs) was estimated to be 112 to 131 feet with an average of approximately 125 feet, and the estimated ROVI in the deep zone (30 to 40 feet bgs) was 75 to 156 feet with an average of approximately 115 feet.

Based on the tests, SVE is a viable remedial technology for remediation of methane, VOCs, and the lighter-range petroleum hydrocarbons, such as gasoline-range hydrocarbons. This technology may also be effective on the lighter-range diesel fraction, but would not be effective by itself for longer-chain diesel-range hydrocarbons and motor oil-range petroleum hydrocarbons and SVOCs. However, increased airflow induced by SVE operation would induce oxygen to the subsurface that would promote microbial degradation of longer-chain hydrocarbons and, over the long term, reduce concentrations of these non-volatile compounds.

4.3.2 Bioventing Pilot Testing

Bioventing pilot tests were conducted to evaluate the potential effectiveness of bioventing to reduce concentrations of petroleum hydrocarbon constituents at the Site. Bioventing is an in-situ technology generally applicable to the remediation of a wide range of petroleum hydrocarbons. The aim of bioventing is to supply oxygen to the subsurface to enhance microbial degradation of hydrocarbons in the subsurface. The bioventing pilot testing was conducted in accordance with the *Pilot Test Work Plan* (URS and Geosyntec, 2011).

Bioventing pilot tests were conducted at six locations, four with vertical bioventing wells and two with horizontal bioventing wells installed in trenches. Results from the bioventing pilot tests are summarized in the final *Bioventing Pilot Test Summary Report* (Geosyntec, 2012b). Evidence of degradation of petroleum hydrocarbons was observed during the pilot tests, indicating that bioventing is a potential technology to remediate residual petroleum hydrocarbons

4.3.3 Excavation Pilot Testing

Excavation pilot testing was conducted to evaluate the feasibility of excavating impacted soils to a depth of 10 feet bgs and removing the concrete reservoir bases (slabs) located at approximately 8 to 10 feet bgs beneath portions of the former oil storage reservoirs, and also to evaluate smaller

"surgical" excavations. The excavation pilot tests were conducted in accordance with the *Pilot Test Work Plan* (URS and Geosyntec, 2011).

A slot-trench excavation was completed to approximately 10 feet bgs, including removal of the concrete reservoir slab, in the front yard of a property, and a surgical excavation was done to approximately 6 feet bgs in the back yard of a property to evaluate the ability to conduct surgical excavations for localized mass removal. The scope of excavations at these two locations was expanded to include excavation of the remaining portions of the front and back yards to a depth of 2 feet throughout the entire non-hardscape covered portions of the yards. Landscape restoration to the satisfaction of the homeowners was completed following completion of the pilot tests. Details are provided in the individual excavation pilot test reports (URS, 2013a and 2013b).

Overall excavation pilot test findings include the following:

- Soil excavation using slot-trenching and surgical excavation methods are technically feasible, subject to sufficient working space and observance of setback distances established based on location-specific geotechnical conditions.
- Excavation of yard areas to 2 feet bgs is readily implementable using a combination of mechanized equipment and hand tools.
- Noise impacts to the community can be managed to below maximum allowable levels per the City noise ordinance for the majority of excavation activities when conditions allow use of sound attenuation panels. Noise levels may be exceeded when it is not feasible to use sound attenuation panels. Although exceeding the percentile noise levels[6] during most of the excavation activities, both with and without the attenuation panels, maximum noise levels from the excavation pilot test operations are well within the range of noise levels common to urban environments including ambient noise levels recorded at these locations prior to the start of the excavation, and are unlikely to interrupt typical activities in nearby residences.
- Effective odor and vapor control can be achieved during excavation activities by using long-acting vapor suppressant foam when odorous soils are encountered.
- It is technologically feasible to remove most of the exposed concrete reservoir base within areas excavated using the slot-trenching method; however, some concrete around the margins of the trenches cannot effectively be removed due to logistical constraints. The concrete base was removed over approximately 75 to 80% of the excavated area (front yard), which represents approximately 5.3% of the total area of the lot at this property.
- Although the concrete reservoir floor had some surficial staining, standing fluids (hydrocarbons or water) were not encountered above the reservoir base. Where encountered in the slot-trench excavation, the concrete reservoir slab was intact and in good condition

[6] The percentile noise level (L_n) denotes the sound level that is exceeded for "n" percentage of time during the measurement period. The L_{10}, or the sound level exceeded 10% of the time, is typically used as a measure of event noise because it represents the loudest noise sources. The L_{50} is the median sound level, and L_{90} represents the ambient or background sound level.

without indications of weathering or degradation, and evidence was not observed in this excavation that the concrete slab beneath this property had been ripped or broken by the grading contractor during Site development. It does not appear that the concrete reservoir base is a continuing source of impacts at the slot-trench excavation location.

4.3.4 In-Situ Chemical Oxidation (ISCO) Pilot Testing

The use of ISCO at this Site would involve injecting chemical oxidants into the shallow soils to oxidize organic compounds. A preliminary feasibility evaluation for ISCO was conducted at the time the *Pilot Test Work Plan* was prepared (URS and Geosyntec, 2011). The preliminary feasibility evaluation concluded that sodium persulfate and ozone had greater potential for treatment of COCs than other oxidants considered. Based on this evaluation, ISCO bench-scale testing was conducted in two phases. The first phase is documented in the Technical Memorandum prepared by Geosyntec dated July 16, 2012 (Geosyntec, 2012a). The second expanded bench-testing phase is documented in the Phase II Bench-Scale Report (Geosyntec, 2013b).

The Phase I laboratory bench-scale testing was conducted using sodium persulfate and ozone. Soil samples were recovered from a representative location onsite that had TPH-impacts based on previous soil sampling data. The samples were sent to a feasibility testing laboratory to test the ability of that sodium persulfate and ozone to react with the TPH impacts in the soil.

Sodium persulfate was found not to be effective for treatment of TPH and PAHs. Geosyntec concluded that hydrocarbon treatment using high doses of sodium persulfate would not be effective for Site soils, and field-scale tests were therefore not conducted using this chemical oxidant.

The Phase I studies indicated that ozone treatment could be effective on Site soils (at the bench-scale level); however, the dose required for achieving greater than 90% treatment was very high and an excessive quantity of ozone would be required for field application. Additionally, ozone consumption rates were slow, presenting the potential for fugitive ozone emissions. As a result, field-scale pilot testing was not recommended based on feasibility analysis and modeling that was reported the Technical Memorandum summarizing Phase I results (Geosyntec, 2012a).

In response to the Regional Board's correspondence dated February 14, 2013, Geosyntec submitted a *Phase II ISCO Bench-scale Test Work Plan* on March 15, 2013 (Phase II Work Plan, Geosyntec, 2013a), and conducted a second expanded phase if ISCO pilot testing solely using ozone as an oxidant. Phase II ozone treatment bench-scale soil column tests evaluated the impact of varying ozone concentrations and flow rates, and thus doses, on the treatment of TPH in Site soils, to provide additional insight into the feasibility of in-situ chemical oxidation using ozone. The results indicated less than approximately 50% reduction in TPH concentrations was observed in the Phase II tests using lower flow rates and applied ozone doses.

As with the Phase I findings, Geosyntec concluded that effective field applications would require an excessive quantity of ozone to treat a single injection location, and that full-scale treatment would require an excessive quantity of ozone to achieve greater than 50% reduction in hydrocarbon mass. Therefore, field pilot testing of ISCO using ozone was not recommended based on both Phase I and Phase II findings, and was not considered as a possible remedial alternative.

5.0 REMEDIAL ACTION OBJECTIVES AND SITE-SPECIFIC CLEANUP GOALS

Media-specific (i.e. soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) have been developed for the Site, and numerical SSCGs for the COCs have been developed to achieve the medium-specific RAOs. These medium-specific RAOs and SSCGs, along with the Revised FS, including an analysis of economic and technological feasibility in accordance with SWRCB Resolution 92-49 and other ARARs, were used to identify the recommended response actions for each impacted medium that are proposed in this RAP.

Various demarcations of acceptable risk have been established by regulatory agencies. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR 300) indicates that incremental lifetime cancer risks (ILCRs) posed by a site should not exceed a range of one in one million (1×10^{-6}) to one hundred in one million (1×10^{-4}) and that noncarcinogenic chemicals should not be present at levels expected to cause adverse health effects (i.e., a Hazard Index [HI] greater than 1). In addition, other relevant guidance (USEPA, 1991c) states that sites posing a cumulative cancer risk of less than 1×10^{-4} and hazard indices less than unity (1) for noncancer endpoints are generally not considered to pose a significant risk warranting remediation. The California Hazardous Substances Account Act (HSAA) incorporates the NCP by reference, and thus also incorporates the acceptable risk range set forth in the NCP. In California, the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) regulates chemical exposures to the general population and is based on an acceptable risk level of 1×10^{-5}. The DTSC considers the 1×10^{-6} risk level as the generally accepted point of departure for risk management decisions for unrestricted land use. Cumulative cancer risks in the range of 1×10^{-6} to 1×10^{-4} may therefore be considered to be acceptable, with cancer risks less than 1×10^{-6} considered *de minimis*. The risk range and target hazard index has been considered in developing RAOs and SSCGs based on human health exposures to soil and soil vapor. For groundwater and the soil leaching to groundwater pathway, water quality objectives in the Basin Plan to protect the designated beneficial uses, including municipal supply, have been considered.

5.1 REMEDIAL ACTION OBJECTIVES

The following RAOs are proposed for the Site based on the above and site-specific considerations:

- Prevent human exposures to concentrations of COCs in soil, soil vapor, and indoor air such that total (i.e., cumulative) lifetime incremental carcinogenic risks are within the NCP risk range of 1×10^{-6} to 1×10^{-4} and noncancer hazard indices are less than 1 or concentrations are below background, whichever is higher. Potential human exposures include onsite residents and construction and utility maintenance workers. For onsite residents, the lower end of the NCP risk range (i.e., 1×10^{-6}) and a noncancer Hazard Index less than 1 have been used.
- Prevent fire/explosion risks in indoor air and/or enclosed spaces (e.g., utility vaults) due to the accumulation of methane generated from the anaerobic biodegradation of petroleum

hydrocarbons in soils. Eliminate methane in the subsurface to the extent technologically and economically feasible.

- Remove or treat LNAPL to the extent technologically and economically feasible, and where a significant reduction in current and future risk to groundwater will result.
- Reduce COCs in groundwater to the extent technologically and economically feasible to achieve, at a minimum, the water quality objectives in the Basin Plan to protect the designated beneficial uses, including municipal supply.

A further consideration is to maintain residential land-use of the Site and avoid displacing residents from their homes or physically divide the established Carousel community.

5.2 SITE-SPECIFIC CLEANUP GOALS

Medium-specific SSCGs for soil, soil vapor, and groundwater have been designed to achieve these RAOs. The SSCGs were developed using the guidance documents and agency policies identified by the Regional Board in the CAO, as well as other applicable resources. The RWQCB has directed Shell to use the RWQCB-revised SSCGs in preparing the Revised RAP, Revised FS, and Revised HHRA (RWQCB, 2014d) and provided corrections for the SSCGs for total petroleum hydrocarbons as motor oil (TPHmo) and benzene in subsequent correspondence (RWQCB, 2014e). The RWQCB-approved and directed SSCGs for each medium are summarized below.

5.2.1 Soil

SSCGs for soil were calculated considering human health exposure pathways (i.e., risk-based SSCGs), and the leaching to groundwater pathway. Risk-based SSCGs were developed using a methodology and approach similar to that used to conduct the property-specific HHSREs. Risk-based SSCGs for the residential scenario are based on: (1) frequent exposure assumptions (350 days per year) for shallow soil (e.g., from 0 to 5 feet bgs), and (2) infrequent exposure assumptions (4 days per year) for soils at depth that residents are unlikely to contact more than a few times per year (e.g., from 5 to 10 feet bgs). Risk-based SSCGs for the construction and utility maintenance worker scenario are developed assuming exposures can occur to soil at depths from 0 to 10 feet below ground surface (bgs).

- The Soil SSCGs for residential exposures are chemical-specific numerical values for COCs assuming a target incremental cancer risk of 1×10^{-6} and a hazard quotient of 1. These numerical SSCGs are calculated for both frequent and infrequent exposure assumptions.
- The Soil SSCGs for construction and utility maintenance worker exposures are chemical-specific numerical values for COCs assuming a target incremental cancer risk of 1×10^{-5} and a hazard quotient of 1.
- The Soil SSCGs for the leaching to groundwater pathway are based on protection of groundwater as provided by the Regional Board (RWQCB, 2014d, e). Soil SSCGs for the leaching to groundwater pathway are chemical-specific numerical values for COCs directed by the Regional Board in their January 23, 2014 letter, as revised in the May 29, 2014 letter.

The soil SSCGs used in this Revised RAP are consistent with those listed in Table 1 of the January 23, 2014 RWQCB letter directing Shell to submit this RAP, as modified per the Regional Board's letter of May 29, 2014. Revised SSCGs for soil are listed in Table 5-1.

5.2.2 SSCGs for Sub-Slab and Soil Vapor

As directed in the January 23, 2014 RWQCB letter directing Shell to submit this RAP:

- Soil vapor and sub-slab soil vapor SSCGs for the residential exposures have been calculated using a vapor intrusion attenuation factor of 0.002. In response to comments received from the Regional Board, the sub-slab soil vapor data were re-evaluated considering more recent data, not subtracting the contributions of outdoor air from the indoor air results, and evaluating the contribution of background concentrations in an alternate quantitative manner. Based on the evaluation, an upper-bound vapor intrusion attenuation factor of 0.002 was used to derive sub-slab soil vapor SSCGs. In addition, as directed by the RWQCB (RWQCB, 2014d, e), a vapor intrusion attenuation factor of 0.002 was used to evaluate deeper soil vapor. The use of this default attenuation factor of 0.002 for the assessment of petroleum hydrocarbons detected in deeper soil vapor does not take into account the natural vadose-zone biodegradation that has been identified at the Site and will significantly over-estimate the potential for vapor intrusion for these data.
- Odor-based screening levels also have been developed and were considered in the preparation of this RAP. The odor-based screening levels for soil vapor published in the SFBRWQCB ESL documentation (SFRWQCB, 2013) are used in this RAP. Based on the comparison of the risk based SSCGs and odor based screening levels corrective action planning to address risk-based SSCGs will also address odor concerns.
- The SSCGs for construction and utility maintenance worker exposures are chemical-specific numerical values for COCs assuming a target incremental cancer risk of 1×10^{-5} and a hazard quotient of 1. These numerical SSCGs will be applied to soil vapor from 0 to 10 feet bgs. These numerical values are provided in Table 5-2.
- THMs are not considered with respect to soil vapor exposures because they are components of drinking water and are not Site-related COCs.

Details of the soil vapor SSCG calculations are provided in the Revised HHRA (Geosyntec, 2014c) and the results are presented in Table 5-2.

The SSCGs for methane are the same as those presented in the Data Evaluation and Decision Matrix (Geosyntec, 2010a) previously prepared for the Site. These SSCGs are consistent with Cal-EPA DTSC (DTSC, 2005) guidance for addressing methane detected at school sites.

Methane Level	Response
>10%LEL (> 5,000 ppmv or 0.5%) Soil vapor pressure > 13.9 in H_2O	Evaluate engineering controls
> 2% - 10%LEL (> 1,000 - 5,000 ppmv or 0.1 - 0.5%) Soil vapor pressure > 2.8 in H_2O	Perform follow-up sampling and evaluate engineering controls

This RAP describes the proposed response actions for areas where the methane RAOs are not met.

5.2.3 SSCGs for Groundwater

Because no current or future use of the shallow zone and Gage aquifers at or near the Site is anticipated due to high total dissolved solids, the restrictive controls on groundwater production associated with the adjudication of the West Basin, the thin nature of the Shallow Zone, and the lack of space for pumping related infrastructure in the overlying community, the following groundwater SSCGs are proposed for the Site (consistent with the RAOs):

- Remove or treat LNAPL to the extent technologically and economically feasible, and where a significant reduction in risk to groundwater will result, and
- Reduce concentrations of COCs in groundwater to the extent technologically and economically feasible to achieve, at a minimum, the water quality objectives in the Basin Plan to protect the designated beneficial uses, including municipal supply.

The groundwater SSCGs are presented in Table 5-3.

6.0 SUMMARY OF HUMAN HEALTH RISK ASSESSMENT

6.1 HHRA OVERVIEW

Geosyntec conducted a HHRA to estimate potential human health risks associated with COCs detected in soil, sub-slab soil vapor, and soil vapor at the Site that was submitted in conjunction with the March 2014 FS and RAP (Geosyntec, 2014a). The Revised HHRA has been modified to address comments by the Regional Board, OEHHA, and the Expert Panel and the Revised HHRA (Geosyntec, 2014c) is being submitted as a companion document to this Revised RAP. The objective of the HHRA was to evaluate potential human health impacts to onsite residents and onsite construction and utility maintenance workers prior to any remediation efforts at the Site (baseline condition). In addition, an evaluation of potential COC leaching from soil to groundwater was conducted using the Soil SSCGs for the leaching to groundwater pathway as provided by the Regional Board (RWQCB, 2014d, e). Cumulative estimates of incremental lifetime cancer risks and noncancer hazard indices have been evaluated across media to address the comments received by the Expert Panel (RWQCB, 2014d).

The methodology used in the HHRA was consistent with current USEPA, RWQCB, and DTSC guidance and incorporated the SSCGs presented in the Revised SSCG Report (Geosyntec, 2013c) as revised to address Regional Board comments. The HHRA used the SSCGs with the Site concentration data to develop a cumulative risk characterization for the Site addressing both potential human health risks and potential leaching to groundwater concerns. The HHRA is a predictive tool and is used in the remedial decision-making process to determine if further action is warranted for areas of the Site.

The HHRA addressed potential onsite exposures to residents and construction and utility maintenance workers. Potential exposures to COCs detected in shallow soils were evaluated for the direct contact pathways, as well as inhalation of volatile COCs in outdoor air and nonvolatile COCs in fugitive dust. Additionally, the potential for volatile COCs to migrate from the subsurface (using sub-slab soil vapor data) into residential structures present above ground was evaluated for a resident. Potential exposures to COCs in soil vapor were also evaluated for inhalation of vapors in outdoor air.

An initial step in the HHRA process is an evaluation of available data to identify media-specific COCs. A variety of samples have been collected as a part of the Site investigation process. Detected compounds include TPH, VOCs, SVOCs, PAHs and metals. These compounds, if they were detected in at least one sample in a given media (soil or soil vapor), were included in the COC selection process; however, due to the large number of soil samples collected (over 10,000) if a chemical had a frequency of detection less than 0.05 percent, it was not evaluated further in the Revised HHRA as a COC. A risk-based toxicity-concentration screen was then used to focus the list of COCs to those chemicals that have the potential to contribute significantly to potential risk at the Site (Geosyntec, 2013c). For the selection of soil COCs to address the leaching to groundwater pathway, chemicals that were detected in groundwater above their respective MCL or NL were carried forward into the HHRA. The COCs evaluated in the HHRA are consistent with the COCs

presented in the Revised SSCG Report with the addition of toluene and xylenes as directed by the Regional Board. Although there is no evidence that PCE and TCE are site-related COCs, PCE and TCE were included in the HHRA as directed by the Regional Board. Additionally, THMs that are likely associated with municipal water use have been included.

Metals and carcinogenic PAHs (cPAHs) may be associated with petroleum hydrocarbons, but are also naturally occurring in the environment. According to the DTSC (Cal-EPA DTSC 1997, 2009a, 2009c, 2009d) for naturally occurring materials such as metals and cPAHs, an evaluation of background concentrations is important to evaluate whether the metals concentrations at the Site are consistent with naturally occurring levels in the area, and whether they should be included in the HHRA. If concentrations of a metal or cPAHs are within background, these constituents are not considered a COC in the HHRA and are not evaluated further. The background analysis for the Site is summarized in the HHRA and presented in more detail in the Background Analysis Report (Appendix A to Geosyntec, 2014a). Metals and cPAHs were retained as COCs in the HHRA as appropriate based on the results of Site-wide toxicity-concentration screen and property-specific background analysis.

To evaluate potential human health risk or potential for leaching to groundwater, SSCGs presented in the Revised SSCG Report, as modified by the Regional Board (RWQCB, 2014d, e) were used. The SSCGs are presented in Tables 5-1, 5-2 and 5-3. These values were used to calculate cumulative ILCR and noncancer Hazard Indices estimates for each property and the streets for the exposure pathways and media presented above. For potential leaching to groundwater, the SSCGs were compared to the property-specific and streets soil data as well. The results of the cumulative human health risk and noncancer evaluation as well as the evaluation of potential leaching to groundwater were combined to form an overall risk characterization of each property.

For sub-slab soil vapor, SSCGs for residential exposures have been calculated using a vapor intrusion attenuation factor of 0.002 which is considered an upper-bound vapor intrusion attenuation factor. In addition, as directed by the RWQCB (RWQCB, 2014d, e), a default attenuation factor of 0.002 was used to evaluate deeper soil vapor data. The use of a default attenuation factor of 0.002 for the assessment of petroleum hydrocarbons detected in deeper soil vapor does not take into account the natural vadose-zone biodegradation that has been identified at the Site and will significantly over-estimate the potential for vapor intrusion for these data.

Properties that did not meet the RAOs were identified for further evaluation in the Revised FS and Revised RAP.

As discussed in Section 5, various demarcations of acceptable risk have been established by regulatory agencies. Under most situations, cancer risks in the range of 10^{-6} to 10^{-4} may be considered to be acceptable with cancer risks less than 10^{-6} considered *de minimis*. The NCP (40 CFR 300) indicates that lifetime incremental cancer risks posed by a site should not exceed a range of one in one million (1×10^{-6}) to one hundred in one million (1×10^{-4}) and noncarcinogenic chemicals should not be present at levels that have the potential to cause adverse health effects (i.e., a hazard index greater than 1). If the HI exceeds 1, there may be concern for potential noncarcinogenic health effects. However, an HI above 1 does not indicate an effect will definitely occur due to the margin of

safety associated with the exposure assumptions and chemical toxicity criteria used in health risk assessments. Also it should be noted that the scientific methods used in health risk assessment cannot be used to link individual illnesses to chemical exposures, rather health risk assessments are used as a predictive tool to evaluate theoretical risks for remedial decision making.

6.2 POTENTIAL RESIDENTIAL EXPOSURES

For soils at a depth of less than or equal to 2 feet bgs, a total of 87 properties were identified as having an exceedance of the lower bound of the risk range of 1×10^{-6} or an HI of 1. Seventeen properties had an exceedance of the ILCR of 1×10^{-6}. The ILCR estimates ranged from 2×10^{-6} to 2×10^{-5}, well within the risk management range of 10^{-6} to 10^{-4}. The primary COCs that contributed to the ILCR estimates were benzene, benzo(a)pyrene, ethylbenzene, 1-methylnaphthalene, naphthalene, and PCE (one property). Eighty-seven (87) properties were identified as having an exceedance of an HI of 1, ranging from 2 to 10, with two properties having values of 20 and 30. Thirty-five (35) of those properties had an HI of 2, marginally above the threshold of 1, and 33 of the 35 properties with no individual COC-specific HQ above 1. Another 32 properties had a value ranging from 3 to 5. The primary COCs that contributed to the HI estimates were TPHd and TPHmo. One property had a lead hazard quotient of 2, marginally above the HI of 1.

For shallow surface soils (≤5 feet bgs), 172 properties were identified as having an exceedance of the lower bound of the risk range of 1×10^{-6} or a hazard index of 1. (These include the 87 properties discussed in the previous paragraph.) Seventy-three (73) properties had an exceedance of the ILCR of 1×10^{-6}. The ILCR estimates ranged from 2×10^{-6} to 3×10^{-5}, well within the risk management range of 10^{-6} to 10^{-4}. Eleven ILCR estimates were at or above a risk level of 1×10^{-5}; 51 values were at or below 5×10^{-6}. The primary COCs that contributed to the ILCR estimates were benzene, cPAHs, ethylbenzene, 1-methylnaphthalene, naphthalene, PCE (one property) and vinyl chloride (one property). One hundred and seventy-two (172) properties were identified as having an exceedance of an HI of 1, values for 164 properties ranged from 2 to 10, with seven properties having a value of 20 and one property having a value of 40. Thirty-two (32) properties have a value of 2, marginally above the threshold of 1, and 27 properties with no individual COC-specific HQ above 1. Another 74 properties had a value ranging from 3 to 5. The primary COCs that contributed to the HI estimates were TPHd and TPHmo, with TPHd being the primary COC for 55 properties.

For subsurface soils (>5 to ≤10 ft bgs), no properties were identified as having an exceedance of the lower bound of the risk range of 1×10^{-6} or an HI of 1 for the infrequent contact residential exposure scenario.

In addition to the evaluation of incremental cancer risk and noncancer hazard, a property-specific background analysis was conducted for the Site COCs to determine if metals or cPAHs were present in soils above background levels. Metals and cPAHs considered above background were included in the estimates of risk and hazard summarized above with the exception of arsenic. For an additional five properties, arsenic was the only COC identified due to being above background. These properties should be considered further during remedial planning.

Based upon the multiple lines of evidence evaluations presented in the Follow-up Indoor Air Reports and Final Interim Reports, Geosyntec and URS concluded that constituents detected in indoor air are reflective of background sources. Notwithstanding the fact that regulatory guidance does not require remediation of COCs present at or below background levels, the RWQCB directed Shell to evaluate theoretical exposures due to the vapor intrusion pathway using the detected concentrations of COCs in sub-slab soil vapor. The Revised HHRA includes this vapor intrusion evaluation and theoretical exposures were calculated using conservative assumptions (e.g., sub-slab soil vapor to indoor air attenuation factor of 0.002).

For sub-slab soil vapor, 27 properties were identified as having an exceedance of the lower bound of the risk range of 1×10^{-6} or a HI of 1, not including the background risks associated with THMs. Trihalomethanes are not considered in the final risk characterization for soil vapor due to their presence as a result of municipal water use at the Site. The ILCR estimates for 25 properties ranged from 2×10^{-6} to 3×10^{-5}, well within the risk management range of 10^{-6} to 10^{-4}. Two ILCR estimates were at 1×10^{-4} and 2×10^{-3}, at and above the upper-bound of the risk management range of 1×10^{-4}. The property with the highest ILCR estimate is 378 E. 249th Street where elevated benzene concentrations were observed underneath the garage, and a sub-slab mitigation system was installed as an interim measure. The property with the second highest ILCR estimate is 24603 Marbella Avenue where elevated benzene concentrations were observed in one sample in the backyard during the first round of soil vapor sampling for that property. The result was not confirmed in the subsequent two sampling events in which benzene was not detected in any sub-slab soil vapor sample from the property. The primary COCs that contributed to the ILCR estimates were benzene, carbon tetrachloride, chloroform, ethylbenzene, methylene chloride, naphthalene, PCE, TCE and vinyl chloride (one property). Of the 27 properties that were identified, five properties had no individual COC-specific ILCR estimate above 1×10^{-6}. Two properties were identified as having an exceedance of a HI of 1, with values of 2 and 5. These two properties were also identified as having an ICLR exceedance of greater than 1×10^{-6}.

In response to comments received from the Expert Panel, cumulative cancer risk and noncancer hazard results were summed across all media, specifically soil less than or equal to 5 feet bgs along with sub-slab soil vapor, for an on-site resident. Only one property had cumulative risk greater than 1×10^{-6} (a value of 2×10^{-6}) when the media risks separately were less than 1×10^{-6}. However, this property is already identified for consideration due to an exceedance of the SSCG for leaching to groundwater and therefore potential cumulative risks for this property will be addressed as a part of the remedial action for soils.

6.3 POTENTIAL CONSTRUCTION AND UTILITY MAINTENANCE WORKER EXPOSURES

Construction and utility maintenance worker exposures were evaluated for both soil and soil vapor in two areas within the Kast Site: (1) within the individual property boundaries, and (2) within the Streets.

For soil, nine residential properties were identified as having an exceedance of the target risk of 1×10^{-5} or an HI of 1 when the data were analyzed using the construction and utility worker exposure scenario. The ILCR estimates ranged from 2×10^{-5} to 3×10^{-5}, well within the risk management range of 10^{-6} to 10^{-4}. The primary COC that contributed to the ILCR estimates was benzene. One hundred and thirty-eight (138) properties were identified as having an exceedance of an HI of 1, ranging from 2 to 10. Forty-one (41) of those properties have a value of 2, marginally above the threshold of 1. The primary COCs that contributed to the HI estimates were TPHd and TPHg, with TPHd the primary contributor at 116 properties.

For soil data collected in the streets, the ILCR was 2×10^{-5} with no individual COC having a risk greater than 1×10^{-5}. The noncancer HI estimate was 6 with TPHd as the primary contributors to the HI estimate. The lead hazard quotient was less than 1.

For soil vapor, no property had an ILCR greater than 1×10^{-5} or a noncancer HI greater than 1. For data collected in the streets the ILCR was 2×10^{-5} and the noncancer HI estimate was 0.04.

6.4 POTENTIAL SOIL LEACHING TO GROUNDWATER

An evaluation was conducted for the potential for COCs to migrate from the soil to underlying groundwater at the Site. For soil ≤5 ft bgs within the properties, 202 properties exceed the soil-leaching-to-groundwater SSCGs. TPHd, TPHg, TPHmo, benzene and naphthalene are the compounds with the most frequent exceedances in this depth interval. For soil >5 to ≤10 ft bgs, 174 properties exceed the soil-leaching-to-groundwater SSCGs. TPHd, TPHg, TPHmo, benzene and naphthalene are the chemicals with the most frequent exceedances in this depth interval.

For soil data collected in the Streets from ≤10 ft bgs, concentrations were compared to the soil-leaching-to-groundwater SSCGs. Using the maximum concentrations, 11 COC concentrations exceeded their respective soil leaching to groundwater SSCGs (1,2,3-trichloropropane, antimony, arsenic, benzene, cis-1,2-dichloroethene, naphthalene, PCE, thallium, TPHg, TPHd and TPHmo).

6.5 HHRA SUMMARY AND PROPERTIES PROPOSED FOR REMEDIATION

The results of the HHRA are presented graphically on Figures 6-1, 6-2 and 6-4. Table 6-1 presents the property addresses that exceeded the lower bound of the risk management range for ILCR and a noncancer hazard index of 1 for soil and sub-slab soil vapor, respectively. In addition, soil leaching to groundwater and metals present above background are considered. For sub-slab soil vapor, concentrations of methane were also considered. These properties along with impacts in the Streets are identified as not meeting the RAOs established for the Site and are considered further in the RAP. In addition, in response to RWQCB comments, soils between 5 and 10 feet bgs have been included for consideration in the Revised FS Report and Revised RAP for targeted excavation as shown on Figure 6-4.

The number of properties identified for consideration in the RAP are as follows:

Media	Depth	Number of Properties Considered in RAP
Soil	≤5 ft bgs	202
Soil	≤5 ft bgs and >5 to ≤10 ft bgs combined	224
Soil Vapor	Sub-slab	28[7]

[7] 27 properties were identified based on RAO exceedance for potential vapor intrusion, and one property was identified based on methane. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site.

7.0 SUMMARY OF FEASIBILITY STUDY

The remedial actions recommended in this Revised RAP emerged as the recommendation made in the Revised FS Report for the Site (Geosyntec, 2014d). The Revised FS Report, which is a companion document to this Revised RAP, includes identification and screening of a range of technologies, each of which can address a specific Site cleanup issue. Screening of technologies is followed in the Revised FS Report by identification, screening and detailed evaluation of a range of remedial alternatives for the Site. This section of the Revised RAP provides an overview of the FS process.

Each technology identified in the Revised FS Report is appropriate to address a specific Site cleanup issue. Technologies are identified in two categories: (1) Technologies that interrupt the human health exposure pathway, and (2) technologies that remove COC mass in addition to interrupting the human health exposure pathway. In the first category, the following technologies are identified:

- Sub-slab vapor intrusion mitigation, which may include the installation of passive barriers, passive venting, or active sub-slab depressurization;
- Capping portions of the Site, which involves the placement of cover over the impacted media;
- Removal of all Site features; and
- Institutional controls, which restrict access to impacted media.

Technologies which remove COC mass in addition to interrupting the human health exposure pathway include the following:

- Excavation:
    - Lifting and cribbing houses (assists in removing mass);
    - Temporarily moving houses (assists in removing mass);
    - Removal of residual concrete slabs if encountered;
    - Selected Excavation Around Existing Structures;
    - Targeted Excavation;
- Soil vapor extraction (SVE);
- Bioventing;
- In-situ chemical oxidation (ISCO);
- Mobile LNAPL/source removal;
- Monitored natural attenuation (MNA);
- Contingency in-situ groundwater remediation:

- Air sparging with SVE;
- Biosparging;
- Injection of oxidant (e.g., Oxygen Release Compound ®).

After screening, three technologies were eliminated from further consideration: In-situ chemical oxidation; lifting and cribbing houses to allow excavation beneath houses, and temporarily moving houses to allow excavation beneath houses. None of the remaining technologies alone constitutes a complete approach to Site cleanup. It is necessary to combine groups of technologies to develop a complete cleanup approach. Remedial alternatives, which are defined in the FS, represent such combinations of technologies. After preliminary remedial alternatives are defined in the FS Report, these alternatives are screened to assess those which represent realistic approaches to Site cleanup.

Remedial alternatives which remain after screening, and the specific technologies employed as part of those alternatives, are summarized below:

- Alternative 1 – No Action;
- Alternative 4 – Excavation of Site soils from both landscaped areas and beneath residential hardscape; existing institutional controls; SVE/bioventing; sub-slab mitigation; removal of LNAPL; and groundwater MNA and potentially supplemental active remediation. Four separate excavation alternatives in this category are evaluated in the FS Report:
    - Alternative 4B – Excavation to 3 feet bgs;
    - Alternative 4C – Excavation to 5 feet bgs;
    - Alternative 4D – Excavation to 5 feet bgs with Targeted Deeper Excavation to 10 feet bgs;
    - Alternative 4E – Excavation to 10 feet bgs.
- Alternative 5 – Excavation of Site soils from landscaped areas only; existing institutional controls; SVE/bioventing; sub-slab mitigation; removal of LNAPL; and groundwater MNA and potentially supplemental remediation. Four separate excavation alternatives in this category are evaluated:
    - Alternative 5B – Excavation to 3 feet bgs;
    - Alternative 5C – Excavation to 5 feet bgs;
    - Alternative 5D – Excavation to 5 fee bgs with Targeted Deeper Excavation to 10 feet bgs;
    - Alternative 5E – Excavation to 10 feet bgs.
- Alternative 7 – Capping the landscaped areas of the Site; existing institutional controls; SVE/bioventing; sub-slab mitigation; removal of LNAPL; and groundwater MNA and potentially supplemental remediation.

These remaining alternatives then are evaluated against a set of criteria that include the following:

- Overall protection of human health and the environment;
- Compliance with applicable or relevant and appropriate requirements (ARARs);
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, and volume through treatment;
- Short-term effectiveness;
- Implementability;
- Cost;
- State acceptance;
- Consistency with State Water Resources Control Board Resolution 92-49;
- Social considerations;
- Sustainability.

An additional criterion, Community Acceptance, will be considered following comment on the Revised FS Report and on the Revised RAP.

The RWQCB letter of January 23, 2014 makes clear that the Revised FS Report must meet the provisions of SWRCB Resolution 92-49. With respect to remedial activity, Resolution No. 92-49 focuses on impacts to water quality and not on all media. Waste in non-water media (such as soil) should be addressed through remediation to promote the attainment of background water quality (not, for example, background levels in soil) or the best water quality that is reasonably feasible given the considerations listed. Resolution 92-49 also includes the concept of technical and economic feasibility, in a manner that is distinct from the criteria of implementability or cost. Technological feasibility is determined by assessing available technologies which have shown to be effective under similar hydrogeologic conditions in reducing the concentration of the constituents of concern. Economic feasibility is an objective balancing of the incremental benefit of attaining further reductions in the concentrations of constituents of concern as compared with the incremental cost of achieving those reductions.

The recommended alternative is the alternative that meets the two threshold criteria (overall protection of human health and the environment and compliance with ARARs), and that best balances the remaining criteria. Alternative 4B meets the Resolution 92-49 criteria for protection of groundwater and is protective of human health. Shell concludes that the existing institutional control, further enhanced with a notification system, is fully protective of human health, and that Alternative 4B is adequately protective, but acknowledges that other alternatives that excavate to a deeper depth may be marginally more protective in the event of inadvertent residential excavation without seeking a City permit. After detailed evaluation and consideration of input from the RWQCB regarding protectiveness for potential residential activities and additional mass removal, the alternative that was recommended for further development in the Revised RAP was the following:

- Alternative 4D – Excavation of Site soils to 5 feet bgs from both landscaped areas and areas beneath residential hardscape; targeted deeper excavation to 10 feet bgs for mass removal; existing institutional controls; SVE/bioventing; sub-slab mitigation; removal of LNAPL; groundwater MNA and potentially supplemental remediation; and long-term monitoring.

Residual concrete reservoir slabs will be removed if encountered in excavations, to the extent practicable and if it can be done safely.

A more detailed description of this recommended alternative follows in Section 8 below.

8.0 RECOMMENDED REMEDIAL ACTIONS

Based upon the results of the Revised HHRA (Geosyntec, 2014c) and Revised FS (Geosyntec, 2014d), and in consideration of the Site characterization information summarized above, RAOs for the Site, the Regional Board's and Expert Panel's comments contained in the RWQCB correspondence dated April 30, 2014 and May 29, 2014, additional direction received from the Regional Board the following multi-media remedial actions are recommended for the Site:

- Excavation of shallow soils at impacted residential properties where RAOs and the more stringent of the health risk-based or leaching to groundwater criteria are not met under existing conditions. Excavation will be conducted to a depth of 5 feet bgs at accessible portions of both landscaped and hardscaped areas of residential yards from 202 properties (shown on Figure 6-1).
- Local targeted deeper excavations from 5 to 10 feet bgs at approximately 82 properties (shown on Figure 6-3) in areas where significant additional hydrocarbon mass can be removed. Excavations to 10 feet bgs will be at locations where TPH SSCGs are exceeded by a factor of 10 times or greater than the residual NAPL soil concentration and will be conducted using a combination of conventional and auger excavation methods.
- Residual concrete reservoir slabs will be removed if encountered in excavations, to the extent practicable and if it can be done safely.
- Landscaping and removed hardscape will be restored following excavation.
- A robust SVE/bioventing system, with SVE/bioventing wells in City streets and on residential properties, will be installed and operated to extract VOCs and methane and to promote degradation of residual hydrocarbon concentrations via bioventing where RAOs are not met following soil excavation. Bioventing will be integral with SVE via cyclical operation of SVE wells. Bioventing in concert with SVE will be used to increase oxygen levels in subsurface soils and promote microbial activity and degradation of longer-chain petroleum hydrocarbons.
- Sub-slab mitigation will be implemented at 28 properties (shown on Figure 6-4) where RAOs are not met and calculated vapor intrusion risk is greater than 1×10^{-6} using an attenuation factor of 0.002 or methane concentrations in sub-slab soil vapor exceed the upper RAO for methane of 0.5%. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site.
- Long-term monitoring of sub-slab soil vapor probes at properties scheduled for remedial excavation will be conducted until the SVE/bioventing system becomes operational and periodically thereafter. Monitoring will also be continued at select soil vapor probe locations in City streets and of utility boxes and other Site features previously monitored until the SVE/bioventing system becomes operational. Thereafter, monitoring will be conducted at newly installed shallow and multi-depth soil vapor probes.

- SVE/bioventing system operations and maintenance (O&M) and system effectiveness sampling will be conducted periodically.
- LNAPL will be recovered where it has accumulated in monitoring wells MW-3 and MW-12 and in additional wells if it accumulates at a measurable thickness, to the extent technologically and economically feasible, and where a significant reduction in current and future risk to groundwater will result.
- COCs in groundwater will be reduced to the extent technologically and economically feasible via source reduction and monitored natural attenuation (MNA). MNA could be paired with contingency groundwater remediation of oxidant injection in areas where Site-related COCs exceed 100x MCL if, after a five-year review following start of SVE/bioventing operations, the groundwater plume is not stable or decreasing. In addition, upgradient sources would need to be addressed by the overseeing agencies.
- The shallow soil remedy includes a Surface Containment and Soil Management Plan to address notifications, management, and handling of residual soils below the depth of excavation and that are impacted by COCs at concentrations greater than risk-based levels. Soils remaining below 5 feet bgs and impacted soils beneath City streets and sidewalks will be addressed through the Surface Containment and Soil Management Plan (Appendix C). Implementation of the Surface Containment and Soil Management Plan can be accomplished through the City of Carson permitting process, as the Carson Municipal Code is an existing institutional control that requires that a Grading Permit be obtained for excavations deeper than 3 feet. In addition, Shell will implement a community outreach program to inform and educate residents in the community of residual impacted soils and of the notification procedures for management of these materials via the Surface Containment and Soil Management Plan.

These remedial actions are intended to achieve the RAOs and the RWQCB-approved SSCGs for soil, soil vapor, and groundwater as directed in the Regional Board's Review of the Revised SSCG Report and Directive dated January 23, 2014 and Review of the March 10, 2014 RAP, HHRA and FS dated April 30, 2014, and SSCG clarification letter dated May 29, 2014.

Although there is no indication that there are any long-term health risks or water quality concerns caused by COCs associated with residual concrete slabs, the recommended remedy for the Site, as summarized above and described in detail in subsequent sections of this RAP, would remove residual concrete slabs where practicable, and where it can be done safely, if encountered during excavation. Operation of the SVE/bioventing system would address any concerns at the Site related to COCs that may be associated with the residual reservoir slabs left in place.

Figures 8-6 and 8-7 provide conceptual rendering of completed remediation at a typical property in plan view (Figure 8-6) and cross-section view (Figure 8-7).

In accordance with the California Environmental Quality Act (CEQA), an Environmental Impact Report (EIR) is being prepared by the RWQCB as the lead agency. The EIR will analyze the potential environmental impacts associated with the recommended remediation alternative.

There remain approximately 13 properties for which access has not been granted and no sampling has been completed. Sampling will be conducted as access is granted to these properties, and the results will be analyzed consistent with the approach described above to determine what remedial measures, if any, will be taken.

8.1 APPROACH FOR EXCAVATION OF SHALLOW SOILS

Shallow soils will be excavated from residential properties where results of the Revised HHRA indicate that RAOs are not met under existing conditions. Shell will excavate shallow soils to a depth of 5 feet below existing grade in landscaped and hardscaped areas at identified properties (shown on Figure 6-1), subject to setback requirements to protect structures and certain utilities. Residual concrete slabs will also be removed if they are encountered in the excavations and can be safely removed. Based on Revised HHRA findings and evaluation of potential for COCs to leach to groundwater using Regional Board-directed SSCGs, 202 properties have been identified for remedial excavation (see Section 8.1.1). Shell maintains that the existing institutional control, further enhanced with a notification system, is fully protective of human health and that the previously recommended shallow excavation to 3 feet bgs is adequately protective but acknowledges that other alternatives that excavate to a deeper depth may be marginally more protective in the event of inadvertent residential excavation without seeking a City permit. Excavation to 5 feet bgs is recommended as a conservative measure based on Regional Board and Expert Panel comments and in consideration of the State Acceptance criterion.

Soils will be excavated from both landscaped areas and areas currently covered by hardscape, including walkways, driveways, patio areas, and hardscape associated with landscaping. Excavation areas at individual properties will be dependent on setback requirements established by the Geotechnical Engineer and approved by the L.A. County Department of Public Works and City of Carson. Per requirements of the local water purveyor, Cal-Water, setbacks will also be required from transite pipe water mains that are located at a depth of approximately 3 to 3.5 feet in front yards of the west side of north-south trending streets and the south side of east-west trending streets. Setbacks will also be required from power poles located along rear property lines and will be established in consultation with Southern California Edison. Exceptions to excavation beneath hardscape include patios covered by structures and roofs, and swimming pools and pool decking surrounding swimming pools. These hardscape areas will not be excavated to avoid structural demolition and potential damage to swimming pools and appurtenant equipment. In addition, property-specific features may limit excavation in some localized areas and this will be considered as the individual Property-Specific Remediation Plans are developed. No excavation will occur beneath City streets and sidewalks or beneath houses. In addition to treatment by the SVE/bioventing system discussed below, remaining soils in these non-excavated areas are addressed in the Surface Containment and Soil Management Plan (Appendix C) and by existing institutional controls.

Hardscape and landscaping will be removed during the initial stage of excavation and restored to like conditions following completion of excavation in consultation with the homeowner. Shell also anticipates that it will be necessary to remove most fences and block walls between yards and ornamental or partitioning walls on individual properties, as the depth of excavation will exceed fencepost and footing depths. Additionally, the distance between adjacent houses is approximately 7 to 10 feet, depending on fireplace and water heater locations, and removal of fences and walls separating side yards will facility equipment access to back yards. As with other hardscape, fences and walls will be restored following completion of excavation prior to restoration of landscaping.

Residents will be provided temporary living assistance while active excavation, backfill, and hardscape restoration work are being implemented (see Preliminary Relocation Plan, Appendix D).

Excavation to 5 feet bgs is consistent with the approach described in the Regional Board's Review of the Revised SSCG Report and Directive dated January 23, 2014, comments in its April 30, 2014 letter on the March 10 RAP, and in the interest of State Acceptance. In its' January 23, 2014 letter commenting on the Revised SSCG Report, the Regional Board stated:

> "…defining the uppermost soil interval from zero to five feet is supportive of unrestricted residential use because institutional controls are already in place throughout Los Angeles County, including the City of Carson and Carousel Tract for excavations that are deeper than five feet. These controls require a soils investigation as well as grading and shoring permits in order to excavate at depths below five feet. In the Carousel Tract, the Los Angeles County building code is administered by the City of Carson. Because the City must be notified and approve excavations below five feet (Los Angeles County Building Code Sections 3304.1.2, 3307.1, 1803.5.7, J103, J104) the City could readily inform residents and workers of other appropriate precautions necessary for excavations below five feet through existing administrative processes."

Additional information regarding the proposed shallow excavation remedy is provided in the following sections.

8.1.1 Identification of Properties for Remedial Excavation to 5 Feet bgs

Findings of the Revised HHRA with respect to potential impacts to human health and potential for COCs to leach to groundwater were used to identify properties that will require remedial excavation. In total, 202 properties were identified for remedial excavation to 5 feet bgs as discussed in Section 6.5 and summarized in Table 6-1 and shown on Figure 6-1.

As summarized in Section 6.3.1 of the Revised HHRA and Section 6.2 of this Revised RAP, for soils ≤5 ft bgs, 172 properties were identified as having an exceedance of the lower bound of the risk range of 1×10^{-6} or a hazard index of 1. The ILCR estimates ranged from 2×10^{-6} to 3×10^{-5}, well within the NCP risk management range of 10^{-6} to 10^{-4}. The primary COCs that contributed to the ILCR estimates were benzene, carcinogenic PAHs, ethylbenzene, 1-methylnaphthalene, naphthalene, PCE (one property) and vinyl chloride (one property). One hundred and seventy-two (172 properties

were identified as having an HI exceeding 1; values for 164 properties ranged from 2 to 10, with seven properties having a value of 20 and one property having a value of 40. The primary COCs that contributed to the HI estimates were TPHd and TPHmo, with TPHd being the primary COC for 55 properties.

The Revised HHRA also evaluated the potential for COCs to migrate from the soil to underlying groundwater at the Site. For residential soil ≤5 ft bgs, 202 properties exceed the soil-leaching-to-groundwater SSCGs. TPHd, TPHg, TPHmo, naphthalene, and benzene are the COCs with the most frequent exceedance in this depth interval. The property-specific results indicating properties identified for excavation to 5 feet bgs are presented in Table 6-1 and shown on Figure 6-1.

A total of 10 properties were identified as having metals present above background due to the presence of arsenic, antimony, or thallium. These properties have been identified for shallow soil excavation of soils from ≤5 ft bgs. The data were reviewed with respect to depth interval to evaluate whether the presence of these metals at concentrations above background would be addressed through shallow excavation or remain at depths from >5 to 10 feet bgs and pose a potential for leaching to groundwater.

Antimony was present above background levels at one property, but detections above background concentrations are present in shallow surface soil and will be addressed by excavation.

Arsenic was present above background levels at five properties and thallium was present above background levels at four properties at depths >5 to 10 feet bgs. The detections of arsenic and thallium above background are localized and do not represent a significant mass for leaching to groundwater. Leaching of arsenic and thallium to groundwater is not expected to be above what would occur for background soils. However, groundwater will continue to be monitored to assess whether an increase in arsenic or thallium concentrations due to the leaching pathway is occurring.

Based on hydrocarbon mass estimates developed for the Revised FS, removal of soils to a depth of 5 feet from accessible areas at these 202 properties would result in an approximately 11% reduction in hydrocarbon mass estimated to be present in the upper 10 feet of Site soils (see Section 5.2.3 of Revised FS). When compared to the total estimated hydrocarbon mass at the site from ground surface to the depth of groundwater, the excavated mass to 5 feet bgs would represent approximately 3% of the total hydrocarbon mass at the Site.

8.1.2 Identification of Properties for Targeted Deeper Excavation from 5 to 10 Feet bgs

Based upon the Regional Board's directive and Expert Panel's comments, an alternative that evaluates local targeted excavation to 10 feet bgs was included in the Revised FS and is presented here in the Revised RAP. The Revised FS evaluated the feasibility of local targeted removal of soils from 5 to 10 feet bgs using a combination of conventional excavation with small to medium-sized tracked excavators or tractor-mounted backhoes, such as the methods pilot tested (URS, 2013a, b, d), and soil removal using limited access bucket auger drilling to accomplish this additional mass

removal and found that, although difficult to implement at a large scale, deeper excavation could be accomplished.

Targeted excavation areas have been identified where, based on distribution of hydrocarbon impacts in the upper 10 feet, the potential exists for substantial hydrocarbon mass removal via deeper excavation. This excavation scenario entails removal of impacted soils from 5 to 10 feet bgs at residential properties in localized areas. It is recommended that these additional excavations be performed where practicable at targeted areas where constituents are present at 10 times the TPH SSCGs for leaching to groundwater or greater than the residual NAPL soil concentration (e.g., 50,000 mg/kg for TPHmo). Properties identified for targeted deeper excavation from 5 to 10 feet bgs are summarized in Table 6-1 and shown on Figure 6-3. Some properties were identified for excavation of both front and back yards, while others were identified for excavation of only the front or back yard.

The recommend values for definition of targeted deep excavation locations are 1,170 mg/kg for TPHg, 6,250 mg/kg for TPHd and 50,000 mg/kg for TPHmo. The TPHmo value is equal to the residual NAPL saturation concentration because 10 times the TPHmo SSCG of 10,000 mg/kg would result in a higher concentration and typically in these instances cleanup goals are capped at residual saturation concentrations.

The use of a 10-fold factor is based on regulatory precedence from Oregon and Massachusetts. The pertinent citations from the environmental regulations from each state are provided in footnotes below.

The state of Massachusetts[8] defines areas of localized elevated concentrations or hot spots (as referenced in the regulations) as: (a) discrete areas where the average concentration within the area is greater than 10 but less than 100 times the average concentration in the immediate surrounding area, unless there is no evidence that the discrete area would be associated with greater exposure potential than the surrounding area. In all cases, a discrete area where the concentration of an oil or hazardous material is greater than 100 times the concentration in the surrounding area is considered a hot spot. Thus, the recommended factor of 10 times the SSCG values is at the low end of the range used by Massachusetts.

The state of Oregon[9] defines hot spots of contamination for media other than groundwater or surface water as presenting a risk to human health or the environment exceeding (i) 100 times the acceptable risk level for human exposure to each individual carcinogen; (ii) 10 times the acceptable risk level for human exposure to each individual noncarcinogen; or (iii) 10 times the acceptable risk level for exposure of individual ecological receptors or populations of ecological receptors to each individual

[8] http://www.mass.gov/eea/agencies/massdep/cleanup/regulations/310-cmr-40-0000-mcp-subpart-a-general-provisions.html

[9] http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_122.html

hazardous substance. The Oregon guidance would also support using a factor of 10 times the SSCG values or greater than the residual NAPL soil concentration to define hot spots.

Concentrations equal to 10 times the respective SSCGs for TPHg and TPHd, and the residual NAPL soil concentration (e.g., 50,000 mg/kg) for TPHmo were used to identify locations for deeper excavations using results of the 3-dimensional modeling conducted for the Site as discussed in Section 5.2.1 and Appendix A of the Revised FS Report. All of the Site TPH soil data (TPHg, TPHd and TPHmo) were used from ground surface to groundwater to develop a 3-dimensional model of the distribution of TPH in the subsurface using krigging to interpolate between known data points (i.e., sample collection points). A horizontal slice from 5 to 10 feet bgs was then taken from the 3-dimensional model, and this 5 to 10-foot distribution was plotted 2-dimensionally to define areas where 10X SSCGs for TPHg and TPHd and 50,000 mg/kg for TPHmo are exceeded. This distribution is shown as a series of gray areas on Figure 6-3 along with properties identified for targeted deeper excavation. Because of the nature of the interpolation, the shaded gray areas do not necessarily mean that TPH is present in all areas within the gray shading at concentrations above 10 times SSCGs. Properties were identified where a significant amount of mass could be removed based on visual interpretation of the areal extent of impacts exceeding 10 times SSCGs or greater than the residual NAPL soil concentration and residential property boundaries. Small areas of exceedance that were due to one or a limited number of samples and where significant mass could not be removed were not identified for excavation. Additionally, properties were not included if they had not been identified for excavation to 5 feet bgs (see Section 8.1.1).

In total, 82 properties were identified for targeted deeper excavation, 33 of these properties were identified for excavation in accessible portions of both front and back yards, 20 for excavation in front yards only, and 29 for excavation in back yards only. Based on the modeled hydrocarbon distribution, the entire accessible areas would be excavated, subject to required setback distances, in some yards, and partial areas of yards would be excavated at some properties. These areas where TPH is present at greater than 10 times SSCGs and identified properties are shown on Figure 6-3. A list of property addresses identified for deeper excavation is provided in Table 6-1.

The Revised FS estimated that the additional hydrocarbon mass that could be removed by localized targeted deeper excavation from 5 to 10 feet bgs in these areas represents approximately 23% of the total mass present in the upper 10 feet of soils at the Site and approximately 6% of the total hydrocarbon mass from ground surface to groundwater at the Site. In combination, excavation to 5 feet bgs at 202 properties and targeted deeper excavation from 5 to 10 feet bgs at an additional 82 properties for mass removal would result in removal of approximately 34% of the total mass in the upper 10 feet of soils at the Site and approximately 9% of the total hydrocarbon mass from ground surface to groundwater at the Site.

8.1.3 Mass Removal Estimates

As discussed in Section 5.2.3 of the Revised FS, Geosyntec prepared estimates of the total mass of petroleum hydrocarbons quantified as TPHg, TPHd, and TPHmo using 3-dimensional modeling that employed krigging to interpolate between known sample data points. The detailed basis for that estimate is provided in Appendix A of the Revised FS.

Provided below is an estimate of the amount of mass that would be removed and the amount of mass that would be left in place based on the remedial excavation alternative summarized above. It should be noted that these mass estimates are for the excavation part of the recommended remedy. Significant further mass removal will occur through SVE/bioventing which will be implemented Site-wide upon completion of the excavation program.

The total hydrocarbon mass in the upper 10 feet at the Site was estimated to be 4,330,000 pounds, and the total mass from ground surface to approximately 50 feet was estimated to be 16,500,000 pounds. The estimated mass removal for excavation to 5 feet bgs at the 202 identified properties was estimated at 480,000 pounds, or about 11% of the total mass in the upper 10 feet and 3% of the total mass from ground surface to approximately 50 feet. The additional mass that would be removed by targeted deeper excavation at 82 identified properties was estimated to be 1,010,000 pounds, which represents approximately 23% of the total mass in the upper 10 feet at the Site and 6% of the total mass from ground surface to approximately 50 feet. In combination, excavation to 5 feet bgs at 202 identified properties and targeted deeper excavation from 5 to 10 feet bgs at 82 identified properties would remove approximately 1,490,000 pounds of hydrocarbon mass (approximately 34%), leaving 2,840,000 pounds of hydrocarbons in the upper 10 feet of the Site and approximately 15,010,000 pounds of mass from ground surface to approximately 50 feet bgs.

8.1.4 Planning for Excavation Design

Following approval of the RAP, a Remedial Design and Implementation Plan (RDIP) will be prepared, as discussed in Section 9. In addition to the RDIP, a separate Property-Specific Remediation Plan (PSRP) will be prepared for each property. A property survey will be conducted by a California-licensed Professional Land Surveyor to document existing conditions within the Carousel tract in general and at each parcel that will include property boundaries, Site elevations and grade, building location(s), existing hardscape and landscaping, and underground and overhead utilities that encroach into that parcel.

The PSRPs will define areas to be excavated, features to be removed and those that will be protected in place, and locations of underground utilities that need to be either protected in place or removed and restored. The PSRPs will also identify the types of equipment and excavation approach for each property (e.g., use of standard excavating equipment, auger excavation, or a combination of equipment).

A geotechnical evaluation will be conducted and grading plans prepared as part of each RDIP. For properties planned for targeted deeper excavation to 5 to 10 feet bgs, the geotechnical evaluation will include drilling and sampling of a soil boring to collect samples for soil index and strength properties testing (see Section 8.1.3.1 below).

Utilities present in the Carousel community that may need to be avoided or temporarily interrupted are summarized below. These utilities will be identified and provisions made to protect them in place or remove and reinstall as part of the RDIP and PSRP processes.

- Water service to the neighborhood is provided by California Water Service Company (Cal-Water). Water mains are located on residential properties approximately 3.5 feet in from the inner edge of the sidewalk on the west side of north-south trending named streets and 3.5 feet in from the inner edge of the sidewalk on the south side of east-west trending numbered streets at approximately 3 to 3.5 feet bgs. The water mains are of asbestos-cement (transite) pipe construction, and according to Cal-Water, these water mains will need to be avoided and not exposed in excavations. This will limit excavation in the immediate area of the water mains to allow for vertical and lateral setbacks of approximately from the pipelines. Setback distances from the water mains will be established in consultation with Cal-Water during preparation of the RDIPs.

  Water service laterals to houses where excavations are conducted in front yards either will be protected in place in a manner similar to what was done during pilot test excavations or will be capped, removed and replaced.

- Based on the 5-foot depth of excavation, sewer laterals at some properties may be affected. If sewer laterals are present within the 5-foot or targeted deeper 5 to 10-foot excavations, they will be capped, removed and replaced.

- Gas mains located in City streets will not be affected by excavation work. Gas service laterals to houses where excavations occur in front yards will be protected in place or will be capped, removed, and replaced when excavation is completed and excavations have been backfilled.

- Sewer, water, and gas lateral line work will be conducted by a licensed contractor in accordance with City of Carson and Southern California Gas Company requirements.

- Telecommunications service trunk lines are located in a common trench with gas mains in the street or beneath the sidewalks and will not be affected by the work. Telecommunications lines to houses where excavation occurs in front yards may need to be removed and replaced. Shell has assumed that replacement of telecommunications lines will be done by an AT&T contractor that routinely does telephone cable work in the neighborhood.

- Electrical power is provided by Southern California Edison to homes in the Carousel tract by overhead lines that drop via lines to the roof line of houses from power lines along the back property lines of each block. The power lines are supported by wooden power poles located in back yards near the back lot line. Depending on overhead clearance and the specific equipment to be used for excavation at individual properties, it may be necessary to remove and replace the drop lines leading from the power poles to the houses. If this is necessary, power to the residence will be interrupted during the excavation and backfill process. Required setback from the power poles, maximum allowable excavation depths adjacent to the poles, and back-cut sloping requirements to protect the power poles will be established in consultation with Southern California Edison and the Geotechnical Engineer.

As part of RDIP and PSRP preparation, Shell contractors will meet with homeowners, and their legal representatives as appropriate, to obtain necessary information for relocation during remedial implementation and to discuss hardscape and landscape restoration. During this meeting, existing

landscape irrigation systems will be documented so that they can be restored as part of landscape restoration. In some cases, Shell may provide alternative landscape restoration from existing conditions if desired and agreed to by the homeowner, or as required by City Code. If during this meeting the homeowners express a desire that existing landscaping (such as a mature tree or shrubs) or hardscape not be removed from their property, an option will be discussed of leaving landscape elements or hardscape in place with the homeowners agreeing to enter into a Land Use Covenant (deed restriction) that would be recorded with the County Recorder's Office advising of the potential presence of impacted soil beneath hardscaped areas. If the landscaping or hardscape is removed in the future and potentially impacted soils below the area are exposed, they would be managed in accordance with the Surface Containment and Soil Management Plan (Appendix C).

8.1.4.1 Geotechnical Evaluations

In order to develop soil geotechnical parameters for design of excavation slopes, setbacks, and possible shoring systems at properties planned for targeted deeper excavation to 5 to 10 feet, a soil boring will be advanced to approximately 20 feet bgs at each property to collect relatively undisturbed samples for soil index properties and strength testing. The borings will be drilled using a hollow-stem auger drilling rig, and relatively undisturbed samples will be collected. Due to drill rig access considerations, the geotechnical borings will be located in front yards of the properties identified for targeted deeper excavation. The presence of the concrete reservoir bases will likely require coring of the concrete to allow sampling below the reservoir bottom. Upon completion, the boreholes will be backfilled using high-solids cement/bentonite grout from the bottom of the boring to 10 feet bgs and with hydrated bentonite from 10 feet bgs to the ground surface.

Laboratory tests will be conducted to evaluate soil index properties and shear strength parameters of subsurface soils. Laboratory tests will include in-situ moisture content and dry density (ASTM International [ASTM] D 2937), Atterberg limits (ASTM D 4318), sieve analysis (ASTM D 422), direct shear test (ASTM D 3080), and expansion index (ASTM D 4829).

A geotechnical evaluation will also be prepared for properties planned for excavation to 5 feet bgs; however, these evaluations will rely on existing hand-auger boring data and data from geotechnical borings advanced at locations for targeted deeper excavation and will not have geotechnical borings conducted. Based upon these geotechnical evaluations, the PSRPs will include planned excavation slopes and/or setbacks from existing structures or other features, such as around building foundations, as required by the Geotechnical Engineer and in accordance with City and County requirements.

The geotechnical investigation will need to be completed before finalizing excavation designs, including sidewall slopes, setbacks from structures, and shoring design, as applicable. The geotechnical investigation will precede preparation of grading plans and Grading Permit Applications to be submitted to the City of Carson and LACDPW.

8.1.5 General Excavation Approach

8.1.5.1 Utilities

Prior to starting demolition of existing landscaping and hardscape and initiation of excavation, a subcontracted private utility-locating geophysical contractor will locate and identify potential subsurface obstructions. Utility lines will be clearly marked in the field for removal or avoidance.

Hand excavation will be utilized to confirm the location and depth of the transite pipe water mains located in the front yards of approximately one-half of the properties. Shell anticipates working closely with Cal-Water on this aspect of the utility location work. Other underground utilities will be located, as deemed necessary, by hand excavation "potholing."

8.1.5.2 Proposed Excavation Methods and Equipment

Excavation will be conducted using conventional rubber track-mounted excavators or rubber-tired backhoes. Contractors will utilize the smallest, quietest equipment capable of effectively and safely completing planned excavation tasks. Based on performance during the excavation pilot tests, an approximately 15,000 to 18,000 pound medium-sized excavator would be effective for work in front yards and back yards where sufficient access is available, and a small approximately 3,500-pound rubber track-mounted mini-excavator was shown to be effective for work in back yards with narrow access via side yards. Side yard access will be significantly improved if work can be done sequentially on adjacent properties and the fence between the side and back yards of the properties can be removed, allowing larger equipment access to back yards. Excavation and soil management will also be conducted using a front-end loader and/or Bobcat skid-steer mini-loader to move soil from back yards to front yards and *vice versa* to bring in clean fill soil.

In some areas where targeted excavation from 5 to 10 feet is conducted, a limited access bucket auger drilling rig will be used in conjunction with conventional excavation equipment. Conventional excavation using slot-trenching as necessary to protect structures or other features and open bulk excavation with appropriate sloping, setbacks, and/or shoring will be used where possible as the preferred excavation method. Auger excavation using a limited access rig has the advantage of being able to work in relatively tight spaces adjacent to structures to remove a column of soil. Maximum bucket width of limited access auger rigs identified is 3 feet. Conceptually, using this approach, a 3-foot diameter borehole would be excavated and then backfilled with controlled low strength material[10] (CLSM, also referred to as sand-cement slurry) and allowed to cure overnight. The adjacent column would then be excavated and backfilled with CLSM the following day. A row of boreholes can be completed and filled, for example adjacent to a structure, and, if necessary, a second row of boreholes could be completed adjacent to the first row with the centers of the boreholes offset to achieve maximum soil removal. Using this approach it is possible to remove

[10] CLSM can be designed to have low enough compressive strength to allow excavation with hand tools and a range of permeability to air and liquids. It will be necessary to design the CLSM mix to have permeability comparable to that of surrounding soils in order to effectively operate the SVE/bioventing systems.

approximately 90% of soil from an area. A schematic rendering showing how this approach could be used is shown on Figures 8-6 and 8-7. While technically feasible, auger excavation is very slow and approximately three times more expensive than conventional excavation. Use of this method would also require re-excavating the upper approximately 3 to 5 feet of CLSM fill material and replacing it with clean import soil, unless the auger excavation is in an area that will be covered with hardscape. Auger excavation would therefore be used in limited application in favor of conventional excavation wherever possible.

Because auger excavation has not been used previously at the Site, Shell plans to conduct an auger excavation pilot test during preparation of the RDIP. Access will be sought at a property that overlies the former concrete reservoir base so that both auger removal of soil and augering or coring through the reservoir base can be pilot tested. This pilot testing will include evaluation of methods to control vapors and odors during soil removal and to manage potential accumulation of methane in boreholes while augering or coring the concrete reservoir base.

In areas where access to equipment is severely limited, excavation will be accomplished using a mini-excavator, and where necessary hand tools and wheelbarrows will be used to conduct excavations. Hand excavation may be required on side yards where there is insufficient room for equipment to operate. Depth of excavation using these methods is restricted to 5 feet bgs.

Other equipment that likely will be used during excavation and backfill operations includes:

- A water truck or water buffalo for dust control;
- Electrical generator(s);
- Mechanical and/or vibratory soil compaction equipment;
- Odor suppressant foam system (tank, compressor, foam generator and pump);
- Meteorological station;
- Organic vapor and dust monitoring equipment; and
- Employee comfort stations.

Excavations will be made with setbacks from structures and/or side slopes at the horizontal to vertical ratio recommended by the Geotechnical Engineer and approved by the LACDPW and City of Carson in the Grading Permit for the particular property being excavated. The basic excavation protocols will be altered as needed as excavations are conducted and to address any previously unknown utilities, concrete debris or foundations unearthed. If possible and approved by the LACDPW and City, the 5 foot excavations will have vertical sidewalls to maximize removal of impacted soils to the full depth of excavation. We anticipate that excavation sidewalls will be sloped below foundation footings of structures. However, it is possible that the LACDPW and City will require setbacks from structures in accordance with appropriate elements of Sections J101, J104, J106, and J108 of the County Grading Code as amended by the City of Carson.

If remnants of the former reservoir concrete sidewalls and bases are encountered in remedial excavations, the concrete will be removed where encountered in the upper 5 feet of the excavations. At locations where targeted deeper excavations extend from 5 to 10 feet bgs, the concrete reservoir slabs will be removed where encountered, to the extent practicable and where it can be done safely. Based upon discussions with drilling contractor personnel, the limited access auger rig should be capable of drilling through concrete rubble and coring through the concrete slab. The ability to use the auger rig to remove the concrete slab will need to be proven in a pilot test. If it is not possible to safely remove the slab using this excavation technique, the concrete will not be removed in areas excavated using the auger excavation method. If encountered concrete extends laterally beneath a structure or beneath the sidewalk, it will be cut at the edge of the structure or inner edge of the sidewalk and the remaining concrete will be left in place.

As currently envisioned, excavation will proceed in phases, with each phase of work including approximately eight contiguous properties, if access can be obtained. Where possible, each phase will include homes on both sides of a city block (e.g., the east side of Marbella and west side of Neptune Avenues or the west side of Ravenna and east side of Panama Avenues). This approach will be used so that back-of-lot fences or block walls can be removed one time and excavation conducted in both yards before the fences are restored. Removal of the side and back fences/walls will also facilitate equipment access and ability to conduct bulk excavations rather than more time consuming slot trenching.

Each phase will include approximately eight properties with work occurring on properties in sequence. For properties on the perimeter of the tract, work will likely proceed at a smaller number of properties for each phase. Assuming City approval of the number of daily truck trips, excavation will occur concurrently on four properties. By excavating on four properties concurrently, the overall duration to complete remedial excavation is shortened and excavations can be accomplished more efficiently. Preliminarily, based on working five days per week, it is estimated that excavation and backfill will take approximately six weeks per property and site restoration will take an additional approximately two weeks; approximately 10 weeks will be needed to complete a phase of eight properties. This is a preliminary estimate that will be refined during preparation of the RDIP and confirmed during implementation of the initial phases of work. Work on the second phase of properties (i.e., the next eight properties working down the block), will begin approximately at the end of week six or eight of work on the first phase.

As described in the Preliminary Relocation Plan (Appendix D), residents of properties where remedial excavations are being conducted will be relocated for the duration of the remedial excavation, backfill, and hardscape restoration operations. Following backfill and utility and hardscape restoration, residents would move back into their homes during landscape restoration and fence/block wall construction, or, at their option, wait to return until after the landscape restoration work is completed. For non-excavated properties adjacent to properties where excavation work is being conducted, residents of adjacent properties and will be offered relocation as necessary.

This phased excavation approach will require that access can be obtained and Grading Permits for the properties are available for all eight properties in a phase before work commences. In the event that

a property does not require excavation, that property will be skipped in the sequencing of work; however, side yard and back property fences likely will need to be removed to allow excavation of the adjacent properties. The efficacy of this phased approach depends upon residents of the affected properties providing access to allow the work to proceed.

Following excavation and backfill but prior to site restoration, SVE/bioventing wells will be installed at each property where required. Additionally, for those properties where a sub-slab mitigation system is required, the system will be installed concurrent with or following the excavation activities.

8.1.5.3 Materials Handling

As soon as feasible, excavated soils will be loaded directly into an awaiting transport vehicle (i.e., end-dump truck, dump truck, or covered soil bin) using the excavator, front-end loader or skid-steer mini-loader. To the extent possible, impacted soil will be direct loaded into approved waste haulers for transport to the appropriate recycling or disposal facility. Care will be taken to ensure that all loose soil is brushed off the transporter and properly managed prior to covering with a tarp.

In the unlikely event that it is necessary to temporarily stockpile soil onsite before loading, soils either will be covered with plastic sheeting, or they will be temporarily placed in a covered bin.

Waste haulers will follow prescribed transportation routes that will be specified in a Transportation Plan that will be included in the RDIP. Haul trucks will not be permitted to stage within the Carousel community while waiting to be loaded and will not be permitted to idle for longer than five minutes during loading.

Excavated impacted soil will be transported offsite to appropriately licensed recycling/disposal facilities by a state-licensed waste hauler for appropriate recycling or disposal. Soils will be pre-profiled during the RDIP process, and approval will be obtained from the recycling/disposal facilities before excavation activities begin. A minimum of one sample per 500 cubic yards of export soil will be required by the recycling/disposal facility for profiling purposes. If possible, samples for profiling will be collected from geotechnical borings at appropriate depths. All documentation pertaining to waste disposal profiles and waste disposal acceptance will be in place prior to any offsite shipments of waste. If it is necessary to stockpile any soils while awaiting analytical results, soils will be appropriately covered and contained in accordance with SCAQMD 1166 requirements, and may be transported to a contractor storage yard.

8.1.5.4 Dust, Vapor and Odor Control

Dust suppression using water mist will be performed as required during excavation activities. Water mist will also provide the first level of vapor and odor control. Care will be taken to ensure that the soil is not over-saturated which could generate runoff that would need to be managed and increase the weight of soil to be disposed. The focus of this effort will be to assure that particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) levels to exceed 50 micrograms per cubic meter ($\mu g/m^3$). Excavation and loading operations will cease if the wind speed is greater than 15 miles per hour (mph) averaged over a 15-minute period or instantaneous wind speeds exceed 25 mph.

Based on monitoring data or odor perception, vapor and odor control will be implemented on an as needed basis. Based on experience from the excavation pilot test, Rusmar AC-565 Long Duration Foam was found to be most effective at controlling vapors and odors. This type of foam, or equivalent, and necessary support equipment will be staged and ready for application at locations where remedial excavations are conducted and there is the potential for odor releases.

8.1.6 Monitoring During Excavation Activities

A number of types of monitoring will be performed during Site remediation activities. These include:

- Worker health and safety in accordance with the Health and Safety Plan (HSP);
- Monitoring and reporting to comply with SCAQMD Rule 1166 Mitigation Plan requirements;
- Dust monitoring for SCAQMD Rule 403 Compliance;
- Meteorological monitoring of atmospheric conditions, including wind direction and speed using a portable meteorological station; and
- Monitoring for odors.

8.1.7 Post-Excavation Sampling

Post-excavation soil samples will be collected to document concentrations of certain COCs remaining on properties following excavation. This sampling will supplement the more than 10,000 soil samples that have previously been collected from residential properties.

Post-excavation soil samples will be collected from the walls of excavations adjacent to residential structures. Samples will only be collected from walls of excavations along property lines, where the adjacent property has not been or is not scheduled to be excavated. Samples will be collected from two depths at two locations along each side of the residences (8 locations, 16 samples total) and from two locations at the bottom of each excavation in the back and front yards (4 samples), yielding a total of 20 samples per property. Samples will be collected from two locations at two depths along property lines in the front and back yards of properties where the adjacent property will not be excavated. Depths of sidewall samples will be established in the field based on visual observations. These samples will be analyzed for COCs with the potential to migrate to soil vapor and groundwater, including TPHg, TPHd, TPHmo, and VOCs. Because of their very low solubility and migration potential, post-excavation samples will not be analyzed for SVOCs, PAHs, or metals.

8.1.8 Site Restoration

As described above, hardscape and landscaping will be removed during the initial stage of excavation and restored to like conditions following completion of excavation. If it is necessary to remove fences and block walls between yards and ornamental or partitioning walls on individual properties, these hardscape features will be restored to like conditions or as agreed to with the homeowner.

During homeowner meetings that will be part of the RDIP process, hardscape and landscape restoration will be discussed and agreed to with the owner. Alternative hardscape and landscaping will be considered if requested by the owner and it does not result in significant schedule or cost impacts.

Backfill will begin upon completion of excavation and installation of other remedial elements, described in Sections 8.2 and 8.4 below, are completed. Borings from auger excavation will be backfilled with 2-sack slurry the same day they are excavated. Where slot trenching is used for 5-foot excavations or for targeted deeper excavations to 10 feet, the lower part of the slot trenches will also be backfilled with 2-sack slurry. The upper 3 feet of excavations will be backfilled with certified clean imported soil. Backfill soil will be free of deleterious organic matter (i.e., vegetation) and cobbles larger than 4 inches in diameter, and be approved by the Geotechnical Engineer. Backfill soils will be moisture conditioned to near optimal moisture content and compacted to at least 90% relative compaction, or as determined by the Geotechnical Engineer and approved by LACDPW and the City of Carson in the Grading Permit. The upper foot of soil backfill will be topsoil suitable for vegetation growth and will be compacted to not more than 85% relative compaction. The Geotechnical Engineer or Contractor will perform compaction testing during fill placement and prepare a final grading compaction report for each property.

Hardscape will be restored soon after backfill is completed, after which the residents will be able to return to their homes while landscape restoration and reconstruction of fences and walls continues.

In addition to restoration at individual residences, Shell anticipates that it will be necessary to apply an asphalt top coat to City streets within the Carousel tract following completion of excavation of residential yards and installation of SVE wells and piping.

8.2 SOIL VAPOR EXTRACTION (SVE)/BIOVENTING

SVE and bioventing are the selected remedial technologies to address petroleum hydrocarbons, VOCs, and methane in soil vapor and to promote degradation of residual hydrocarbon concentrations that do not meet RAOs, or are not removed by excavation. Use of SVE/bioventing will address impacted areas beneath existing paved areas, City sidewalks, and concrete foundations of the homes, in addition to addressing reduction of COC concentrations in excavated areas below 5 feet bgs and areas not targeted for deeper excavation for mass removal with the goal of achieving SSCGs over time. Operation of the SVE/bioventing system will also address impacted soils that may be associated with residual concrete reservoir slabs left in place below the depth of excavation.

SVE is recognized as an effective technology for removal and treatment of VOCs from impacted soils. The process involves inducing airflow in the subsurface with an applied vacuum, enhancing in-situ volatilization of VOCs, and effecting movement of the VOCs to vapor extraction wells for removal from the subsurface. SVE is also effective at removing methane from subsurface soils and has been used for this application at other hydrocarbon-impacted sites and at landfills. SVE would effectively remediate the lighter volatile-range petroleum hydrocarbons, VOCs, and methane.

SVE pilot tests were conducted to evaluate the potential effectiveness of SVE to remove vapor-phase VOCs from subsurface soils at three onsite locations in areas with soil conditions ranging from likely favorable to potentially unfavorable for SVE. The SVE pilot test activities and results are provided in the S*oil Vapor Extraction Pilot Test Report* (URS, 2010f) and summarized in Section 4. The SVE well configuration at the Site will be based on the average effective ROVI from the pilot test results.

Bioventing is an in-situ technology generally applicable to the remediation of petroleum hydrocarbons in shallow soils. In this process, air is introduced into the subsurface to provide oxygen to enhance biodegradation of petroleum compounds. As summarized in Section 4.3.2 and in more detail in the final *Bioventing Pilot Test Summary Report* (Geosyntec, 2012b), bioventing was found to be effective at reducing hydrocarbon concentrations in Site soils over time. SVE working in concert with bioventing will promote microbial degradation of longer-chain petroleum hydrocarbons and, over the long term, reduce concentrations of these less-volatile compounds in the subsurface.

The SVE system will be operated in a cyclic manner, with active extraction in different portions of the Site at different times. The SVE/bioventing system(s) will be operated cyclically (pulsed) to extract impacted soil vapor and introduce oxygen to the subsurface to stimulate degradation of the heavier fraction of diesel-range hydrocarbons and motor oil-range hydrocarbons in a bioventing operational mode. During periods of active vapor extraction from a sub-set of wells ("on" cycle), the SVE system will not only remove hydrocarbon vapors, but will also draw oxygen into the subsurface to enhance the biodegradation of residual petroleum hydrocarbons in soil. During periods when no extraction is occurring for the set of wells ("off" cycle), remediation will be achieved through biodegradation alone (i.e., bioventing). The system will be designed to use the same infrastructure (i.e., extraction wells) for both SVE and bioventing, and the cyclic operating conditions will be used to implement both remedial actions. The SVE/bioventing system will be operated in manner to achieve the soil oxygen demand estimated from the bioventing pilot tests (Geosyntec, 2012b).

8.2.1 SVE/Bioventing Conceptual Design

SVE/bioventing will be implemented throughout the Site to remediate volatile petroleum hydrocarbons (i.e., gasoline-range petroleum hydrocarbons and the lighter fractions of the diesel range petroleum hydrocarbons), VOCs, and methane, and induce increased airflow to promote microbial degradation of longer-chain hydrocarbons (diesel and motor oil-range petroleum hydrocarbons). The SVE/bioventing infrastructure will consist of a system of extraction wells, belowground conveyance piping, aboveground manifold and treatment compound(s), vapor treatment system(s), and various system controls and instrumentation. SVE will be applied in the shallow zone from approximately 5 to 10 feet bgs, intermediate zone from approximately 15 to 25 feet bgs, and deep zone from approximately 30 to 40 feet bgs and locally deeper depending on depths of soil impact and depth to groundwater. Nested shallow, intermediate, and deep zone wells will be installed in the streets of the Site, which provide ready access for installation. Shallow zone wells will also be installed within the front and back yards of select residences. Locations of these shallow-zone wells in the front and back yards will be based on locations where RAOs are not met in the 0 to 10 foot bgs depth interval and to achieve SVE/bioventing coverage beneath houses. Well and piping components for SVE/bioventing wells installed on residential properties will be entirely below grade (see Figures 8-5 and 8-7). These shallow wells will be screened from 5 to 10 feet bgs

and will be connected to the SVE system via conveyance piping, which will be installed in the streets.

Based on the SVE pilot test ROVI results for the intermediate zone, a total of 63 nested well clusters (shallow, intermediate, and deep zone) will be installed in the streets with an average spacing of approximately 125 feet. Based on the estimated ROVI of 50 feet for the shallow zone from the SVE pilot test, an additional 65 shallow zone wells will be installed between the nested wells in the streets of the Site to provide increased vapor extraction coverage within the shallow zone. Additionally, shallow zone wells will be installed in the front and back yards of residences requiring remediation of the shallow zone soil by SVE/bioventing. Due to potential short-circuiting from surface landscaping, the shallow zone ROVI for the residential wells is estimated to be 25 feet. The ROVI for the SVE/bioventing system is based on the results of the SVE pilot test rather than the bioventing pilot test, because the blower planned for vapor extraction of the combined system is a robust unit with large capacity and vacuum and a system to treat extracted vapors (see Section 8.2.2). The estimated radius of influence reported for the bioventing pilot test (Geosyntec, 2012b) assumed small fans would be used to minimize the concentrations of extracted vapors. The radii of influence estimated from the bioventing pilot test are not applicable for the proposed SVE/bioventing system.

A total of 221 residences[11] are proposed for SVE/bioventing remediation. The estimated vapor extraction coverage for the shallow, intermediate, and deep zones is shown on Figures 8-1, 8-2, and 8-3, respectively.

Upon approval of the RAP, a RDIP providing the well field layout, SVE system(s) location(s) and specifications, and conveyance piping layout will be submitted for RWQCB approval.

8.2.2 SVE/Bioventing Equipment

Based on the estimated quantity of extraction wells (63 nested street wells, 65 shallow zone street wells, and 472 shallow zone residential wells), it is impractical to construct an SVE system to extract simultaneously from all of the proposed wells. As a result, a system or systems rated for a combined 3,000 standard cubic feet per minute (scfm) at up to 12 inches of mercury (in-Hg) vacuum is planned.

Shell is currently evaluating offsite locations for the installation of the remediation equipment, as well as the potential use of multiple smaller SVE systems to allow for more flexibility of vapor treatment. Potential offsite SVE system locations are being evaluated in terms of technological feasibility, accessibility and availability of the locations. These potential SVE locations are shown on Figure 8-8. The three offsite locations are on the former Turco Property (owned by Pedro First, Ltd., an affiliate of Black Equities Group, Ltd. and occupied by American Logistics International), the business park located at 24412 So. Main Street owned by 24412 So. Main Street, LLC and managed by Surf Properties, and vacant land north of the MTA/BNSF rail line owned by County

[11] Note: The table at the end of Section 6 indicates that 224 properties are identified for consideration for remedial planning. Of these, three properties are based only on excavation due to occurrence of metals, and these properties are not included in the 221 locations identified for SVE/bioventing remediation.

Sanitation District No. 8 and leased to CBB Carson Properties and managed by SB Management Corporation, part of Black Equities Group, Ltd. Shell is currently in discussions with representatives of these three locations regarding access for system installation. To minimize impacts on the residents and preserve the integrity of the neighborhood, construction of the treatment system at an offsite location is the preferred option, rather than within the neighborhood. If a suitable offsite location cannot be secured, Shell will consider options for locating the treatment system within the neighborhood. Based on preliminary discussions with the SCAQMD, it would be possible to permit a SVE treatment system in a residential neighborhood if risks associated with air emissions are below threshold levels.

The SVE/bioventing system(s) will be operated cyclically (pulsed) to extract impacted soil vapor and introduce oxygen to the subsurface to stimulate biodegradation. The SVE component of this remedial measure will remove gasoline-range hydrocarbons and the lighter fractions of the diesel-range hydrocarbons. The bioventing component will result in biodegradation of the heavier fractions of the diesel-range and motor oil-range hydrocarbons in a bioventing operational mode. Pulsing of the SVE/bioventing system will consist of extracting from select well sets for a pre-determined time interval. The time intervals and well sets will be determined based on data collected during start-up activities and may be modified based on monitoring data collected during the remedial action period.

As observed during the pilot test, granular activated carbon (GAC) effectively removed the lighter volatile-range petroleum hydrocarbons and VOC mass from the extracted soil vapor. However, with lighter volatile-range petroleum hydrocarbons representing the majority of the total contaminant mass removed and the expected concentrations, alternative treatment technologies such as thermal and/or catalytic oxidation are likely to be initially more effective. In addition, GAC will not remove methane from the recovered vapors, which will require an alternate treatment technology. The design of the SVE system potentially will include use of multiple treatment technologies in a staged approach, depending on inlet concentrations. The remediation equipment will provide the flexibility to transition from thermal oxidation to catalytic oxidation followed by GAC treatment, when the concentrations have decreased sufficiently.

Due to the localized presence of chlorinated compounds in soil vapor, thermal oxidation could generate acid gas as a by-product of the combustion process. The use of thermal or catalytic treatment would need to be evaluated in the RDIP prior to implementing this technology. However, methane is effectively treated using thermal technologies. A thorough evaluation of the use of thermal treatment and GAC will be performed and presented in the RDIP to establish the appropriate technology to treat the various contaminants detected at the Site. The off-gas treatment system will be permitted by SCAQMD. The permit application will be submitted to SCAQMD after the RDIP is approved by the Regional Board.

The SVE/bioventing treatment system(s) will be installed in an enclosed structure constructed with sound attenuation insulation to reduce operating noise levels to decibel (dB) levels at our below the City of Carson Noise Ordinance. The system will have an effluent discharge stack of sufficient height for dispersion of treated off gases, consistent with modeling results and requirements in the

SCAQMD permit to Construct/Operate. As described in Section 9, the detailed design of the SVE/bioventing system will be presented in the RDIP.

8.2.3 SVE/Bioventing Well Installation

The SVE/bioventing extraction wells in the streets will be constructed as either triple-nested vertical wells in the same borehole, separated by cement/bentonite seals similar to those used during the SVE pilot test, or single shallow zone wells. The triple-nested wells will have screen intervals of 5 to 10 feet bgs, 15 to 25 feet bgs, and 30 to 40 feet bgs for the shallow, intermediate, and deep zones, respectively. However, the actual screen length/depth intervals may be revised based on subsurface stratigraphy encountered during well installation. A minimum separation of 5 feet will be maintained between each screen interval. The single shallow zone wells will have screen intervals of 5 to 10 feet bgs. Each well will be completed within a flush-mount traffic-rated well vault surrounded by a concrete skirt. Typical nested and single shallow zone well construction details are shown of Figures 8-4 and 8-5, respectively.

Findings of the Revised HHRA regarding properties where concentrations of COCs would not meet RAOs were used to identify properties that will require SVE/bioventing. In total, 221 properties were identified for treatment with SVE/bioventing. The actual locations for installation of residential SVE/bioventing wells will be established during system design based on COC and methane distribution in the subsurface (as depicted on Figures 3-3 through 3-17). Shallow SVE/bioventing wells will be installed at individual residences, where required, and will be screened from approximately 5 to 10 feet bgs or to the depth of the former reservoir concrete slabs if present at less than 10 feet bgs. In general, two wells are planned at each property where RAOs are not met. The number of wells will be increased for larger properties, as appropriate, to achieve SVE/bioventing coverage beneath the building foundation slab based on the ROVI and lot configuration. At properties that have pools, the number of wells may be increased to achieve SVE/bioventing coverage beneath the residence.

The shallow wells will be constructed similar to the single shallow zone wells installed in the streets but will be completed entirely below ground and not visible from the surface. The SVE/bioventing wells and conveyance piping within the residences will be covered with backfill soil.

At residential properties where remedial soil excavation will be performed, wells will be installed following backfill placement either by hand or using a small Bobcat skid-steer or similar equipment with a power auger attachment. Conveyance piping will be laid prior to final backfill and grading, and will be brought to the back of sidewalks for later connection to piping in the streets. At residential properties that will not have excavation performed but that will have SVE/bioventing wells, well and piping installation will be done in the same general timeframe as nearby properties that are being excavated and SVE/bioventing wells and piping are installed. At non-excavated properties, the wells will be installed by hand and piping will be laid in hand excavated trenches. Hardscape and landscaping that is affected by well and/or piping installation will be restored to like conditions following installation. Plan view and cross-section schematic views of a typical residence soil excavation and SVE/bioventing well system installation details are shown on Figures 8-6 and 8-7, respectively.

8.2.3.1 Trenching

Conveyance piping will be installed in trenches within the City streets. Trenching will require the same monitoring and vapor and odor mitigation as residential excavations. Odors will be controlled using long-acting vapor suppressing foam, as necessary. Shell anticipates that it will be necessary to apply an asphalt top coat to City streets within the Carousel tract following completion of excavation of residential yards and installation of SVE/bioventing wells and piping.

8.2.4 SVE/Bioventing System Operation

The SVE/bioventing system will be operated until RAOs are met, by cyclical extraction from the well field in sets of wells. The extraction "well sets" to be operated concurrently will be determined during the two to three month startup phase of SVE/bioventing operation and adjusted and optimized periodically throughout the duration of SVE/bioventing operations at the Site. Cycling of the system will promote oxygenation of the subsurface which will enhance the biodegradation of residual petroleum hydrocarbons when the SVE is in the "off" cycle and will revert back to SVE mode when the area is switched to the "on" cycle. It is expected that recovered vapors from SVE system operation will decline through time and SVE operation can be discontinued in some wells and active operation shifted to other parts of the Site. In this case, the wells would still need to be operated periodically to introduce oxygen to the subsurface in a bioventing mode of operation.

Field activities associated with the system operation will include periodic Site visits to record operating parameters; monitor VOC and methane concentrations in the influent, effluent, and extraction wells using field instrumentation, and for performance of routine system preventive maintenance and troubleshooting. The recorded operating parameters, and influent, effluent, and well concentrations will be used to fine tune and adjust the system and to optimize influent VOC and methane concentrations to sustain removal rates to achieve remediation with the shortest possible time frame, and to maintain compliance with the SCAQMD permit. As part of the operations and maintenance (O&M) activities, it is expected that field personnel will periodically need to access well boxes in the streets. The frequency of accessing well boxes will be established during system startup. Field personnel will not need to access wells installed on residential properties for O&M purposes.

It is anticipated that the SVE/bioventing system(s) will be operated on a continuous basis and shut down only during performance of routine maintenance. The potential operating time for the SVE/bioventing system has been estimated based on data collected during the SVE and bioventing pilot tests (URS, 2010f; Geosyntec, 2012b). The operating time for the SVE/bioventing system is a function of soil concentrations, TPH composition, and operating parameters (e.g., percent operating time for an individual extraction well). In general, areas with lower TPH concentrations will achieve the RAOs more quickly than areas with higher soil concentrations. SVE will be more effective at removing the lower molecular weight (i.e., more volatile) constituents present in soil. The higher molecular weight constituents will be remediated through bioventing. Based on the TPH fractionation analyses conducted as part of the Phase II Site characterization, estimates for SVE/bioventing system operating time assume that the gasoline-range hydrocarbons and the lighter

fraction of the diesel-range hydrocarbons will be remediated by SVE and the heavier fraction of the diesel-range hydrocarbons and motor-oil range hydrocarbons will be remediated by bioventing.

- SVE: The average vapor extraction rate of the shallow wells in the SVE pilot test ranged from approximately 20 to more than 100 scfm. Assuming a ROVI of 50 feet, 10-foot treatment zone thickness, soil air-filled porosity of 0.3, and 10% operating cycle, a pore volume will be extracted every 30 days. In order to remove mass that may be in residual or sorbed phases in the vadose zone, it is assumed that 100 pore volumes of vapor extraction will be sufficient to meet the SVE remedial goals. The cyclic operation of the SVE/bioventing system will facilitate removal of mass-transport limited migration of constituents from residual or sorbed phases to the vapor phase. Based on these assumptions,, the estimated SVE operating time is approximately 5 years. However, areas with higher VOC concentrations may require longer SVE system operation than areas of average or lower concentrations. Note that the RAOs for protection of groundwater will be met by remediating the lower molecular weight TPH fractions which have a greater leaching potential (TPHCWG, 1997).
- Bioventing: The bioventing pilot test found that relatively low air flow rates (i.e., less than 1 scfm) are necessary to deliver sufficient oxygen to meet the bioventing oxygen demand. This oxygen demand will be met by implementation of the combined SVE/bioventing system described above. An estimate for the biodegradation rate for TPH in soil can be made using a stoichiometric evaluation for the amount of oxygen necessary to biodegrade residual hydrocarbons (ITRC, 2009). Based on the estimated flow rate of the SVE/bioventing system, sufficient oxygen to remediate soils with TPH concentrations of 10,000 mg/kg will be delivered to the subsurface within approximately 30 years. An alternate approach to estimate the operating time for the bioventing system is to calculate the time necessary for TPH concentrations following SVE operation to be reduced to SSCGs. Based on the distribution of TPH in soils and the remediation of gasoline-range hydrocarbons and the lighter fraction of the diesel-range hydrocarbons by SVE, soils with initial TPH concentrations of 10,000 mg/kg will likely be reduced to approximately 7,500 mg/kg (TPHd = 2,500 mg/kg and TPHmo = 5,000 mg/kg). A 40 percent reduction in these concentrations is necessary to meet the risk-based SSCGs. Following methods presented in the bioventing pilot test summary report (Geosyntec, 2012b), a time period of 30 to 40 years of bioventing operation is estimated to achieve these remedial action objectives.

These operating periods should be considered preliminary. Operation of the SVE/bioventing system will be optimized during the remedial action as monitoring data are collected (e.g., increase cycle time for areas with higher concentrations). Improved estimates of the potential operating time for the SVE/bioventing system can be made after analysis of these monitoring data.

8.3 SUB-SLAB VAPOR MITIGATION

Based upon the multiple lines of evidence evaluations presented in the Follow-up Indoor Air Reports and Final Interim Reports, Geosyntec and URS have concluded that constituents detected in indoor air are reflective of background sources. Notwithstanding the fact that regulatory guidance does not

require remediation of COCs present at or below background levels, the RWQCB directed Shell to evaluate theoretical exposures due to the vapor intrusion pathway using the detected concentrations of COCs in sub-slab soil vapor. The Revised HHRA includes this vapor intrusion evaluation and theoretical exposures were calculated using conservative assumptions (e.g., sub-slab soil vapor to indoor air attenuation factor of 0.002). Consequently, sub-slab vapor mitigation systems will be installed at residential properties where RAOs for soil vapor would not be met based on potential exposure due to vapor intrusion of petroleum hydrocarbons or chlorinated ethenes (e.g. PCE and TCE) from soil vapor to indoor air, and at the two locations where detected methane concentrations in sub-slab soil vapor probe samples exceed the methane SSCG of 0.5%. One of these properties has already had an interim mitigation system installed, and the other only slightly exceeds the methane SSCG of 0.5% methane in a single measurement from a single sub-slab probe. Note that potential exposures to trihalomethanes (i.e., chloroform, bromodichloromethane, or dibromochloromethane) were not considered in this assessment, because the presence of these constituents in soil vapor is believed to be due to off-gassing from municipal water (either leaking water lines or sewer lines or applied irrigation).

Based on the HHRA results and methane detected in sub-slab soil vapor, 28 properties have been identified for sub-slab vapor mitigation as summarized in Table 6-1 and shown on Figure 6-4. Twenty-seven (27) properties were identified based on RAO exceedance for potential vapor intrusion, and one property was identified based on methane. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site.

Sub-slab depressurization (SSD) systems will be used to mitigate the potential vapor intrusion pathway at the Site. The SSD system creates a negative pressure below the slab of the residence using a fan to remove air from below the slab and exhausting it above the building. This process keeps vapors emanating from the soil below from entering the building.

SSD design, installation, and operation will be in general accordance with the DTSC Vapor Intrusion Mitigation Advisory (DTSC, 2011). The system consists of creating holes in the slab or footing, removing a quantity of soil from beneath the slab to create suction pit and placing suction pipes into the holes. The suction pipes are directed to above the roof and a fan connected to the system to create a sub-slab vacuum.

8.3.1 Diagnostic testing

After installation of the SSD system, diagnostic testing will be conducted to assess the vacuum distribution beneath the building foundation and whether modifications to the system design (e.g., larger fan or additional suction pits) is warranted. The PVC riser pipe joints will not be glued until the initial system diagnostic tests are complete. The diagnostic testing consists of the following activities:

- A fan will be temporarily installed on the vent pipe from the suction point(s).

- Quarter-inch diameter hole(s) will be drilled through the floor of the residence and slightly into the sub-slab soils across the slab away from the suction point(s). These test holes will be used to monitor the differential air pressures across the slab (above and below the slab). The floor will be repaired and restored following the diagnostic testing.
- Initial pressure differentials will be recorded with the fan off. The fan will then be turned on (exhausting the gases outside the home) and the static vacuum in the riser pipe(s) and differential pressure at the test hole(s) measured using a digital micro-manometer, with a resolution of 0.0001 inches of water column (in-WC) and an accuracy of ± 1% of the reading or ±0.0005 in-WC.
- Airflow will also be measured with one of the following instruments: a vane anemometer, a hot wire anemometer, or a pitot tube. If measured airflow and vacuum are not within the fan's performance specifications, an alternate fan will be selected.

The SSD system will be considered effective once vacuum conditions are established beneath the slab. Because indoor air concentrations measured during the Phase II investigation are indistinguishable from background levels, effectiveness of the SSD will be assessed only through cross-slab differential pressure measurements. Additional indoor air/sub-slab soil vapor sampling is not necessary to further assess the vapor intrusion pathway following installation of the sub-slab vapor mitigation system; however, as discussed in Section 8.6, additional sub-slab soil vapor monitoring will be performed in accordance with Regional Board directives.

8.3.2 Permitting

Because the SSDs will operate in an active and not a passive mode, SCAQMD will require permits for the active operation of the SSD systems. After completion of the diagnostic testing, a permit application will be submitted to SCAQMD. Additionally, Shell contractors will confirm that homes with a SSD have a carbon monoxide (CO) monitor, as required in all homes by California law.

8.4 GROUNDWATER

8.4.1 Description of Groundwater Occurrence, Quality and Potential Sources

Groundwater beneath the Site has been extensively investigated and reported to the RWQCB since initial well installation in 2009. A description of groundwater conditions including occurrence, quality, COCs, and COC sources was presented in the Revised SSCG Report (Geosyntec, 2013c) and is summarized in Section 3.3.4 above. The SSCGs for groundwater at the Site are listed in Table 5-3 of this RAP document.

8.4.2 Groundwater Remediation Plan

8.4.2.1 Site-Related COCs

Reduction of Site-related petroleum COCs in groundwater (benzene, naphthalene, TPH) to meet RAOs will eventually occur due to natural processes, but will be accelerated by the significant accompanying source reduction proposed in Section 8.1, 8.2 and 8.5 of this RAP. Reduction of TPH-related compounds to the SSCGs is expected to cause arsenic to decrease to background levels

as aerobic conditions return (Section 3.3.4.5). Without source reduction in the vadose zone or of LNAPL, the length of time needed to meet RAOs in groundwater is expected to be long (several hundred years). However, following the significant source zone reduction proposed in the RAP for soils, soil vapor, and LNAPL, reduction of Site-related COCs to meet RAOs is expected to require much less time. For example, based on modeling, benzene levels in groundwater will likely meet SSCGs at the Site in approximately 70 years (see discussion below) assuming significant vadose zone and LNAPL source zone reduction onsite, as well as source reduction associated with identified upgradient sources (RWQCB, 2014a).

It is proposed that source reduction through excavation, SVE/bioventing in the vadose zone, as well as LNAPL removal as discussed below, will be used in conjunction with MNA as the remedy for Site-related COCs in groundwater. MNA relies on naturally occurring processes to decrease concentrations of chemical constituents in soil and groundwater. Natural processes include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of constituents in media of concern.

MNA is listed as a common remedial approach used for leaking underground fuel tank (LUFT) sites (SWRCB, 2012). According to the USEPA, Office of Solid Waste and Emergency Response (OSWER) Directive 9200.4-17P (USEPA, 1999), "*the most important considerations regarding the suitability of MNA as a remedy include: whether the contaminants are likely to be effectively addressed by natural attenuation processes, the stability of the groundwater contaminant plume and its potential for migration, and the potential for unacceptable risks to human health or environmental resources by the contamination. MNA should not be used where such an approach would result in either plume migration or impacts to environmental resources that would be unacceptable to the overseeing regulatory authority.* ***Therefore, sites where the contaminant plumes are no longer increasing in extent, or are shrinking, would be the most appropriate candidates for MNA remedies."*** Consistent with the USEPA Directive 9200.4-17P, the LUFT Manual (SWRCB, 2012) indicates that the first line of evidence for natural attenuation is the use of trend analyses on historical data to demonstrate that the plume is stable or retreating.

Trend analyses and modeling were conducted in the *Revised Site-Specific Cleanup Goals Report* (Geosyntec, 2013c) to assess temporal trends and the stability of the benzene plume at the Site to support the MNA approach. Results of the Monitoring and Remediation Optimization System (MAROS) analysis indicated that the benzene in Site groundwater is likely being attenuated through natural biodegradation processes and is a stable or decreasing plume. This conclusion is supported by the current observed distribution of benzene in the plume, which shows significant attenuation (to non-detect or near non-detect concentrations) at the downgradient plume edge near the property boundary). The conclusion is also supported by the significant age of the plume source (more than ~50 years). In addition, the Bioscreen model simulation results (Geosyntec, 2013c) show that even without source zone reduction no significant down-gradient migration of the benzene plume is predicted. The second simulation, which assumed 80% benzene source zone mass removal (a reasonable assumption given the proposed remedy of LNAPL removal coupled with SVE that will remove a large proportion of the leachable lighter petroleum fractions including benzene, and soil

excavation), predicts that the benzene concentrations in groundwater will be degraded to below the MCL in approximately 70 years, also with no significant down-gradient migration of the benzene plume. This of course assumes that the overseeing agencies will be successful in stopping off-Site migration of COCs onto the Site.

In summary, MNA is an appropriate remedy for Site-related COCs in groundwater because:

- The benzene plume at the Site is limited in areal extent and is stable or declining due to natural degradation processes.
- Benzene and TPH are well-defined and generally limited to the Site (i.e., they do not extend significantly downgradient of the Site boundary nor into the underlying Gage aquifer with the exception of the migration of benzene presumably from the adjacent Turco site which has impacted the Gage aquifer beneath the northwest portion of the Site). Benzene is collocated with TBA indicative of a gasoline release (not crude oil) in that location.
- The Shallow groundwater at the Site will not be used in the foreseeable future due to: (1) high total dissolved solids and other water quality issues unrelated to Site conditions, (2) is present in a low yield, thin aquifer, (3) there are restrictions on groundwater pumping in the basin due to the adjudication of the groundwater resource; and, (4) the overlying land use is completely residential without the needed open space for water production infrastructure.
- Significant reduction of Site-related COCs in the vadose zone source areas is anticipated with any proposed Site remedy.

The post-remediation natural reduction in Site-related COC concentrations in groundwater will be monitored. Semi-annual monitoring of both shallow zone and Gage wells will be conducted for a five-year period following implementation of SVE/bioventing. Groundwater samples will be analyzed for the COCs, including select MNA parameters[12]. The semi-annual MNA program will commence during implementation of the RAP, specifically following the startup phase of the SVE system. If after five years of semi-annual MNA monitoring the concentrations of Site-related COCs are not stable or decreasing based on statistical analysis, contingency in-situ groundwater remediation through oxidant injection will be considered at localized areas (i.e., where Site-related COCs exceed 100x MCLs) as discussed below. However, if the concentrations of Site-related COCs are stable or decreasing, the MNA program will continue and will be re-assessed after five additional years of annual groundwater monitoring.

It is also proposed that the RWQCB or other appropriate agencies actively pursue upgradient responsible parties who may be contributing to certain COCs (notably benzene, TBA, and chlorinated compounds and their breakdown products) migrating onto the former Kast Site. Additional discussion of these upgradient sources is also discussed in the Revised SSCG Report

[12] MNA parameters may include oxidation-reduction potential, dissolved oxygen, pH, nitrate, iron, sulfate, and methane.

(Geosyntec, 2013c). The potential or actual migration of these COCs onto the former Kast Site was indicated by the RWQCB (2014a).

8.4.2.2 Contingency Plan for Groundwater Remediation

If warranted by the results of the statistical analyses conducted on the initial five years of semi-annual MNA data, contingency remediation of certain Site-related COCs in localized areas of groundwater (e.g. where Site-related COCs exceed 100x MCLs) may be implemented. The purpose of this contingency remediation would be to further shorten the time over which the concentrations of COCs will return to background or MCL levels if the proposed Site remedy, including natural processes, is insufficient.

Oxidant injection was retained in the Revised FS report as the selected contingency in-situ groundwater remediation technology because it is more easily implementable and potentially effective, and results in less disruption to Site residents. Air sparging with SVE and biosparging were not retained for future consideration in the FS report due to the infrastructure requirements and potential for significant disruption to residents.

Injection of an oxidant (e.g., Oxygen Release Compound® [ORC®]) involves the introduction of an oxidant, in this case a phosphate-intercalated magnesium peroxide that, when hydrated, produces a controlled and continuous release of oxygen to the saturated zone. The controlled-release of oxygen to the saturated zone accelerates the development of existing indigenous microorganisms to biodegrade the organic constituents. This process involves mixing an oxidant with water to form a slurry that is pressure injected (using a pump) into the saturated zone. Once the slurry is injected into the groundwater, tiny oxidant particles produce a controlled-release of oxygen. Oxidant can also be injected into filter socks placed in wells. When filter socks are exhausted, spent socks are replaced with new filter socks containing the slurry to restore oxygen supply to promote biodegradation of remaining organic constituents. Similar commercially-available oxidants could also be used. Injection of chemical oxidants into the saturated zone would be conducted in accordance with applicable waste discharge requirements (WDRs).

Oxidant (e.g. ORC®) injection could be implemented in localized Site areas to remediate volatile petroleum hydrocarbons and VOCs. The conceptual evaluation assumes use of ORC® as the oxidant, although similar commercially-available oxidants could also be used. The oxidant injection program would consist of a system of injection wells where oxidant is delivered at the wellhead by pressure injection or by placement of filter socks containing oxidant. The oxidant would be injected/replaced on a periodic basis as evaluated in the pilot test report. Alternatively, the oxidant could be injected in one or more rounds without wells using direct-push or other technology.

The ROI for oxidant injection is estimated to be 15 feet. The conceptual design would target injection near wells with the highest concentrations of COCs in shallow groundwater, with the injection points transecting shallow groundwater water flow. The oxidant injectate volume and injection schedule would be optimized during operation as the rate of constituent removal would decrease when concentrations of dissolved constituents are reduced.

A pilot test would be performed to assess the ability of oxidant injection to achieve SSCGs. For conceptual design purposes, based on an estimated injection ROI of 15 feet at the Site, it is envisioned that a total of 19 oxidant injection wells or injection points would be installed in the streets with an average spacing of 30 feet (see Figure 8-9). If deemed necessary, and if this technology is selected for groundwater remedy, a RDIP providing the injection well location(s), specifications, and calculations of oxidant delivery will be submitted for RWQCB approval.

8.5 LIGHT NON-AQUEOUS PHASE LIQUIDS (LNAPL)

Shell will continue periodic LNAPL recovery where LNAPL has accumulated in monitoring wells (MW-3 and MW-12) to the extent technologically and economically feasible, and where a significant reduction in risk to groundwater will result. If LNAPL accumulates in the future in other wells to a measurable thickness, LNAPL recovery will commence from those wells, and if LNAPL accumulates at a thickness of greater than 0.5 foot in other wells, LNAPL will also be periodically recovered from those wells using a dedicated pump. The goal for LNAPL recovery will be an end point of no measurable LNAPL accumulation in monitoring wells at the Site.

LNAPL is currently being recovered from monitoring wells MW-3 and MW-12 on a monthly basis using dedicated pneumatic total fluids pumps installed in the wells. Recovered LNAPL is placed in drums which are immediately transported offsite for proper disposal. Periodic LNAPL recovery from MW-3 began on November 9, 2010, and recovery from MW-12 began on October 28, 2013. An estimated 108.9 and 10.6 gallons of LNAPL have been removed from MW-3 and MW-12, respectively, since LNAPL recovery began.

As part of the remedial actions described in this RAP, LNAPL recovery will continue from wells MW-3 and MW-12 on a monthly basis, and, if LNAPL is detected at a measurable thickness in other wells in the future, monthly LNAPL recovery will be initiated on these wells with sorbent socks or, if they have an LNAPL thickness of greater than 0.5 foot, with a dedicated pump. Monitoring of LNAPL and water levels, and LNAPL recovery volume monitoring will continue during LNAPL recovery events. When LNAPL recovery shows a declining trend in wells in which LNAPL occurs, recovery trends will be evaluated, a recommendation may be made to the RWQCB to reduce the frequency of LNAPL recovery, as appropriate.

In the future, Shell proposes to assess the economic and technical feasibility of continued hydraulic recovery of mobile LNAPL using LNAPL transmissivity (Tn) as a criterion. The Interstate Technology & Regulatory Council (ITRC) suggests that hydraulic recovery systems can practically recover LNAPL where the Tn is greater than 0.1 to 0.8 ft^2/day and that "Further lowering of Tn is difficult and can be inefficient; that is, it can take very long to marginally reduce Tn without much benefit in terms of reduction of LNAPL mass, migration potential, risk, or longevity" (ITRC, 2009). Tn will be assessed using baildown tests in wells with a minimum of 0.5 foot of LNAPL, as described by ASTM E2856-13 (ASTM, 2013). Evaluation of Tn may be used as an alternative end point for LNAPL recovery.

8.6 POST-CONSTRUCTION LONG-TERM MONITORING AND SAMPLING

This section provides Shell's recommended long-term monitoring and sampling plan for the Site. Post-excavation sampling from remedial excavations was addressed in Section 8.1.7.

8.6.1 Sampling of Existing Soil Vapor Probes in Streets and Utility Vaults

- Quarterly monitoring of existing soil vapor probes at 1, 1.5 and 5 feet bgs at nine onsite probe locations and one offsite location in the streets will continue until site conditions demonstrate it is no longer necessary or feasible.
- Quarterly monitoring of 69 onsite and offsite utility vaults will continue until after the SVE/bioventing system becomes operational and site conditions demonstrate it is no longer necessary.

8.6.2 SVE/Bioventing System Operational Sampling

- After installation and startup of the SVE/bioventing system, periodic monitoring will be conducted as specified in the SCAQMD Permit. Periodic monitoring will include, at a minimum, collection of system influent and effluent vapor samples for laboratory analyses for VOCs and fixed gases, as required in the SCAQMD permit.
- Results of the analyses, in conjunction with measured flow rates, field readings and time of operation, will be used to estimate the mass of VOCs removed from the subsurface, degradation of longer-chain hydrocarbons, and as a basis for optimizing and eventual shutdown of SVE operations and switching from the SVE/bioventing to bioventing mode of operations.
- Mass removal estimates will be provided to the RWQCB on an annual basis. The RWQCB will also be copied on reports required in the SCAQMD permit.
- System operational VOC and methane monitoring data, in conjunction with system effectiveness data (see below) will be evaluated to establish when soil vapor SSCGs have been met or asymptotic concentrations have been achieved. At that time, a recommendation may be made to terminate the SVE operational mode, in which case the system operational status would change to bioventing only mode and the extraction system would only be operated periodically to induce oxygen flow to the subsurface.

8.6.3 Monitoring of SVE/Bioventing System Effectiveness

- To monitor SVE/bioventing effectiveness, soil vapor and soil samples will be collected at 16 representative locations throughout the Site prior to start of SVE/bioventing system operation to establish baseline conditions.
    - The nested or clustered soil vapor well and probe locations and soil boring locations will be specified in the RDIP. The vapor well and boring locations will be situated in between the SVE/bioventing wells so that results are not strongly influenced by close proximity to the extraction wells.

  - Some of the soil vapor wells/probes will be installed near existing street soil vapor probes that are sampled quarterly, as these probes will likely be decommissioned during trenching in the street for SVE conveyance pipe installation.
  - Multi-depth soil vapor probes/wells will be installed at each location at depths of 1.5, 5, 7.5, 20 and 35 feet bgs. The 7.5, 20 and 35-foot sampling screen depths will target the midpoint of the SVE well screens.
  - Sub-slab soil vapor samples will be submitted to a state or National Environmental Laboratory Accreditation Program (NELAP)-certified laboratory and analyzed for VOCs by USEPA Method TO-15 and fixed gases (including methane) by ASTM Method D-1946.
  - To reduce homeowner disruption, additional soil vapor monitoring probes/wells will not be installed on residential properties.

- Following SVE/bioventing system startup, soil vapor samples will be collected from the 16 multi-depth SVE wells and soil vapor probes installed in the streets annually for 5 years and once every 5 years thereafter during system operation to monitor system effectiveness at reducing COC concentrations and degradation of longer-chain hydrocarbons.
- Results of the baseline and periodic sampling will be used to evaluate overall system effectiveness as well as optimize system operation and will be reported in an initial 5-year review report and subsequent reports submitted on a 5-year basis.
- Soil vapor samples will be screened in the field with portable field instruments and analyzed for VOCs by EPA Method TO-15 and fixed gases (including methane) by ASTM Method D-1946.
- Periodic measurements of vacuum at these SVE wells and soil vapor probes will be performed to evaluate and confirm the radius of influence of the system. If the design radius of influence is not confirmed by these vacuum readings, system operating parameters may be adjusted or need for installation of additional wells will be evaluated.
- Soil samples will be collected from 16 soil boring locations in the streets at representative locations throughout the site using a Geoprobe rig. Boring locations will be specified in the RDIP.
- Samples will be collected at depths of 7.5, 20 and 35 feet bgs (midpoint of SVE well screen intervals).
- After 5 years of SVE/bioventing system operation and at 5-year intervals thereafter, Geoprobe borings will be advanced and sampled at the same depths at locations adjacent to the previous borings and samples will be collected for comparative analysis with prior samples from the same locations.
- Soil samples will be analyzed for TPHg, TPHd, and TPHmo by EPA Method 8015M, and VOCs by EPA Method 5035/8260B. Samples will also be extracted using the Synthetic Precipitation Leaching Procedure (SPLP) to evaluate leachability of COCs in soil and reductions in leachability over time.

8.6.4 Residential Sampling

8.6.4.1 Sub-Slab Soil Vapor Probe Monitoring

- At the 202 properties identified for soil excavation from 0 to 5 feet bgs, sub-slab soil vapor probes will be monitored and sampled every other year for VOCs and fixed gases until remedial excavation is completed and the SVE/bioventing system becomes operational.
    - After the SVE/bioventing system is fully operational, sub-slab soil vapor probes will be monitored and sampled every 5 years at the same 202 properties until site conditions demonstrate it is no longer necessary.
    - Methane screening will be conducted using hand-held instruments inside the homes at the time of the sub-slab soil vapor probe sampling.
    - Soil vapor samples will be screened in the field with portable field instruments and analyzed for VOCs by EPA Method TO-15 and fixed gases (including methane) by ASTM Method D-1946.
    - Because outside sub-slab soil vapor probes in front and back yards will be removed along with residential hardscape, replacement probes will be installed in the garage (if one does not exist) so that two probes can be sampled per property.
    - If results of sub-slab soil vapor analysis indicate that potential vapor intrusion risk exceeds 1×10^{-6} and RAOs for potential vapor intrusion are exceeded, and the property has not previously been identified for installation of sub-slab mitigation, a sub-slab depressurization system will be installed.
    - If a sub-slab depressurization system has previously been installed, it will be checked to confirm it is working as designed, and if not, corrective steps such as installing a larger fan or expanding the system will be evaluated.
    - To minimize impact on residents, further indoor air sampling will not be conducted unless specific conditions indicate it is warranted. Rather, Shell recommends moving to mitigation rather than further characterization and accompanying disruption.
    - Also to minimize impact on the community sub-slab sampling will be conducted over a 6 to 8-week period each year and scheduled to accommodate homeowners to the extent possible.

8.6.4.2 Sub-Slab Depressurization (SSD) Systems

- The SSD monitoring program will consist of sub-slab soil vapor probe sampling at the properties where SSD systems are installed as follows:
    - One sampling event per year for years 1 through 5 following system installation;
    - One sampling event every other year for years 5 through 15; and
    - One sampling event every five years for years 15 through 30, or until site conditions demonstrate it is no longer necessary.

- Each sampling event would consist of checking sub-slab soil vapor probes for pressure/ vacuum, and sampling two or three sub-slab soil vapor probes, depending on timing relative to hardscape removal and garage probe installation, for analysis for VOCs and fixed gases (including methane).
- The SSD system will include a manometer or in-line pressure gauge to provide a simple measure that the system is operating as designed. Clear instructions (including the name and contact information for the appropriate Shell contractor) will be placed in a visible location to address problems with the SSD system operation.
- Annual inspections will be done to verify that the SSD systems are operating as designed and vacuum and flow rate of the SSD fan will be monitored.

8.6.5 Groundwater Sampling

- Following RAP approval, monitoring of both shallow zone and Gage wells will be conducted semi-annually.
- Groundwater samples will be analyzed for VOCs, TPHg, TPHd, TPHmo and metals, as well as select MNA parameters, including oxidation-reduction potential, dissolved oxygen, pH, nitrate, iron, sulfate, and methane.
- The semi-annual MNA evaluation program will commence following the startup phase of the SVE system.
- If after five years of semi-annual MNA monitoring the concentrations of Site-related COCs exhibit an increasing trend based on statistical analysis, contingency in-situ groundwater remediation will be considered at localized areas (i.e., where Site-related COCs exceed 100x MCLs).
- If concentrations of Site-related COCs are stable or decreasing, the MNA program will continue and will be re-assessed after five additional years of annual groundwater monitoring.

8.7 CONSTRUCTION PHASE AND POST-CONSTRUCTION PHASE ACTIVITIES

During the period of active remedial construction activities for soil excavation, backfill and property restoration, SVE/bioventing well and piping system installation, and installation of sub-slab mitigation, Shell's contractors will have a daily presence in the neighborhood. These activities will include use of excavators, backhoes and loaders, waste-hauling trucks and dump trucks to deliver fill soils, drilling rigs, personal trucks and other vehicles, and various supporting equipment. During the period of active remedy implementation, there will be periods of heavy truck traffic and construction activity.

Following the period of active remedial construction during which soil excavation and SVE/bioventing system installation will be completed, Shell's contractors will have a less visible presence in the community; however, continued periodic sampling will be performed at residences, streets, and for monitoring and O&M of the SVE/bioventing system.

9.0 PLANNED REMEDIAL DESIGN AND IMPLEMENTATION PLAN (RDIP) PROCESS

9.1 OVERALL RDIP PROCESS

Following approval of the RAP, a Site-wide Remedial Design and Implementation Plan (RDIP) will be prepared. The Site-wide RDIP will provide details on the design and implementation of the planned remedy outlined in this RAP. The RDIP is expected to include the following elements:

- Details of the non-property specific remedial excavation activities to be conducted on a Site-wide basis including elements of the remedial design, such as general excavation methodologies, permitting, and health and safety requirements.
- SVE/bioventing system design including well, treatment system compound location, piping and treatment system layout, as well as operation, monitoring, and maintenance plans.
- SVE/bioventing performance evaluation borings and multi-depth soil vapor probe designs.
- Sub-slab mitigation system design including operation, monitoring and maintenance plans.

Following approval of the RDIP, Property-Specific Remediation Plans (PSRPs) will be prepared for all properties that require excavation, sub-slab mitigation, and/or SVE/bioventing. The PSRPs will define areas to be excavated and depths of excavation, features to be removed and those that will be protected in place, and locations of underground utilities that need to be either protected in place or removed and restored, and will fulfill the requirements for municipal permitting. For those properties where sub-slab mitigation will be installed, the PSRPs will include details of the mitigation system design. The PSRPs will identify SVE/bioventing well and piping locations for the 221 properties where SVE/bioventing wells will be installed. The PSRPs will be prepared in groups according to the planned excavation phasing, to provide the level of detail needed for individual property permitting and restoration. It is anticipated that these groups of PSRPs will be submitted to the Regional Board for a two-week review period prior to submittal of permit packages to the municipal Building Officials.

Additional information on the Site-wide RDIP and the PSRPs is provided below.

9.2 SITE-WIDE RDIP

Preparation of the Site-wide RDIP will begin following conceptual approval of the RAP. The RDIP will provide a detailed discussion of the specific tasks necessary to implement the Site-wide remedy, including engineering design of the selected remedial actions, project phasing, and operation/ monitoring/maintenance of different components of the remedy.

The overall sequencing and preliminary schedule will be discussed, including activities necessary to fully implement each of the components of the remedy, how these activities will be coordinated to facilitate construction/implementation, and identification of potential major scheduling problems or delays which may impact the overall schedule.

Excavation equipment and methodologies to be included in the RDIP will apply to the property-by-property excavation activities (to be detailed in the PSRPs) and to the SVE/bioventing piping system installation. The Site-wide RDIP will address non-property specific elements of the remedial design, including general excavation methodologies, identification of suitable backfill criteria, surveying, traffic plans, notifications and site preparation, proposed odor, dust, and noise control measures, etc. It will additionally provide discussion of staging and logistical issues related to the excavation portion of the work.

For the SVE/bioventing system, the RDIP will include the proposed well field layout, SVE system(s) location(s) and specifications, and conveyance piping layout. This will include treatment system design criteria. The RDIP will detail the periodic monitoring, maintenance requirements, and reporting for SVE system operation. SVE/bioventing system recordkeeping requirements, including operating parameters; monitoring of the influent, effluent, and extraction wells using field instrumentation; and the performance of routine system preventive maintenance and troubleshooting will also be addressed in the RDIP.

The general sub-slab mitigation design will be included in the RDIP. Specific elements of the sub-slab mitigation system for each of the properties will be included in the property-specific design and permitting package presented in the PSRPs (see Section 9.3).

The RDIP will also identify anticipated permitting requirements and regulatory compliance activities, including Grading Permits, Stormwater Discharge Permits, dust control requirements, SCAQMD Rule 1166 Mitigation Plan requirements for excavation, SCAQMD Permit to Construct/Operate for SVE/bioventing operation, SCAQMD permits for asbestos removal to install the sub-slab mitigation systems and permits for treatment of sub-slab mitigation effluent, etc.

Following implementation of the remedy, operations, monitoring, and maintenance activities will continue at the Site, and these planned activities will be detailed in the RDIP. This will include operations, monitoring, and maintenance of active systems, as well as continued groundwater monitoring and LNAPL removal, and periodic monitoring of soil vapor probes and sub-slab soil vapor probes. The RDIP will provide additional details regarding selected locations for baseline and periodic sampling of soil and soil vapor to assess the effectiveness of the SVE/bioventing system on reducing concentrations of COCs. Additionally, a Five-Year Review Report is anticipated to be completed following five years of full-scale SVE/bioventing system operations and at five-year intervals thereafter. The specific purpose is to review site conditions and monitoring data, evaluate remedy effectiveness and recommend changes in remedy components, if warranted.

9.3 PROPERTY-SPECIFIC REMEDIATION PLANS (PSRPS)

As part of the RDIP, an individual remediation plan will be prepared for each property. The PSRPs will define areas to be excavated, features to be removed and those that will be protected in place, and locations of underground utilities that need to be either protected in place or removed and restored. The PSRPs will also include landscape restoration plans that will be developed in consultation with the property owners/residents.

A geotechnical evaluation will be conducted and grading plans prepared as part of each RDIP. For properties planned for targeted deeper excavation to 5 to 10 feet bgs, the geotechnical evaluation will include drilling and sampling of a soil boring to collect samples for soil index and strength properties (see Section 8.1.3.1). A geotechnical evaluation will also be prepared for properties planned for excavation to 5 feet bgs; however, these evaluations will rely on existing hand-auger boring data and data from geotechnical borings advanced at locations for targeted deeper excavation and will not have geotechnical borings conducted. Based upon these geotechnical evaluations, the PSRPs will include planned excavation slopes and/or setbacks from existing structures or other features, such as around building foundations, and sensitive utilities such as water mains present in front yards and power poles present in back yards, as required by the Geotechnical Engineer and in accordance with City, County, and utility provider requirements. For properties that will include SVE/bioventing activities, the PSRP will identify extraction well locations and sub-grade piping layout. For the properties that have been identified for sub-slab mitigation, an individual design package will be developed for each property and included in the PSRP. It is anticipated that, for properties where excavation will also be conducted, the sub-slab mitigation system will be installed concurrent with or soon after completion of excavation activities on that property.

Shell personnel will meet with homeowners/residents and their legal representatives as appropriate, during the PSRP preparation process to obtain necessary information for relocation during remedial implementation and to discuss hardscape and landscape restoration. During this meeting, existing landscape irrigation systems will be documented so that they can be restored as part of landscape restoration. In some cases, Shell may provide alternative landscape restoration from existing conditions if desired by the homeowner. If during this meeting the homeowners express a desire that existing hardscape or favored landscaping such as mature trees or shrubs not be removed from their property, an option will be discussed of leaving hardscape and landscaping in place with the homeowners agreeing to enter into a Land Use Covenant (deed restriction) that would be recorded with the County Recorder's Office advising of the potential presence of impacted soil beneath hardscaped areas.

9.3.1 Permitting

The remedial implementation work will require a number of permits from different agencies before the work can proceed. Subject to RWQCB approval of the RAP, Shell will begin securing necessary permits as part of the RDIP process and as PSRPs are completed. Permits will be required from the City of Carson, Los Angeles County, SCAQMD, and possibly other agencies. A discussion of major permitting activities is included below.

9.3.1.1 City of Carson Permits

Because the volume of soils to be excavated at individual properties is expected to be greater than 50 cubic yards (cy), Grading Permits will be required for each property where excavation is conducted. Grading Permits will be obtained from the City of Carson Department of Building and Safety (DBS). The City of Carson follows the LACDPW Grading Guidelines and is a contract city, meaning that the LACDPW provides plan check and approval services for the City. Based on these guidelines, a geotechnical soils engineering report and grading plans will be prepared for each affected parcel after

access has been obtained. As noted previously, geotechnical investigations for targeted deeper investigations will require a geotechnical boring to be drilled and sampled so that soils can be tested for index classification and soil strength testing. For the 5-foot excavations, to the extent feasible, existing Site soil boring data will be used to prepare geotechnical reports that are required as part of the Grading Permit submittal.

Early in the RDIP phase following submittal of the RAP, URS will meet with the City of Carson Building Official to discuss grading plan and permit requirements. Alternate approaches to grading permitting will be discussed, such as the potential to issue blanket or blocks of Grading Permits for multiple properties that would be excavated in a phase or even the entirety of the work. The goal will be to streamline the plan check and permitting process to the extent possible to expedite the remediation and return of residents to their homes. Grading plans will be prepared in accordance with applicable provisions of the Carson Municipal Code (CMC), enacted through City Ordinance 14-1534U passed March 18, 2014 which adopts the 2014 LA County Grading Code.

The City of Carson issues Grading Permits following LACDPW grading plan review and approval. Experience gained during excavation pilot test grading plan preparation, review, and approval will be of benefit; however, the length of time required for LACDPW review is not within Shell's ability to control. The ability to expedite permit review and approval will be discussed with the City and other agencies as appropriate.

Excavation and Encroachment Permits will be required for equipment staging and operations, lane closures in public streets, and for encroachment onto sidewalks and City property/easements. The City Engineering Department will require a Traffic Management Plan as part of the Encroachment Permit Application. Excavation of trenches for installation of SVE system piping will also require an Encroachment and Excavation Permit from the City. Additionally, groundwater monitoring and LNAPL removal activities require Encroachment Permits from the City of Carson. A Trash Bin/Containers Permit may also be needed for roll-off bins if they will be placed on the street along with the Excavation and Encroachment Permit.

9.3.1.2 South Coast Air Quality Management District Permits

Rule 1166 Contaminated Soil Mitigation Plan

Excavation of VOC- and TPH-impacted soils within the geographic area encompassed by the SCAQMD must be conducted and managed in accordance with the requirements of SCAQMD Rule 1166, Volatile Organic Compound Emissions from Decontamination Soil. Although the volume of soil to be excavated at individual properties will be less than 2,000 cubic yards, which is the maximum volume of VOC-impacted soil that can be excavated under a Rule 1166 Various Locations Permit, based upon the overall scope of the remedial excavation project at 202 homes, with a total estimated soil volume of approximately 144,000 cubic yards plus an additional approximately 8,100 cubic yards for SVE/bioventing piping installation, Shell anticipates that the SCAQMD will require a Site-specific Rule 1166 Contaminated Soil Mitigation Plan for the excavation work. The Rule 1166 Plan will set strict notification, monitoring and enforcement requirements on the work. The Rule 1166 Mitigation Plan will be obtained by the contractor selected to perform the excavation work.

Written records of monitoring data for Rule 1166 monitoring compliance will be kept on field forms in a format approved by the SCAQMD. Within 30 days of completion of excavation work for each phase of work, written records of monitoring of VOC-contaminated soil, daily inspections of any covered stockpiles of VOC-contaminated soil, and disposal of VOC-contaminated soil will be provided to the SCAQMD in accordance with the Site-specific Rule 1166 Permit.

Additionally, excavation of trenches will be done under a Rule 1166 Plan and Permit from the SCAQMD. Based on the volume of soils that will need to be excavated, a Site-specific 1166 Permit will be required. This trenching work could potentially be done under the same 1166 Permit as the excavations on residential properties.

SCAQMD Permit to Construct/Operate

SVE/bioventing equipment will be constructed and operated under a Site-specific SCAQMD Permit to Construct/Operate. The Permit to Construct/Operate will need to be obtained from SCAQMD before the system is constructed and installed. The system will have an effluent discharge stack of sufficient height for dispersion of treated off gases, consistent with modeling results and requirements in the SCAQMD permit to Construct/Operate.

SCAQMD Permits for Sub-slab Depressurization Systems

SCAQMD will require permits for the active operation of the SSD systems. After completion of the diagnostic testing, a permit application will be submitted to SCAQMD for each of the systems.

Asbestos Notifications/Abatement Permits

Because some of the residential building materials used in construction of the homes included asbestos-containing materials, those homes that require installation of a sub-slab mitigation system will require an asbestos survey, and based on the results of that survey, may require permitting from the SCAQMD for abatement of those asbestos containing elements prior to installation of the system.

9.3.1.3 Stormwater Pollution Prevention Plan

Because implementation of Site remedial actions will occur over a period of varying weather conditions, weather will need to be considered during day-to-day activities. Remediation work is expected to continue during the rainy season, and provisions will be included to contain and collect rainwater that may accumulate in work areas and prevent contaminated runoff from exiting work areas and entering the storm drain system.

Prior to the start of excavation work, the excavation contractor will prepare a Stormwater Pollution Prevention Plan (SWPPP) that includes use of best management practices (BMPs) to manage and control stormwater. The SWPPP will be reviewed by URS on behalf of Shell and submitted to the Regional Board for review and approval before beginning work in the rainy season.

9.3.1.4 Other Permits

A number of other permits will need to be obtained to support the remedial excavation aspects of the Site remedy. These permits will be defined as part of the RDIP and PSRP preparation process and

obtained from the respective agency prior to the start of physical onsite work at individual properties. These are anticipated to include:

- The contractor retained to perform the excavation work shall have a valid OSHA Trenching Permit per 29 CFR 1926.650, 29 CFR 1926.651, and 29 CFR 1926.652 and Cal/OSHA Trenching Permit CCR Title 8 Section 341.
- Plumbing and Electrical Permits will be needed if plumbing or electrical service is removed and replaced.
- A Masonry Permit may be required for construction of replacement masonry block walls.
- A Landscaping Permit may be required for restoration of property landscaping.
- The SVE system(s) will be installed in an enclosed structure, which will require plumbing, electrical, building, and construction permits from the City of Carson. The SVE system structure will be constructed with sound attenuation insulation to reduce operating noise levels to decibel (dB) levels at our below the City of Carson Noise Ordinance.

9.3.2 Notifications

At least 72 hours prior to initiation of excavation activities, notifications will be made to appropriate public agencies, including: the Regional Board, SCAQMD, City of Carson Engineering and Planning Departments, LA County Fire Department, and attorneys representing homeowners/residents for parties engaged in litigation against Shell. Shell will also circulate a Fact Sheet and Work Notice that will be distributed to members of the community, elected officials, and other interested parties at least one week before start of the work. Underground Service Alert (USA) will be notified at least 72 hours prior to subsurface activities, to allow marking of underground utilities that may exist in the area, as required by state law.

9.4 HEALTH AND SAFETY

9.4.1 Health and Safety Plan (HSP)

Protecting the health and safety of the public and of Site workers during implementation of remedial actions is of paramount importance to Shell and its consultants and contractors. Pursuant to State of California Division of Occupational Safety and Health (Cal/OSHA) Hazardous Waste Operations Standards (Title 8, CCR Section 5192) and Code of Federal Regulations (Title 40 CFR, Section 1910.120), a project-specific Site-specific Health & Safety Plan (HSP) will be prepared for remedial activities to be conducted at the Site.

All work will be done in accordance with the HSP and Job Safety Analyses (JSAs) that will be prepared for specific work tasks and activities that will be conducted. JSAs will be prepared either by URS or by subcontractors performing specific work activities and will be reviewed and approved by URS prior to start of the work. Site field personnel conducting the work will review applicable JSAs at daily tailgate safety meetings.

9.4.2 Emergency Response Plan

Shell contractors will prepare an Emergency Response Plan that will update the previously-prepared *Carousel Tract Pilot Testing Emergency Response Plan*. The purpose of the Emergency Response Plan (Plan) will be to provide specific information on potential hazards that may arise from the excavation program and subsequent SVE well and piping installation work that could affect the Carousel community and to describe the risk mitigation and emergency response procedures that will be instituted. The Plan will outline roles, responsibilities, and authorities of Shell, URS, and its subcontractors, as well as public agencies who are or may be involved in emergency preparedness, mitigation, and response activities to address potential hazards associated with soil remediation activities at the Carousel Tract. The Plan will outline existing and potential hazards associated with soil, soil vapors, and soil excavation activities, and will describe procedures, communications, and coordination processes for initiating emergency response to safeguard the community in the event of an emergency. The Plan will also provide information on emergency notification services, based on existing public resources. Finally, the Plan will provide a list of important public agency contacts and emergency preparedness resources.

9.5 TENTATIVE SCHEDULE OF ACTIONS TO IMPLEMENT THE RAP

As required by the CAO, provided below is a tentative schedule of actions that will be necessary to implement this RAP. This schedule is conditioned on a number of actions by others that will affect implementation of subsequent activities and therefore must be considered tentative. This tentative schedule does not account for delays due to inclement weather or other acts of God, lack of timely access to properties, extended periods for agency approvals of various plans, and issuance of required permits. Additionally, this assumes that no changes to the remedy set forth in this RAP will be required by the RWQCB or by CEQA review.

As described above in Section 9, following approval of the RAP, a Site-wide RDIP will be prepared. The Site-wide RDIP will provide details on the design and implementation of the planned remedy outlined in this RAP, including excavation, SVE/bioventing, and sub-slab vapor mitigation activities. It will include detailed plans for installation of the site-wide components of the SVE/bioventing system. The Site-wide RDIP will also include an overall site-wide geotechnical evaluation based on existing Site data. A licensed land surveyor will conduct a topographic survey, including comprehensive research of existing utilities, of the public areas of the entire tract. The survey will be referenced to the California State Plane Coordinate System horizontal (North American Datum of 1983 [NAD83]) and vertical (North American Vertical Datum of 1988, 2005 Adjustment [NAVD88]). Existing conditions will also be documented in field notes and photographically. If access can be obtained, property-specific surveys needed for preparation of PSRPs will be conducted at the same time. The Site-wide RDIP is projected to be submitted approximately 12 weeks following approval of the RAP.

In addition to the Site-wide RDIP, PSRPs will be prepared for each property where excavation, SVE/bioventing, or sub-slab vapor mitigation is planned. For properties that will include excavation activities, the PSRP will include a demolition plan, excavation plan and details, fine grading plan and site restoration plan. The PSRP for each parcel will be prepared for submittal to the Regional Board,

City of Carson and LA County DPW. For properties that will include SVE/bioventing activities, the PSRP will identify extraction well locations and sub-grade piping layout. For the properties that will receive sub-slab vapor mitigation, the PSRP will provide design information for the SSD system.

Preparation of these PSRPs is contingent on homeowners providing access for surveying and meeting with Shell's contractor personnel to discuss planned activities, relocation needs, current property conditions, and property restoration following excavation, SVE/bioventing well installation, and SSD installation. Preparation of the PSRPs will start upon approval of the RDIP and will proceed on a rolling basis in phases of eight properties per phase. Approximately six weeks will be needed to complete the PSRPs per phase of eight houses following completion of property surveys, assuming owner access. Preparation of these plans will extend throughout the implementation period over approximately 200 weeks, so that PSRPs are completed and submitted for Regional Board, City, and County review and permit issuance with sufficient lead time prior to field activities at the designated residences. The length of time that LACDPW will take to review and approve grading plans is unknown, but is typically 4 to 6 weeks. During Pilot Test activities, these review and approval activities took several months.

Mobilization for excavation, mitigation system installation, on-property SVE/bioventing well installation, and/or SSD installation will start upon approval of PSRPs and issuance of Grading Permits, and is estimated to take approximately one week. It is assumed that the initial mobilization will occur approximately six months after RAP approval. As described in Section 8.1.3, as currently envisioned excavation will proceed in phases. Following excavation, on-property SVE/bioventing piping and sub-slab mitigation systems will be installed, as appropriate, before backfill and site restoration. The SVE/bioventing wells will be installed following the fine grading activities at each property. Preliminarily, it is estimated that excavation and backfill will take approximately six weeks per property and hardscape restoration and landscaping are estimated to take an additional two weeks. Work on the next phase of properties is planned to begin approximately at the end of week six or eight of work on the first phase. Based on approximately 10 weeks to complete a phase (assuming eight homes per phase and working on four houses at a time for time-to-complete purposes), with overlapping phases as described above, the suite of residential remedial construction activities including excavation, on-property SVE/bioventing well and piping installation, backfill, sub-slab vapor mitigation, and site restoration is estimated to take approximately 5.1 years to complete.

The SVE/bioventing system will require a Permit to Operate/Construct from the SCAQMD. Shell's contractors will begin work on the permit application and required air quality modeling as part of the RDIP process, and the application will be submitted approximately four weeks after approval of RDIP. This schedule is dependent on identifying and securing a location for the SVE treatment system compound(s). As previously noted, Shell is currently communicating with owners/managers at three offsite locations for the SVE compound(s). It is assumed that SCAQMD will complete its review and approval of the SVE system permit application within three months with expedited processing.

SVE/bioventing well installation in the streets will begin upon completion of the first phase of residential excavations, which is projected to begin approximately nine months after RAP approval. Piping installation will begin upon obtaining Permit to Construct/Operate; Shell will seek approval from SCAQMD to begin SVE well and piping installation prior to Permit issuance, but construction of the treatment system cannot begin until the Permit is issued by SCAQMD. Completion of SVE/bioventing well and piping installation will be tied to completion of excavation work plus approximately eight weeks. It is estimated that SVE/bioventing well and piping installation and treatment system installation will be completed approximately 5.6 years after RAP approval.

Upon completion of installation of all elements, SVE/bioventing system startup will begin and will occur over an approximately three month period. Based on preliminary estimates of the duration of remediation system operation to achieve cleanup goals, the SVE/bioventing system may operate for a period of approximately 30 to 40 years. Improved estimates of the potential operating time for the SVE/bioventing system can be made after system startup and operation and analysis of monitoring data. A Five-Year Review Report is anticipated to be completed following five years of full-scale SVE/bioventing system operations. The specific purpose is to review site conditions and monitoring data, evaluate remedy effectiveness and recommend changes in remedy components, if warranted.

10.0 SUMMARY

10.1 INTRODUCTION

This Revised RAP for the former Kast Property (Site) in Carson, California was prepared by URS Corporation (URS) and Geosyntec Consultants, Inc. (Geosyntec) on behalf of Equilon Enterprises LLC, doing business as Shell Oil Products US (Shell or SOPUS) in accordance with CAO No. R4-2011-0046 issued to Shell by the RWQCB on March 11, 2011 and the RWQCB's letter dated January 23, 2014 directing Shell to submit a RAP and Human Health Risk Assessment pursuant to California Water Code Section 13304. A RAP, Feasibility Study (FS) and HHRA were timely submitted to the Regional Board on March 10, 2014 as directed in the RWQCB's January 23, 2014 letter. The Regional Board, along with OEHHA and the UCLA Expert Panel reviewed these documents, and the Regional Board provided comments in its letter dated April 30, 2014. The April 30, 2014 letter directed Shell to submit a Revised RAP, FS, and HHRA addressing the RWQCB, OEHHA and the Expert Panel's comments and directives by June 16, 2014. Per the Regional Board's letter dated June 4, 2014, the submittal date was revised to June 30, 2014. This Revised RAP is being submitted in partial satisfaction of that directive. The Revised HHRA (Geosyntec, 2014c) and Revised FS (Geosyntec, 2014d) are being submitted concurrently as separate documents.

This Revised RAP, along with the Revised HHRA and FS, were prepared to fully address the Regional Board's directives provided beginning on Page 15 of the April 30, 2014 letter. The Revised RAP summarizes the remedial alternative evaluation process provided in the companion Revised FS and identifies and describes recommended full-scale remedial actions for impacted shallow soil and other media at the Site in accordance with requirements of the CAO and directives in the Regional Board's January 23 and April 30, 2014 letters. The Revised RAP and the recommended remedy comply with applicable provisions of the California Health and Safety Code, California Water Code, and SWRCB Resolution 92-49, and in particular, the Regional Board and Expert Panel's comments on the previously submitted RAP dated March 10, 2014.

This Revised RAP and the companion HHRA and FS were prepared following extensive multimedia investigations at the Site from 2008 to present. Key assessment work completed at the Site includes:

- Assessment in public rights-of-way, the adjacent railroad right-of-way, and other non-residential areas including soil, soil vapor, groundwater, and outdoor air media;
- Assessment at 95% of the individual residential properties, including soil, sub-slab soil vapor, and indoor air testing;
- Assessment of environmental impact and feasibility of removal of residual concrete reservoir slabs;
- Pilot testing to evaluate different potential remedies for Site impacts, and
- Development of Site-Specific Cleanup Goals.

The Site has been impacted with petroleum hydrocarbons associated with crude oil storage during the period prior to residential redevelopment. The distribution of hydrocarbons was significantly affected by reservoir demolition and Site grading activities by the developer.

10.2 CONSTITUENTS OF CONCERN (COCS) AND HUMAN HEALTH RISK ASSESSMENT

Crude oil is a complex mixture of petroleum hydrocarbon compounds. Hydrocarbon impacts in shallow and deep soils were quantified as gasoline-range (TPHg), diesel-range (TPHd), and motor oil-range (TPHmo) hydrocarbons together with VOCs, SVOCs, including PAHs; VOCs, including benzene, and methane were quantified in soil vapor (also referred to as soil gas); dissolved-phase VOC and TPH impacts were evaluated in groundwater, and LNAPL consisting of crude oil locally present in groundwater has been assessed and defined. In addition to hydrocarbon-related impacts, impacts are also locally present from chlorinated solvents, such as PCE and TCE, and from THMs associated with potable water treatment provided by the water service purveyor. Although the chlorinated solvents TCE and PCE are found sporadically around the Site in shallow soils, their presence in groundwater is related to offsite sources. Because THMs are related to drinking water delivered to the Site by Cal-Water, THMs are not considered Site-related COCs.

Some of these compounds, referred to as constituents of concern (COCs), are present at concentrations that result in estimates of incremental lifetime cancer risk (ILCR) and noncancer hazard that are above regulatory thresholds or may pose a concern for the potential leaching to groundwater pathway. Although exposure to methane does not, by itself, pose a risk to human health, if methane accumulates in an enclosed space at a concentration between approximately 5% (termed the lower explosive limit, LEL) and 15% (termed the upper explosive limit, UEL) in the presence of sufficient oxygen and a source of ignition is present, methane may pose a combustion or explosion hazard. Methane in soil vapor at depth does not pose a combustion or explosion hazard.

Groundwater is impacted with Site COCs as well as with those attributed to upgradient sources; COCs attributed to offsite sources are discussed in detail in the Revised SSCG Report (Geosyntec, 2013c). These non-Site related COCs include tert-butyl alcohol (TBA), TCE and PCE. Site-related COCs in groundwater exceeding California MCLs or NLs are benzene, naphthalene, and arsenic, and TPH also exceeds the San Francisco Bay Regional Water Quality Control Board ESLs.

The Revised HHRA, summarized in Section 6 of this Revised RAP, has been modified to address comments by the Regional Board, OEHHA, and the Expert Panel. The objective of the HHRA was to evaluate potential human health impacts to onsite residents and onsite construction and utility maintenance workers prior to any remediation efforts at the Site (baseline condition), to evaluate potential COC leaching from soil to groundwater, and to use as a predictive tool in the remedial decision-making process to determine if further action is warranted for areas of the Site. Cumulative estimates of incremental lifetime cancer risks and noncancer hazard indices have been provided across media to address the comments received by the Expert Panel (RWQCB, 2014d).

The HHRA addressed potential onsite exposures to residents and construction and utility maintenance workers. Potential exposures to COCs detected in shallow soils were evaluated for the

direct contact pathways, as well as inhalation of volatile COCs in outdoor air and nonvolatile COCs in fugitive dust. The potential for volatile COCs to migrate from the subsurface (using sub-slab soil vapor data) into residential structures present above ground was evaluated for a resident.

10.3 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) have been developed for soil, soil vapor, and groundwater based on Site characterization investigations completed at the Site. These RAOs include:

- Prevent human exposures to concentrations of COCs in soil, soil vapor, and indoor air such that total (i.e., cumulative) lifetime incremental cancer risks are within the NCP risk range of one in one million to one hundred in one million (1×10^{-6} to 1×10^{-4}) and noncancer Hazard Indices are less than 1 or concentrations are below background, whichever is higher. Potential human exposures include onsite residents and construction and utility maintenance workers. For onsite residents, the lower end of the NCP risk range (i.e., 1×10^{-6}) and a noncancer hazard index less than 1 have been used.
- Prevent fire/explosion risks in indoor air and/or enclosed spaces (e.g., utility vaults) due to the accumulation of methane generated from the anaerobic biodegradation of petroleum hydrocarbons in soils. Eliminate methane in the subsurface to the extent technologically and economically feasible.
- Remove or treat LNAPL to the extent technologically and economically feasible, and where a significant reduction in current and future risk to groundwater will result.
- Reduce COCs in groundwater to the extent technologically and economically feasible to achieve, at a minimum, the water quality objectives in the Basin Plan to protect the designated beneficial uses, including municipal supply.

A further consideration is to maintain residential land-use of the Site and avoid displacing residents from their homes or physically divide the established Carousel community.

10.4 FEASIBILITY STUDY

The Revised FS Report, which is a companion document to the Revised RAP and is summarized in Section 7 above, identified and screened a range of remedial technologies potentially applicable to site cleanup. Technologies that remained for consideration following technology screening included:

- Potential sub-slab vapor intrusion mitigation;
- Capping portions of the Site;
- Institutional controls, which restrict access to impacted media;
- Excavation;
- Soil vapor extraction (SVE);
- Bioventing;

- LNAPL/source removal;
- Monitored natural attenuation (MNA); and
- Removal of residual concrete reservoir slabs.

These technologies were then assembled into remedial alternatives that were subjected to initial screening and detailed evaluation for cleanup of the Site. Remedial alternatives that remained after screening, and the specific technologies included in those alternatives, are summarized below:

- Alternative 1 – No Action.
- Alternative 4 – Excavation of Site soils from both landscaped areas and beneath residential hardscape; existing institutional controls; SVE/bioventing; sub-slab mitigation; removal of LNAPL; groundwater MNA, and potentially supplemental groundwater remediation (e.g., in areas exceeding 100x MCLs). Four separate excavation depth alternatives in this category were evaluated in the FS Report, excavation to 3 feet bgs, 5 feet bgs, 5 feet bgs with targeted deeper excavation to 10 feet bgs, and 10 feet bgs.
- Alternative 5 – Excavation of Site soils from landscaped areas only; existing and new institutional controls; SVE/bioventing; sub-slab mitigation; removal of LNAPL; groundwater MNA, and potentially supplemental groundwater remediation. The same four excavation depth alternatives were evaluated for this category as were evaluated for Alternative 4.
- Alternative 7 – Capping the landscaped areas of the Site; existing and new institutional controls; SVE/bioventing; sub-slab mitigation; removal of LNAPL; groundwater MNA, and potentially supplemental groundwater remediation.

For the detailed evaluation, the Revised FS Report used as guidance the nine criteria that are identified in the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988). In addition, the Revised FS Report used three criteria that address key Site-specific issues of importance to alternative evaluation:

- Consistency with Resolution 92-49;
- Social Considerations; and
- Sustainability.

10.5 RECOMMENDED REMEDIAL ACTION

Based upon the results of the Revised HHRA (Geosyntec, 2014c) and Revised FS (Geosyntec, 2014d), and in consideration of the comprehensive Site characterization data, RAOs for the Site, the Regional Board's and Expert Panel's comments contained in the RWQCB correspondence dated April 30, 2014 and May 29, 2014, and additional direction received from the Regional Board, the following multi-media remedial actions were selected as the recommended remedy for the Site.

- Excavation of shallow soils at impacted residential properties where RAOs and the more stringent of the health risk-based or leaching to groundwater criteria are not met under existing conditions. Excavation will be to a depth of 5 feet bgs at accessible portions of both landscaped and hardscaped areas of residential yards from 202 properties (shown on Figure 6-1).
- Local targeted deeper excavations from 5 to 10 feet bgs at approximately 82 properties (shown on Figure 6-3) in areas where significant additional hydrocarbon mass can be removed. Excavations to 10 feet bgs will be at locations where TPH SSCGs are exceeded by a factor of 10 times and will be conducted using a combination of conventional and auger excavation methods.
- Residual concrete reservoir slabs will be removed if encountered in excavations, to the extent practicable and where it can be done safely.
- Post-excavation soil samples will be collected and analyzed from sidewalls of excavations, as appropriate.
- Landscaping and removed hardscape will be restored following excavation.
- A robust SVE/bioventing system, with SVE/bioventing wells in City streets and on residential properties, will be installed and operated to extract VOCs and methane and to promote degradation of residual hydrocarbon concentrations via bioventing where RAOs are not met following soil excavation. Bioventing will be integral with SVE via cyclical operation of SVE wells. Bioventing in concert with SVE will be used to increase oxygen levels in subsurface soils and promote microbial activity and degradation of longer-chain petroleum hydrocarbons.
- Sub-slab mitigation will be implemented at 28 properties (shown on Figure 6-4) where RAOs are not met based on theoretical calculated vapor intrusion exposures or methane concentrations in sub-slab soil vapor exceed the upper RAO for methane of 0.5%. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site.
- The recommended remedy includes a comprehensive long-term monitoring plan that will include monitoring of:
    - Sub-slab soil vapor probes at properties scheduled for remedial excavation until the SVE/bioventing system becomes operational and periodically thereafter;
    - Select soil vapor probe locations in City streets until the SVE/bioventing system becomes operational; thereafter, monitoring will be conducted at newly installed shallow and multi-depth soil vapor probes;
    - Utility boxes and other Site features previously monitored until the SVE/bioventing system becomes operational;

  - SVE/bioventing system operations and maintenance (O&M) and system effectiveness sampling will be conducted periodically.

- LNAPL will be recovered where it has accumulated in monitoring wells MW-3 and MW-12 and in additional wells if it accumulates at a measurable thickness, to the extent technologically and economically feasible, and where a significant reduction in current and future risk to groundwater will result. The goal for LNAPL removal will be no measurable thickness in wells.

- COCs in groundwater will be reduced to the extent technologically and economically feasible via source reduction and monitored natural attenuation (MNA). MNA could be paired with contingency groundwater remediation of oxidant injection in areas where Site-related COCs exceed 100x MCL if, after a five-year review following start of SVE/bioventing operations, the groundwater plume is not stable or decreasing. In addition, upgradient sources would need to be addressed by the overseeing agencies.

- The shallow soil remedy includes a Surface Containment and Soil Management Plan to address notifications, management, and handling of residual soils below the depth of excavation and that are impacted by COCs at concentrations greater than risk-based levels. Soils remaining below 5 feet bgs and impacted soils beneath City streets and sidewalks will be addressed through the Surface Containment and Soil Management Plan (Appendix C). Implementation of the Surface Containment and Soil Management Plan can be accomplished through the City of Carson permitting process, as the Carson Municipal Code is an existing institutional control that requires that a Grading Permit be obtained for excavations deeper than 3 feet. In addition, Shell will implement a community outreach program to inform and educate residents in the community of residual impacted soils and of the notification procedures for management of these materials via the Surface Containment and Soil Management Plan.

These remedial actions are intended to achieve the RAOs and the RWQCB-approved SSCGs for soil, soil vapor, and groundwater as directed in the Regional Board's Review of the Revised SSCG Report and Directive dated January 23, 2014 and Review of the March 10, 2014 RAP, HHRA and FS dated April 30, 2014, and SSCG clarification letter dated May 29, 2014.

Following approval of the RAP, a Site-wide Remedial Design and Implementation Plan (RDIP) will be prepared. The Site-wide RDIP will provide details on the design and implementation of the planned remedy, including excavation, SVE/bioventing, and sub-slab vapor mitigation activities. It will include detailed plans for installation of the non-property specific components of the SVE/bioventing system. In addition, Property-Specific Remediation Plans (PSRPs) will be prepared for each property where remedial work will occur that will present detailed plans for remedial activities on a property-by-property basis, including site restoration.

The tentative schedule of actions to implement the RAP is discussed in Section 9.5. Certain items, including agency review and approval of the RDIP and PSRPs, review of grading plans and permit applications by the City of Carson and LA County DPW and issuance of Grading Permits, issuance

of the Permit to Operate/Construct for the SVE/bioventing treatment system by SCAQMD, and obtaining access at the individual properties, may take longer than estimated and are outside the control of Shell and its consultants. The construction phase of Site remediation, including installation of the SVE/bioventing system is expected to take approximately 5.6 years after RAP approval. Upon completion of installation of all elements, SVE/bioventing system startup will begin and will occur over an approximately three month period. Based on preliminary estimates of the duration of remediation system operation to achieve cleanup goals, the SVE/bioventing system may operate for a period of approximately 30 to 40 years.

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TABLES

Table 5-1
Site-Specific Cleanup Goals for Soil
Former Kast Property

CAS Number	Constituents of Concern	$SSCG_{soil-GW}$[1] (mg/kg)	(BTV)[2] (mg/kg)	Soil Site-Specific Cleanup Goals (mg/kg)					
				Onsite Resident				Construction and Utility Maintenance Worker	
				EF = 350 d/y		EF = 4 d/y			
				SSCG (mg/kg)	Basis	SSCG (mg/kg)	Basis	SSCG (mg/kg)	Basis
	Inorganics								
7440-36-0	Antimony	2.7E-01	7.4E-01	3.1E+01	nc	2.7E+03	nc	3.1E+03	nc
7440-38-2	Arsenic	--	1.2E+01	6.1E-02	c	5.4E+00	c	1.5E+01	c
7440-43-9	Cadmium	--	3.8E+00	7.0E+01	nc	6.2E+03	nc	2.4E+02	c
18540-29-9	Chromium VI	--	--	1.3E+00	c	1.1E+02	c	6.7E+00	c
7440-48-4	Cobalt	--	1.1E+01	2.3E+01	nc	2.1E+03	nc	1.1E+02	c
7440-50-8	Copper	--	5.9E+01	3.1E+03	nc	2.7E+05	nc*	3.1E+05	nc*
7439-92-1	Lead	--	6.1E+01	8.0E+01[3]	--	8.2E+02[4]	--	8.2E+02[5]	--
7440-28-0	Thallium	1.4E-01	2.3E-01	7.8E-01	nc	6.8E+01	nc	7.7E+01	nc
7440-62-2	Vanadium	--	4.6E+01	3.9E+02	nc	3.4E+04	nc	3.3E+03	nc
7440-66-6	Zinc	--	2.9E+02	2.3E+04	nc	2.1E+06	nc*	2.3E+06	nc*
	PAHs								
56-55-3	Benz[a]anthracene	--	--	1.6E+00	c	1.4E+02	c	2.6E+02	c
50-32-8	Benzo[a]pyrene	--	9.0E-01	1.6E-01	c	1.4E+01	c	2.6E+01	c
205-99-2	Benzo[b]fluoranthene	--	--	1.6E+00	c	1.4E+02	c	2.6E+02	c
207-08-9	Benzo[k]fluoranthene	--	--	1.6E+00	c	1.4E+02	c	2.6E+02	c
218-01-9	Chrysene	--	--	1.6E+01	c	1.4E+03	c	2.6E+03	c
53-70-3	Dibenz[a,h]anthracene	--	--	1.1E-01	c	9.7E+00	c	1.9E+01	c
193-39-5	Indeno[1,2,3-cd]pyrene	--	--	1.6E+00	c	1.4E+02	c	2.6E+02	c
90-12-0	Methylnaphthalene, 1-	--	--	1.6E+01	c	1.4E+03	c	2.7E+03	c
91-57-6	Methylnaphthalene, 2-	--	--	2.3E+02	nc	2.0E+04	nc	1.1E+04	nc
91-20-3	Naphthalene	1.4E+01	--	4.0E+00	c	3.5E+02	c	3.9E+01	c
129-00-0	Pyrene	--	--	1.7E+03	nc	1.5E+05	nc*	6.7E+04	nc
	TPH								
	TPHg	117	--	7.6E+02	nc	6.6E+04	nc*	8.6E+02	nc
	TPHd	625	--	1.3E+03	nc	1.1E+05	nc*	1.9E+03	nc
	TPHmo	10000	--	3.3E+03	nc	2.9E+05	nc*	1.6E+05	nc*
	SVOCs								
121-14-2	2,4-Dinitrotoluene	--	--	1.6E+00	c	1.4E+02	c	2.8E+02	c
117-81-7	Bis(2-Ethylhexyl) Phthalate	--	--	3.5E+01	c	3.0E+03	c	6.4E+03	c
	VOCs								
79-34-5	1,1,2,2-Tetrachloroethane	--	--	4.7E-01	c	4.1E+01	c	5.7E+00	c
96-18-4	1,2,3-Trichloropropane	4.2E-06	--	2.1E-02	c	1.9E+00	c	2.0E+00	nc
95-63-6	1,2,4-Trimethylbenzene	--	--	8.3E+01	nc	7.2E+03	nc	7.5E+01	nc
107-06-2	1,2-Dichloroethane	3.2E-04	--	--		--		--	
156-59-2	cis-1,2-Dichloroethene	3.9E-03	--	--		--		--	
78-87-5	1,2-Dichloropropane	--	--	8.3E-01	c	7.2E+01	c	8.5E+00	c
108-67-8	1,3,5-Trimethylbenzene	--	--	8.5E+01	nc	7.4E+03	nc	7.7E+01	nc

Table 5-1

Site-Specific Cleanup Goals for Soil

Former Kast Property

CAS Number	Constituents of Concern	$SSCG_{soil\text{-}GW}$[1] (mg/kg)	(BTV)[2] (mg/kg)	Soil Site-Specific Cleanup Goals (mg/kg)					
				Onsite Resident				Construction and Utility Maintenance Worker	
				EF = 350 d/y		EF = 4 d/y			
				SSCG (mg/kg)	Basis	SSCG (mg/kg)	Basis	SSCG (mg/kg)	Basis
106-46-7	1,4-Dichlorobenzene	1.2E-02	--	2.8E+00	c	2.4E+02	c	2.8E+01	c
71-43-2	Benzene	2.1E-02	--	2.2E-01	c	1.9E+01	c	2.2E+00	c
75-27-4	Bromodichloromethane	--	--	4.9E-01	c	4.2E+01	c	5.3E+00	c
74-83-9	Bromomethane	--	--	8.8E+00	nc	7.7E+02	nc	7.8E+00	nc
100-41-4	Ethylbenzene	--	--	4.8E+00	c	4.2E+02	c	5.1E+01	c
75-09-2	Methylene chloride	--	--	5.3E+00	c	4.7E+02	c	5.9E+01	c
75-65-0	tert-Butyl Alcohol	7.9E-03	--	--		--		--	
127-18-4	Tetrachloroethene	5.8E-03	--	5.5E-01	c	4.9E+01	c	1.0E+01	c
108-88-3	Toluene	--	--	4.8E+03	nc	4.2E+05	nc*	1.6E+04	nc
79-01-6	Trichloroethene	3.2E-03	--	1.2E+00	c	1.0E+02	c	5.5E+00	nc
75-01-4	Vinyl chloride	3.2E-04	--	3.2E-02	c	2.8E+00	c	3.1E-01	c
1330-20-7	Xylene, total	--	--	5.6E+02	nc	4.9E+04	nc	4.7E+02	nc

Notes:

" -- " not applicable or not available

EF = exposure frequency; d/y = days per year

TPHg = Total Petroleum Hydrocarbons- gasoline range

TPHd = Total Petroleum Hydrocarbons- diesel range

TPHmo = Total Petroleum Hydrocarbons- motor oil range

nc = SSCG based on noncancer effects; c = SSCG based on cancer effects

* Values are above Csat, 1E+05 or Cres

[1] A $SSCG_{soil\text{-}GW}$ value was only listed for those COCs identified for potential soil leaching to groundwater. These $SSCG_{soil\text{-}GW}$ are from the January 23, 2014 letter from the Regional Board on the Revised SSCG Report (RWQCB, 2014b) as corrected in the May 29, 2014 letter from the Regional Board for benzene and TPH-mo (RWQCB, 2014e).

[2] To evaluate potential human health exposures, the higher value between the health-based SSCG and Background Threshold Value (BTV) will be selected as the cleanup goal. To evaluate potential leaching to groundwater, the higher between $SSCG_{soil\text{-}GW}$ and BTV will be will be selected as the cleanup goal.

[3] Cal-EPA DTSC, 2009b. Revised California Human Health Screening Levels for Lead. September 2009.

[4] Based on USEPA adult lead model (USEPA, 2003), similar parameters used for the residential CHHSL, and a lower exposure frequency.

[5] Based on USEPA adult lead model (USEPA, 2003), similar parameters used for the industrial worker CHHSL, and a lower exposure frequency.

Table 5-2
Site-Specific Cleanup Goals for Sub-Slab and Soil Vapor
Former Kast Property

CAS Number		Odor-Based SSCG[1] (µg/m³)	Sub-Slab and Soil Vapor		Soil Vapor	
			Onsite Resident		Construction and Utility Maintenance Worker	
			SSCG (µg/m³)	Basis	SSCG (µg/m³)	Basis
79-34-5	1,1,2,2-Tetrachloroethane	5.2E+06	2.1E+01	c	1.2E+05	c
79-00-5	1,1,2-Trichloroethane	--	7.5E+01	c	1.0E+05	nc
75-34-3	1,1-Dichloroethane	6.3E+07	7.6E+02	c	2.5E+07	c
120-82-1	1,2,4-Trichlorobenzene	1.1E+07	1.0E+03	nc	3.9E+05	nc
95-63-6	1,2,4-Trimethylbenzene	--	3.7E+03	nc	2.3E+06	nc
107-06-2	1,2-Dichloroethane	1.2E+06	5.9E+01	c	8.5E+05	c
78-87-5	1,2-Dichloropropane	6.0E+05	1.2E+02	c	2.5E+06	c
108-67-8	1,3,5-Trimethylbenzene	--	3.7E+03	nc	2.3E+06	nc
106-99-0	1,3-Butadiene	--	7.2E+00	c	3.0E+05	c
106-46-7	1,4-Dichlorobenzene	5.5E+05	1.1E+02	c	7.2E+05	c
123-91-1	1,4-Dioxane	3.1E+08	1.6E+02	c	1.6E+05	c
540-84-1	2,2,4-Trimethylpentane	--	5.2E+05	nc	6.5E+08	nc
591-78-6	2-Hexanone	--	1.6E+04	nc	7.9E+06	nc
622-96-8	4-Ethyltoluene	--	5.2E+04	nc	2.5E+07	nc
71-43-2	Benzene	2.4E+06	4.2E+01	c	1.0E+06	c
75-27-4	Bromodichloromethane	5.5E+09	3.3E+01	c	7.8E+05	c
74-83-9	Bromomethane	4.0E+07	2.6E+03	nc	9.5E+06	nc
75-15-0	Carbon disulfide	--	3.7E+05	nc	1.4E+09	nc
56-23-5	Carbon tetrachloride	3.2E+07	2.9E+01	c	1.1E+06	c
67-66-3	Chloroform	2.1E+08	2.3E+02	c	4.9E+06	c
110-82-7	Cyclohexane	--	3.1E+06	nc	1.8E+10	nc
124-48-1	Dibromochloromethane	--	4.5E+01	c	8.8E+05	c
156-59-2	Dichloroethene, cis-1,2-	3.4E+07	3.7E+03	nc	8.3E+06	nc
156-60-5	Dichloroethene, trans-1,2-	3.4E+07	3.1E+04	nc	9.3E+07	nc
10061-02-6	Dichloropropene, trans-1,3-	2.1E+06	7.6E+01	c	3.9E+06	c
64-17-5	Ethanol	--	2.1E+06	nc	1.9E+08	nc
100-41-4	Ethylbenzene	1.0E+06	4.9E+02	c	7.0E+06	c
142-82-5	Heptane	--	3.7E+05	nc	2.3E+09	nc
87-68-3	Hexachloro-1,3-butadiene	6.0E+06	5.5E+01	c	8.0E+04	c
110-54-3	Hexane	--	3.7E+05	nc	1.7E+09	nc
67-63-0	Isopropanol	--	3.7E+06	nc	5.7E+08	nc
98-82-8	Isopropylbenzene (cumene)	--	2.1E+05	nc	1.5E+09	nc
78-93-3	Methyl ethyl ketone (2-butanone)	1.6E+07	2.6E+06	nc	1.1E+09	nc
75-09-2	Methylene chloride	2.8E+08	1.2E+03	c	2.8E+07	c
1634-04-4	Methyl-tert-butyl ether	2.7E+05	4.7E+03	c	6.5E+07	c
91-20-3	Naphthalene	2.2E+05	3.6E+01	c	6.3E+04	c
103-65-1	Propylbenzene	--	5.2E+05	nc	6.6E+08	nc
75-65-0	tert-Butyl Alcohol (TBA)	--	5.5E+05	nc	2.6E+08	nc

Table 5-2
Site-Specific Cleanup Goals for Sub-Slab and Soil Vapor
Former Kast Property

CAS Number		Odor-Based SSCG[1] (µg/m³)	Sub-Slab and Soil Vapor		Soil Vapor	
			Onsite Resident		Construction and Utility Maintenance Worker	
			SSCG (µg/m³)	Basis	SSCG (µg/m³)	Basis
127-18-4	Tetrachloroethene	1.6E+07	2.1E+02	c	6.6E+06	c
109-99-9	Tetrahydrofuran	--	1.0E+06	nc	4.9E+08	nc
108-88-3	Toluene	1.5E+07	2.6E+06	nc	3.7E+09	nc
79-01-6	Trichloroethene	6.8E+08	2.2E+02	c	2.0E+06	nc
75-01-4	Vinyl chloride	3.9E+08	1.6E+01	c	8.3E+05	c
1330-20-7	Xylene, total	2.2E+05	5.2E+04	nc	5.9E+07	nc
	TPH					
	Aliphatic: C5-C8	--	3.7E+05	nc	1.2E+09	nc
	Aliphatic: C9-C18	--	1.6E+05	nc	1.2E+08	nc
	Aliphatic: C19-C32	--	--	--	--	--
	Aromatic: C6-C8	--	--	--	--	--
	Aromatic: C9-C16	--	2.6E+04	nc	6.7E+06	nc
	Aromatic: C17-C32	--	--	--	--	--
	TPHg	5.0E+04	7.2E+04	nc	2.2E+07	nc
	TPHd	5.0E+05	8.1E+04	nc	2.3E+07	nc
	TPHmo	--	--	--	--	--

Notes:

" -- " not applicable or not available

[1] Odor-based SSCGs for soil vapor based on SFRWCQB ESLs (SFRWCQB, 2013) as directed by RWQCB (RWQCB, 2014b,e).

nc = SSCG based on noncancer effects

c = SSCG based on cancer effects

Table 5-3
Site-Specific Cleanup Goals for Groundwater
Former Kast Property

CAS Number	Constituents of Concern	Primary MCL (µg/L)	Secondary MCL, NL or ESL (µg/L)	Selected Groundwater $SSCG_{GW}$
	Inorganics			
7440-36-0	Antimony	6.0E+00	--	Bkgd
7440-38-2	Arsenic	1.0E+01	--	Bkgd
7440-28-0	Thallium	2.0E+00	--	Bkgd
	PAHs			
91-20-3	Naphthalene	--	1.7E+01	1.7E+01
	TPH			
	TPHg	--	4.1E+02	1.0E+02*
	TPHd	--	2.0E+02	1.0E+02*
	TPHmo	--	6.2E+03	1.0E+02*
	VOCs			
75-34-3	1,1-Dichloroethane	5.0E+00	--	5.0E+00
75-35-4	1,1-Dichloroethene	6.0E+00	--	6.0E+00
96-18-4	1,2,3-Trichloropropane	--	5.0E-03	5.0E-03
107-06-2	1,2-Dichloroethane	5.0E-01	--	5.0E-01
156-59-2	cis-1,2-Dichloroethene	6.0E+00	--	6.0E+00
71-43-2	Benzene	1.0E+00	--	1.0E+00
75-65-0	tert-Butyl Alcohol (TBA)	--	1.2E+01	1.2E+01
127-18-4	Tetrachloroethene	5.0E+00	--	5.0E+00
156-60-5	trans-1,2-Dichloroethene	1.0E+01	--	1.0E+01
79-01-6	Trichloroethene	5.0E+00	--	5.0E+00
75-01-4	Vinyl Chloride	5.0E-01	--	5.0E-01
106-46-7	1,4-Dichlorobenzene	5.0E+00	--	5.0E+00

Notes:

" -- " not available

µg/L: micrograms per liter

Bkgd = background

MCL = State of Maximum Contaminant Level for drinking water

NL = Notification Level

ESL = Environmental Screening Levels, San Francisco RWQCB, Region 2 (SFRWCQB, 2013)

GW = groundwater; SSCG = Site-Specific Cleanup Goal

* Secondary taste and odor threshold for TPH from a Compilation of Water Quality Goals, 16th Edition, April 2011 (SWRCB, 2011)

Table 6-1
Property Addresses for Consideration in Remedial Planning
Former Kast Property

Address	Shallow Excavation	SVE/Bioventing		Targeted Excavation for >5 to ≤10 ft bgs Depth Interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to ≤10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24401 MARBELLA AVE							
24402 NEPTUNE AVE	X	X	X		X		
24402 PANAMA AVE	X		X				
24402 RAVENNA AVE	X	X	X		X		
24403 NEPTUNE AVE	X	X	X	X	X	X	
24403 RAVENNA AVE		X	X				
24405 MARBELLA AVE							
24406 MARBELLA AVE	X	X	X		X		
24406 NEPTUNE AVE		X	X				X
24406 PANAMA AVE	X		X				
24406 RAVENNA AVE	X	X	X				
24409 NEPTUNE AVE	X	X	X	X	X	X	
24409 RAVENNA AVE		X	X				
24410 PANAMA AVE							
24411 MARBELLA AVE	X		X				
24411 PANAMA AVE	X	X	X		X		
24412 MARBELLA AVE	X	X	X	X	X	X	X
24412 RAVENNA AVE	X	X	X				
24413 NEPTUNE AVE	X	X	X	X	X	X	
24413 RAVENNA AVE		X	X				
24416 MARBELLA AVE	X	X	X	X	X	X	
24416 NEPTUNE AVE	X		X				
24416 PANAMA AVE							
24416 RAVENNA AVE	X	X	X				X
24417 MARBELLA AVE							
24417 PANAMA AVE		X	X				
24419 NEPTUNE AVE	X	X	X	X	X	X	
24419 RAVENNA AVE		X	X				
24420 PANAMA AVE	X		X				
24421 PANAMA AVE	X	X	X	X			
24422 MARBELLA AVE	X	X	X				
24422 NEPTUNE AVE		X	X				
24422 RAVENNA AVE	X	X	X				
24423 MARBELLA AVE							
24423 NEPTUNE AVE	X	X	X	X	X	X	X
24423 RAVENNA AVE	X	X	X				
24426 MARBELLA AVE	X	X	X	X	X	X	
24426 NEPTUNE AVE		X	X				
24426 PANAMA AVE	X		X				
24426 RAVENNA AVE	X		X		X		
24427 MARBELLA AVE							
24427 PANAMA AVE		X	X				
24429 NEPTUNE AVE	X	X	X	X	X	X	X
24429 RAVENNA AVE	X	X	X				
24430 PANAMA AVE							
24431 PANAMA AVE	X	X	X				
24432 MARBELLA AVE	X	X	X		X		
24433 MARBELLA AVE	X		X				X

Table 6-1
Property Addresses for Consideration in Remedial Planning
Former Kast Property

Address	Shallow Excavation	SVE/Bioventing		Targeted Excavation for >5 to ≤10 ft bgs Depth Interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to ≤10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24436 PANAMA AVE	X		X				
24502 MARBELLA AVE	X	X	X				
24502 NEPTUNE AVE		X	X				
24502 PANAMA AVE							
24502 RAVENNA AVE	X	X	X		X		
24503 MARBELLA AVE							
24503 NEPTUNE AVE	X	X	X	X	X	X	
24503 PANAMA AVE	X	X	X				
24503 RAVENNA AVE		X	X				
24506 MARBELLA AVE	X	X	X	X			X
24507 MARBELLA AVE							
24508 NEPTUNE AVE	X	X	X		X		
24508 PANAMA AVE							X
24508 RAVENNA AVE	X	X	X	X			
24509 NEPTUNE AVE	X	X	X				
24509 PANAMA AVE	X	X	X	X	X	X	
24509 RAVENNA AVE	X	X	X	X			
24512 MARBELLA AVE	X	X	X	X	X	X	
24512 NEPTUNE AVE	X	X	X		X		
24512 PANAMA AVE							
24512 RAVENNA AVE	X	X	X	X			
24513 NEPTUNE AVE		X	X				
24513 PANAMA AVE	X	X	X		X		
24513 RAVENNA AVE		X	X				X
24516 MARBELLA AVE	X	X	X		X		
24517 MARBELLA AVE	X		X				
24518 NEPTUNE AVE	X	X	X	X			
24518 PANAMA AVE							
24518 RAVENNA AVE	X	X	X	X	X	X	
24519 NEPTUNE AVE	X	X	X				
24519 PANAMA AVE	X	X	X		X		
24522 MARBELLA AVE	X	X	X				
24522 NEPTUNE AVE	X	X	X				
24522 PANAMA AVE							
24522 RAVENNA AVE	X	X	X				
24523 MARBELLA AVE							
24523 NEPTUNE AVE	X	X	X		X		
24523 RAVENNA AVE	X	X	X	X			
24526 MARBELLA AVE	X	X	X		X		
24528 NEPTUNE AVE	X	X	X				
24528 PANAMA AVE							
24529 NEPTUNE AVE	X	X	X		X		
24529 PANAMA AVE							
24529 RAVENNA AVE	X	X	X				
24532 MARBELLA AVE	X	X	X		X		
24532 NEPTUNE AVE							
24532 PANAMA AVE	X	X	X				
24532 RAVENNA AVE							

Table 6-1
Property Addresses for Consideration in Remedial Planning
Former Kast Property

Address	Shallow Excavation	SVE/Bioventing		Targeted Excavation for >5 to ≤10 ft bgs Depth Interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to ≤10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24533 MARBELLA AVE							
24533 PANAMA AVE	X		X				
24533 RAVENNA AVE							
24602 MARBELLA AVE		X	X				
24602 NEPTUNE AVE							
24602 PANAMA AVE		X	X				
24602 RAVENNA AVE							
24603 MARBELLA AVE	X		X				X
24603 NEPTUNE AVE	X	X	X				
24603 PANAMA AVE	X		X				
24603 RAVENNA AVE	X	X	X				
24606 MARBELLA AVE	X	X	X		X		
24607 MARBELLA AVE		X	X				
24608 NEPTUNE AVE	X	X	X				
24608 PANAMA AVE	X	X	X				
24608 RAVENNA AVE	X	X	X				
24609 NEPTUNE AVE	X	X	X	X	X	X	
24609 PANAMA AVE	X	X	X				X
24609 RAVENNA AVE	X		X				
24612 MARBELLA AVE	X	X	X	X	X	X	
24612 NEPTUNE AVE	X	X	X	X	X	X	
24612 PANAMA AVE	X	X	X				
24612 RAVENNA AVE	X		X				
24613 MARBELLA AVE[a]	X						
24613 NEPTUNE AVE	X	X	X	X	X	X	
24613 PANAMA AVE	X	X	X				X
24613 RAVENNA AVE	X	X	X				
24616 MARBELLA AVE	X	X	X	X	X	X	
24617 MARBELLA AVE	X	X	X				
24618 NEPTUNE AVE	X	X	X	X	X	X	
24618 PANAMA AVE	X	X	X				
24618 RAVENNA AVE	X		X				
24619 NEPTUNE AVE	X	X	X	X	X	X	
24619 PANAMA AVE	X	X	X				
24619 RAVENNA AVE		X	X				
24622 MARBELLA AVE	X	X	X	X	X	X	
24622 NEPTUNE AVE	X	X	X	X	X	X	
24623 MARBELLA AVE	X	X	X				X
24623 NEPTUNE AVE	X	X	X	X	X	X	
24627 MARBELLA AVE	X	X	X	X			
24628 MARBELLA AVE	X	X	X		X		
24628 NEPTUNE AVE		X	X				
24629 NEPTUNE AVE	X	X	X	X	X	X	X
24632 NEPTUNE AVE[b]	X	X	X	X	X	X	X
24633 MARBELLA AVE	X		X				
24700 MARBELLA AVE	X	X	X	X			
24700 RAVENNA AVE							
24702 NEPTUNE AVE	X	X	X	X	X	X	

Table 6-1
Property Addresses for Consideration in Remedial Planning
Former Kast Property

Address	Shallow Excavation	SVE/Bioventing		Targeted Excavation for >5 to ≤10 ft bgs Depth Interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to ≤10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24702 PANAMA AVE	X	X	X				
24703 MARBELLA AVE	X		X				
24703 NEPTUNE AVE	X	X	X	X			
24703 PANAMA AVE	X	X	X				
24703 RAVENNA AVE	X	X	X		X		
24706 MARBELLA AVE	X	X	X	X			
24706 RAVENNA AVE	X		X				
24707 MARBELLA AVE							
24708 PANAMA AVE	X	X	X				
24709 NEPTUNE AVE	X	X	X		X		X
24709 PANAMA AVE	X	X	X		X		
24709 RAVENNA AVE	X	X	X		X		
24710 MARBELLA AVE	X	X	X		X		
24712 NEPTUNE AVE	X	X	X	X	X	X	X
24712 PANAMA AVE	X	X	X				
24712 RAVENNA AVE	X		X				
24713 MARBELLA AVE							
24713 PANAMA AVE	X	X	X				
24713 RAVENNA AVE	X	X	X		X		
24715 NEPTUNE AVE	X	X	X	X	X	X	
24716 MARBELLA AVE	X	X	X				
24716 RAVENNA AVE	X		X				
24717 MARBELLA AVE	X		X				
24718 NEPTUNE AVE	X	X	X	X			
24718 PANAMA AVE	X	X	X				
24719 NEPTUNE AVE	X	X	X	X			
24719 PANAMA AVE	X	X	X				
24719 RAVENNA AVE	X	X	X		X		
24722 MARBELLA AVE	X		X				
24722 NEPTUNE AVE							X
24722 PANAMA AVE	X		X				
24722 RAVENNA AVE	X		X				
24723 MARBELLA AVE	X		X				X
24723 RAVENNA AVE	X	X	X				
24725 NEPTUNE AVE							
24726 MARBELLA AVE							
24726 RAVENNA AVE	X		X				
24727 MARBELLA AVE	X		X				
24728 NEPTUNE AVE	X	X	X				
24728 PANAMA AVE	X	X	X				
24729 NEPTUNE AVE	X		X				
24729 PANAMA AVE							
24729 RAVENNA AVE							
24732 MARBELLA AVE	X		X				
24732 NEPTUNE AVE	X	X	X		X		
24732 PANAMA AVE							
24732 RAVENNA AVE	X		X				
24733 MARBELLA AVE	X		X				

Table 6-1
Property Addresses for Consideration in Remedial Planning
Former Kast Property

Address	Shallow Excavation	SVE/Bioventing		Targeted Excavation for >5 to ≤10 ft bgs Depth Interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to ≤10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24733 PANAMA AVE	X		X				
24733 RAVENNA AVE	X	X	X				
24735 NEPTUNE AVE	X		X				
24736 MARBELLA AVE							
24736 RAVENNA AVE	X	X	X	X			
24737 MARBELLA AVE	X	X	X				
24738 NEPTUNE AVE	X	X	X	X	X	X	X
24738 PANAMA AVE	X		X				
24739 NEPTUNE AVE	X		X				
24739 PANAMA AVE	X	X	X				
24739 RAVENNA AVE	X	X	X	X	X	X	
24740 MARBELLA AVE	X		X				
24741 MARBELLA AVE							X
24743 RAVENNA AVE	X	X	X	X	X	X	
24744 MARBELLA AVE	X		X				X
24748 RAVENNA AVE	X	X	X				
24749 RAVENNA AVE	X	X	X		X		X
24752 RAVENNA AVE	X	X	X				
24802 PANAMA AVE	X		X				
24803 NEPTUNE AVE	X		X				
24803 PANAMA AVE	X	X	X				
24808 PANAMA AVE	X		X				
24809 NEPTUNE AVE	X	X	X				
24809 PANAMA AVE	X	X	X	X	X	X	
24812 PANAMA AVE	X		X				
24813 PANAMA AVE	X	X	X				
24815 NEPTUNE AVE	X	X	X				
24818 PANAMA AVE	X		X				
24819 PANAMA AVE	X	X	X		X		
24822 PANAMA AVE	X	X	X				
24823 PANAMA AVE	X	X	X	X			
24825 NEPTUNE AVE							
24828 PANAMA AVE	X	X	X				
24829 PANAMA AVE	X	X	X				
24832 PANAMA AVE	X	X	X				
24833 PANAMA AVE	X	X	X				
24838 PANAMA AVE	X		X				
24904 NEPTUNE AVE		X	X				
24912 NEPTUNE AVE		X	X				
301 244TH ST							
305 244TH ST	X	X	X				
311 244TH ST	X	X	X				
317 244TH ST	X		X				X
321 244TH ST[a]	X						
327 244TH ST							
331 244TH ST[a]	X						
337 244TH ST							
341 244TH ST							

Table 6-1
Property Addresses for Consideration in Remedial Planning
Former Kast Property

Address	Shallow Excavation	SVE/Bioventing		Targeted Excavation for >5 to ≤10 ft bgs Depth Interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to ≤10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
344 249TH ST	X		X				
345 249TH ST	X	X	X				
347 244TH ST							
348 248TH ST	X	X	X	X			X
348 249TH ST	X	X	X				
351 244TH ST	X		X				
352 249TH ST		X	X				X
353 249TH ST	X	X	X				
354 248TH ST	X	X	X	X	X	X	
357 244TH ST							
357 249TH ST		X	X				
358 249TH ST	X		X				
360 248TH ST	X	X	X	X			
361 244TH ST							
362 249TH ST							
363 249TH ST	X	X	X	X			
364 248TH ST	X	X	X				
367 244TH ST	X		X				
367 249TH ST	X	X	X				
368 249TH ST	X	X	X				
373 249TH ST	X	X	X	X			
374 248TH ST	X	X	X		X		
374 249TH ST	X	X	X				
377 244TH ST							
377 249TH ST	X	X	X	X			
378 249TH ST	X	X	X				X
383 249TH ST	X	X	X				X
402 249TH ST	X		X				
408 249TH ST							
412 249TH ST	X	X	X				

[a] = Property exceeds SSCGs in the > 5 to ≤10 feet bgs interval, but only for metals above background, therefore no SVE/bioventing is proposed.

[b] = Property not identified in HHRA based on > 1 E-6 risk level, but slightly exceeds RAO for methane.

GW = groundwater

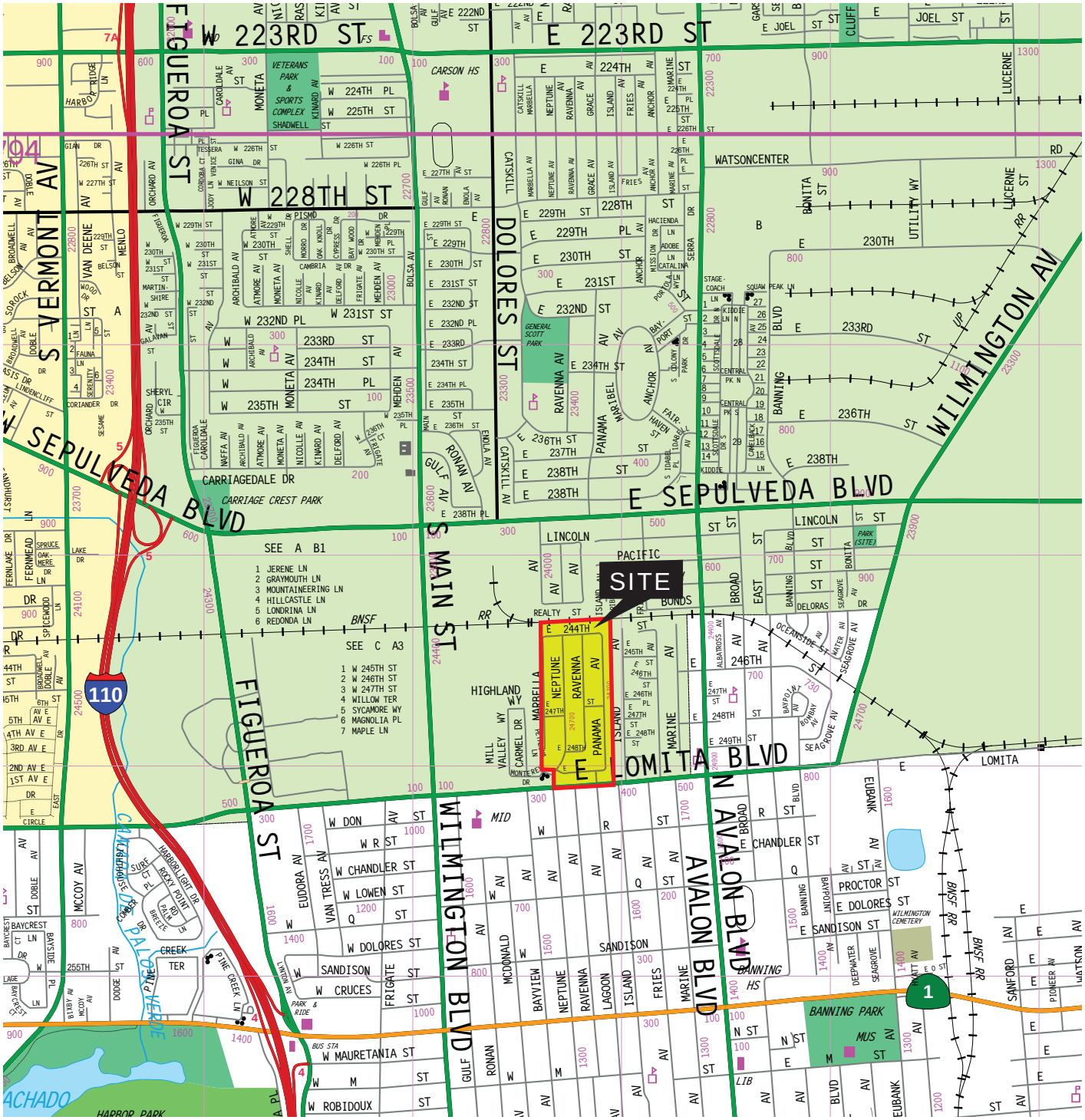
HH = Human Health

RA = Risk Assessment

SSCG = Site-Specific Cleanup Goal

SVE = Soil Vapor Extraction

"X" - Property Selected For Remediation based on results of Human Health Risk Assessment or additional considerations such as targeted mass removal (excavation at some properties > 5 to ≤10 feet bgs) or risk management considerations (subslab depressurization systems)



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0 1400 2800

SCALE IN FEET

N

SITE VICINITY MAP

Project No.: 49194119	Date: June 2014	Project: Former KAST Property	Figure 2-1

K:/2008/KAST/fiugure 1 Vic Map.ai

URS

0 150 300
SCALE IN FEET

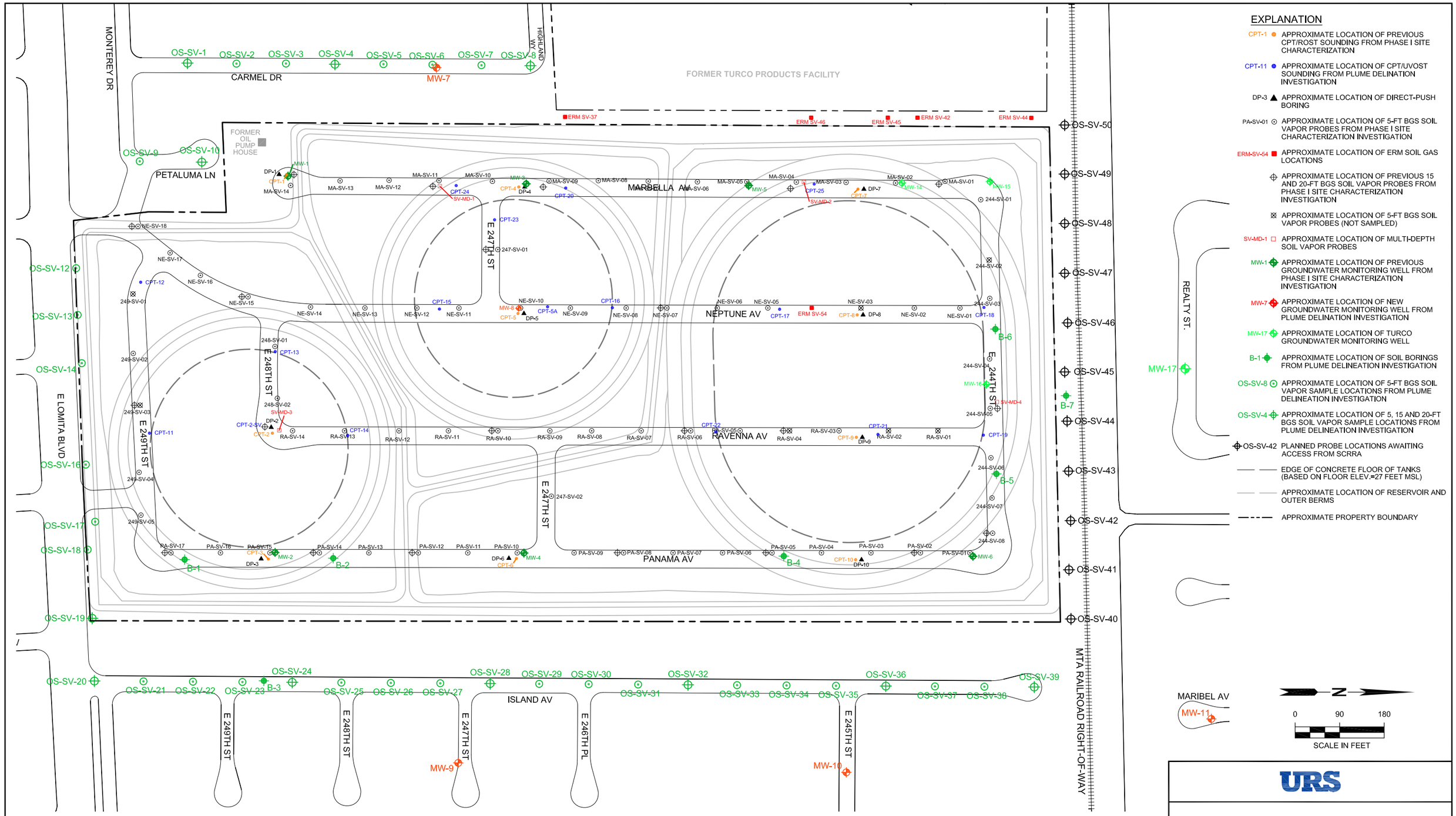
N

URS

LOCATION MAP
SHOWING SITE AND SURROUNDING
PROPERTIES AND FEATURES

Proj. No.:	49194119	Date:	JUNE 2014
Project:	FORMER KAST PROPERTY	Figure:	2-2

G:\1 Shell Products - Former Kast Property\RAP\SVE\Figure 2-2 Location Map Site And Surrounding Props And Features.dwg , File date: 6/30/2014 9:57 AM , Print date: 6/30/2014 10:03 AM by: Volk, Jessica

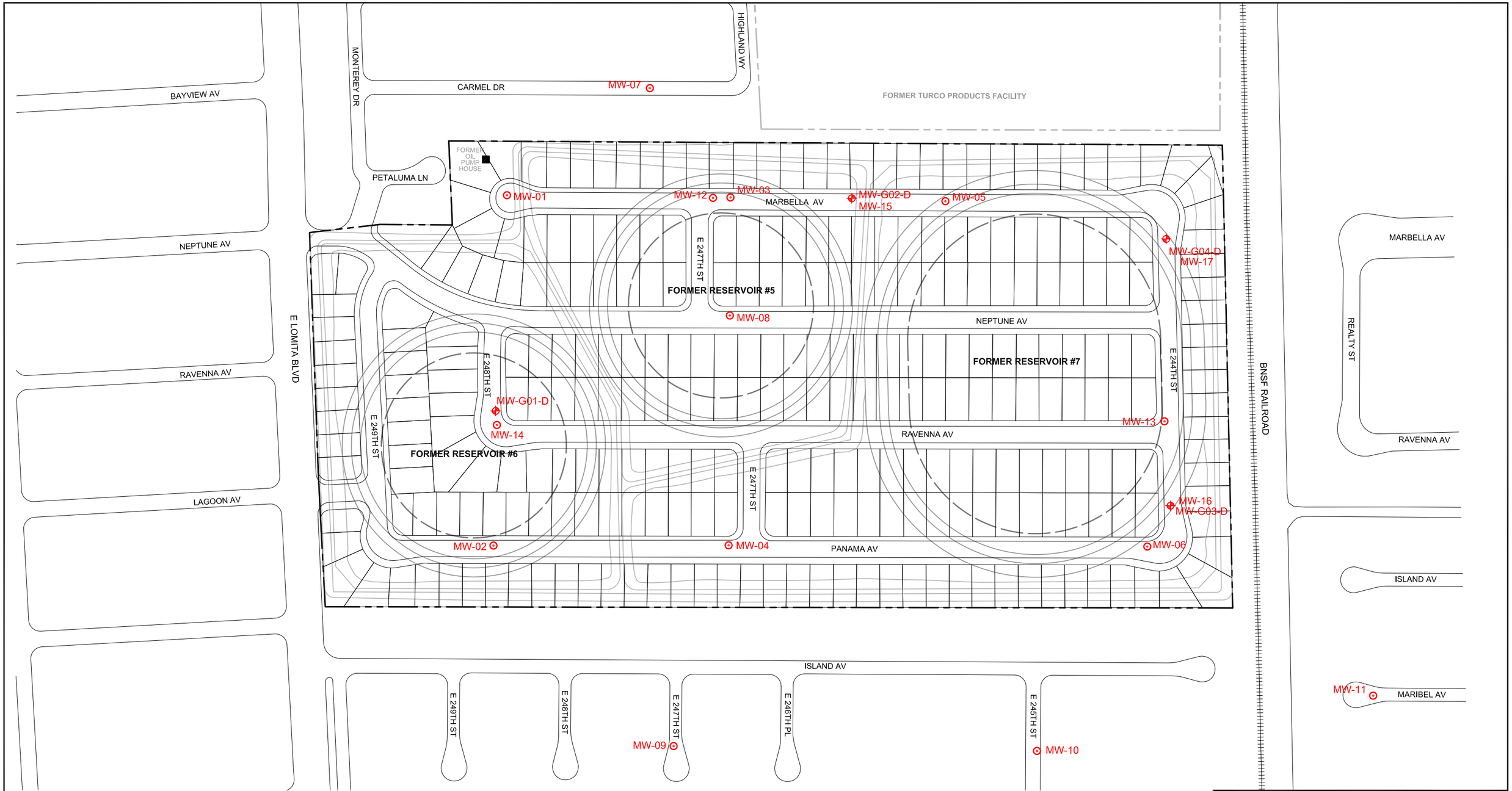


URS

LOCATIONS OF
BORINGS AND SOIL VAPOR PROBES

Proj. No.: 49194119	Date: JUNE 2014
Project: FORMER KAST PROPERTY	Figure: 3-1

G:\1 Shell Products - Former Kast Property\RAP\SVE\Figure 3-1 Boring And Soil Vapor Probes.dwg , File date: 3/10/2014 10:58 AM, Print date: 6/26/2014 3:42 PM by: Sevilla, Vincent



EXPLANATION

MW-G01-D — APPROXIMATE LOCATION OF KAST GAGE MONITORING WELL

MW-10 — APPROXIMATE LOCATION OF SHALLOW WATER-TABLE MONITORING WELL

— — — — APPROXIMATE SITE BOUNDARY

N

0 100 200

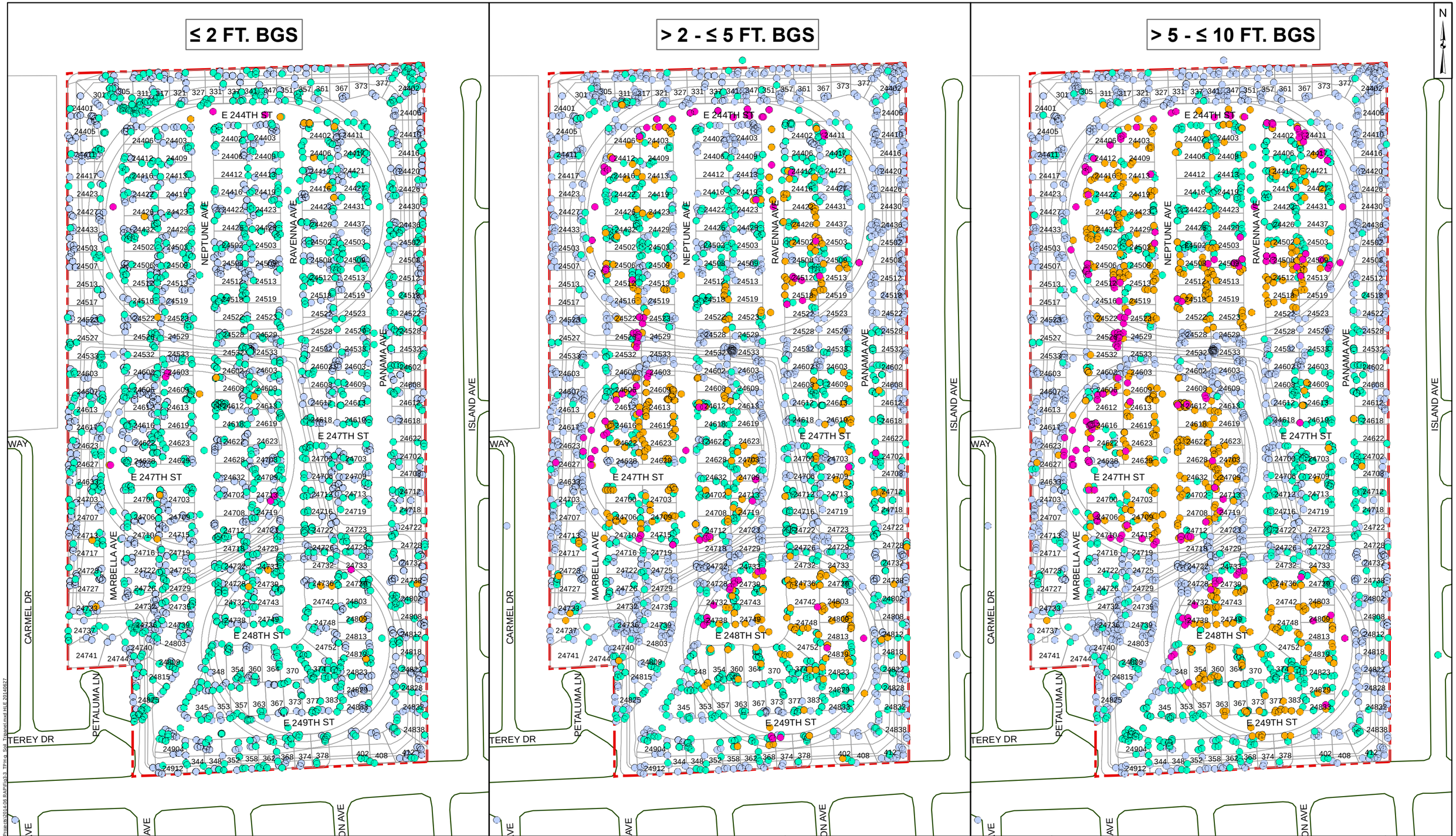
SCALE IN FEET

URS

LOCATIONS OF GROUNDWATER MONITORING WELLS

Proj. No.:	49194357	Date:	JUNE 2014
Project:	FORMER KAST PROPERTY	Figure:	3-2

G:\1 Shell Products - Former Kast Property\RAP\SVE\Figure 3-2 MW Locations.dwg , File date: 6/30/2014 7:23 AM, Print date: 6/30/2014 7:23 AM by: Sevilla, Vincent



Legend

- Non-Detect (ND)
- <= 117 mg/kg
- > 117 to 1170 mg/kg
- > 1170 mg/kg

Notes:
117 mg/kg is the soil leaching to groundwater SSCG for TPHg

250 125 0 250 Feet

Geosyntec consultants

Santa Barbara, CA | June 2014

Distribution of TPH-Gasoline in Site Soils

Former Kast Property

Figure **3-3**

Santa Barbara,A1/Data,P:\GIS\Kast\Projects\2014-06 RAP\Fig3-3_TPHg_Soil_Tpgsamd.mxd 16 E 20140627

Legend

- Non-Detect (ND)
- <= 625 mg/kg
- > 625 to 6250 mg/kg
- > 6250 mg/kg

Notes:
625 mg/kg is the soil leaching to groundwater SSCG for TPHd

250 125 0 250 Feet

Geosyntec consultants

Santa Barbara, CA | June 2014

Distribution of TPH-Diesel in Site Soils

Former Kast Property

Figure **3-4**

Santa Barbara-01\Data P:\GIS\KastProperty\2014-06 RAP\Fig3-4_TPH-d_Soil_Diesel.mxd H:\E 20140627

Legend

- Non-Detect (ND)
- <= 10000 mg/kg
- > 10000 to 100000 mg/kg
- > 100000 mg/kg

Notes:
10000 mg/kg is the soil leaching to groundwater SSCG for TPHmo

250 125 0 250 Feet

Geosyntec consultants

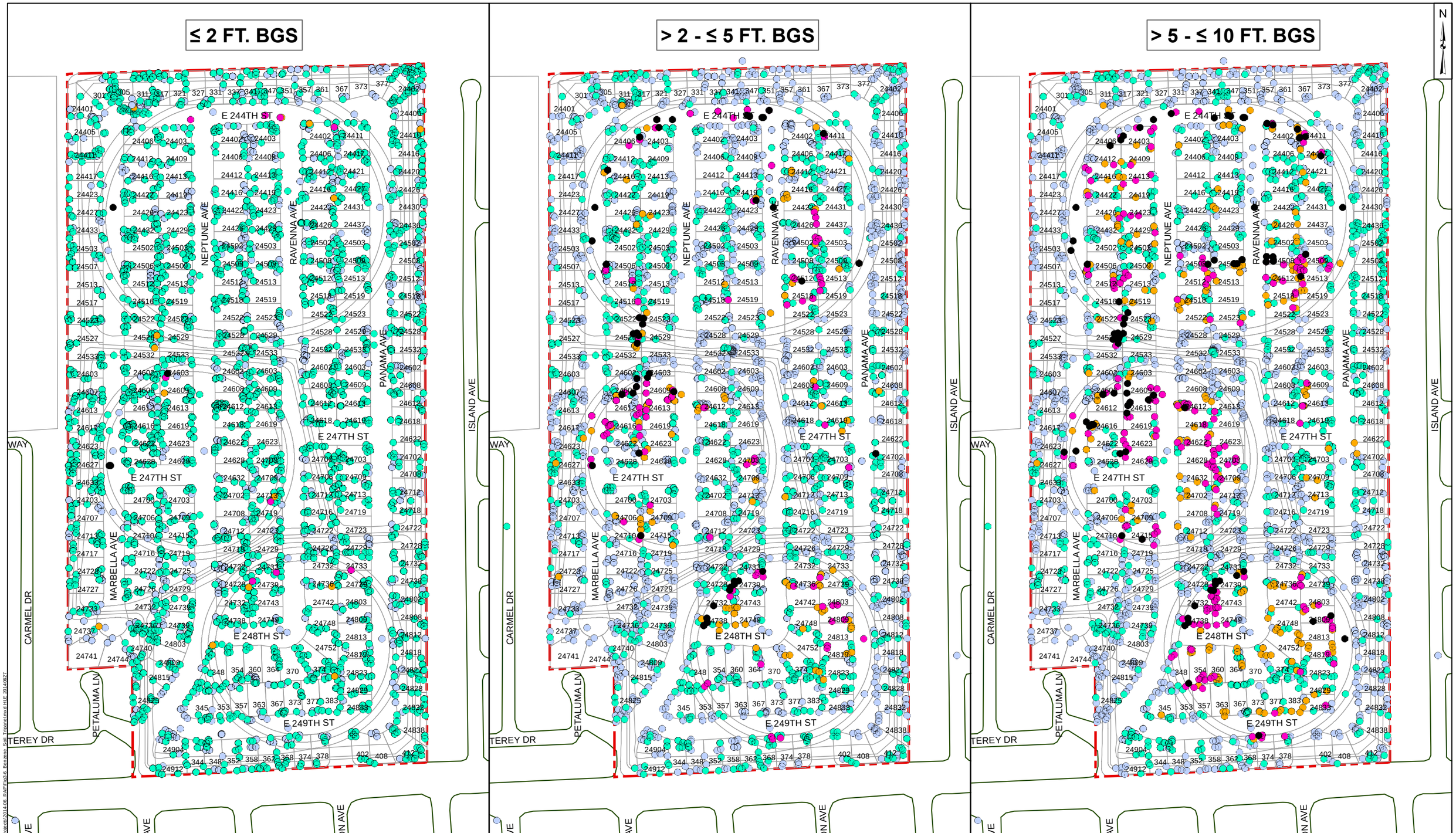
Santa Barbara, CA | June 2014

Distribution of TPH-Motor Oil in Site Soils

Former Kast Property

Figure **3-5**

Santa Barbara,k31Data P:\GIS\Kast\Charts\2014-06 RAP\Fig3-5_TPHmo_Soil_Topsoil.mxd HLE 20140627



Legend

- Non-Detect (ND)
- <= 0.021 mg/kg
- > 0.021 to 0.21 mg/kg
- > 0.21 to 2.1 mg/kg
- > 2.1 mg/kg

Notes:
0.021 mg/kg is the soil leaching to groundwater SSCG for Benzene

250 125 0 250 Feet

Geosyntec consultants

Santa Barbara, CA | June 2014

Distribution of Benzene in Site Soils

Former Kast Property

Figure **3-6**

Santa Barbara,CA|Data P:\GIS\Kast\Shapes\2014-06 RAP\Fig3-6_Benzene_Soil_Tolerance.mxd HLE 2014/06/27

Legend

- Non-Detect (ND)
- <= 4.0 mg/kg
- > 4.0 to 40 mg/kg
- > 40 to 400 mg/kg
- > 400 mg/kg

Notes:
4.0 mg/kg is the human health based SSCG for naphthalene

250 125 0 250 Feet

Geosyntec consultants

Santa Barbara, CA | June 2014

Distribution of Naphthalene in Site Soils

Former Kast Property

Figure **3-7**

Santa Barbara-01\Data P:\GIS\Kast\Projects\2014-06 RAP\Fig3-7_Naphthalene_Soil Trigonometrical H LE 2014-06-27

Legend

- Non-Detect (ND)
- <= 0.9 mg/kg
- > 0.9 to 1.6 mg/kg
- > 1.6 to 16 mg/kg
- > 16 mg/kg

Notes:
0.9 mg/kg is the background SSCG for benzo(a)pyrene-equivalents

250 125 0 250 Feet

Geosyntec consultants

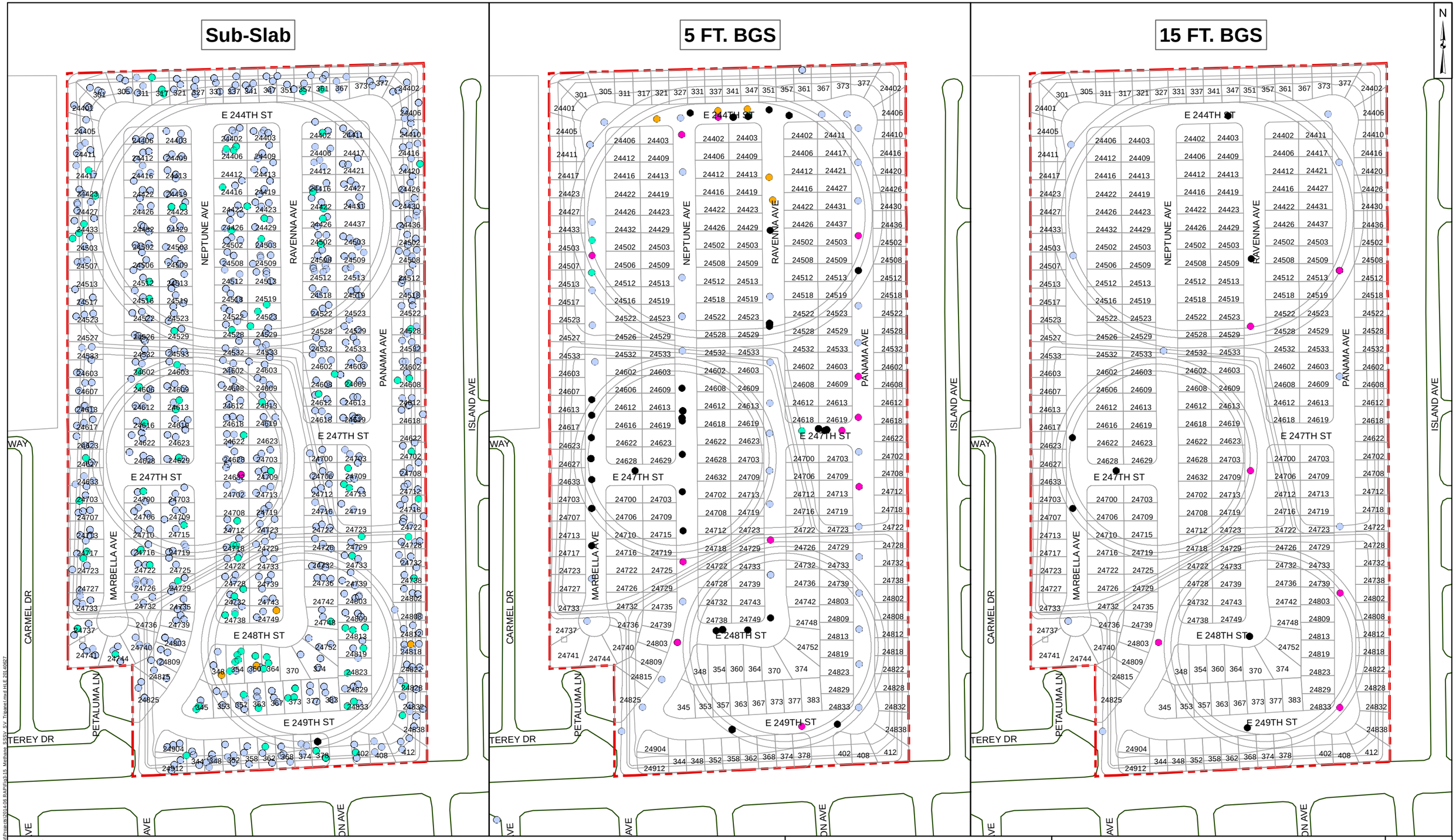
Santa Barbara, CA | June 2014

Distribution of Benzo(a)pyrene-Equivalents in Site Soils

Former Kast Property

Figure **3-8**

Santa Barbara,A1/Data,P:\GIS\Kast\Projects\2014-06_RAP\Fig3-8_RAP_EQ_Soil_Tiles\mxd\HLE 20140627



Legend

- Non-Detect (ND)
- <= 0.1 %
- > 0.1 to 0.5 %
- > 0.5 to 5.0 %
- > 5.0 %

Notes:
Results for methane due to leaking natural gas line or sewer line sources are not shown
0.1% and 0.5% are the SSCGs for methane in soil vapor

250 125 0 250 Feet

Geosyntec consultants

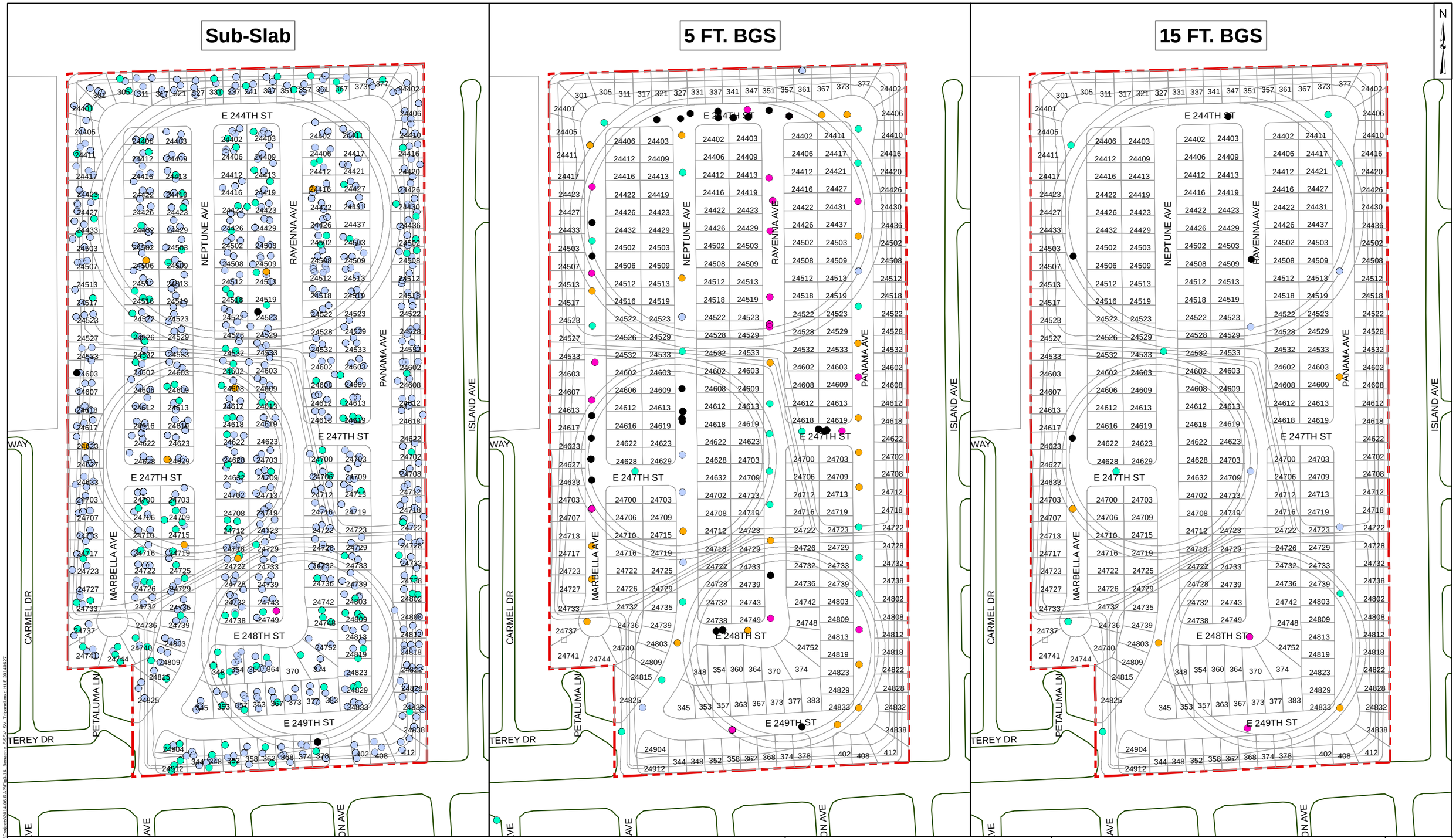
Santa Barbara, CA | June 2014

Methane Concentrations Detected in Sub-slab Soil Vapor and in Soil Vapor at 5 and 15 feet bgs

Former Kast Property

Figure **3-15**

Santa Barbara-01\Data P:\GIS\Kast\Projects\2014-06 RAP\Fig3-15_Methane_SSSV_SV_Triggered.mxd HLE 2014/06/27



Legend

- Non-Detect (ND)
- <= 42 ug/m³
- > 42 to 420 ug/m³
- > 420 to 4200 ug/m³
- > 4200 ug/m³

Notes:
42 µg/m³ is the SSCG for benzene in soil vapor

250 125 0 250 Feet

Geosyntec consultants

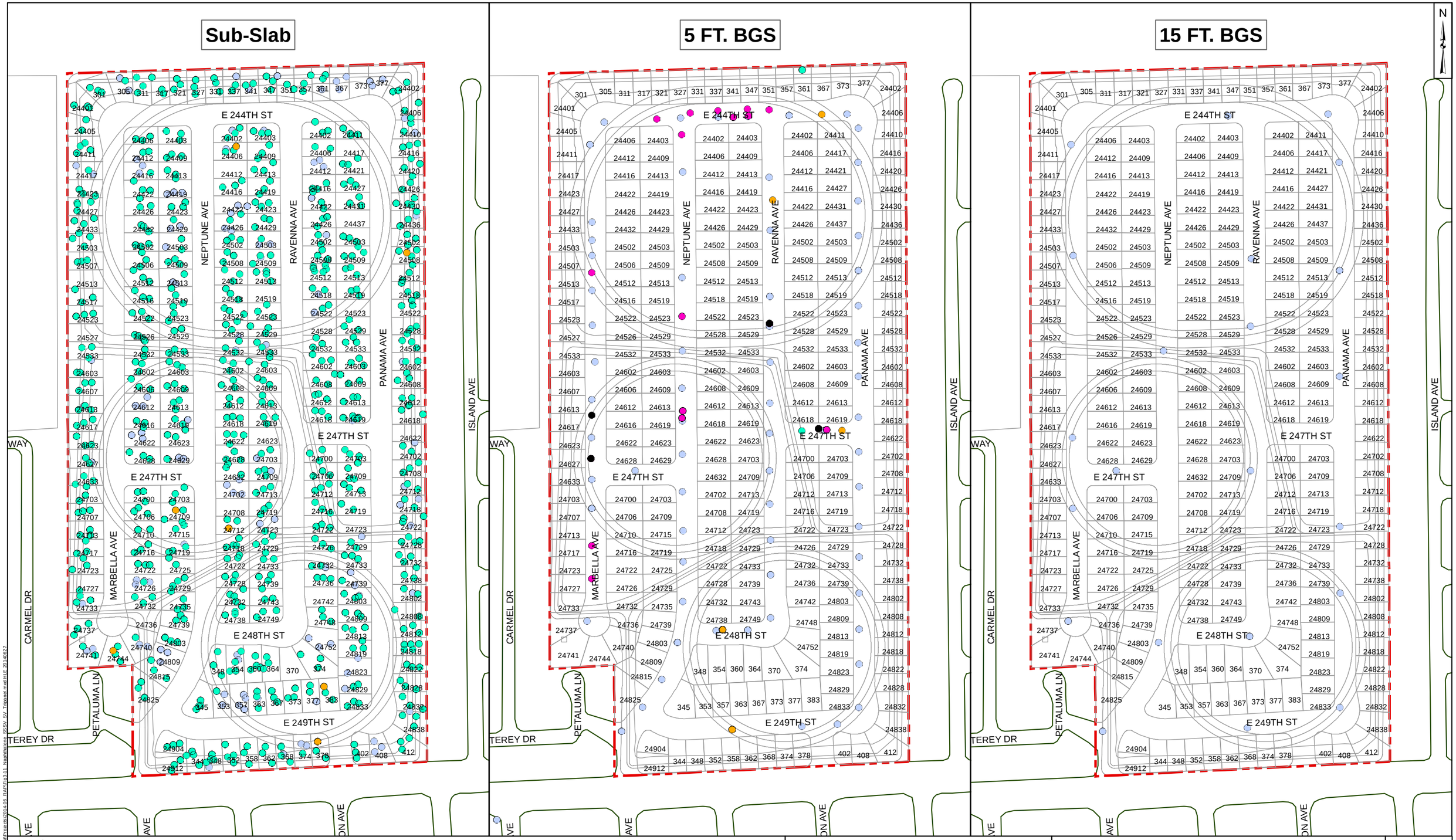
Santa Barbara, CA | June 2014

Benzene Concentrations in Sub-slab Soil Vapor and in Soil Vapor at 5 and 15 feet bgs

Former Kast Property

Figure **3-16**

Santa Barbara/01Data P-IS/SK/kast/Figures/2014-06 RAP/Fig3-16 Benzene SSSV SV Transmit.mxd HLE 20140627



Legend

- Non-Detect (ND)
- <= 36 ug/m³
- > 36 to 360 ug/m³
- > 360 to 3600 ug/m³
- > 3600 ug/m³

Notes:
36 µg/m³ is the SSCG for naphthalene in soil vapor

250 125 0 250 Feet

Geosyntec consultants

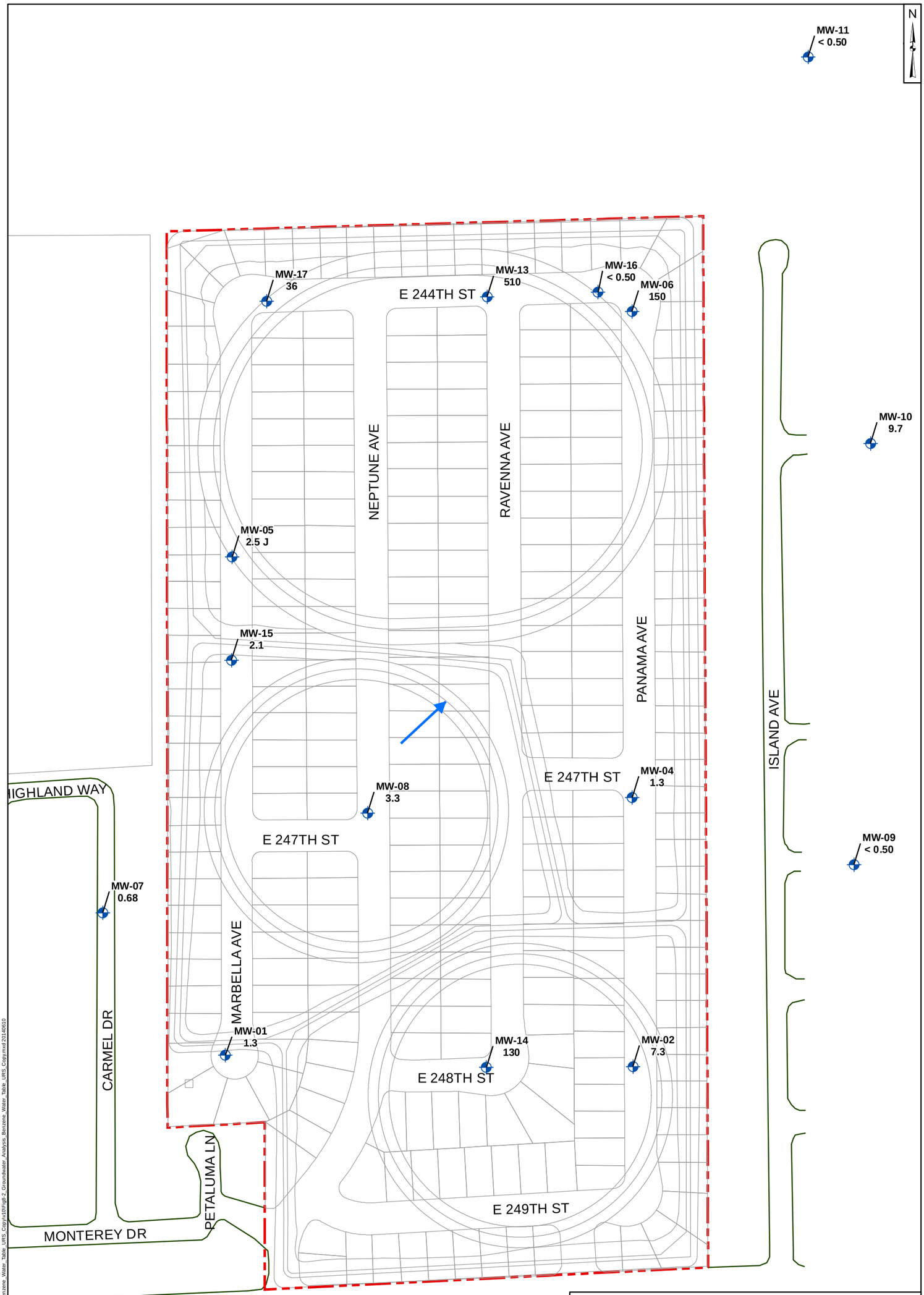
Santa Barbara, CA | June 2014

Naphthalene Concentrations in Sub-slab Soil Vapor and in Soil Vapor at 5 and 15 feet bgs

Former Kast Property

Figure **3-17**

Santa Barbara-01/Data P:\GIS\KastProperty\2014-06_RAP\Fig3-11_Naphthalene_SSSV_SV_Trigonal.mxd HLE 2014/06/27



175 87.5 0 175 Feet

Legend

- Monitoring Well
- Approximate Groundwater Flow Direction
- Site Boundary

MW-08 Monitoring well designation

33 Benzene concentration in micrograms per liter (µg/l) collected in April 2014

< : Less than detection limit

J : Estimated value

Benzene Concentrations in Groundwater - 2Q 2014
Shallow Zone Wells

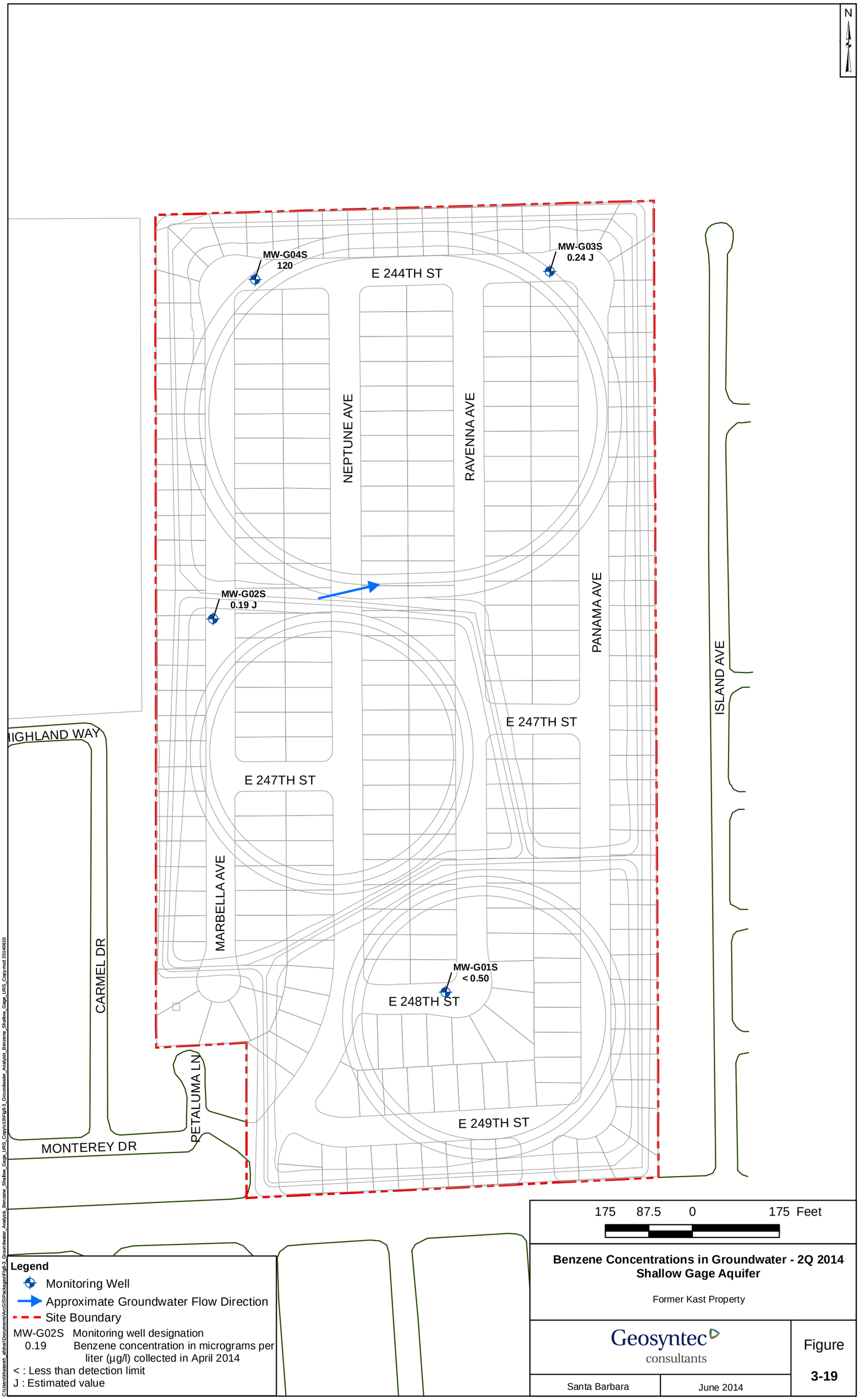
Former Kast Property

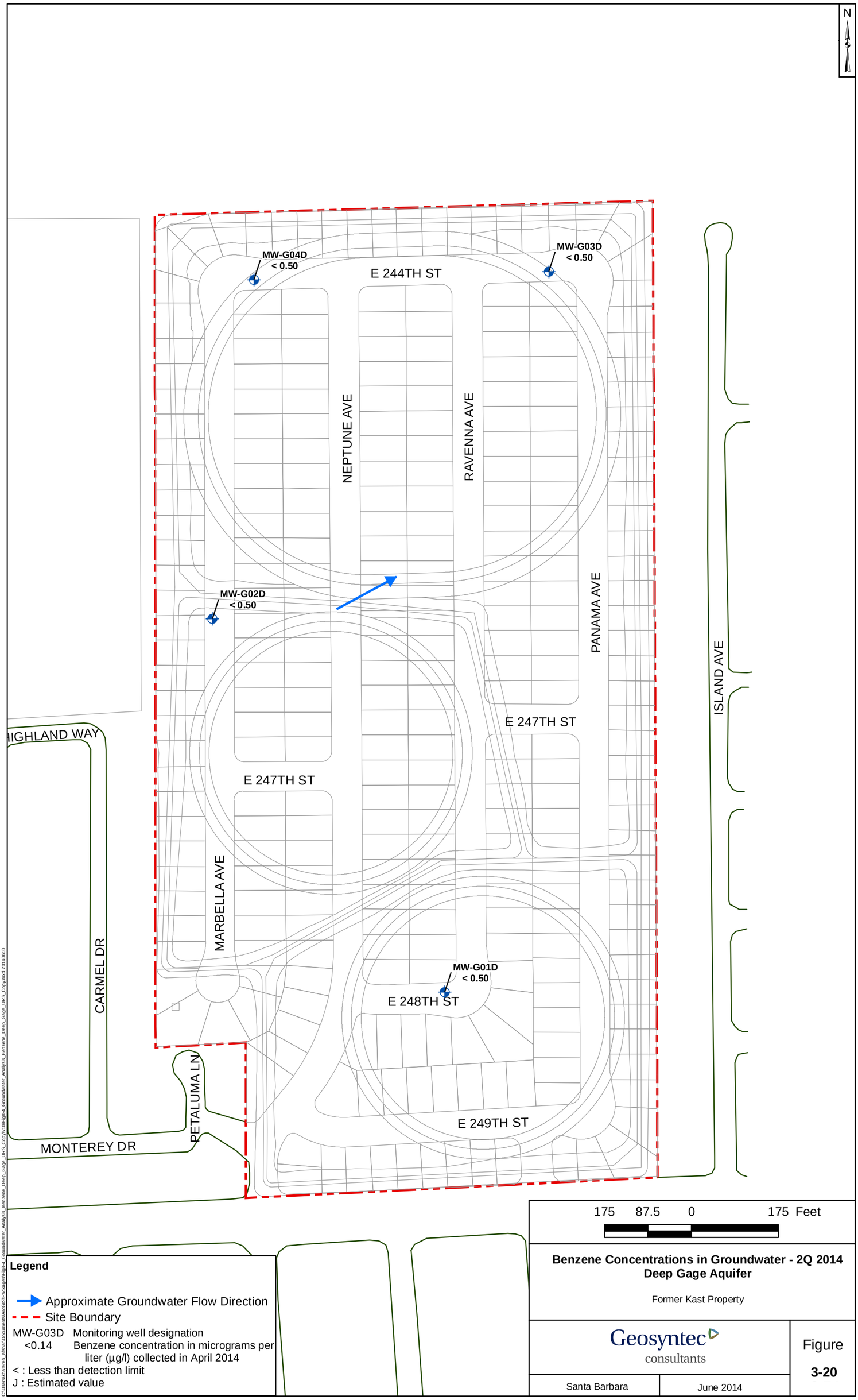
Geosyntec consultants

Santa Barbara | June 2014

Figure **3-18**

C:\Users\bstanch.atlhar\Documents\ArcGIS\Packages\Fig3-2_Groundwater_Analysis_Benzene_Water_Table_URS_Copy\v20\Fig3-2_Groundwater_Analysis_Benzene_Water_Table_URS_Copy.mxd 2014/06/10


N
MW-G04S
120
MW-G03S
0.24 J
E 244TH ST
NEPTUNE AVE
RAVENNA AVE
PANAMA AVE
ISLAND AVE
MW-G02S
0.19 J
E 247TH ST
E 247TH ST
HIGHLAND WAY
MARBELLA AVE
CARMEL DR
MW-G01S
< 0.50
E 248TH ST
PETALUMA LN
E 249TH ST
MONTEREY DR
175 87.5 0 175 Feet
Legend
Monitoring Well
Approximate Groundwater Flow Direction
Site Boundary
MW-G02S Monitoring well designation
0.19 Benzene concentration in micrograms per liter (µg/l) collected in April 2014
< : Less than detection limit
J : Estimated value
Benzene Concentrations in Groundwater - 2Q 2014
Shallow Gage Aquifer
Former Kast Property
Geosyntec consultants
Santa Barbara
June 2014
Figure
3-19


N
MW-G04D
< 0.50
MW-G03D
< 0.50
E 244TH ST
NEPTUNE AVE
RAVENNA AVE
PANAMA AVE
ISLAND AVE
MW-G02D
< 0.50
E 247TH ST
E 247TH ST
HIGHLAND WAY
CARMEL DR
MARBELLA AVE
MW-G01D
< 0.50
E 248TH ST
PETALUMA LN
E 249TH ST
MONTEREY DR
175 87.5 0 175 Feet
Legend
Approximate Groundwater Flow Direction
Site Boundary
MW-G03D Monitoring well designation
<0.14 Benzene concentration in micrograms per liter (µg/l) collected in April 2014
< : Less than detection limit
J : Estimated value
Benzene Concentrations in Groundwater - 2Q 2014
Deep Gage Aquifer
Former Kast Property
Geosyntec consultants
Santa Barbara
June 2014
Figure
3-20

FORMER TURCO PRODUCTS FACILITY

FORMER OIL PUMP HOUSE

PETALUMA LN

E. LOMITA BLVD

BNSF RAILROAD

MARBELLA AV

NEPTUNE AV

RAVENNA AV

PANAMA AV

E 247TH ST

E 248TH ST

E 249TH ST

E 244TH ST

FORMER RESERVOIR #5

FORMER RESERVOIR #6

FORMER RESERVOIR #7

MA-SV-14
DP-1
CPT-1
MW-01
MA-SV-11
SV-MD-1
MW-12
CPT-24
VEW-03D
MA-SV-09
CPT-20
DP-4
CPT-4
MW-03
MW-G02-D
MW-15
MW-05
MA-SV-04
SV-MD-2
DP-7
MA-SV-01
MW-17
MW-G04-D
NE-SV-18
CPT-23
247-SV-01
N-24715G1 9.5'
CPT-15 7.7'
CPT-5 7.3'
NE-SV-12 7.9'
MW-08
DP-5
NE-SV-09 7'
CPT-16 6'
NE-SV-07
N-24612G2 7.5'
N-24612G1 8.5'
NE-SV-15
M-24502G1 7'
M-24432G1 7.5'
M-24422G 7'
CPT-17 6'
NE-SV-04 10.5'
NE-SV-03 8.9' - 9.5'
NE-SV-05 10.2'
DP-8
NE-SV-02 7.1' - 8'
CPT-18
B-6
CPT-13 8.6'
MW-G01-D
MW-14 10'
DP-2
RA-SV-14
CPT-2 10.2'
R-24736G2 10'
R-24736G1 10.5'
CPT-14
RA-SV-10
RA-SV-08
RA-SV-06
RA-SV-04
CPT-9 11.9'
RA-SV-03 11'
244-SV-05H
244-SV-05I
RA-SV-01 8'
244-SV-05G 9'
244-SV-05F 9'
244-SV-05E 8'
VEW-01D
MD-4
244-SV-05A
MW-13
CPT-19
B-5
249-SV-03
VEW-02D
PA-SV-03 6.7' - 7.1'
MW-G03-D
MW-16
244-SV-08
PA-SV-15
PA-SV-14
PA-SV-10
PA-SV-17
B-1
DP-3
MW-02
B-2
PA-SV-12
DP-6
MW-04
PA-SV-08
PA-SV-05
B-4
CPT-10 7.5'
DP-10
PA-SV-02
MW-06

EXPLANATION

- LOCATION OF GROUNDWATER MONITORING WELL
- LOCATION OF CPT/UVOST SOUNDING
- LOCATION OF 10-FT BGS SOIL VAPOR PROBE
- LOCATION OF 15-FT AND 20-FT BGS SOIL VAPOR PROBE
- LOCATION OF DIRECT-PUSH BORING
- LOCATION OF MULTI-DEPTH SOIL VAPOR PROBE
- APPROXIMATE LOCATION OF PILOT TEST GEOTECHNICAL BORING
- LOCATION OF SVE EXTRACTION WELL
- ADVANCED TO ≥10' BGS WITHOUT REFUSAL NOTED ON BORING LOGS OR IN FIELD NOTES
- REFUSAL AT ≤10' BGS NOTED ON BORING LOGS OR IN FIELD NOTES WITH DEPTH OF REFUSAL NOTED
- APPROXIMATE PROPERTY LINE
- ESTIMATED EXTENT OF RESIDUAL CONCRETE RESERVOIR SLABS

N

0 70 140

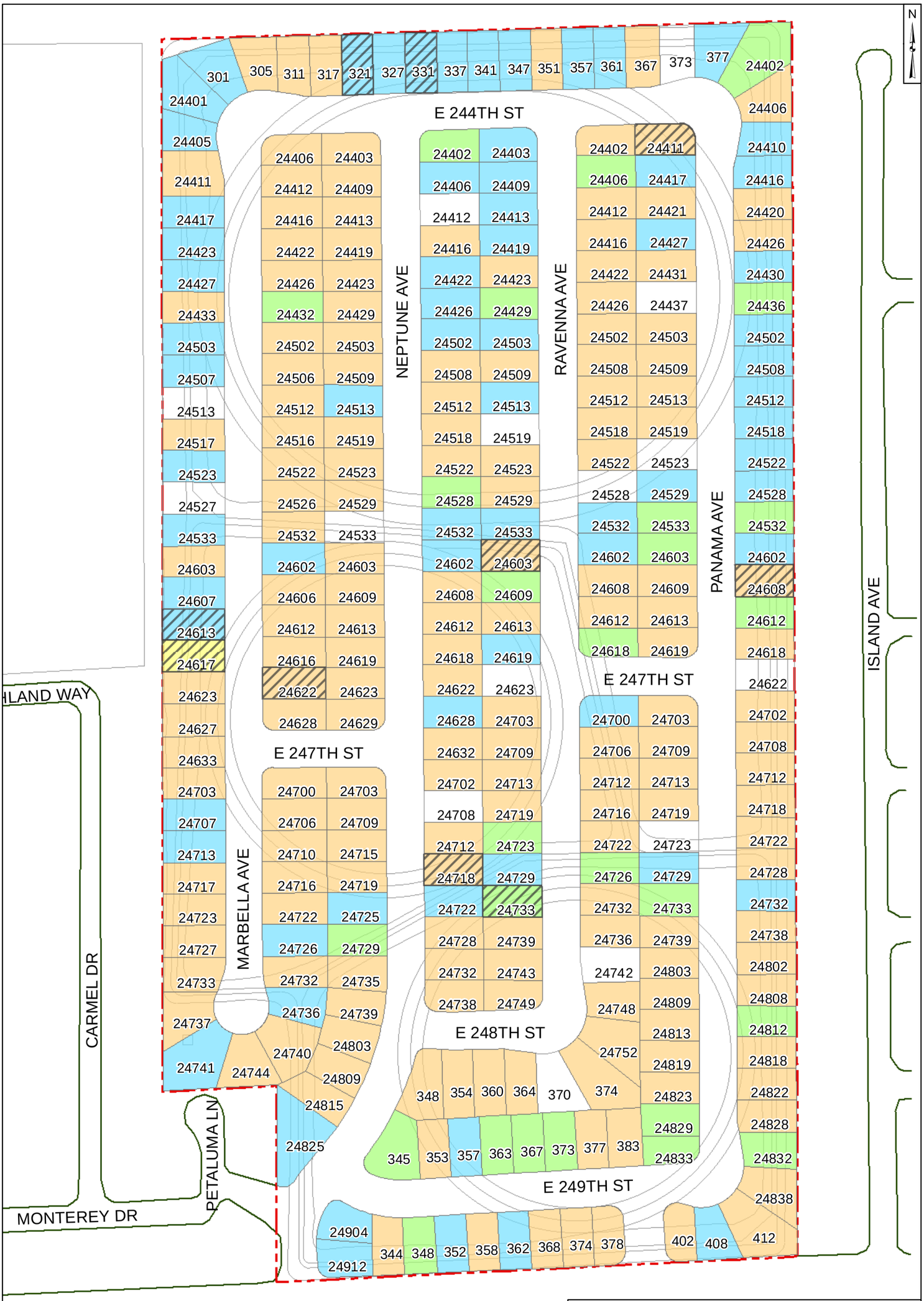
SCALE IN FEET

URS

ESTIMATED EXTENT OF RESIDUAL CONCRETE RESERVOIR SLABS SHOWING BORING REFUSAL IN SOIL BORINGS, MONITORING WELLS AND SOIL VAPOR PROBES INSTALLED IN STREETS

Proj. No.: 49194119	Date: JUNE 2014
Project: FORMER KAST PROPERTY	Figure: 3-21

G:\1 Shell Products - Former Kast Property\CADD\Boring Refusal\Figure 3-21 EstResidConcSlabsBorRefslMap SB MW SVP In Streets.dwg , File date: 6/29/2014 3:50 PM, Print date: 6/29/2014 3:51 PM by: Sevilla, Vincent



Legend

- < HHRA or Soil Leaching to GW Criteria
- > Soil Leaching to GW Criteria
- > HHRA Criteria
- > HHRA and Soil Leaching to GW Criteria
- No Data Available
- Antimony, Arsenic, or Thallium > Background

Notes:
ft bgs = feet below ground surface

150 75 0 150 Feet

Properties Exceeding Human Health and/or Leaching to Groundwater Criteria, ≤ 5 Feet Below Ground Surface

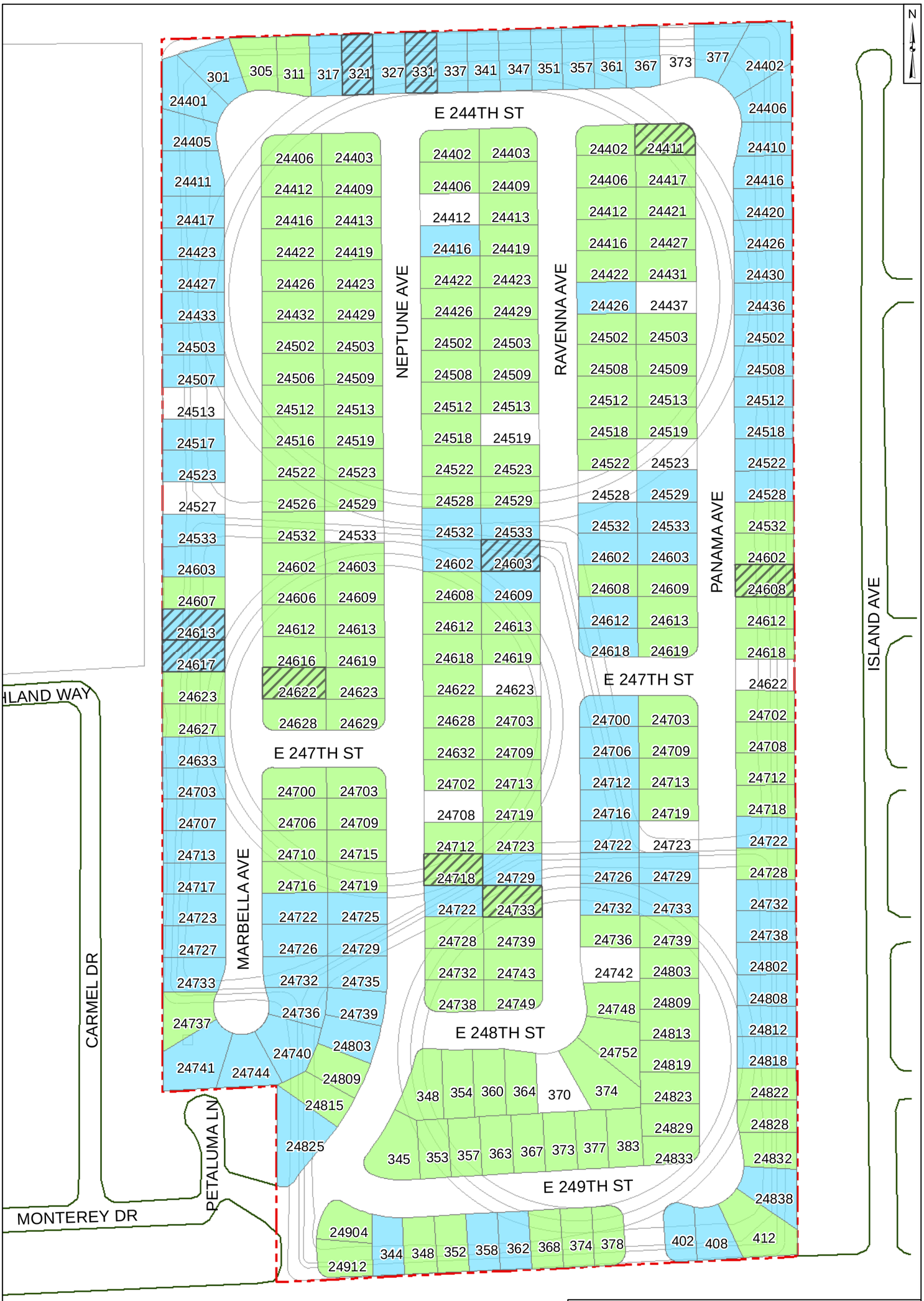
Former Kast Property

Geosyntec consultants

Santa Barbara | June 2014

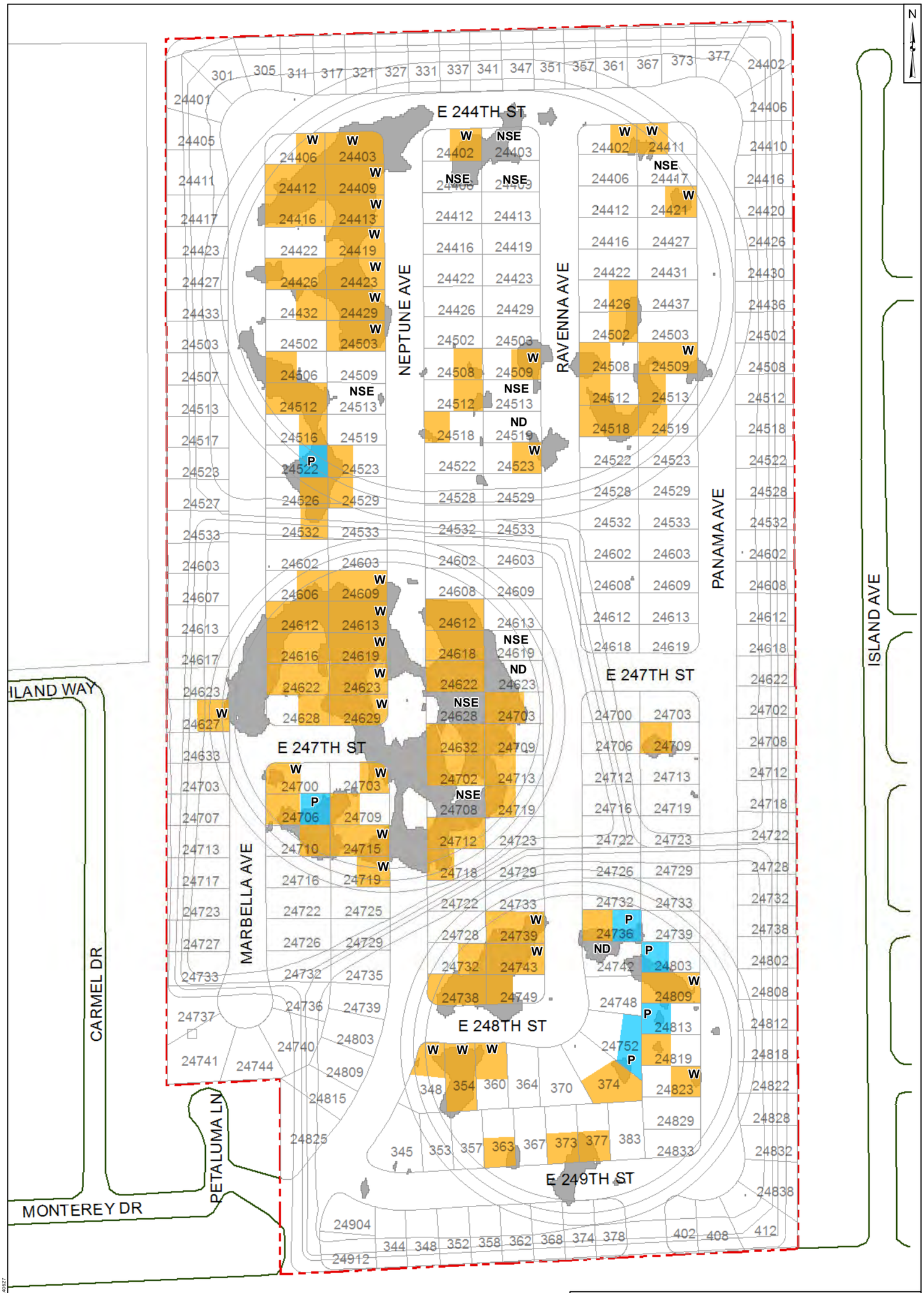
Figure **6-1**

P:\GIS\Kast\Projects\2014-06 PA\PF\Fig6-1_Soil_Lead5_Kast_Residential.mxd 2014/06/27



Properties Exceeding Human Health and/or Leaching to Groundwater Criteria, > 5 Feet and ≤ 10 Feet Below Ground Surface

Former Kast Property



Legend

- TPH Concentrations > 10x SSCG
- Targeted Excavation Area
- Pool
- Site Boundary

Notes:

NSE = No Shallow Excavation Planned
P = Pool
W = Water Main
ND = No Data

150 75 0 150 Feet

Properties Identified for Targeted Excavation > 5 and ≤ 10 Feet Below Ground Surface

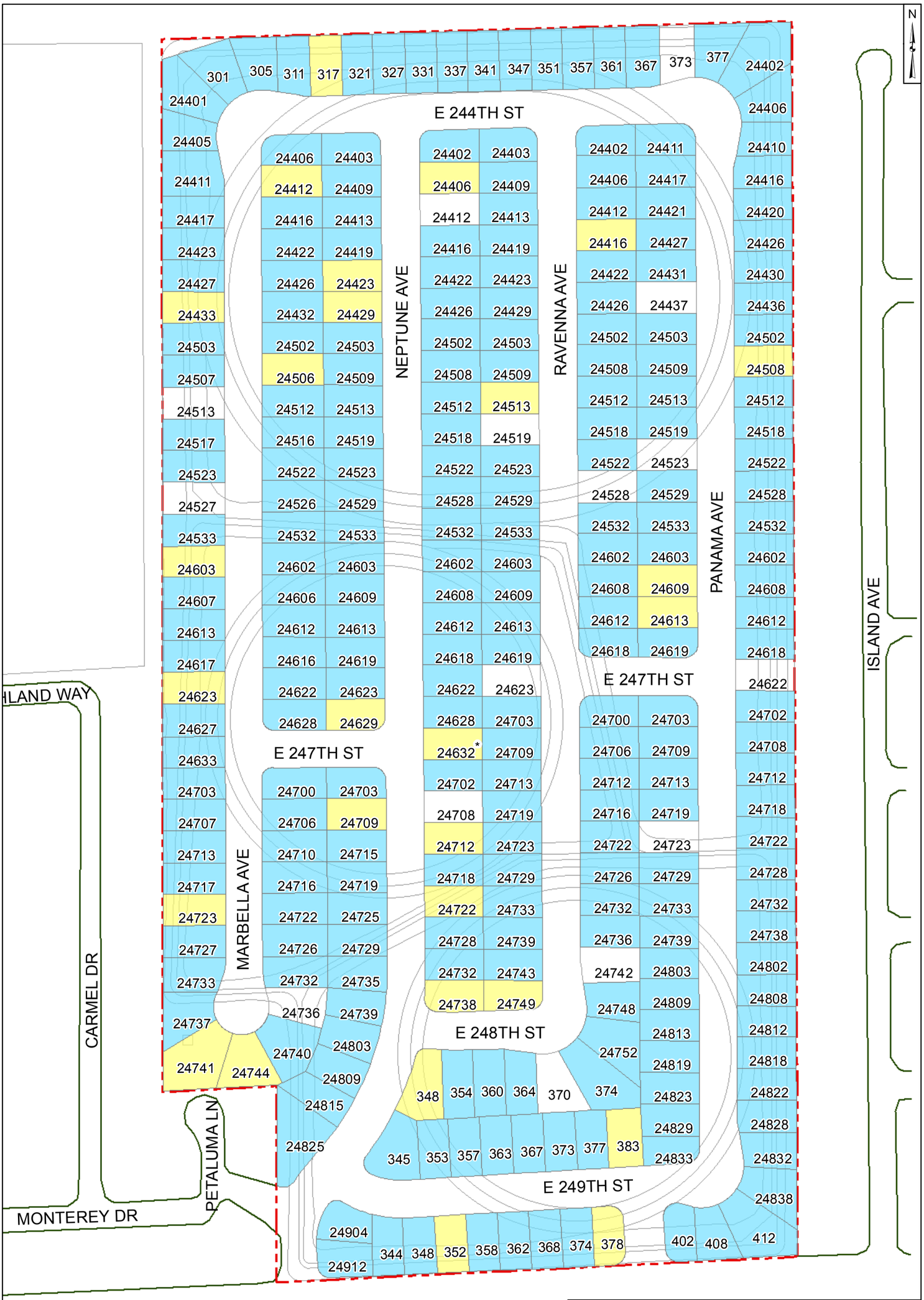
Former Kast Property

Geosyntec consultants

Santa Barbara | June 2014

Figure 6-3

P:\GDX\cadProjects\2014-06 DAP\Fig6-3_Targeted_Excavation_Area_gdx\d108.mxd 20140627



Legend

- ≤ 1 x 10^{-6} incremental lifetime cancer risk
- > 1 x 10^{-6} incremental lifetime cancer risk
- No Data Available

Notes:

-Background risks associated with trihalomethanes not Included

-* = 24632 Neptune Avenue property identified for sub-slab mitigation based on methane detection at 0.58%, slightly above the methane Site-Specific Cleanup Goal (SSCG) of 0.5%

Properties Exceeding Human Health Criteria for Sub-Slab Soil Vapor to Indoor Air

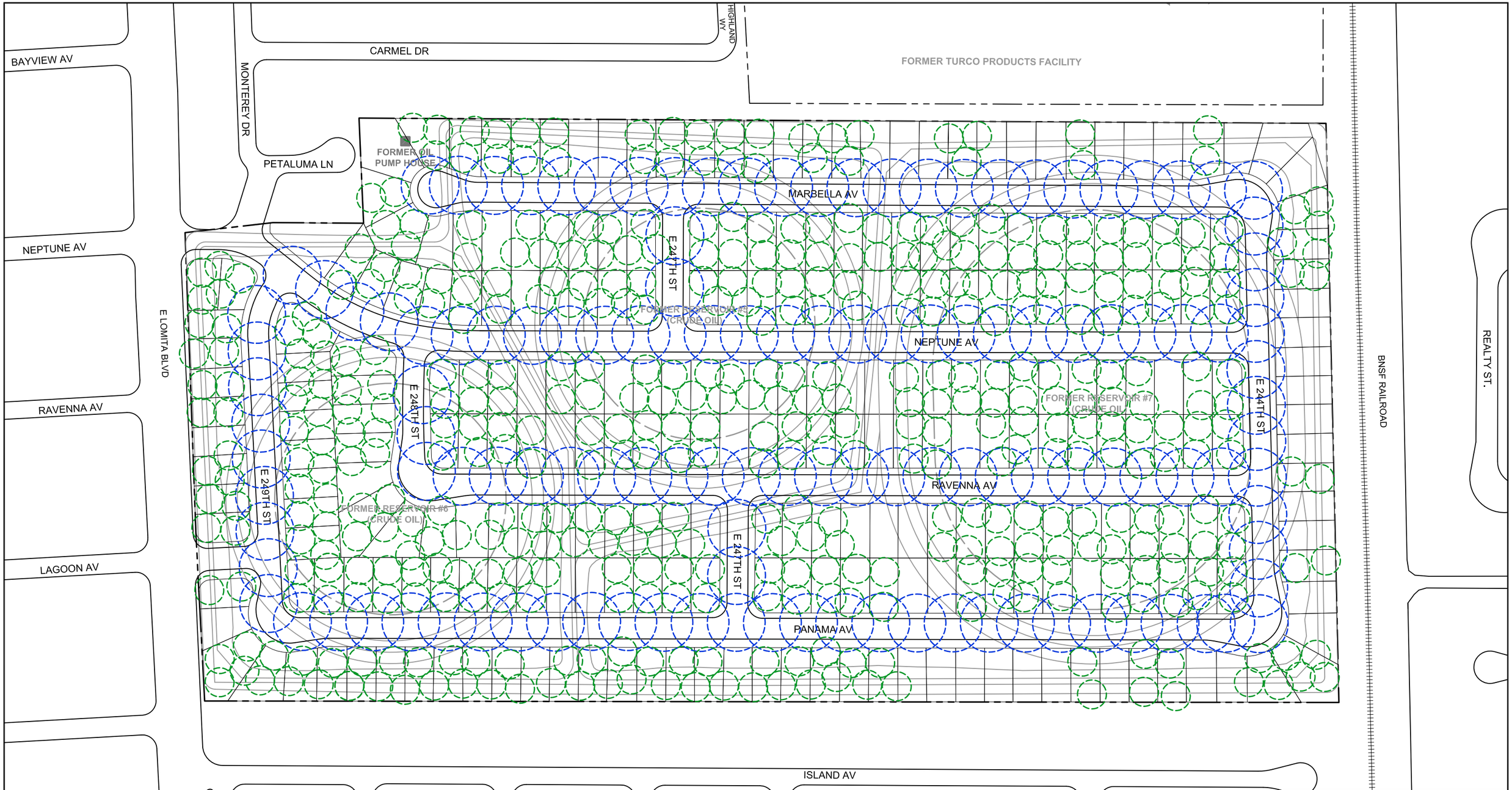
Former Kast Property

Geosyntec consultants

Santa Barbara | June 2014

Figure 6-4

P:\GIS\Kast\Projects\2014-06 RAP\Fig6-4b_SSSV_IA_Resident.mxd 2014/06/27



EXPLANATION

APPROXIMATE PROPERTY LINE

CONCEPTUAL STREET EXTRACTION WELL RADIUS OF VACUUM INFLUENCE (50 FEET)
128 SHALLOW WELLS AT APPROXIMATELY 62.5-FOOT SPACING

CONCEPTUAL RESIDENTIAL EXTRACTION WELL RADIUS OF VACUUM INFLUENCE (25 FEET)
472 SHALLOW WELLS AT 221 RESIDENCES

N

0 80 160

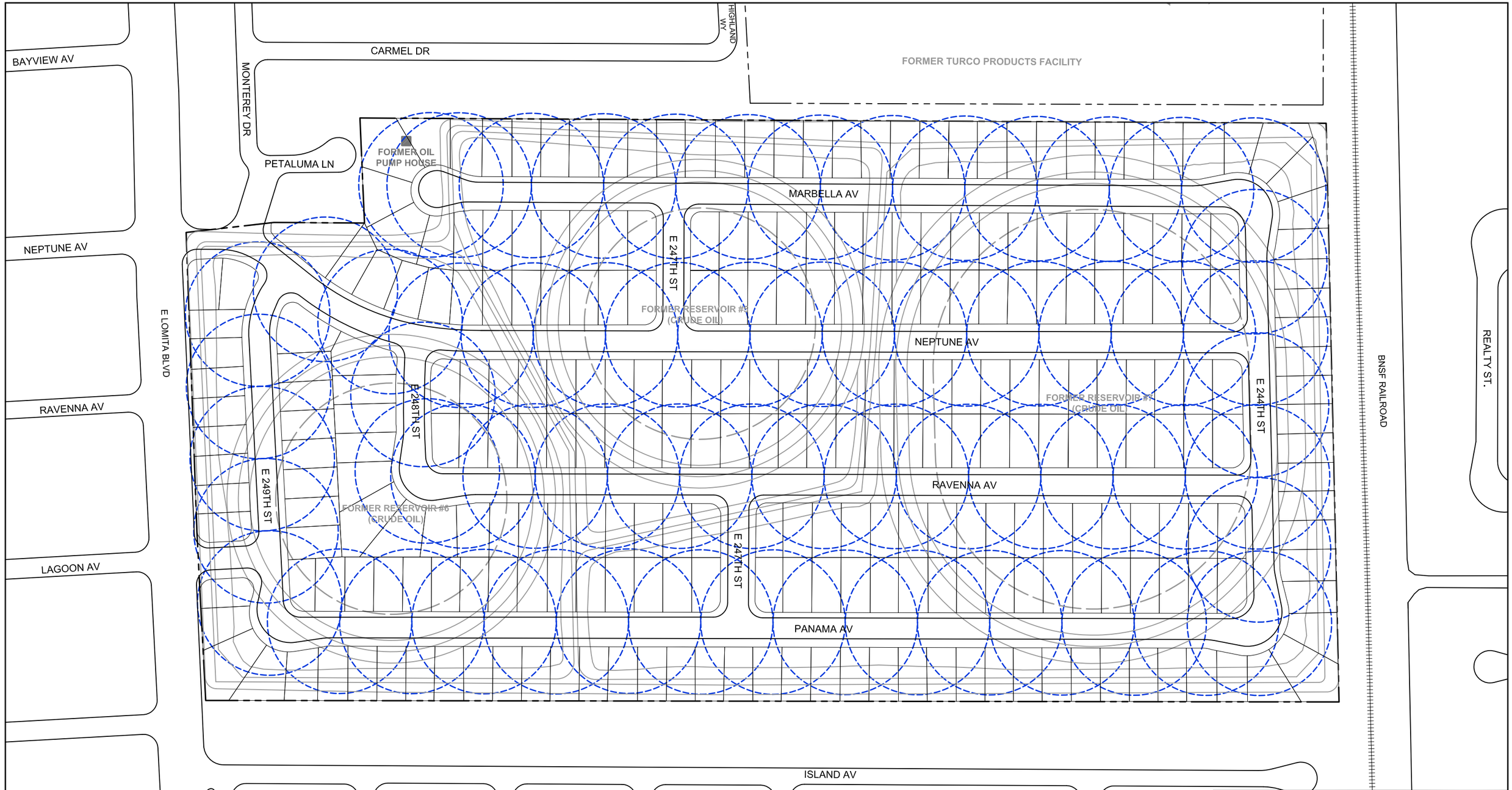
SCALE IN FEET

URS

CONCEPTUAL VAPOR EXTRACTION COVERAGE FOR THE SHALLOW ZONE

Proj. No.:	49194119	Date:	JUNE 2014
Project:	FORMER KAST PROPERTY	Figure:	8-1

G:\1 Shell Products - Former Kast Property\RAP\SVE\Figure 8-1 Conceptual Vapor Extraction Coverage - Shallow Zone 062714.dwg , File date: 6/27/2014 4:33 PM, Print date: 6/27/2014 4:33 PM by: Sevilla, Vincent



EXPLANATION

APPROXIMATE PROPERTY LINE

CONCEPTUAL INTERMEDIATE EXTRACTION WELL RADIUS OF VACUUM INFLUENCE (125 FEET) 63 WELLS AT APPROXIMATELY125-FOOT SPACING

N

0 80 160

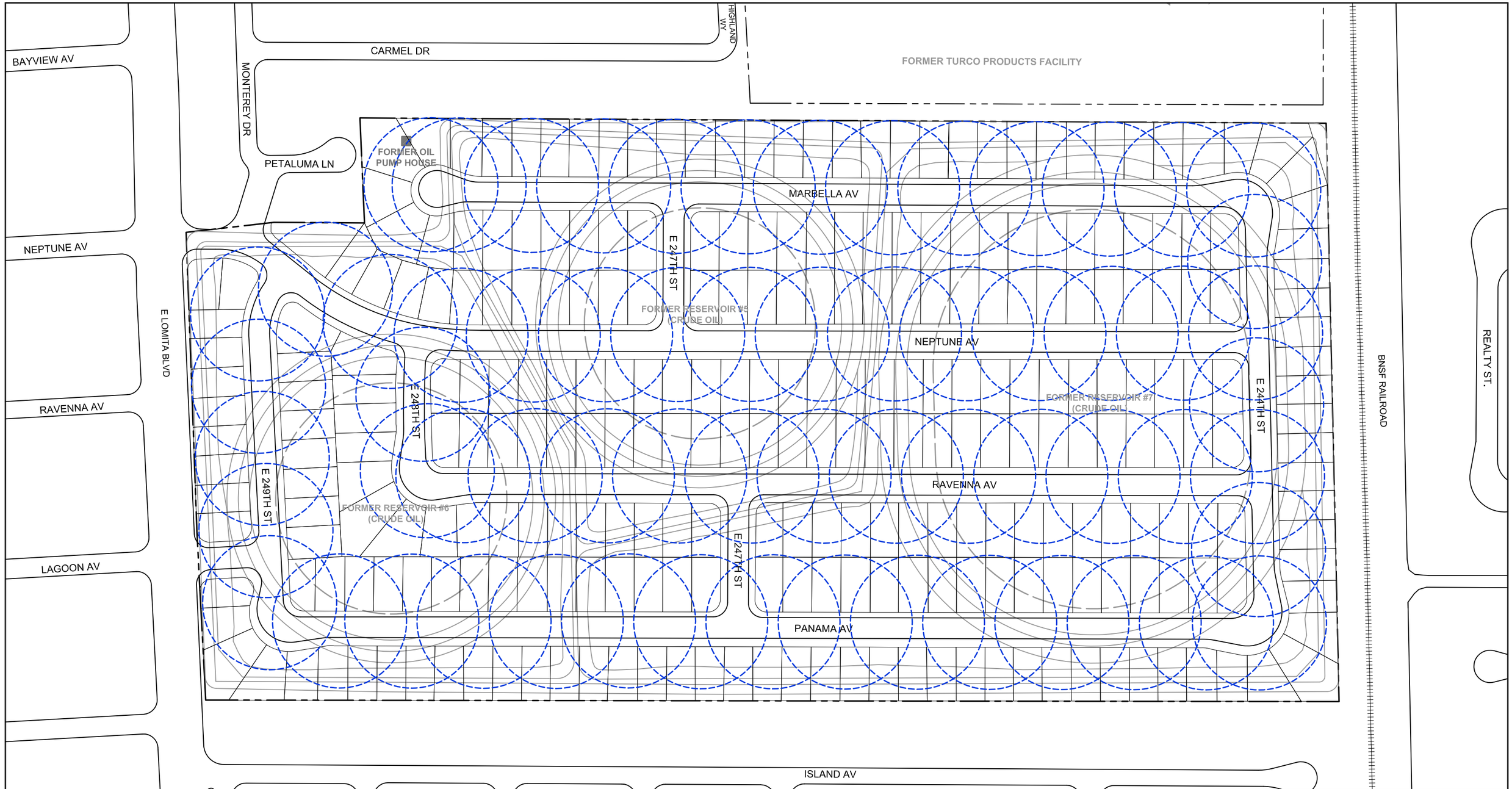
SCALE IN FEET

URS

CONCEPTUAL VAPOR EXTRACTION COVERAGE FOR THE INTERMEDIATE ZONE

Proj. No.:	49194119	Date:	JUNE 2014
Project:	FORMER KAST PROPERTY	Figure:	8-2

G:\1 Shell Products - Former Kast Property\RAP\SVE\Figure 8-2 Conceptual Vapor Extraction Coverage - Intermediate Zone.dwg , File date: 6/27/2014 4:29 PM, Print date: 6/27/2014 4:29 PM by: Sevilla, Vincent



EXPLANATION

APPROXIMATE PROPERTY LINE

CONCEPTUAL DEEP EXTRACTION WELL
RADIUS OF VACUUM INFLUENCE (116 FEET)
63 WELLS AT APPROXIMATELY125-FOOT SPACING

N

0 80 160

SCALE IN FEET

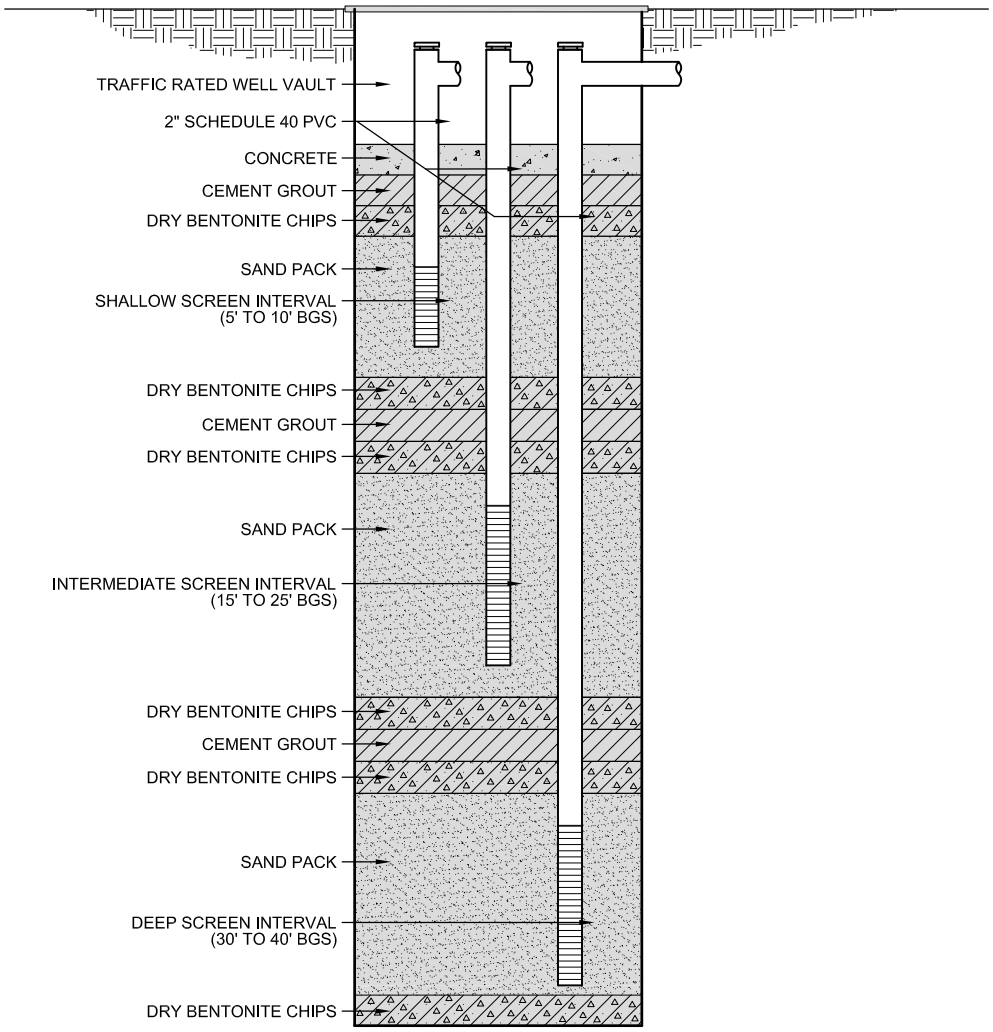
URS

CONCEPTUAL VAPOR EXTRACTION COVERAGE FOR THE DEEP ZONE

Proj. No.:	49194119	Date:	JUNE 2014
Project:	FORMER KAST PROPERTY	Figure:	8-3

G:\1 Shell Products - Former Kast Property\RAP\SVE\Figure 8-3 Conceptual Vapor Extraction Coverage - Deep Zone.dwg , File date: 6/27/2014 4:31 PM, Print date: 6/27/2014 4:31 PM by: Sevilla, Vincent

TRIPLE COMPLETION STREET SOIL VAPOR EXTRACTION WELL



BORING DIAMETER: 11 3/4"
TOTAL DEPTH (APPROXIMATE): 42' BGS

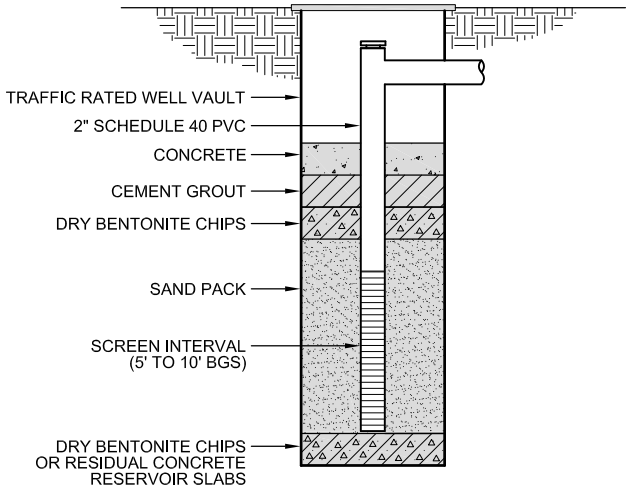
NOTES:
BGS = BELOW GROUND SURFACE
PVC = POLYVINYLCHLORIDE

URS

TYPICAL NESTED WELL CONSTRUCTION DETAIL

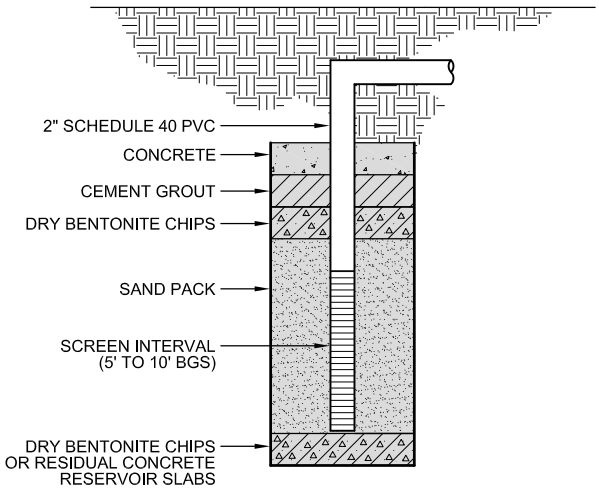
Proj. No.: 49194119	Date: JUNE 2014
Project: FORMER KAST PROPERTY	Figure: 8-4

SHALLOW STREET SOIL VAPOR EXTRACTION WELL



BORING DIAMETER: 6 3/4" MINIMUM
TOTAL DEPTH (APPROXIMATE): 11' BGS

SHALLOW RESIDENTIAL SOIL VAPOR EXTRACTION WELL



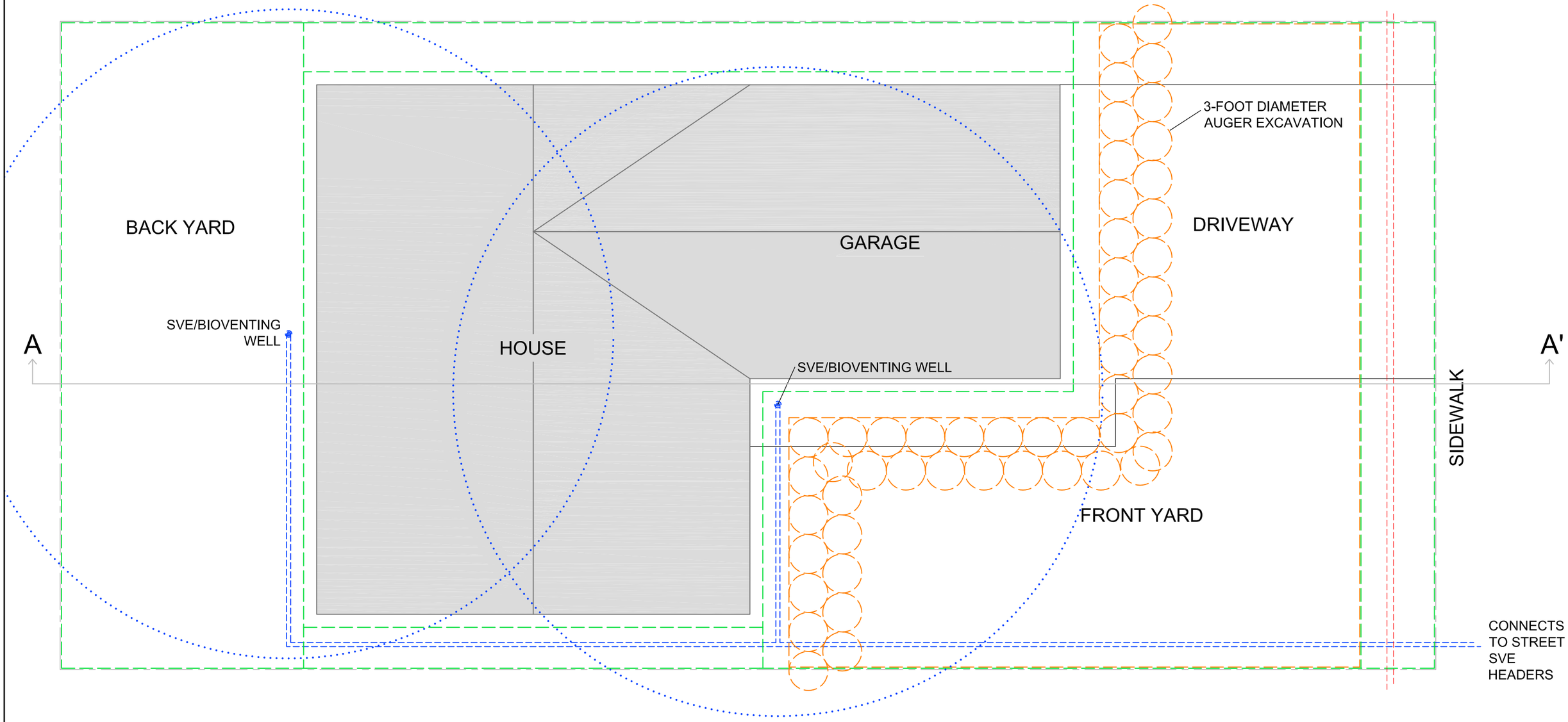
BORING DIAMETER: 6 3/4" MINIMUM
TOTAL DEPTH (APPROXIMATE): 11' BGS

NOTES:
BGS = BELOW GROUND SURFACE
PVC = POLYVINYLCHLORIDE

URS

TYPICAL SHALLOW WELL CONSTRUCTION DETAIL

Proj. No.: 49194119	Date: JUNE 2014
Project: FORMER KAST PROPERTY	Figure: 8-5



PLAN VIEW

0 5 10
SCALE IN FEET

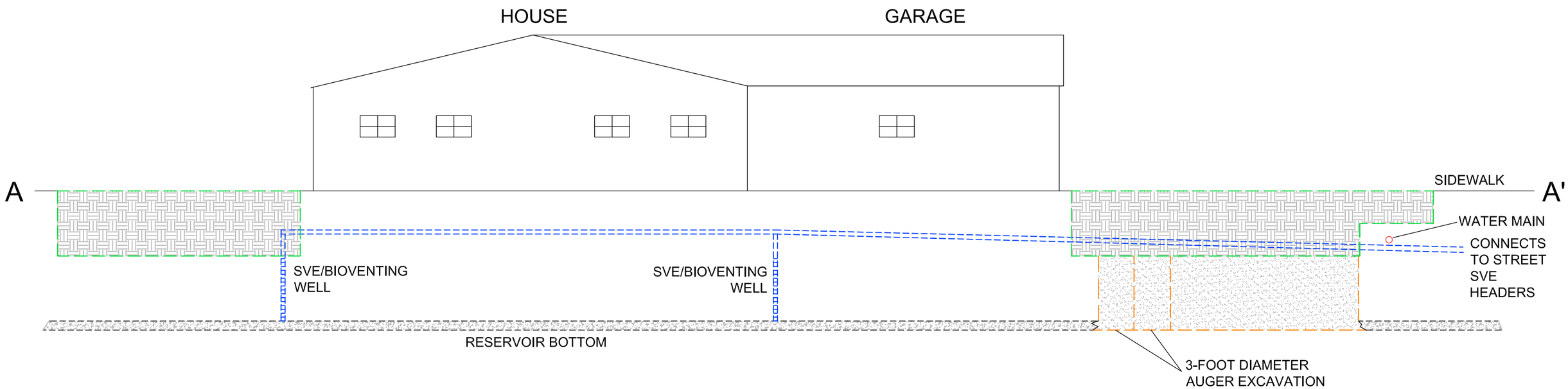
EXPLANATION

- APPROXIMATE PROPERTY LINE
- 5-FOOT EXCAVATION AREA
- 10-FOOT TARGETED EXCAVATION
- SOIL VAPOR EXTRACTION/BIOVENTING SYSTEM PIPING
- CONCEPTUAL RESIDENTIAL EXTRACTION WELL RADIUS OF INFLUENCE
- WATER MAIN

URS

CONCEPTUAL REMEDIATION AT A RESIDENCE - 5-FT EXCAVATION, 5 TO 10-FT TARGETED EXCAVATION, AND SVE/BIOVENTING PLAN VIEW

Proj. No.: 49194119	Date: JUNE 2014
Project: FORMER KAST PROPERTY	Figure: 8-6



A-A' CROSS SECTION VIEW

0 5 10
SCALE IN FEET

EXPLANATION

- 5-FOOT EXCAVATION
- 10-FOOT TARGETED EXCAVATION
- SOIL VAPOR EXTRACTION/BIOVENTING WELL AND SYSTEM PIPING (PIPING IS PROJECTED ONTO CROSS-SECTION FROM SIDE YARD LOCATION)
- SOIL BACKFILL
- SLURRY BACKFILL

URS

CONCEPTUAL REMEDIATION AT A RESIDENCE - 5-FT EXCAVATION, 5 TO 10-FT TARGETED EXCAVATION, AND SVE/BIOVENTING
A-A' CROSS-SECTION VIEW

Proj. No.: 49194119	Date: JUNE 2014
Project: FORMER KAST PROPERTY	Figure: 8-7

EXPLANATION

POTENTIAL OFF-SITE SVE LOCATION ALTERNATIVES

- A Former Turco Property
- B Business park at 24412 So. Main Street
- C Vacant land north of MTA/BNSF rail line

0 150 300
SCALE IN FEET

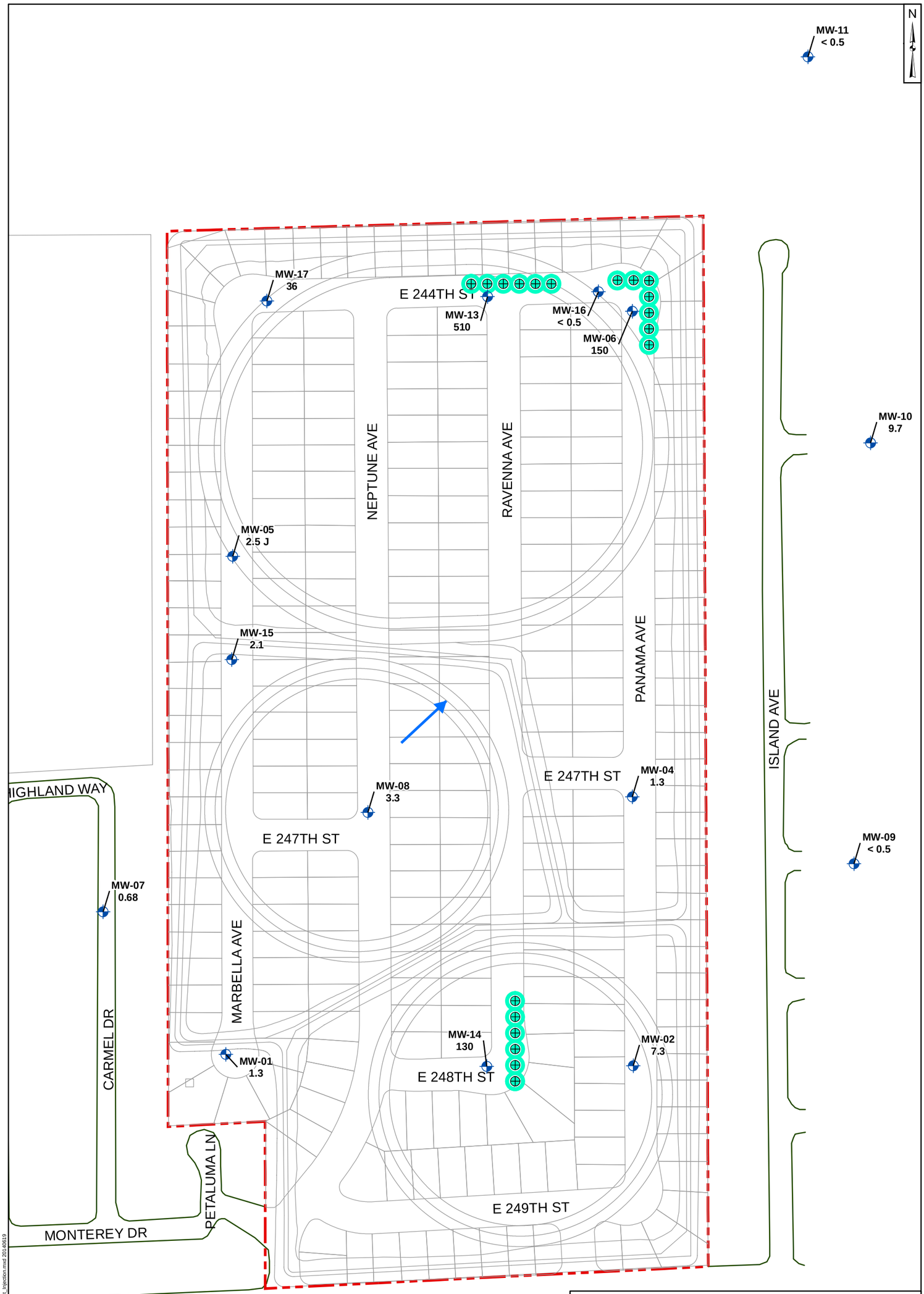
N

URS

POTENTIAL
SOIL VAPOR EXTRACTION TREATMENT
SYSTEM LOCATIONS

Proj. No.:	49194119	Date:	JUNE 2014
Project:	FORMER KAST PROPERTY	Figure:	8-8

G:\1 Shell Products - Former Kast Property\RAP\SVE\Figure 8-8 Potential SVE System Locations.dwg , File date: 6/30/2014 1:36 PM , Print date: 6/30/2014 1:37 PM by: Sevilla, Vincent



Legend

- Monitoring Well
- Oxygen Release Compound Injection Well
- 15ft Radial Zone of Influence for Oxygen Release Compound Injection Well
- Approximate Groundwater Flow Direction
- Site Boundary

MW-08 Monitoring well designation
33 Benzene concentration in micrograms per liter (µg/l) collected in April 2014
< : Less than reporting limit
J : Estimated value

175 87.5 0 175 Feet

In-Situ Groundwater Remedy Preliminary Design, Oxidant Injection

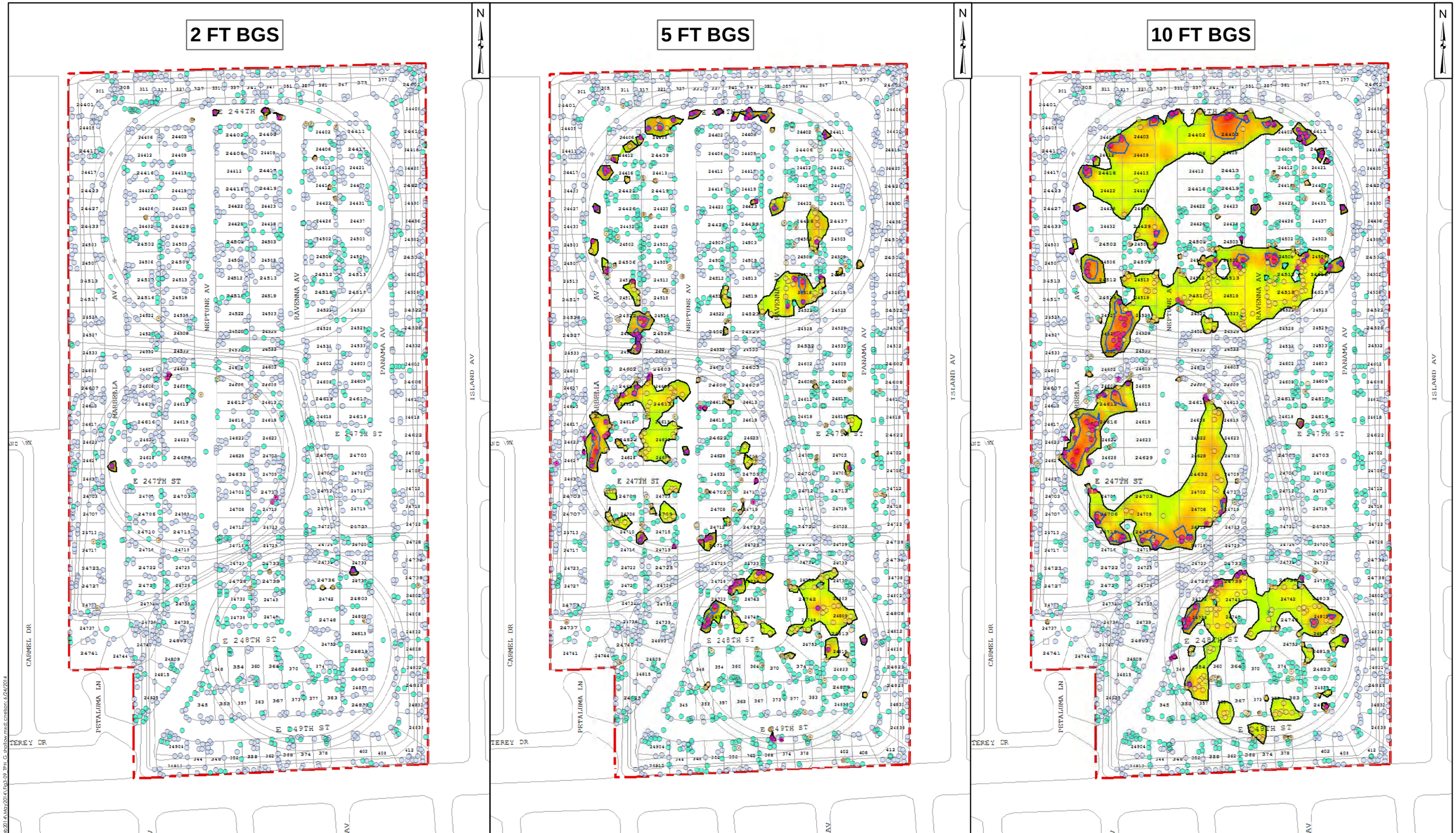
Former Kast Property

Geosyntec consultants

Santa Barbara | June 2014

Figure **8-9**

P:\GIS\KastProjects\2014-06 FS\Fig5-1_FS_InSitu_GW_Remedy_Prelim_Design_Oxidant_Injection.mxd 2014/06/19



TPH as Gasoline

- Non-Detect (ND)
- < 117 mg/kg
- >= 117 to 1,170 mg/kg
- > 1,170 mg/kg

Contour

- 117 mg/kg
- 1,170 mg/kg

TPH as Gasoline in Soil: 1,000 mg/kg; 100 mg/kg; 10 mg/kg; 1 mg/kg; 0.1 mg/kg; 0.02 mg/kg

Note: Contours created in Mining Visualization System (MVS) using Franke/Nielson Inverse Distance Weighting (IDW) interpolation

250 125 0 250 Feet

Geosyntec consultants

Santa Barbara, CA

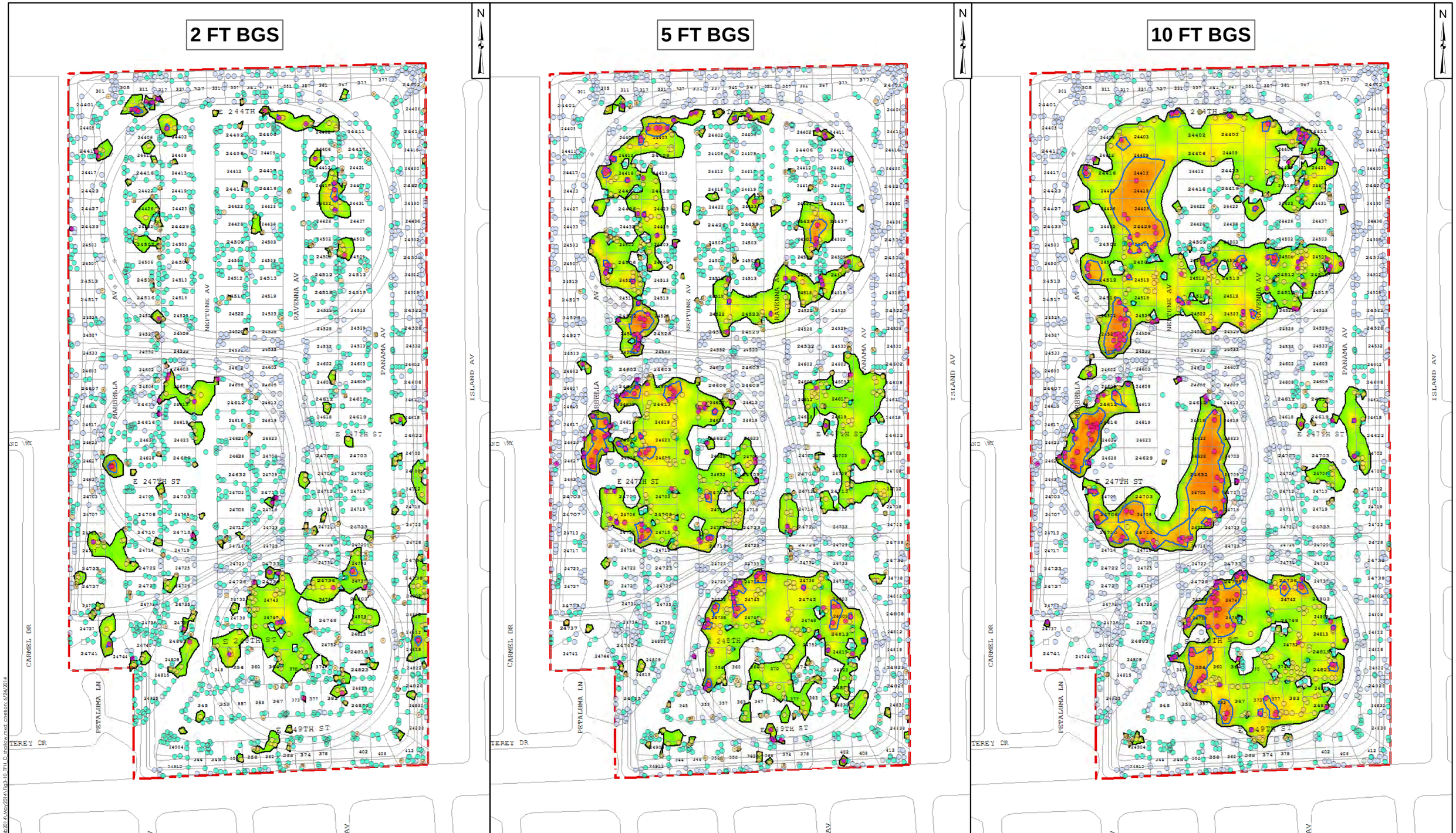
24-Jun-2014

Contours Showing TPHg Distribution in Soil

Former Kast Property

Figure **3-9**

N:\KAST\GIS\KAST\GIS\MXD\Feb2014\Feb09 TPH G-shallow.mxd; cnelson; 6/24/2014



TPH as Diesel
- Non-Detect (ND)
- < 625 mg/kg
- >= 625 to 6,250 mg/kg
- > 6,250 mg/kg

Contour
- 625 mg/kg
- 6,250 mg/kg

TPH as Diesel in Soil
- 10,000 mg/kg
- 1,000 mg/kg
- 100 mg/kg
- 10 mg/kg
- 1 mg/kg

Note: Contours created in Mining Visualization System (MVS) using Franke/Nielson Inverse Distance Weighting (IDW) interpolation

250 125 0 250 Feet

Geosyntec consultants

Santa Barbara, CA

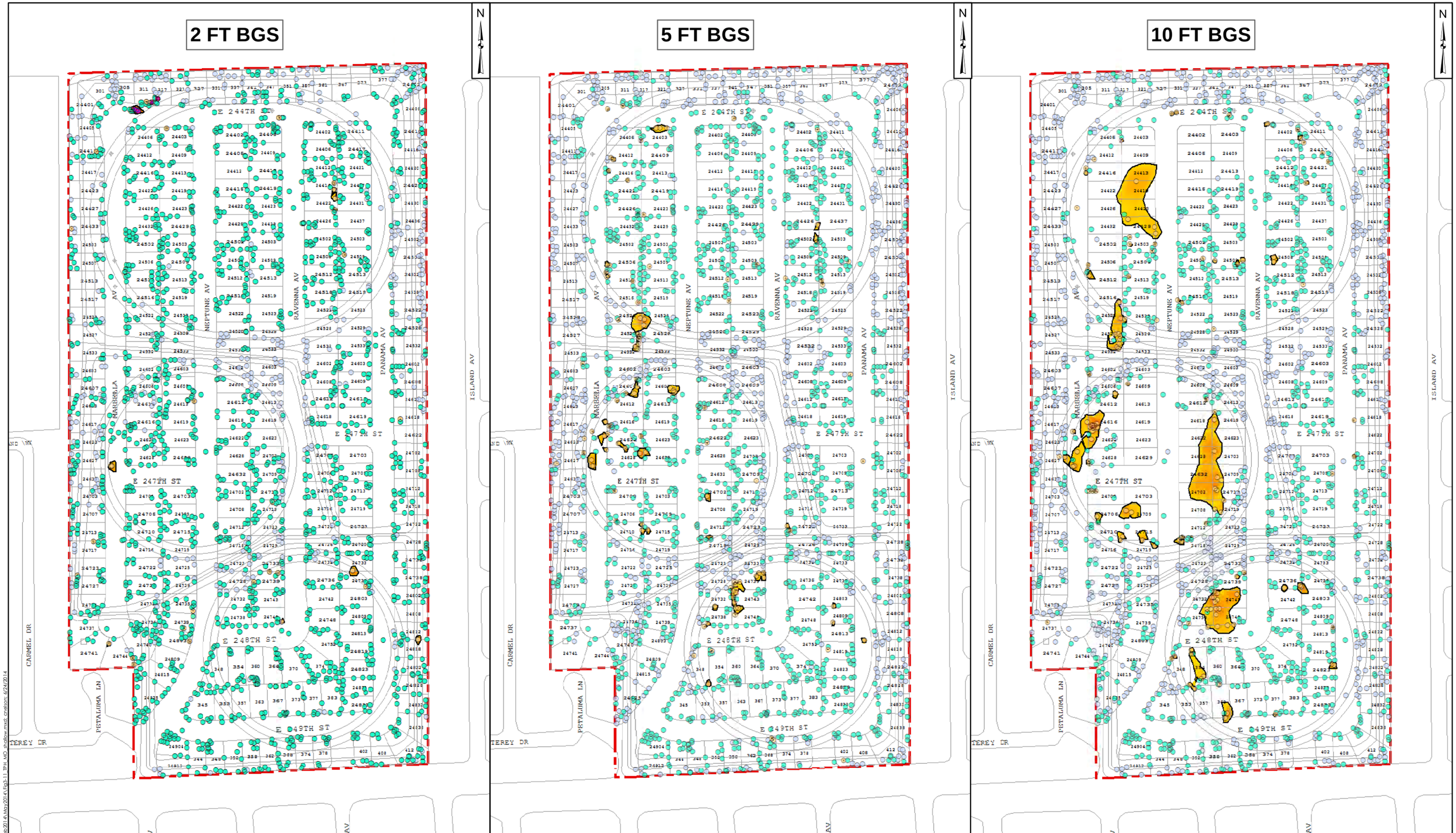
24-Jun-2014

Contours Showing TPHd Distribution in Soil

Former Kast Property

Figure **3-10**

N:\KAST\GIS\KAST\GIS\MXD\Feb2014\May2014\Fig3-10_TPH_D_shallow.mxd creation: 6/24/2014



TPH as Moter Oil

- Non-Detect (ND)
- < 10,000 mg/kg
- >= 10,000 to 50,000 mg/kg
- > 50,000 mg/kg

Contour

- 10,000 mg/kg
- 50,000 mg/kg

TPH as Motor Oil in Soil
100,000 mg/kg
10,000 mg/kg
1,000 mg/kg
100 mg/kg
10 mg/kg
3 mg/kg

Note: Contours created in Mining Visualization System (MVS) using Franke/Nielson Inverse Distance Weighting (IDW) interpolation

250 125 0 250 Feet

Geosyntec consultants

Santa Barbara, CA

24-Jun-2014

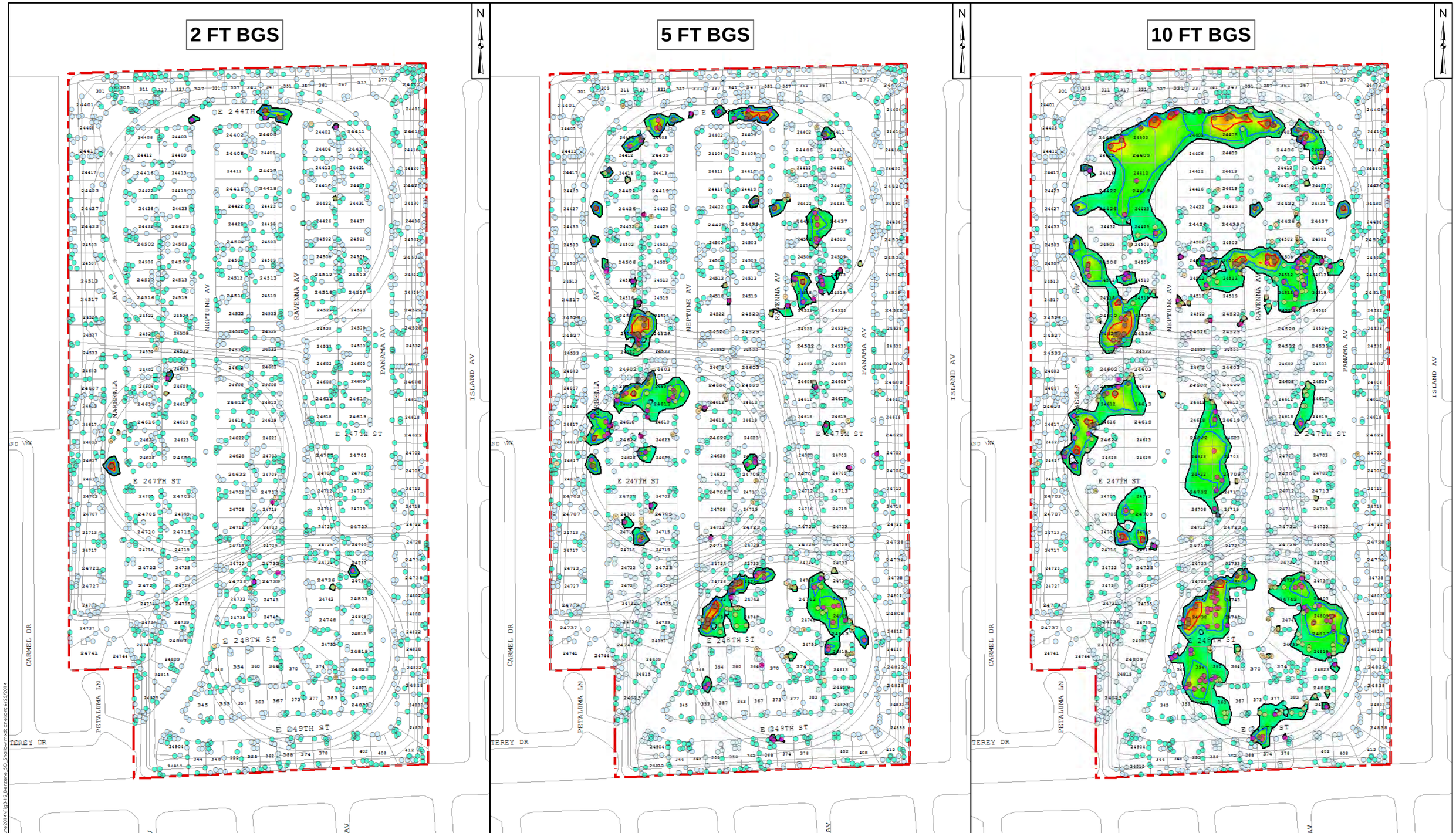
Contours Showing TPHmo Distribution in Soil

Former Kast Property

Figure

3-11

N:\KAST\GIS\KAST\GIS\MXD\Feb2014\May2014\Fig3-11_TPH_MO_shallow_multi_contours_6/24/2014



Benzene
- Non-Detect (ND)
- < 0.021 mg/kg
- >= 0.021 to 0.21 mg/kg
- >= 0.21 to 2.1 mg/kg
- > 2.1 mg/kg

Contour
- 0.021 mg/kg
- 0.21 mg/kg
- 2.1 mg/kg

Benzene in Soil
10 mg/kg
1 mg/kg
0.1 mg/kg
0.01 mg/kg
0.001 mg/kg

250 125 0 250 Feet

Note: Contours created in Mining Visualization System (MVS) using Franke/Nielson Inverse Distance Weighting (IDW) interpolation

Geosyntec consultants

Santa Barbara, CA

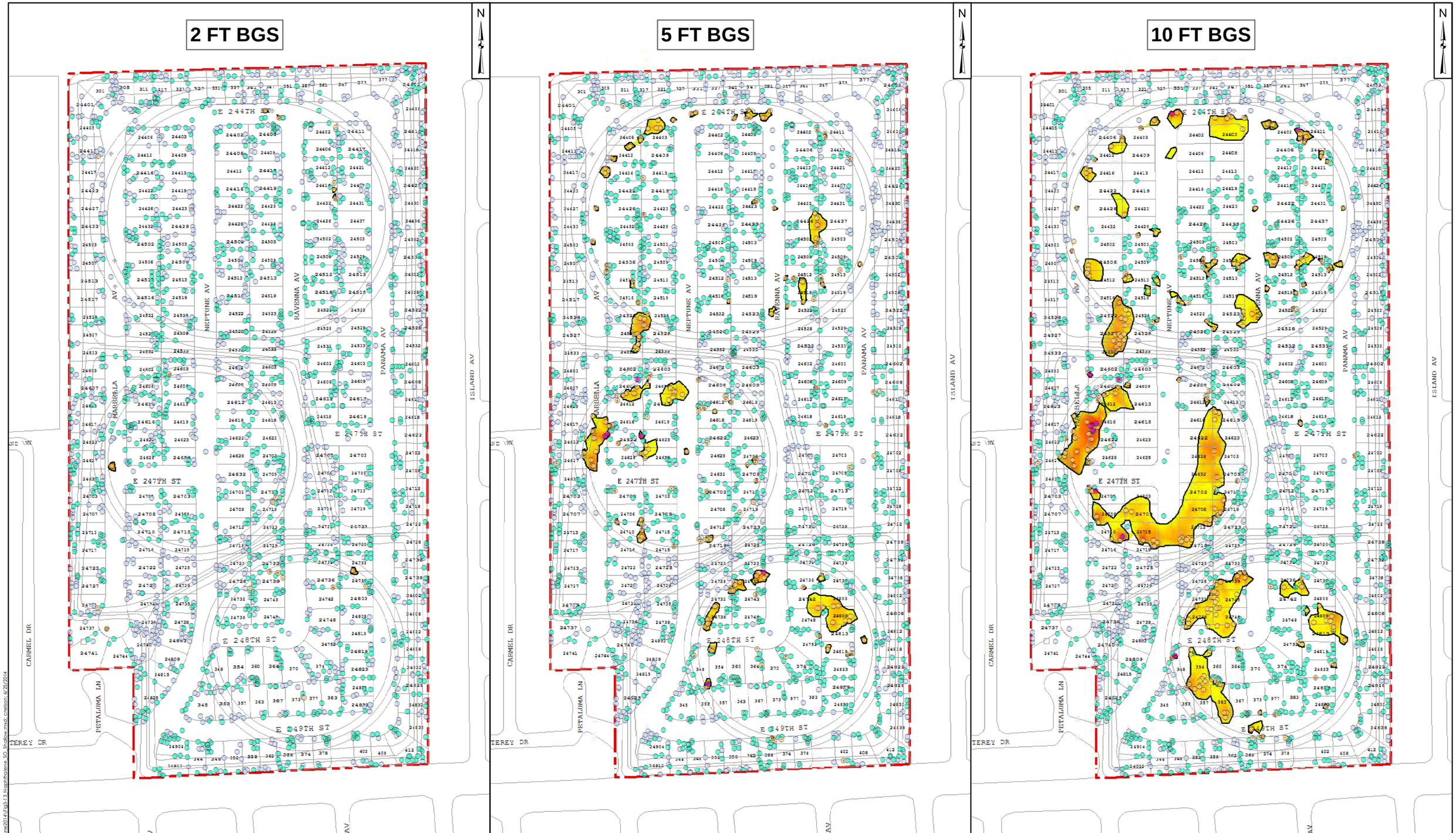
25-Jun-2014

Contours Showing Benzene Distribution in Soil

Former Kast Property

Figure **3-12**

N:\KAST\GIS\KAST\GIS\MXD\June2014\Fig3-12 Benzene-SO_Shallowest.mxd: cnelson: 6/25/2014



Naphthalene
- Non-Detect (ND)
- < 4.0 mg/kg *
- >= 4.0 to 40 mg/kg
- >= 40 to 400 mg/kg
- > 400 mg/kg

Contour
- 4.0 mg/kg *
- 40 mg/kg
- 400 mg/kg

Naphthalene in Soil: 10 mg/kg, 1 mg/kg, 0.1 mg/kg, 0.01 mg/kg, 0.001 mg/kg

250 125 0 250 Feet

Note: Contours created in Mining Visualization System (MVS) using Franke/Nielson Inverse Distance Weighting (IDW) interpolation
* - 4.0 mg/kg is the human health based SSCG

Geosyntec consultants

Santa Barbara, CA

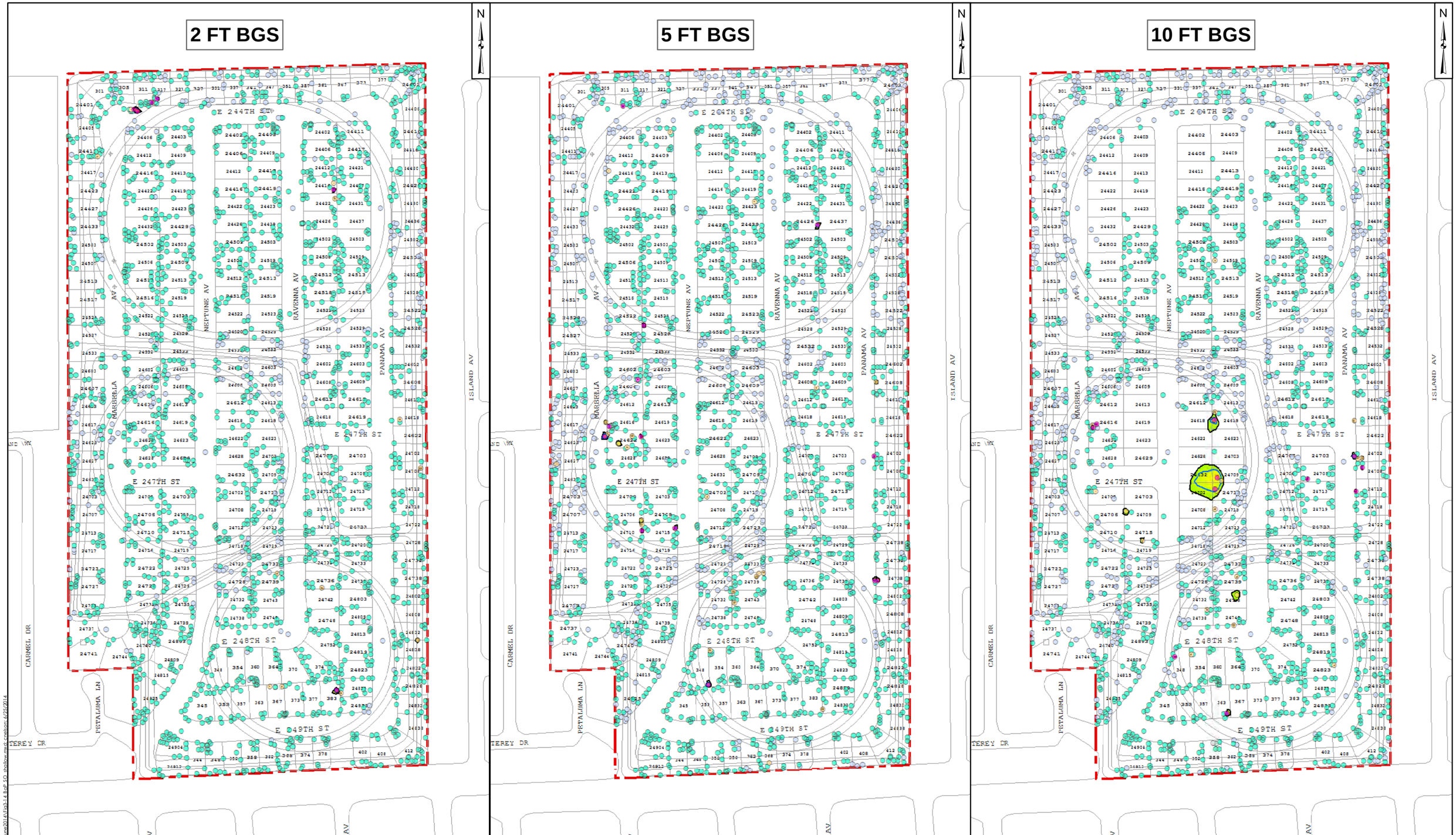
25-Jun-2014

Contours Showing Naphthalene Distribution in Soil

Former Kast Property

Figure **3-13**

N:\KAST\GIS\KAST\GIS\MXD\ June2014\Fig3-13 Naphthalene_SO_Shallow.mxd: creation: 4/25/2014



Benzo(a)pyrene-equivalent Contour

- Non-Detect (ND)
- < 0.9 mg/kg
- >= 0.9 to 1.6 mg/kg
- > 1.6 mg/kg
- 0.9 mg/kg
- 1.6 mg/kg

Benzo(a)pyrene-equivalent in Soil: 10 mg/kg, 1 mg/kg, 0.1 mg/kg, 0.01 mg/kg, 0.001 mg/kg

250 125 0 250 Feet

Note: Contours created in Mining Visualization System (MVS) using Franke/Nielson Inverse Distance Weighting (IDW) interpolation

Geosyntec consultants

Santa Barbara, CA

25-Jun-2014

Contours Showing Benzo(a)pyrene-Equivalents Distribution in Soil

Former Kast Property

Figure **3-14**

APPENDIX A

CROSS-REFERENCE TABLE OF REGIONAL BOARD REQUIREMENTS ADDRESSED IN THE REVISED HHRA, FS, AND RAP

CROSS-REFERENCE TABLE OF REGIONAL BOARD REQUIREMENTS ADDRESSED IN THE REVISED HHRA, FS, AND RAP

Former Kast Property

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
RWQCB, Review of Remedial Action Plan, Feasibility Study Report and Human Health Risk Assessment Report Pursuant to California Water Code Section 13304 Order. Letter to Shell Oil Products US dated April 30, 2014.				
RWQCB-1	Page 2 First Paragraph Page 3 Second Paragraph	*This letter also directs Shell to revise the RAP, FS, and HHRA consistent with comments from OEHHA and the UCLA Expert Panel.*	The RAP, FS, and HHRA have been revised in accordance with the comments from RWQCB, OEHHA, and the UCLA Expert Panel. The documents are submitted separately, but concurrently. This Response to Comments (RTC) table lists each comment received from RWQCB, OEHHA, and the UCLA Expert Panel as well as where the comment is addressed or how it was evaluated (which document and which section).	Revised RAP Revised FS Revised HHRA
RWQCB-2	Page 6 List Item 2	*Soil vapor extraction (SVE) and bio venting will be implemented to reduce waste concentrations in soil and soil vapor at residential properties which have been identified having soil or soil vapor that exceed SSCGs at depths below three feet bgs. SVE and biovent wells will be installed in City streets and private yards to implement these technologies.*	SVE/bioventing is proposed as part of the selected Site remedy described in the Revised RAP. SVE/bioventing is proposed to address COCs in Site soils and soil vapor not addressed by the proposed excavation to 5 feet and locally bgs from 5 to 10 feet bgs.	Revised FS, Sections 5,6,7, and 8 Revised RAP Section 8
RWQCB-3	Page 8 First Paragraph	*The RAP is based, in part, on SSCGs that were not approved by the Regional Board, and consequently the RAP will not achieve the approved SSCGs and cleanup objectives.*	The Revised HHRA, Revised FS and Revised RAP have been revised to use the Regional Board approved SSCGs provided in their January 23, 2014 letter and as corrected in their May 29, 2014 correspondence.	Revised HHRA Revised FS Revised RAP
RWQCB-4	Page 8	*…the Regional Board does not concur that the proposed RAP has a substantial*	The Revised RAP describes a proposed remedy expected to meet the approved RAOs and SSCGs	Revised FS, Section 6.2.2.4

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
	First Paragraph	*likelihood to achieve compliance with approved SSCGs within a reasonable time frame, nor meet the cleanup goals and objectives that implement the applicable Water Quality Control Plans and Policies in a reasonable time frame…*	in a reasonable time frame. The proposed excavation of shallow soils will result in protection of human health as well as mass removal of COCs over the relatively short term (approximately 5 years). Deeper impacts which do not impact human health and impacts in un-excavated areas will be addressed over a longer term (approximately 30-40 years) through SVE/bioventing for soil/soil vapor. Groundwater impacts will be addressed over the long term through MNA. A contingent remedial measure of oxidant injection for groundwater is also included in the RAP should monitoring data indicate additional actions are necessary based on an increasing plume.	Revised RAP, Section 8.
RWQCB-5	Page 8 Site-Specific Cleanup Goals Numbered Paragraph 1	*In developing the RAP, Shell used generic guidance from the Regional Board's Underground Storage Tank (UST) program to define SSCGs for TPH in soil (Interim Site Assessment and Cleanup Guidebook, May, 1996). However, there are Site specific data available that indicate the generic UST cleanup goals are not sufficient to reduce the leaching potential of waste from soil to groundwater at the Site. SSCGs for TPH in soil based on Site specific soil characteristics were calculated in the Revised SSCG Report and approved by the Regional Board, however, these approved SSCGs were not used to develop the RAP.*	In the March 10, 2014 HHRA, Shell proposed modifications to certain of the soil SSCGs for total petroleum hydrocarbons (TPH) to protect groundwater based on the Regional Board's 1996 Interim Site Assessment & Cleanup Guidebook (RWQCB, 1996a). However, the RWQCB comments directed Shell to use the TPH SSCGs included in their January 23, 2014 letter. The Revised HHRA, Revised FS, and Revised RAP use the latest SSCGs approved by the RWQCB as corrected in their May 29, 2014 correspondence.	Revised HHRA Revised FS Revised RAP

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
		Consequently, the generic cleanup goals proposed in the RAP are not appropriate for the Site. The RAP also inappropriately applied a dilution/attenuation factor to the UST program cleanup goals and proposed less stringent SSCGs than are needed to reduce the leaching potential of TPH from soil to groundwater. The dilution / attenuation factor used by Shell to set a less stringent SSCG for TPH in soil was not approved by the Regional Board in the January 23, 2014 letter. The January 23, 2014 letter amended the CAO, approved appropriate SSCGs, and directed Shell to use the approved SSCGs in the development of the RAP. However, the RAP is not based on the SSCGs that are approved by the Regional Board. The Regional Board cannot concur that the SSCGs used to develop the RAP will attain SSCGs necessary to protect groundwater quality.		
RWQCB-6	Page 8 Site-Specific Cleanup Goals Numbered Paragraph 2	*Sub-slab mitigation is necessary because the proposed remedy does not include removal of waste beneath houses at the Site.*	The revised HHRA includes a vapor intrusion evaluation using a sub-slab to soil vapor attenuation factor from which 27 properties were identified for vapor mitigation based on RAO exceedance for potential vapor intrusion and one property was identified based on methane. While the data collected at the Site do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the	RAP Section 8.3

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
			homeowners in the Carousel neighborhood to alleviate concerns about potential impact to their indoor air from the Site. Additionally, impacts in un-excavated areas will be addressed over a longer term (approximately 30-40 years) through SVE/bioventing for soil/soil vapor.	
RWQCB-7	Page 9 Site-Specific Cleanup Goals Numbered Paragraph 2	*The attenuation factor approved in the Regional Board's January 23, 2014 letter addressed development of SSCGs for soil vapor in shallow soil, not SSCGs in sub-slab soil vapor. By using non-approved SSCGs for sub-slab soil vapor and failing to develop a SSCG for soil vapor in shallow soil, the RAP may underestimate the number of houses that need sub-slab mitigation measures to reduce the potential for vapor intrusion. This issue was discussed in the Regional Board's January 23, 2014 letter and the UCLA Expert Panel Report attached to the Regional Board's January 23, 2013 letter.*	The Revised SSCG Report presented a single set of soil vapor SSGCs for the site for the vapor intrusion pathway, encompassing sub-slab soil vapor and soil vapor. Section 7.1.1.5 of the Revised SSCG Report states that values listed in Table 7-2 (which are repeated in Table 9-3 of the Revised SSCG Report) are the SSCGs for sub-slab soil vapor at the Site. If the attenuation factor of 0.002 referenced by the Regional Board in the January 23, 2014 letter was not intended to be applied to these sub-slab soil vapor cleanup goals, then it is not clear that the Regional Board made any comment on the sub-slab to soil vapor SSCGs. It should be noted that the values presented in Table 2 in the Regional Board's January 23, 2014 letter are the sub-slab soil vapor cleanup goals proposed by Shell but adjusted to reflect the attenuation factor of 0.002 rather than the attenuation factor of 0.001 used in the Revised SSCG Report. The Regional Board soil vapor SSCGs were then applied to the sub-slab soil vapor data in the risk assessment as this is considered the most robust and relevant dataset to	Revised HHRA, Appendix D Revised RAP, Section 8.3

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
			evaluate potential vapor intrusion at this site. An updated assessment of the sub-slab soil vapor to indoor air attenuation factor is presented in Appendix D of the HHRA. This updated assessment demonstrates that an attenuation factor of 0.002 is a conservative upper-bound value based on evaluation of the empirical data (i.e., sub-slab and indoor air concentration measurements) collected at the Site. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impact to their indoor air from the Site.	
RWQCB-8	Page 9 Site-Specific Cleanup Goals Numbered Paragraph 2	*The Regional Board's January 23, 2013 letter required Shell to consider the results in the Site Delineation Reports (Plume Delineation Report, URS, September 29, 2010; and Supplemental Site Delineation Report, URS, May 27, 2011) and in the property-by-property investigations in developing the RAP. However, the RAP considered only the results of the property-by-property investigations, and did not consider the Site Delineation Reports.*	The Regional Board's January 23, 2014 letter to Shell states (at page 9) that "Shell shall consider (emphasis added) the results in the Site Delineation Report soil concentrations contours and the results of the property-by-property investigations in developing the RAP." (Shell assumes the Regional Board is referring to the Plume Delineation Report.) This comment was discussed with the Regional Board during the January 24, 2014 meeting. Shell requested clarification from the Regional Board on what they were referring to with respect to the Site Delineation Report and soil concentration	Revised RAP Section 3.3.1 and Figures 3-3 through 3-17

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
			contours and the word "consider" was emphasized by the Regional Board staff at that time. These data sets were clearly considered and the soil vapor extraction/bioventing system was included in the RAP to address the distribution of petroleum hydrocarbons identified in the Plume Delineation Report, soil concentrations contours, and the results of the property-by-property investigations. Moreover, the following data sets were expressly considered in the HHRA, FS and RAP submitted on March 10, 2014: • Analytical results presented in the Plume Delineation Report as well as data collected from area-wide and residential property investigations. • Soil and soil vapor concentration contour maps were updated with more recent data, and included the updated contour maps in Appendix B of the March 10, 2014 RAP. • Analytical results from the property-by-property investigations were included in tables and figures included the March 10, 2014 HHRA and RAP. The data identified in the Regional Board's January 23, 2014 letter to Shell were considered in the preparation of the March 10, 2014 RAP. The following tables and figures in the RAP	

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
			show where these factors were considered: • HHRA Tables 1a through 3 • HHRA Appendix E • RAP Figures 3-3 through 3-14 • RAP Appendix B Figures showing the updated contour plots in soil and soil vapor have been created and are provided on Figures 3-9 through 3-17 in the Revised RAP. Due to the interpolation inherent in the software used to extrapolate between data points to generate the contours, these maps are not necessarily representative of the actual distribution of impacts. Also, it should be noted that these maps interpolate data from known sample points to areas where no sampling has been conducted and therefore show the presence of impacts based on extrapolation where there are not data to confirm whether impacts actually exist. In the Revised FS a version of the EVS software, Mining Visualization Software (MVS), was used to interpolate TPH concentrations throughout the Site by kriging. These interpolated concentrations and contours were used to identify residences where residential SVE/bioventing wells are proposed and to identify properties for targeted deeper excavation.	

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
RWQCB-9	Page 9 Excavation First Paragraph	*The RAP proposes to excavate impacted soil from areas around houses that contain waste that exceeds SSCGs for TPH and other COCs in soil to a depth of three feet bgs. The Regional Board has several concerns with the excavation proposed by the RAP and FS (discussed further below) pertaining to the proposed excavation depth. Excavations to three feet bgs may not be sufficient to address nuisance caused by waste at the Site, may not protect residents from exposure to waste during some types of residential activities, and will leave a considerable mass of waste in Site soil that can continue to leach to groundwater. The waste mass in soil below three feet bgs will result in an unreasonable time frame needed for other components of the RAP such as SVE, bioventing, and MNA to achieve the SSCGs.*	Based on analyses presented in the FS and Revised FS, Shell believes that Alternative 4B (excavation around houses exceeding SSCGs to 3 feet) effectively balances the concerns identified by the RWQCB. The analysis in the Revised FS Report shows that the incremental benefit of deeper excavation beyond that proposed in Alternative 4B (3 feet excavation) must be viewed in the context of the additional duration, impacts, and nuisance to the community. Shell recognizes the lingering concerns of RWQCB that alternatives that excavate to a deeper depth may be marginally more protective in the event of inadvertent residential excavation without seeking a City permit. Therefore, in response to the RWQCB's comments and in the interest of State Acceptance, Alternative 4B (excavation to 3 feet) will not be recommended as the preferred alternative. Instead, the Revised FS recommends Alternative 4D which includes excavation around houses exceeding soil RAOs to 5 feet, with targeted excavation locally to 10 feet to remove additional hydrocarbon mass. The Revised RAP describes a proposed remedy expected to meet the approved RAOs and SSCGs in a reasonable time frame. The proposed excavation of shallow soils will result in protection of human health as well as mass	Revised FS Section 6.3.3. Section 7 Section 8 Revised RAP Section 8

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
			removal of COCs over the relatively short term (approximately 5 years). Deeper soil impacts which do not impact human health will be addressed over a longer term (approximately 30-40 years) through SVE/bioventing for soil/soil vapor. SVE/bioventing will relatively quickly remove the volatile and most leachable TPH and VOC fractions from the vadose zone over the entire Site. Groundwater impacts will be addressed over the long term through MNA. A contingent remedial measure of oxidant injection for groundwater is also included in the RAP should monitoring data indicate additional actions are necessary.	
RWQCB-10	Page 9 Excavation Numbered Paragraph 1	*The Site investigation characterized soil from samples taken at depths of two feet, five feet and ten feet bgs. Waste was detected at all depths investigated and Site data show that the waste concentration, and thus waste mass, increases significantly with depth. Consequently, the proposed RAP excavation depth to three feet leaves significant quantities of waste in soil at levels that exceed the SSCGs necessary to reduce the leaching of waste from soil to groundwater.*	The Revised FS contains an analysis of the distribution of TPH mass at the Site, as well as an analysis of the TPH mass to be removed under the various excavation scenarios. Approximately 75% of the TPH mass at the Site resides in the 10-50 foot range. Thus, any excavation scenario in the upper 10 feet of the Site will leave substantial mass in place. However, the deeper mass, along with mass not subject to excavation in the upper 10 feet is generally not a source of direct contact risk to human receptors and will be remediated through SVE/bioventing. SVE/bioventing is expected to relatively quickly remove the most leachable fraction of TPH and other VOCs.	Revised FS Section 5.2.3. Revised RAP Section 8

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
			Again, the Revised RAP proposes excavation around houses exceeding SSCGs to 5 feet, with targeted excavation locally to 10 feet to remove additional hydrocarbon mass. SVE/bioventing will relatively quickly remove the most leachable TPH and VOC fractions from the entire Site.	
RWQCB-11	Page 9 Excavation Numbered Paragraph 2	*The RAP relies on SVE, bioventing, free-product removal, and monitored natural attenuation (MNA) to reduce the waste in soil that will not be removed by excavation. However, these technologies have not been proven effective in reducing waste concentrations at the Site in a reasonable time frame as required by Resolution 92-49. The bioventing pilot test (Biovent Pilot Test Summary Report, Geosyntec, December 6, 2012) indicated, for example, that time frames of greater than 80 years may be required to reduce waste concentrations to attain the SSCGs for soil. The RAP estimates of SVE duration are based on the time necessary to vent a specific number of soil pore volumes. The basis for the SVE time frame estimates may not be accurate because the mass of sorbed COCs to the Site soils may continue to volatilize into the soil pores as they are vented. Based on information provided in the RAP, the Regional Board cannot concur that SVE and bioventing will attain SSCGs in a*	The remedy described in the Revised RAP proposes SVE/bioventing to reduce COCs in soil not removed by excavation. SVE/bioventing will relatively quickly remove the most leachable TPH and VOC fractions from the entire Site. It is inappropriate to reference the bioventing time frame presented in the Bioventing Pilot Test Summary Report to estimate the time frame for the SVE/bioventing system, because the Bioventing Pilot Test was based on using small fans to introduce oxygen to the subsurface and not the robust SVE/bioventing system that is proposed. The application of both of these technologies together will reduce the time frame based on bioventing alone. Additional details regarding the estimated time frame for the SVE/bioventing system to achieve the RAOs have been included in the Revised FS and Revised RAP.	Revised FS, Section 6.2.2.4 Revised RAP, Section 8.2

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
		reasonable time frame.		
RWQCB-12	Page 10 Excavation Numbered Paragraph 3	*The RAP indicates that excavation of residential properties to three feet bgs would effectively limit exposure to residents who may engage in gardening or construction of residential yard features that require digging because there are existing institutional controls through the City of Carson building codes. However, the institutional controls cited by the RAP may not be effective in limiting residential exposure to waste because the institutional controls may not apply to excavations that generate small volumes of soil that are typical of residential activities.*	Institutional controls already are in place for excavations 3 feet or deeper at the Site. The City of Carson Building Code Section 8105, which amends the L.A. County Building Code Section 7003.1, is an existing institutional control that would limit, through permitting processes, contact with impacted soils beneath a depth of 3 feet. This existing institutional control supports any soil excavation remedy to depths ≥ 3 feet. Because of this code provision, the City must be notified and approve excavations deeper than 3 feet. The City could readily inform residents and workers of other appropriate precautions necessary for excavations below 3 feet through existing administrative processes, and also notify Shell that monitoring and disposal may be required. Shell would coordinate with the City of Carson to establish a process through existing building and grading permit reviews, General Plan overlay or footnote, area plan, or similar process, to ensure that if a property owner were to conduct activities involving excavations greater than 3 feet deep (such as building renovation, installation of a pool or deeper landscape alterations), Shell would be notified so that the company could arrange for sampling and proper handling of impacted soils. Based upon the above analysis, Shell believes excavation to 3 feet is protective of a resident's	Revised FS Section 6.3.3.1 Revised RAP Section 8.1

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
			potential exposure to soils with COCs. Nevertheless, Shell proposes excavation around houses exceeding soil RAOs to 5 feet, with targeted excavation locally to 10 feet to remove additional mass. Furthermore, as previously described by the Expert Panel (Newfields, 2014), USEPA (2003) has indicated that "Twenty-four (24) inches of clean soil cover is generally considered to be adequate for gardening areas…". Thus, the potential for a resident to contact soils below 3 feet is low.	
RWQCB-13	Page 10 SVE/Bioventing, LNAPL Removal and Monitored Natural Attenuation Numbered Paragraph 1	*Pilot tests of SVE and bioventing indicated that more than 80 years may be necessary to reduce waste concentrations to a level at which leaching to the groundwater will be reduced in order to attain the SSCGs for groundwater in a reasonable time frame.*	The RWQCB estimate is based on the results of the bioventing pilot test but did not consider the additional impact of the proposed SVE on the remediation time frame. SVE will relatively quickly remediate the more volatile fractions of TPH; thus bioventing will target a smaller mass of residual TPH. This will shorten the time frame for the SVE/bioventing system to achieve RAOs. The remedy described in the Revised RAP proposes SVE/bioventing to reduce COCs in soil not removed by excavation. SVE/bioventing will relatively quickly remove the volatile and most leachable TPH and VOC fractions from the vadose zone over the entire Site. Shell's assessment of joint operation of SVE and bioventing leads to a conclusion that the time frame to achieve remedial goals in Site soils	Revised FS Section 6.2.2.4 Revised RAP Sections 8.2 and 8.4

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
			will be approximately to 30 to 40 years. With respect to groundwater, analysis of data indicates the benzene plume is stable or decreasing, and is currently close to or below MCLs near the downgradient property boundary. Modeling predicts that benzene will meet MCLs in Site groundwater within approximately 70 years using MNA assuming source reductions proposed in the RAP and that agencies are successful in stopping off-Site migration of COCs onto the Site. MNA could be paired with contingency groundwater remediation of oxidant injection in areas where Site-related COCs exceed 100x MCL if, after a five-year review following start of SVE/bioventing operations, the groundwater plume is not stable or decreasing.	
RWQCB-14	Page 10 SVE/Bioventing, LNAPL Removal and Monitored Natural Attenuation Numbered Paragraph 2	*The RAP proposes LNAPL removal in wells where it accumulates to a depth exceeding 0.5 feet. LNAPL removal has been on-going at the Site for approximately three years. Although free product removal can be an effective technology for removing waste at some cleanup sites, the mass of product removed to date at the Site is a small percentage of the total waste mass remaining at the Site. Consequently, the Regional Board cannot conclude that free product removal will greatly affect the time*	As part of the remedial actions described in this RAP, LNAPL recovery will continue from wells MW-3 and MW-12 on a monthly basis, and, if LNAPL is detected at a measurable thickness in other wells in the future, monthly LNAPL recovery will be initiated on these wells with sorbent socks or, if they have an LNAPL thickness of greater than 0.5 foot, with a dedicated pump. The goal for LNAPL removal will be no measurable thickness in wells. In addition, in the future Shell proposes to	Revised RAP Section 8.5

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
		frame necessary to achieve the SSCGs for groundwater. Further, the Board notes that at other sites in the Los Angeles Region, LNAPL removal to a thickness of a sheen has been shown to be technologically and economically feasible. Consequently, the LNAPL recovery to a thickness of 0.5 feet proposed by the RAP may be less than that which is technologically and economically feasible.	continue to assess the economic and technical feasibility of continued hydraulic recovery of mobile LNAPL using LNAPL transmissivity as a criterion. Details of this approach are listed in the Revised RAP Section 8.5.	
RWQCB-15	Page 10 SVE/Bioventing, LNAPL Removal and Monitored Natural Attenuation Paragraph between Numbered Paragraphs 2 and 3	*The RAP proposes MNA to reduce concentrations of COCs in groundwater to levels that meet applicable water quality objectives where SVE and bioventing are not effective at achieving the objectives. However, there are no studies of MNA at the site to indicate that MNA will be effective in reducing COC concentrations to levels that meet applicable water quality objectives in a reasonable time frame. Review of the past five years of groundwater monitoring data show COC levels fluctuate and there is no discernable trend of COC reduction in most of the monitoring wells. The RAP proposes that Shell will propose additional remedies if MNA is not effective after five years. Although MNA may be an appropriate component of the remedy, the proposed remedy would leave a significant mass of waste in soil that will continue to leach to groundwater. As a result, the time frame for*	As described in the Revised SSCG Report, although some wells may show fluctuating COC concentrations, the current plume at the Site is stable or declining. Currently, the plume is close to or below MCLs near the downgradient property boundary. These conditions are indicative of MNA occurring presently at the Site. MNA is a common approach used at many petroleum release sites in the LA Basin where shallow groundwater is impacted. Together with the mass reduction remedies proposed, MNA is expected to be effective at further reducing the plume to MCLs. It is again noted that SVE/bioventing will relatively quickly remove the most leachable TPH and VOC fractions from the vadose zone over the entire Site, thus limiting the further leaching of these Site-related COCs to	Revised RAP Section 8.4

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
		MNA may be excessive. Therefore, the Regional Board cannot conclude that MNA as proposed in the RAP will attain the groundwater SSCGs in a reasonable time frame.	groundwater. Modeling predicts that benzene will meet MCLs in Site groundwater within approximately 70 years using MNA assuming the source reductions proposed in the RAP and that agencies are successful in stopping the off-Site migration of COCs onto the Site. Groundwater within the Site is not being extracted or consumed for any domestic or commercial/industrial purposes. MNA could be paired with contingency groundwater remediation of oxidant injection in areas where Site-related COCs exceed 100x MCL if, after a five-year review following start of SVE/bioventing operations, the groundwater plume is not stable or decreasing.	
RWQCB-16	Page 10 SVE/Bioventing, LNAPL Removal and Monitored Natural Attenuation Numbered Paragraph 3	*The Regional Board is concerned that the RAP does not adequately discuss the siting of the off-gas treatment facilities that will be required to implement the SVE and bioventing technologies. Based on discussions with Shell contractors, Regional Board staff is concerned that it may not be possible to locate off-gas treatment facilities at the Site because it is zoned for residential use. The RAP fails to discuss plans or contingencies for siting the SVE treatment facility if the Site is not available to house an SVE treatment facility.*	Potential offsite SVE system locations are being evaluated in terms of technological feasibility, accessibility and availability of the locations. These potential SVE locations are shown on Figure 8-8. The three offsite locations are on the former Turco Property, the business park located at 24412 So. Main Street, and vacant land north of the MTA/BNSF rail line Shell is currently in discussions with representatives of these three locations regarding access for system installation and operations.	RAP Section 8.2.2 and Figure 8-8

CROSS-REFERENCE TABLE OF REGIONAL BOARD REQUIREMENTS ADDRESSED IN THE REVISED HHRA, FS, AND RAP

Former Kast Property

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
RWQCB-17	Page 12 Economic Feasibility First Paragraph	*The FS does not provide a complete evaluation of economic feasibility as required by Resolution 92-49. The FS provides cost estimates of alternatives; but does not discuss the incremental benefit of attaining further reductions in the concentrations of COCs compared with the incremental cost of achieving those reductions. The FS provides the costs of remedial excavation alternatives to depths of two feet, three feet, five feet, and ten feet. (See Attachment III). Regional Board staff note that Site data indicate that waste concentrations and mass increase with depth. The Regional Board expects that the incremental costs of excavation at depth are offset by the incremental benefits of reducing the concentrations of COCs. However, the FS failed to conduct an objective balancing of the incremental benefit of attaining further reductions in the concentrations of COCs as compared with the incremental cost of achieving those reductions as required by Resolution 92-49.*	A detailed evaluation of economic feasibility including the incremental benefit of attaining further reductions in the concentrations of COC is provided in the Revised FS. This evaluation includes economic feasibility; nuisance concerns; technological feasibility, implementability, and effectiveness; and time to achieve SSCGs. The economic feasibility evaluation focuses on the incremental benefit compared with incremental cost.	Revised FS Section 6.0 Section 6.2.2.1 Table 6-1

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
RWQCB-18	Page 12 Economic Feasibility Second Paragraph	*The UCLA Expert Panel also evaluated the proposed remedy in accordance with Resolution 92-49 and recommended that Shell evaluate excavation alternatives to greater depths to remove a larger fraction of the TPH mass than the estimated 6-8% of the total that would be removed in the alternative proposed by the RAP. (See Attachment II).*	Based on Shell discussions with CP Lai of RWQCB, it appears that the Expert Panel may have incorrectly evaluated and used his calculations in estimating the fraction of TPH mass to be excavated. In the Revised FS Shell has evaluated the TPH mass present at the entire site by depth fraction and estimated the TPH mass to be removed by the various excavation scenarios.	Revised FS Section 5.2.3 Section 6.2.2.1 Table 6-1 Appendix A
RWQCB-19	Page 12 Nuisance Concerns First Paragraph	*The FS does not provide sufficient rationale for the preferred alternative. With regard to the excavation depth, excavation to three feet would not be effective in limiting the exposure of residents to waste below three feet. The three-foot excavation depth alternative relies on institutional controls based on City of Carson Building Code Section 8105 to limit resident exposure to wastes below three feet. However, the City of Carson does not require a building permit for such activities as gardening and landscaping, and excavations to depths greater than three feet does not require heavy equipment. Site data indicate that waste is present in soils at depths of three feet and five feet bgs, so it is reasonable to assume that there is waste present at depths greater than three feet that residents could be exposed to through residential activities such as gardening and building yard*	The Revised FS describes in detail the rationale for selecting the proposed remedy (4D). With respect to the provisions of the Building Code referenced in the comment, please refer to the response to the previous comment RWQCB-12.	Revised FS Section 6.0 Section 7.0

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
		features. The Building Code does not apply to excavations that remove less than 50 cubic yards of soil and may not be effective in limiting exposure to wastes in soils below three feet.		
RWQCB-20	Page 13 Technological Feasibility, Implementability and Effectiveness First Paragraph	*The FS consideration of effectiveness and technological feasibility is also deficient regarding excavation depth. By limiting the FS evaluation of excavation depth to the protection of human health only, the FS does not consider the effectiveness of the proposed preferred alternative on abating nuisance and protecting groundwater quality. The FS consideration of feasibility only focuses on the degree of excavation being readily excavated rather than analyzing whether alternative depths are capable of being implemented, effected or accomplished. The FS ignores a Site pilot test that showed that excavating to ten feet is feasible at the Site. The FS's consideration of effectiveness and feasibility as required by Resolution 92-49 is limited and does not provide supporting rationale to concur with the proposed alternative.*	The Revised FS describes in detail the rationale, including compliance with 92-49, for selecting the proposed remedy (Alternative 4D) which includes excavation around houses exceeding soil RAOs to 5 feet, with targeted excavation locally to 10 feet to remove additional hydrocarbon mass.	Revised FS Section 6 Section 6.2.2 Section 7
RWQCB-21	Page 13 Technological Feasibility, Implementability and Effectiveness	*The FS does not evaluate different types of excavation and bases its evaluation of the technological feasibility of excavation on the presence of utilities that are below grade, the constrained areas that may be available*	The Revised FS considers this comment and contains an evaluation of various techniques, including the use of augers to locally excavate soils at the Site to a depth of 10 feet. Use of auger excavation is included in the recommended	Revised FS Section 5 Section 6

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
	Second Paragraph	*for excavation, and the need to implement shoring for deeper excavations. However, the Regional Board has overseen remedial excavations in the Los Angeles region where there are underground utilities and has approved deep excavations using technologies that address the issues cited in the FS. The FS fails to consider in detail alternative excavation technologies that may be feasible to justify the technological infeasibility of excavating below three feet bgs. The UCLA Expert Panel Report also suggests that Shell consider alternative technologies, such as use of augers, which would also have the benefit of reducing other impacts associated with excavation (See Attachment II).*	Alternative 4D.	
RWQCB-22	Page 13 Technological Feasibility, Implementability and Effectiveness Third Paragraph	*The FS did not fully evaluate alternatives based on excavating to ten feet bgs in the comparative analysis because this excavation depth was considered "Not Implementable" and thus eliminated from detailed analysis. The Regional Board notes that a pilot excavation was successfully completed at the Site to a depth of ten feet bgs and thereby excavation to ten feet bgs should be considered implementable, and the FS should fully analyze this excavation depth alternative.*	Please refer to the response to the previous comment RWQCB-21	Revised FS Section 5 Section 6

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
RWQCB-23	Page 13 Technological Feasibility, Implementability and Effectiveness Fourth Paragraph	*The FS consideration of Overall Protection of Human Health and the Environment is based on long term effectiveness and permanence of the remedy. However, in evaluating overall protection of human health and the environment, the FS does not estimate the waste mass to be removed and the waste mass left on Site as it affects protection of human health and the environment. As discussed above, the waste mass quantity is a key determinant of the period that soil vapor will be generated and the period that soil vapor extraction and bioventing will be required to operate to meet the SSCGs. These technologies may generate COCs to which residents might be exposed over a long time frame. The FS indicates that more than 80 years is required to degrade the hydrocarbons below grade using bioventing. It follows that monitoring and maintenance will be required. The FS fails to note that Resolution 92-49 favors remedies that are permanent and do not require lengthy time frames of monitoring and maintenance which will be required for SVE and bioventing.*	Please refer to the response to the previous comments RWQCB-13, 17, 18, and 20. Also, estimates of hydrocarbon mass removal and the mass of hydrocarbons that would be left in place are included in RAP Section 8.1.3.	
RWQCB-24	Pages 13 and 14 Technological Feasibility,	*It is also noted that bioventing will generate intermediate waste products that will continue to pose risks to residents of the*	Shell is not aware of any studies that have identified a concern that bioventing will results in the generation of intermediate products that may	

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
	Implementability and Effectiveness Fourth and Fifth Paragraphs	*Carousel Tract… Additionally, the permanence of bioventing is questionable as intermediate wastes may be generated as hydrocarbons are degraded by bioventing.*	pose a risk to residents. This concern is not raised in State Board or USEPA regulatory guidance on the use of bioventing. This statement fails to recognize that natural biodegradation will degrade intermediate products that may be generated (i.e., bioventing facilitates the degradation process, but will not generate constituents that are not a result of the natural process). Additionally, the cyclic operation of the SVE/bioventing system will mitigate intermediate compounds generated by aerobic biodegradation of petroleum hydrocarbons by extracting these vapors and transporting them to the SVE treatment unit.	
RWQCB-25	Page 14 Technological Feasibility, Implementability and Effectiveness First Paragraph	*SVE and bioventing will require off-gas treatment. The FS does not adequately discuss requirements or feasibility of obtaining a permit to operate a SVE and bioventing system at the Site. It is not clear that such permits are available in residential areas of the South Coast Air Quality Management District. If permits for SVE and bioventing are not available, the effectiveness of the proposed alternative is decreased and issues of long term effectiveness due to the lengthy time frame to reach the SSCGs are exacerbated.*	Shell requested and held meetings with the South Coast Air Quality Management District and Shell's consultants to discuss the possibility of permitting an SVE system in this area well in advance of the March 10, 2014 submittal. The Regional Board was verbally informed of those meetings and their results when they were held. Text was added to explicitly state that "based on preliminary discussions with the SCAQMD, it would be possible to permit a SVE treatment system in a residential neighborhood if risks associated with air emissions are below threshold levels."	RAP Section 8.2.2
RWQCB-26	Page 14 Time to Achieve	*The proposed preferred alternative of excavation to three feet bgs leaves*	The time frame to remediation based on SVE/bioventing was addressed in the previous	Revised FS Section 6.2.2.4

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
	SSCGs First Paragraph	*significant waste mass on the Site which must be addressed by bioventing and SVE to achieve SSCGs…Achievement of SSCGs will take a significantly longer time when relying on excavation to three feet bgs than would excavation to deeper depths that will remove a greater mass of waste. The RAP alternative would not be as protective of groundwater quality as alternatives that remove greater mass of waste, since waste will continue to leach from soil to groundwater for a longer time frame. Resolution 92-49 favors cleanups that are permanent and do not require ongoing maintenance and monitoring. The FS fails to consider these factors in its evaluation of alternatives.*	response to comment RWQCB-13. It is expected that the SVE/bioventing system will remove most of the more volatile and leachable fraction of TPH and VOCs in a relatively short time frame (~5 years). However, because an estimated 74% of the Site mass lies beneath 10 feet bgs, there is a negligible difference among the time frames that would be required to remediate this contaminant mass for an excavation to 2 feet, 3 feet, 5 feet, or 10 feet.	
RWQCB-27	Page 14 Time to Achieve SSCGs Second Paragraph	*The FS assesses excavation to three feet to be more implementable than alternatives that involve deeper excavations because fewer properties would be excavated than excavation to depths greater than three feet bgs. The FS notes that cleanup of fewer properties would reduce the time frame of excavation. However, as noted above and by the UCLA Expert Panel, excavation to a lesser depth will prolong the overall length of time to achieve SSCGs. This rationale confuses a less difficult and less extensive cleanup with greater implementability.*	Please refer to the response to the previous comment RWQCB-26.	

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
RWQCB-28	Page 14 Time to Achieve SSCGs Third Paragraph	*The FS considers SVE/bioventing as an effective technology for removing and reducing the concentrations of waste that are left after excavation. However, the Bioventing Pilot Test Report determined that time frames of up to 80 years may be required to reduce hydrocarbon concentrations to the SSCGs necessary to protect groundwater at the Site. Resolution 92-49 directs the Regional Board to concur with remedies which the discharger demonstrates, and the Regional Board concurs with, to have a substantial likelihood to achieve compliance within a reasonable time frame. Achieving the SSCGs in a time frame of up to 80 years is not a reasonable time frame because remedial actions would be required to continue in a residential neighborhood for decades, the exposure and nuisance potentials would persist for decades, and waste could continue to leach to groundwater for decades. Resolution 92-49 directs the Regional Board to consider cleanup proposals that implement permanent cleanup and abatement solutions that do not require ongoing maintenance, wherever feasible. The FS does not sufficiently consider alternatives that achieve a permanent remedy that avoids long-term monitoring and maintenance.*	Please refer to the response to the previous comments RWQCB-11 and RWQCB-13.	

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
RWQCB-29	Page 15 First Paragraph	*The FS consideration of Overall Protection of Human Health and the Environment is based on long term effectiveness and permanence of the remedy. However, the FS does not estimate the waste mass to be removed and the waste mass left on-site as it affects protection of human health and the environment. As discussed above, the waste mass is a key determinant of the period that soil vapor will be generated and the period that soil vapor extraction and bioventing will be required to operate to meet the SSCGs. These technologies may generate COCs to which residents might be exposed over a long time frame. Consequently, sub-slab mitigation and SVE may need to be operated for a long time frame that is not reasonable. The FS fails to note that Resolution 92-49 favors remedies that are permanent and do not require lengthy time frames of monitoring and maintenance which will be required for SVE and bioventing.*	The Revised FS contains an analysis of the distribution of TPH mass at the Site, as well as an analysis of the TPH mass to be removed under the various excavation scenarios. Also, estimates of hydrocarbon mass removal and the mass of hydrocarbons that would be left in place are included in RAP Section 8.1.3. Approximately 74% of the TPH mass at the Site resides in the 10-50 foot range, and an estimated 88% of the site mass would remain after excavation to 10 feet bgs. Thus, any excavation scenario in the upper 10 feet of the Site will leave substantial mass in place. However, the deeper mass, along with mass not subject to excavation in the upper 10 feet will be remediated through SVE/bioventing. SVE/bioventing is expected to relatively quickly (i.e., approximately 5 years) remove the more volatile and leachable fraction of TPH and other VOCs. Additional excavation depths do not materially shorten this time period. SVE/bioventing is expected to reduce remaining COC concentrations to meet SSCGs in 30 to 40 years of operation. In normal remediation timeframes, a remedy with an O&M period of 30 to 40 years is not uncommon. Again, the Revised RAP proposes excavation around houses exceeding SSCGs to 5 feet, with targeted excavation locally to 10 feet to remove additional mass.	Revised FS Section 5 Section 6 Section 7

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
			Additionally, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impact to their indoor air from the Site. The Revised FS addresses 92-49 for all alternatives.	
RWQCB-30	Page 15 Second Paragraph	*In order for the Regional Board to concur with cleanups that attain water quality that is less than background, the alternative cleanup levels must "Be consistent with maximum benefit to the people of the state; not unreasonably affect present and anticipated beneficial use of such water, and not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and the Regional Water Boards." The FS fails to correctly evaluate consistency with Resolution 92-49 with respect to the effect on groundwater. The FS states that there is no current or future use of the Shallow Zone and Gage aquifer at or near the Site. However, the shallow zone overlays the Gage aquifer in the general area of the Site and the groundwater beneath the Site, which is designated in the Basin Plan with the beneficial use of Municipal and Supply (MUN). As such, impacts on the designated*	Impacts on the designated beneficial use of groundwater were evaluated in the FS as well as in the Revised FS. The proposed remedy (MNA with contingency oxidant injection) is designed to return groundwater to MCLs. This remedy may require 70 years to accomplish. Although this time frame may seem long, the fact remains that Site-related COCs impacts are limited in extent and confined to the Shallow Zone at the Site. Benzene concentrations are at or near MCLs at the downgradient property boundary. Shallow Zone groundwater is not, and will not, be used in the foreseeable future due to non-Site related water quality issues (including high TDS), the restrictions placed on groundwater extraction in the basin, and the lack of space for overlying pumping infrastructure. Groundwater at the site is not currently being consumed. The fact that the Shallow Zone overlies the Gage aquifer is certainly considered and no intention was made in the FS to suggest the Shallow Zone does not bear a MUN beneficial use designation.	Revised FS Section 4.3.10 Section 4.3.11 Section 5.3.5 Section 5.3.6 Revised RAP Section 8.4

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
		beneficial uses must be addressed in the remedy.	In consideration of these factors, the Revised RAP proposes a MNA remedy for the Shallow Zone Site related COCs with a contingency oxidant injection. This remedy assumes the agencies will be successful in stopping the migration of COCs from upgradient sources.	
RWQCB-31	Page 15 Conclusion and Directive Number 1 for Revised RAP	*Utilizes approved SSCGs set forth in the Regional Board's letter of January 23, 2014, including attenuation factors for soil vapor.*	The Revised HHRA, Revised FS and Revised RAP have been revised to use the Regional Board–directed and approved soil SSCGs as corrected in their May 29, 2014 correspondence. The Revised HHRA has also been revised to clarify the use of the Regional Board approved soil vapor SSCGs. An updated assessment of the sub-slab soil vapor to indoor air attenuation factor is presented in Appendix D of the HHRA. This updated assessment demonstrates that an attenuation factor of 0.002 is a conservative upper-bound value based on evaluation of the empirical data (i.e., sub-slab and indoor air concentration measurements) collected at the Site.	Revised HHRA Revised FS Revised RAP
RWQCB-32	Page 15 Conclusion and Directive Number 2 for Revised RAP	*Provides estimates of mass proposed to be left in place and bases for estimating the time and cost to reduce the concentrations of constituents of concerns.*	The Revised RAP includes these estimates. Additional details on mass estimation are included in Appendix A of the Revised FS. Cost estimates are also included in the Revised FS Section 6.	Revised RAP Section 8 Revised FS Appendix A Section 6

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
RWQCB-33	Page 15 Conclusion and Directive Number 3 for Revised RAP	*Provides plans for continued monitoring of the Site, including indoor air quality as appropriate if waste is proposed to be left in place.*	A discussion of post-construction monitoring and sampling has been added as Section 8.6 to the Revised RAP. The post-construction sampling plan includes continued sampling of soil vapor probes in streets and utility vaults, SVE/bioventing system operational sampling, soil and soil-vapor sampling for monitoring of SVE/bioventing system effectiveness, sampling of sub-slab soil vapor probes at properties identified for remedial action, screening indoor air for methane with hand-held instruments, and semi-annual groundwater and MNA sampling. Because indoor air concentrations measured during the Phase II investigation are indistinguishable from background levels, effectiveness of the SSD will be assessed only through cross-slab differential pressure measurements. Additional indoor air/sub-slab soil vapor sampling is not necessary to further assess the vapor intrusion pathway following installation of the sub-slab vapor mitigation system; however, additional sub-slab soil vapor monitoring will be performed in accordance with Regional Board directives. Additionally, post-excavation sampling has been included in Section 8.1.7 of the Revised RAP. Costs for this post-construction monitoring were also estimated and included in the Revised FS.	Revised RAP Sections 8.1.7, 8.3.1, and 8.6
RWQCB-34	Page 15 Conclusion and	*Provides a concept rendering of how the cleanup infrastructure will be placed at a*	Plan view and cross-section schematic views of a typical residence soil excavation and	Revised RAP Figures 8-6

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
	Directive Number 4 for Revised RAP	*typical individual residence.*	SVE/bioventing well system installation and soil excavation details have been provided.	and 8-7
RWQCB-35	Page 15 Conclusion and Directive Number 5 for Revised RAP	*Provides a contingent location for SVE/bioventing treatment facility should an on-site location not be available.*	Please refer to the response to the previous comment RWQCB-16.	Revised RAP Section 8.2.2 and Figure 8-8
RWQCB-36	Page 15 Conclusion and Directive Number 6 for Revised RAP	*Revises the calculation of the sub-slab to indoor air attenuation factor and re-identifies properties exceeding the lower bound of risk range of 1x10-6 or a hazard index of 1, based on the more protective SSCG for soil vapor and sub-slab soil vapor for consideration of sub-slab mitigation.*	The Revised HHRA has also been revised to clarify the use of the Regional Board-approved soil vapor SSCGs. An updated assessment of the sub-slab soil vapor to indoor air attenuation factor is presented in Appendix D of the HHRA. This updated assessment demonstrates that an attenuation factor of 0.002 is a conservative upper-bound value based on evaluation of the empirical data (i.e., sub-slab and indoor air concentration measurements) collected at the Site.	Revised HHRA, Appendix D and Section 6.3
RWQCB-37	Page 16 Conclusion and Directive Number 7 for Revised RAP	*Includes an appropriate confirmation sampling plan, with a schedule, of soil, soil vapor, and groundwater to verify the performance of the proposed activities (i.e., Soil Vapor Extraction, Bioventing and Excavation) to document achievement of the Regional Board approved SSCGs for all COCs.*	Post-excavation sampling has been included in Section 8.1.7 of the Revised RAP, and additional post-construction monitoring and sampling has been added as Section 8.6 to the Revised RAP.	Revised RAP Section 8.1.7, Section 8.6

CROSS-REFERENCE TABLE OF REGIONAL BOARD REQUIREMENTS ADDRESSED IN THE REVISED HHRA, FS, AND RAP

Former Kast Property

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
RWQCB-38	Page 16 Conclusion and Directive Number 1 for Revised FS	*Provides a detailed review of remedial excavation methods that are effective in restricted (i.e. small) areas and can reach depths of ten feet bgs.*	The revised FS contains an evaluation of various techniques, including the use of augers to excavate soils to 10 feet at the Site.	Revised FS Section 5
RWQCB-39	Page 16 Conclusion and Directive Number 2 for Revised FS	*Evaluates alternative active groundwater treatment technologies for site-related COCs should the combination of SVE, bioventing, and MNA prove not to be effective.*	This evaluation is included in the Revised FS.	Revised FS Section 4.3.11 Section 5.3.6
RWQCB-40	Page 16 Conclusion and Directive Number 3 for Revised FS	*Identifies institutional controls that are effective in protecting residents from gardening or small project excavations that may encounter waste left in place.*	The Revised FS evaluates institutional controls.	Revised FS Section 4 Section 5 Section 6
RWQCB-41	Page 16 Conclusion and Directive Number 4 for Revised FS	*Evaluates incremental costs in relation to incremental reduction in waste concentrations in accordance with Resolution 92-49.*	The Revised FS evaluates incremental costs in relation to incremental reduction in TPH mass.	Revised FS Section 6 Sec. 6.2.2 Table 6-1
RWQCB-42	Page 16 Conclusion and Directive Number 5 for Revised FS	*Provides details on post cleanup monitoring for alternatives that leave waste in place.*	A discussion of post-construction monitoring and sampling has been added to the RAP.	RAP Section 8.6
RWQCB-43	Page 16 Conclusion and Directive Number 6 for Revised FS	*Provides off site locations for SVE/bioventing treatment areas.*	Please refer to the response to the previous comment RWQCB-16.	RAP Section 8.2.2 and Figure 8-8

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
James C. Carlisle, OEHHA, Human Health Risk Assessment Report, Former Kast Property, Carson, California, Memorandum dated April 29, 2014				
OEHHA-1	Page 1 Comment 1	*The process of eliminating detected chemicals as COPCs should be clearly laid out. A flow chart would be helpful in this regard (see also 4 below).*	Two flow charts have been provided presenting an overview of the COPC selection process for soil and soil vapor.	Revised HHRA, Section 2.2
OEHHA-2	Page 1 Comment 2	*Apparently there are three bases for eliminating detected chemicals as COPCs: a. frequency of detection; b. toxicity screen; and c. comparison with background. Table 4 should include all three criteria and would become much clearer if the reason for exclusion were provided rather than the reason for inclusion.*	The frequency of detection information is provided in the prevalence tables presented in Tables 1 through 3 of the Revised HHRA. Those chemicals that were detected in more than 0.05 % (e.g., more than 5 out of the 10,000 soil samples collected) of the samples were carried into Table 4 for further COC screening. Flow charts outlining the COC screening steps have been added to Section 2.2 of the HHRA report. Table 4 has been revised to include the exclusion rationale as mentioned in OEHHA's comment.	Revised HHRA, Table 4
OEHHA-3	Page 1 Comment 3	*<u>Comparison with background:</u> Page 13 & Table 4 of the main report state that "The results of the one-sample proportion test indicated that cadmium, cobalt, copper, vanadium, and zinc concentrations at the Site are within background". This conclusion seems to contradict the last column of Appendix A Table 5-2 where, in some cases, the answer in is "yes".*	The text has been revised to reflect the information in Table 4. Cadmium, copper, and zinc concentrations at the Site are within background.	Revised HHRA, Section 2.2.3
OEHHA-4	Page 2 Comment 3a	*It appears that if an element passes any one of 4 or 5 screens, it is eliminated. OEHHA believes that the results of the various*	A flow chart was provided summarizing the COC selection process. If a chemical passed the frequency of detection screen, it was further	Revised HHRA Section 2.2

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		analyses should be taken together using a weight-of-evidence approach, rather than a 'pass-one-test-and-you're-out' approach	evaluated with respect to comparison to background (if a metal or carcinogenic PAH evaluated as benzo(a)pyrene equivalents) or 1/10th of the RBSL (all other organic chemicals). The methodology that was followed was the same as used in the Revised SSCG report, just updated with more recent data to confirm no additional chemicals should be included based on the additional data collected since the first HHRA report was submitted. The RWQCB approved the COCs presented in the revised SSCG report with the additional of toluene and xylenes which were added in the HHRA report (March, 2014) and Revised HHRA report.	
OEHHA-5	Page 2 Comment 3b	*Although the use of the one-sample proportion test was approved in a November 21, 2013 OEHHA memorandum, OEHHA is concerned that the test may have been misapplied to the UTL. Using a one-sample proportion test to compare site data to a UTL may bias the analysis in favor of accepting the null hypothesis. It controls the type I error rate at 2 levels (the UTL itself is a UCL on the 95th percentile and then the P value for exceedance of the UTL must be <0.05 to reject the null hypothesis), but does not the type II error rate at all. DTSC (1997) guidance on the subject includes the following: "Metals eliminated as COPC are never again considered in the process of risk*	Geosyntec used the guidance from USEPA on when to use single sample hypothesis tests (ProUCL Version 4.1 User Guide (Draft). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. USEPA, 2010). The guidance indicates that when the BTVs and cleanup standards are known, one-sample hypotheses including the one-sample proportion test may be used to compare site data with known and pre-established threshold values or BTVs. The ProUCL output files are provided in Appendix 6 of Appendix A in the revised HHRA report.	Revised HHRA, Appendix 6 to Appendix A

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		assessment or risk management. Thus, it is highly desirable to avoid or minimize Type II error in selection of COPC. On the other hand, if a Type I error is made, two subsequent levels of decision-making provide opportunities for correction. Thus, acceptable Type II error should always be less than or equal to Type I error." APPENDIX 6 of Appendix A - "ProUCL Output of One Sample Proportion Test Results" contains no ProUCL output, only a summary thereof. Therefore, OEHHA cannot verify the One Sample Proportion Test Results.		
OEHHA-6	Page 2 Comment 3c	*Arsenic has been eliminated as a COPC at sites where the maximum arsenic concentration is more than twice the BTV and/or exceedances comprise up to 30% of the samples. The probability plot has an apparent deviation from linearity. Since the residential SSCG is 12 mg/kg (Table 11), how can concentrations over 28 mg/kg be left in place? For thallium and antimony, the exceedances are even greater in both magnitude and frequency. This does not appear to be consistent with DTSC (1997, 2005, 2009)*	The use of BTV for evaluating COPCs is based not only on the magnitude of the maximum site concentration but also on the frequency of occurrence. For example, a background control site with a BTV (UCL on the 95th percentile) of 12 mg /kg may have concentrations considerably higher than the BTV, but the frequency of such occurrences shall be below the significance level of 5%. The choice of the commonly used 5% significance level is consistent with the assumption that infrequent occurrences of concentrations higher than the BTV won't incur elevated human and environmental risk. The one-proportion test cited in the guidance uses the population proportion rather than the sample proportion for evaluating the data.	

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OEHHA-7	Page 2 Comment 3d	*However, the concern regarding exclusion of elements as chemicals of potential concern is mitigated by the fact that the excluded elements are not believed to be site-related.*	Comment noted.	
OEHHA-8	Page 2 Comment 4	*<u>Toxicity screen</u>: Geosyntec compared the maximum concentration of each detected analyte in a given medium to one-tenth of its RBSL. If the maximum concentration was not greater than one-tenth of the RBSL it was eliminated as a COC for the Site. OEHHA is not aware of a prior approval of this screening procedure. This screening procedure could potentially underestimate risk and/or hazard if several chemicals were present at less than, but close to, their respective RBSLs.*	This methodology was used in the Revised SSCG Report (October, 2013). The Water Board provided an approved list of SSCGs for the COCs identified in the Revised SSCG Report with the addition of toluene and xylenes as stated in their January 23, 2014 letter. In addition for the Kast Site, given the former site use, the primary COCs are TPH and petroleum derived VOCS which have been retained for analysis.	
OEHHA-9	Page 3 Exposure Assessment General Comments	1. *Soil exposure assumptions are similar to those in the SSCG document except that exposure to soils up to 5 feet deep is considered on a 350 days/year basis.* 2. *Equation 3.5.3.3 seems to have omitted a term for sub-slab concentration.* 3. *Vapor intrusion is estimated based on a site-wide attenuation factor of 0.002.*	Comments noted. Equation 3.5.3.3 was reviewed and determined to be correct given the use of the EC (Exposure Concentration) term.	No Change.
OEHHA-10	Page 3 Conclusions First Bullet	*Geosyntec has employed additional screens to the determination of COPCs.* o *The concentration / toxicity screen could potentially underestimate combined risk and/or hazard.*	Comments noted, please see response to previous comment OEHHA-8 for concentration/toxicity screen comment.	

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		o *OEHHA initially had some concerns regarding the screening process based on background comparisons, but it appears that this only affects elements that are not site-related.*		
OEHHA-11	Page 3 Conclusions Second Bullet	*OEHHA verified the SSCGs by independent forward risk and hazard calculations and by comparison to previously approved SSCGs.*	Comment Noted.	
UCLA Expert Panel, Review of the HHRA, FS, and RAP, Memo dated April 29, 2014				
Expert-1	Page 3 Human Health Risk Assessment First Paragraph	*The HHRA does address the cumulative nature of multiple constituents of Concern (COCs) within each medium (e.g., soil, soil vapor, etc), but does not address the cumulative or additive effect of the receptor of concern (e.g., residents) exposure to multiple media.*	Cumulative incremental lifetime cancer risk and noncancer hazard estimates have been included in the Revised HHRA.	Revised HHRA Sections 6.3.1.3 and 6.3.2.1 and Tables 19 and 20.
Expert-2	Page 3 Human Health Risk Assessment Second Paragraph	*Geosyntec states that the assessment of indoor air using sub-slab vapor is highly conservative, and therefore they may believe that adding this additional incremental risk is over-protective. However, standard risk assessment guidance (USEPA 1989) states, "The total exposure to various chemicals will equal the sum of the exposures by all pathways." While USEPA (1989) then cautions the reader to not "automatically sum risk from all exposure pathways*	Cumulative incremental lifetime cancer risk and noncancer hazard estimates have been included in the Revised HHRA.	Revised HHRA Sections 6.3.1.3 and 6.3.2.1 and Tables 19 and 20.

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		evaluated for a site", it does state, "two or more pathways should be combined for a single exposed individual or group of individuals." Given the HHRA evaluated the site data on a property basis, one would expect the receptor exposed to the property soil would be the same receptor exposed to indoor air. USEPA (1989)[1] does recognize that the same individuals may not consistently face the "reasonable maximum exposure" for more than one pathway, and the HHRA does allude to this issue in the uncertainty section when it states that "HHRA assumptions entail the receptor staying outdoors] or indoors the entire duration of the exposure period. As a result, the estimated incremental cancer risks and noncancer hazards are over-estimated." But note the pathways risks were not combined in the HHRA.		
Expert-3	Page 3 Human Health Risk Assessment Fourth Paragraph	*While the risk assessment process is over-protective in many ways, until the cumulative effects of all pathways are evaluated, there may be properties un-identified that would not be meeting this objective.* ***Recommendation: Assess cumulative impacts across mediums in the HHRA.***	Cumulative incremental lifetime cancer risk and noncancer hazard estimates have been included in the Revised HHRA. Only one property had cumulative risk estimates greater than 1×10-6 (a value of 2×10-6) when the media risks separately were less than 1×10-6. However, this property is already identified for consideration in the Revised FS and Revised RAP due to an exceedance of the SSCG for leaching to groundwater and therefore potential cumulative risks for this property will be addressed as a part	Revised HHRA Sections 6.3.1.3 and 6.3.2.1 and Tables 19 and 20.

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			of the remedial action for soils.	
Expert-4	Page 4 Feasibility Study and Remedial Action Plan with regard to Human Health Risk Assessment	*The FS and RAP use the HHRA exceedance of risk/hazard in soils to identify properties for soil excavation and exceedance of risk/hazard in indoor air via soil slab vapor evaluation to identify properties for sub-slab vapor intrusion mitigation. As these two pathways are assessed in the HHRA separately, it is possible that there are some properties that may still pose an unacceptable risk based on the cumulative effects.* ***Recommendation: Ensure all possible "hot spots" requiring more extensive remediation have been identified, by assessing cumulative impacts across mediums.***	Please refer to the response to the previous comment Expert-3.	Revised HHRA Sections 6.3.1.3 and 6.3.2.1 and Tables 19 and 20.
Expert-5	Page 4 Risk Management	*The RAP (or FS) does not clearly state that all existing trees and bushes would be removed during excavations. Most homeowners are more attached to their trees than their hardscapes. The homeowner may choose to refuse the remediation if their mature and/or fruit-bearing tree, for example, has to be removed.* ***Recommendation: If trees can be left in place, institutional controls and surface soil capping should be considered to reduce or mitigate exposure.***	As part of RDIP and PSRP preparation, Shell contractors will meet with homeowners, and their legal representatives as appropriate, to obtain necessary information for relocation during remedial implementation and to discuss hardscape and landscape restoration. During this meeting, existing landscape irrigation systems will be documented so that they can be restored as part of landscape restoration. In some cases, Shell may provide alternative landscape restoration from existing conditions if desired and agreed to by the homeowner, or as required by	Revised RAP Section 8.1.3

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			City Code. If during this meeting the homeowners express a desire that existing landscaping (such as a mature tree or shrubs) or hardscape not be removed from their property, an option will be discussed of leaving landscape elements or hardscape in place with the homeowners agreeing to enter into a Land Use Covenant (deed restriction) that would be recorded with the County Recorder's Office advising of the potential presence of impacted soil beneath hardscaped areas. If the landscaping or hardscape is removed in the future and potentially impacted soils below the area are exposed, they would be managed in accordance with the Surface Containment and Soil Management Plan (Appendix C of the Revised RAP).	
Expert-6	Page 4 Miscellaneous Minor Edits for the HHRA Second Paragraph	*Table 4 - footnote on toluene and xylenes #5 is incorrect as Footnote #5 discusses the additional background analysis to exclude COCs based on the one-sample proportion test.*	A footnote #7 has been added to Table 4 to indicate that "Although not considered as COCs through the screening process, the RWQCB has requested these VOCs to be evaluated as COCs."	Revised HHRA Table 4.
Expert-7	Page 5 Miscellaneous Minor Edits for the HHRA First Paragraph	*Table 5 does not indicate toluene and xylenes are COCs for Soil Vapor, Sub-Slab (though they are marked as such in Table 6). While these analytes would not be selected as COCs using the methodology presented in the table, we recommend that Tables 4 and 5 present the COC screening process*	Table 5 has been revised to indicate that toluene and xylenes are COCs for soil vapor, sub-slab. Flow charts for the COC screening process for soil and soil vapor have also been added to Section 2.2 of the Revised HHRA report.	Revised HHRA Section 2.2.

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		consistently. We would recommend that Table 4 be changed to be consistent with the process described and Table 6 be used to return the analytes to COC list. Using this method of displaying the screening process, the reader would then follow the reasoning of why the analytes are included in the Soil and Soil-Vapor, Sub-Slab categories due to the regulatory request when they actually pass the COC screening process.		
Expert-8	Page 5 Miscellaneous Minor Edits for the HHRA Second Paragraph	*Table 6 - Note the footnote on the toluene and xylenes analytes under the Soil Vapor, Non-Sub-Slab category is incorrect. These analytes are included on the COC list under this category because they* ***did*** *meet the criteria of the COC selection screening process.*	The footnote in Table 6 has been corrected.	Revised HHRA, Table 6
Expert-9	Page 5 Miscellaneous Minor Edits for the HHRA Third Paragraph	*Table 6 should acknowledge the soil vapor screening criteria the Regional Board gave for aliphatic ranges and the nuisance concentration.*	Odor-based screening criteria are provided in Table 12, Soil Vapor SSCGs. Table 6 has been modified to include a footnote that odor based concerns are also being considered in the HHRA.	Revised HHRA, Table 12
Expert-10	Page 5 Miscellaneous Minor Edits for the HHRA Fourth Paragraph	*Table 8 should include a definition of Soil vapor to indoor air volatilization factor (VFsv-IA) for consistency.*	Table 8 revised in response to this comment	Revised HHRA, Table 8
Expert-11	Page 5	*Examining the tables, the reviewer is*	For soil, total xylenes were analyzed in all the	No Change.

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	Miscellaneous Minor Edits for the HHRA Fifth Paragraph	*concerned with the handling of the xylenes. In some cases the xylenes are presented in total (Table 9a), in analytical isomers (Table 5), or in both forms (Table 4 and 6).*	samples with the individual isomers analyzed in a subset of samples such as split samples sent to another laboratory. For soil vapor, only the individual isomers were analyzed. Total xylenes were selected for estimation of noncancer hazard for soil exposures since it was the complete xylene dataset. Supporting tables such as the COC selection presented both.	
Expert-12	Page 5 Miscellaneous Minor Edits for the HHRA Sixth Paragraph	*Table 9a missing VFs on the table for the COCs of 1,2-Dichloroethane, cis-1,2-Dichloroethene, and tert-Butyl Alcohol. Reviewer assumes that the total xylene VFsoil will be used for the xylene isomers if the EPCs are based on the isomers.*	Table 9b has been corrected to show the VFs for the COCs identified. The totally xylene VF was used in the calculations,	Revised HHRA, Table 9b
Expert-13	Page 5 Miscellaneous Minor Edits for the HHRA Seventh Paragraph	*Table 9b does not need VF SV-OA for 1,2-dichloropropane or for 1,3 butadiene.*	Table 9b has been corrected to remove VFsv-oa for these two VOCs.	Revised HHRA, Table 9b
Expert-14	Page 6 Remedial Alternatives and Feasibility Study Analysis Third Paragraph	*Contamination appears to be pooled in certain areas that reflect the original reservoirs. The use of auger technology to get to contamination at 10 bgs in certain "hot spots" may require considerable less disruption of the surface, less soil removed and less truckloads hauled from the site. It is important to consider that a large number of truckloads will have to be removed, which will disrupt daily life in the area, and*	The Revised FS considers and selects Alternative 4D which includes excavation to 5 feet around homes where COCs exceed RAOs and targeted excavation to 10 feet where practicable at areas where constituents are present in significant amounts (i.e., at 10 times the TPH SSCGs for leaching to groundwater or greater than the residual NAPL soil concentration).	Revised FS Section 8 Revised RAP Section 8

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		increase exposure to air pollutants from the exposed soils as well as from truck emissions. Potential impacts are further discussed in Section 4. As indicated by Geosyntec, Alternatives 4D and 5D would provide a greater degree of reduction in impacted soil through excavation, resulting in higher short and long-term effectiveness, and more permanence, and higher reduction of toxicity, mobility and volume.		
Expert-15	Pages 8 and 9 Groundwater Quality Benefits	*The recommended options, 4B or 5B, may remove less than 10% of the TPH mass, leaving >90% of the mass in the ground. This estimate is based on the analysis by the LA RWCB of the total TPH mass present at different depths (Memorandum of March 20, 2014, on TPH Mass Calculation for Subsoil at Kast Property), indicating that the mass is approximately 295,000 lb at 0-2 ft bgs, 650,000 lb at 2-3 ft bgs, 1,740,000 lb at 3-5 ft bgs, and 6,470,000 lb at 5-10 ft bgs.* *Table 1 describes how this mass is distributed as a percentage of the total at different depths bgs.* [see page 9 for Table 1] *Two related aspects of the preferred remediation options, 4B and 5B, are important to note because of their ability to deliver water quality benefits. As noted in*	Please refer to the response to the previous comments RWQCB-18 and Expert-14.	

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		Table 1, while approximately 10% of the cumulative mass is located at 0-3 bgs, the amount that would be excavated in options 4B or 5B is likely to be considerably less because the material that underlies the homes or the public streets will not be removed under these alternatives. Second, the material that would be removed is from the top of the mass, being the furthest from the groundwater resource. Taken together, this suggests that excavation alternatives 4B and 5B are likely to have relatively small impacts on long-term water quality objectives. *If an excavation alternative is being seriously considered by the Board, we recommend requesting that Geosyntec evaluate an additional remediation alternative.* ***Recommendation: Geosyntec should evaluate an excavation alternative at fewer locations than the proposed 183 homes and at greater depths to potentially remove a larger fraction of the TPH in targeted areas.***		
Expert-16	Page 10 Groundwater Quality Benefits	*It would make most sense to take this approach in areas heavily impacted by COCs as shown in Figure 1. The pilot study conducted by Shell demonstrated that*	Please refer to the response to the previous comment RWQCB-21.	

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		excavation to 10 ft is feasible. Any additional excavation alternative that is developed that removes more than 10% of the mass with considerably less land surface disruption would advance water quality goals over the current alternative while imposing considerably less cost on homeowners. *As we discuss below, 4B and 5B represents an expansive excavation effort that may affect upwards of 183 homes, which will very likely impose significant, short-term economic costs on residents, while having nominal impacts on long-term water quality levels. As such, when evaluating this alternative excavation effort, Geosyntec should consider the use of augers to reach some of the contamination at 10 ft bgs, which appears to be pooled in certain areas that reflect the original reservoirs. This technology may require considerably less disruption of the surface, less soil removed and thus less truckloads hauled from the site.* ***Recommendation: Geosyntec should consider the use of augers to reach contamination at 10 ft bgs.*** *It is important to consider that a large*		

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		number of truckloads will have to be removed, which will disrupt daily life in the area, and increase exposure to air pollutants from the exposed soils as well as from truck emissions. The use of augers to reach greater depths might provide a greater degree of reduction in impacted soil through excavation, resulting in higher short and long-term effectiveness, and higher reduction of toxicity, mobility and volume.		
Expert-17	Page 12 Groundwater Quality Benefits	*Whether excavation is warranted depends upon whether the Board believes significant leaching from the TPH mass is likely to continue to occur. This mass may be strongly held by the soils, but we currently have only indirect evidence to support this belief. Such a determination is important since over 60% of the TPH mass is located at 5-10 ft bgs, which would require the more aggressive excavation alternatives to mitigate, and even then would be able to remove only a fraction of this mass due to the needed setbacks from buildings, roads and utilities. (As we discuss below, the excavation options will also impose significant short-term cost on residents.)* *It is uncertain at this point if leaching flow from this TPH mass could be collected and evaluated by remediating groundwater. If this were possible, the magnitude and trends*	The SSCGs for groundwater are generally set at MCLs. The remedy proposed in the Revised RAP is designed to meet these MCLs. Several observations are offered with respect to this comment by the Expert Panel: • Operation of a SVE/bioventing system over the entire site will reduce the volatile and more leachable fractions of TPH and VOCs in a relatively short time frame (5 years). • Additional source reduction will occur from excavation of shallow soils, remediation of LNAPL, and the agencies working to stop the migration of off-Site sources of COCs onto the Site. • MNA is occurring at the Site given the overall stable or decreasing condition of the plume and the low or non-detect	Revised RAP Section 8.4

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		in flow could be evaluated by the Board over time allowing a further assessment of: (1) the basic threat this mass represents to groundwater quality and (2) the need for groundwater remediation as an on-going remedial option. The acceptability of this approach would seem to depend, in part, on whether the Board agrees as Geosyntec asserts there is "... no current or future use of the Shallow Zone and gage aquifer at or near the Site." (p. 12, Feasibility Study, 2014).	concentrations of Site-related COCs at the downgradient property boundary. With the proposed source reduction at the Site, MNA is expected to return the benzene plume to MCLs in approximately 70 years. • Although this time frame may seem long, Shell continues to assert that there is no current or foreseeable future use of the Shallow Zone water at the Site based on the poor water quality (e.g. TDS), the thin nature of the Shallow Zone, the lack of space for pumping infrastructure in the neighborhood due to the area being fully built out, and the restrictions on groundwater pumping imposed by the adjudication of the basin. • The proposed remedy also includes a contingency oxidant injection program in the event MNA is not effective. Thus, the proposed remedy should address any lingering concerns related to groundwater.	
Expert-18	Page 13 Indoor Air Quality	*Based on the extensive on-site testing, no properties exhibited health exceedances for indoor air pollutants. We assume that the 27 properties with sub-slab soil vapor exceedances will be addressed and remediated regardless of the broader*	Comment noted. The current data indicate that indoor air quality within the community is indistinguishable from background concentrations and as a result the excavation scenarios considered in the FS do not	

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		remediation alternative selected for the tract. As a result neither of the more preferred remediation options, 4B or 5B, will significantly contribute to compliance with air quality regulations within residences. Indeed, this is true of the other considered remediation alternatives as well.	differ in reference to contribution to indoor air quality. While the data collected at the Site do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impact to their indoor air from the Site.	
Expert-19	Page 13 Utility Workers	*Other important health exposures reductions could arise from utility workers excavating in the 0-3 ft bgs area. Utility-specific institutional controls might mitigate some or all of these exposures. (Recall that this 0-3 ft bgs is the least contaminated zone of the three zones evaluated. See Figure 2 above.) In the absence of institutional controls, these exposures would remain a concern for all remediation alternatives except for alternatives 2 and 3. This is because all options under alternatives 4 and 5 requires setbacks for homes, streets and utilities. As result, they would leave impacted soils directly under and proximate to the foundation of the homes, streets and utilities infrastructure. All subsurface utilities repairs or replacement will likely disturb these areas unexcavated under and proximate to these homes, streets and utility infrastructure. As a result any potential risks*	Anyone performing excavation is required by law to notify the Underground Service Alert one-call system. Additionally, Shell's contractors are, and would continue to be, set up within the (USA) one-call system to receive notification of planned excavation work in the Carousel Tract under the proposed remedy. Upon notification of planned excavations, Shell or their contractors would coordinate with the entity that contacted USA (whether the homeowner or their representative, a homeowner's contractor, or utility company such as Cal-Water, Southern California Gas Company, or AT&T) to provide monitoring and management and handling of residual soils during excavation activities. Additionally, field support has been provided to individual homeowners and their contractors when they have notified Shell of planned activities on their properties, such as plumbing repairs, driveway replacement, and landscaping improvements.	Revised RAP, Section 4.2, Appendix C

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		to utility workers would not be significantly abated by alternatives 4B and 5B.	Field support activities include monitoring for organic vapors, collection and analysis of soil samples when potential impacts are identified in excavations, and coordination with appropriate contractors for proper disposal of the excavated soils. These activities will continue as discussed in the Surface Containment and Soil Management Plan (Appendix C).	
Expert-20	Page 13 Clean Soil as "Protective Barrier" in Alternative 4 and 5	*Although the proposed excavation alternatives represented by 4 and 5 may provide a perceived "protective barrier" to residents, this is may only be true for the portions of the lot landscaped (5) or hardscaped and landscaped (4), under which impacted soils would be excavated. However, for alternatives 4 and 5, unexcavated soils will remain under buildings, streets, and utility infrastructure and, due to setbacks at greater excavation depths, also potentially adjacent to these structures. As a result, we suggest that the benefits of these alternatives in offering a protective buffer to individuals within their homes are more limited than may be initially perceived.*	The proposed remedy, Alternative 4D, would excavate to 5 feet bgs with targeted deeper excavation to 10 feet bgs which is expected to be protective against inadvertent resident contact to soils exceeding the RAOs. The possibility of exposure to soils remaining below 5 feet bgs and impacted soils beneath City streets and sidewalks is addressed through existing institutional controls that require a Grading Permit be issued by the City of Carson for excavations deeper than 3 feet and a Surface Containment and Soil Management Plan to address notifications, management, and handling of residual soils that are impacted by COCs at concentrations greater than risk-based levels. This plan is included in Appendix C to the RAP. In addition, it is important to emphasize that SVE/bioventing will address COCs in Site soils and soil vapor not addressed by the proposed excavation to 5 feet and locally bgs from 5 to 10 feet bgs.	Revised FS Report Section 5 Section 6 Revised RAP Section 4.2

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			Additional detail is provided in Section 4.2 of the RAP: "Support to Utility Excavations and Homeowners' Activities".	
Expert-21	Page 14 Residential Interim Use Value and Nuisance Losses	*The preferred option in the Remedial Action Plan, 4b, will involve the excavation of soils down to 3 ft bgs under all landscaping for potentially up to 183 homes. Although this is the least intrusive of the excavation depth alternatives considered, it is still likely to impose significant, and on occasions, acute costs to some residents over the period of remediation. The deeper excavation alternative, which would take longer, requires more structural safeguards, and require more on-site activity, would impose even larger social costs of the sort discussed later in this section. While the duration of this period of remediation is uncertain, and depends on the coordination of numerous stakeholders, it is likely to take several years to fully complete for the entire neighborhood.* *Over this period, some residents may experience the interim lost use value from their residences and experience welfare losses associated with nuisance of on-site and neighborhood excavation and soil removal and replacement. These economic factors need to be taken into consideration*	The Revised RAP and the Revised FS discuss the balancing of factors associated with the various alternatives, and these factors and the environmental impacts of the various alternatives will be further analyzed during the CEQA process. The Revised FS analyzes the longer duration and presence of vehicles, open excavations and other activity associated with greater excavation depths/extent. Odor and noise abatement measures are identified in the Revised FS and Revised RAP. The Preliminary Relocation Plan discusses the efforts to minimize the construction-related impact on residents and alleviate these interim impacts, and property-specific implementation of the remedy, site restoration, and mitigation measures will be discussed in the RDIP and the individual PSRPs. These considerations will be further evaluated as part of the CEQA EIR.	

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		when evaluating Resolution 92-49. These impacts could include the following: ***Air pollution exposures.*** *Excavation and soil transportation will likely lead to a substantial increase in interim risk of air pollution exposure to residents, since the contaminated soils will be exposed during excavation and heavy equipment and trucks will be operated during the removal and replacement of soils.* *In particular, particulate matter levels could increase during excavation. Particle pollution contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems, including increased respiratory symptoms such as irritation of the airways, coughing or difficulty breathing. People with heart or lung diseases, children and older adults are most likely to be affected by particle pollution exposure. However, even if you are healthy, one may experience temporary symptoms from exposure to elevated levels of particle pollution. There could be economic costs associated with health impacts, including the cost of medical care and medication.*		

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
		Noise and odor nuisances. *Similarly, excavation and soil removal will likely lead to a substantial level of noise impacts associated with truck trips and the operation of heavy equipment. Odor associated with diesel pollution from the trucks, soil disturbances and other processes could also be expected during an interim period. There could be economic costs associated with mental health impacts from noise and odor nuisances.* ***Loss of trees/shrubs, interim loss of landscaping and other aesthetic impacts.*** *Preferred option 4b would involve excavation below landscape and thus would require the permanent loss of favored existing tree or scrubs. After the excavation period, new trees or other plants would have to be planted and landscaping would have to be redone by the property owners. During the exaction period, there would be an interim loss of recreational space for children and pets. There would also be an interim loss of access to other yard amenities such as pools, sheds, gardens, etc. This could affect property value.* ***Impacted ability of residents to sell their properties.*** *While it would be speculative to predict an exact impact on property values,*		

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
		excavation activities are likely to depress home values during the period of excavation, given the disturbance. ***Intangible costs associated with temporary household displacement.*** *Interim relocation costs are likely to be highest for households with children and the elderly. Relocation could affect children's ability to attend their regular school and participate in their normal extracurricular activities. Relocation could also affect access to residents' places of employment, childcare, medical care, etc.* ***Possible short-term loss of utility services.*** Excavation below hardscapes and landscaped areas will be complicated by utility lines. Some lines may even have to be removed or temporarily unserviceable.		
Expert-22	Page 15 Benefits to Long-Run Real Estate Values	*The relative real estate impacts to home owners are unknown for those remediation alternatives that might significantly alter the property such as alternative 2, 3 and 6.* *For the remediation alternatives 4 and 5, despite the short-term interim use losses that are possible, we would expect the long-term value of the real estate to return to pre-investigation levels assuming the following:* *1. All sub-slab soil vapor concerns are*	Shell agrees that, after implementation of Alternative 4D, the long-term real estate value of Carousel residences is not expected to be negatively affected. Published sales prices for Carousel residences during recent years remain strong. The Revised RAP and Revised FS discuss the balancing of factors associated with the various alternatives, and these factors and the environmental impacts of the various alternatives will be further analyzed during the CEQA	

Comment No.	Regulatory Comment Page Number and Section	Regulatory Comments	Response	Revised Section(s)
		resolved and in full compliance with guidelines. *2. Indoor air quality remains in compliance with accepted exposure guidelines for the subsurface pollutants and their derivatives.* *3. Ground surface environmental health conditions related to subsurface conditions are non-compliant with current regulations which affect the properties residential use value.* *4. Documented or anticipated environmental liabilities associated with subsurface conditions are mitigated.* *5. Threats of future potential losses of interim use value are eliminated.* *6. Local nuisance impacts (e.g., air pollution, dust, noise, odor, loss of utility services, road congestion, etc) from nearby land uses and remediation activities have ceased.*	process.	

APPENDIX B

SECOND QUARTER 2014 GROUNDWATER MONITORING RESULTS

TABLE B-1
Second Quarter 2014 Groundwater Monitoring Results
Shallow Zone (Water Table) Wells
VOCs and Hydrocarbons

LOCATION NAME			MW-01	MW-02	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10	MW-11	MW-13	MW-14	MW-15	MW-16	MW-17
SAMPLE DATE			4/24/2014	4/24/2014	4/23/2014	4/25/2014	4/25/2014	4/25/2014	4/25/2014	4/22/2014	4/24/2014	4/22/2014	4/25/2014	4/24/2014	4/23/2014	4/22/2014	4/24/2014
SAMPLE NAME			MW-01	MW-02	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10	MW-11	MW-13	MW-14	MW-15	MW-16	MW-17
SAMPLE DELIVERY GROUP (SDG)	Method	Unit	14-04-1832	14-04-1832	14-04-1729	14-04-1979	14-04-1979	14-04-1979	14-04-1979	14-04-1614	14-04-1832	14-04-1614	14-04-1979	14-04-1832	14-04-1729	14-04-1614	14-04-1832
1,1,2-Trichloroethane	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	**2.0J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	SW8260B	µg/L	**23**	< 1.0	**2.3**	**4.7J**	**5.7**	**18**	**4.1**	< 1.0	**3**	< 1.0	< 5.0	**0.35J**	**2.5**	< 1.0	**0.38J**
1,1-Dichloroethene	SW8260B	µg/L	**53**	< 1.0	**7.5**	**8.5**	**7.9**	**50**	**14**	< 1.0	**11**	< 1.0	< 5.0	**4.1**	**7.3**	< 1.0	**0.67J**
1,2,3-Trichloropropane	SW8260B	µg/L	< 5.0	< 5.0	< 5.0	< 25	**2.0J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 25	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	SW8260B	µg/L	< 1.0	**5.7**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.5J**	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	SW8260B	µg/L	**4.1**	< 0.50	< 0.50	< 2.5	< 0.50	**0.56**	**0.32J**	< 0.50	< 0.50	< 0.50	< 2.5	< 0.50	< 0.50	< 0.50	< 0.50
1,3,5-Trimethylbenzene	SW8260B	µg/L	< 1.0	**0.75J**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**15**	**1**	< 1.0	< 1.0	< 1.0
Acetone	SW8260B	µg/L	< 20	< 20	< 20	< 100	**13J**	**13J**	< 20	< 20	< 20	< 20	< 100	< 20	< 20	< 20	< 20
Benzene	SW8260B	µg/L	**1.3**	**7.3**	**1.3**	**2.5J**	**150**	**0.68**	**3.3**	< 0.50	**9.7**	< 0.50	**510**	**130**	**2.1**	< 0.50	**36**
Chlorobenzene	SW8260B	µg/L	**0.29J**	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	SW8260B	µg/L	**1000**	< 1.0	**130**	**42**	**97**	**130**	**82**	< 1.0	**90**	< 1.0	**69**	**41**	**36**	< 1.0	**280**
Cumene (Isopropylbenzene)	SW8260B	µg/L	< 1.0	**0.75J**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**15**	**1**	< 1.0	< 1.0	< 1.0
Diisopropyl Ether (DIPE)	SW8260B	µg/L	< 2.0	< 2.0	< 2.0	< 10	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 10	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	SW8260B	µg/L	< 1.0	**5**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**100**	**8.2**	< 1.0	< 1.0	< 1.0
Methyl-tert-Butyl Ether	SW8260B	µg/L	**0.33J**	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	SW8260B	µg/L	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	**56**	**4.0J**	< 10	< 10	< 10
n-Butylbenzene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.3J**	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	SW8260B	µg/L	< 1.0	**2.4**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0
p/m-Xylene	SW8260B	µg/L	< 1.0	**14**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.1J**	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	SW8260B	µg/L	< 1.0	**0.38J**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0
Propylbenzene	SW8260B	µg/L	< 1.0	**0.83J**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**14**	**0.80J**	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 5.0	**0.33J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.9J**	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butyl Alcohol (TBA)	SW8260B	µg/L	< 10	< 10	**8.8J**	< 50	**24**	**14**	< 10	< 10	**26**	< 10	**28J**	**5.2J**	< 10	< 10	**9.6J**
Tetrachloroethene	SW8260B	µg/L	**2.7**	< 1.0	< 1.0	< 5.0	< 1.0	**1.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	SW8260B	µg/L	**23**	< 1.0	**5**	**8.9**	**22**	**0.59J**	**0.99J**	< 1.0	**2.9**	< 1.0	**5.3**	**1.3**	**1.6**	< 1.0	**10**
Trichloroethene	SW8260B	µg/L	**5.9**	< 1.0	< 1.0	**920**	**0.49J**	**3.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	**1.3**	< 1.0	< 1.0
Vinyl Chloride	SW8260B	µg/L	**0.37J**	< 0.50	**2.9**	< 2.5	**0.49J**	**0.38J**	< 0.50	< 0.50	< 0.50	< 0.50	< 2.5	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes, Total	SW8260B	µg/L	< 1.0	**17**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.1JA**	< 1.0	< 1.0	< 1.0	< 1.0
Carbon Chain C25-C28	SW8015B	µg/L	< 50	**26J**	< 48	**20J**	**17J**	< 48	< 48	< 48	**42J**	< 48	**77**	**40J**	< 48	< 48	< 50
Carbon Chain C29-C32	SW8015B	µg/L	< 50	**19J**	< 48	**9.4J**	< 48	< 48	< 48	< 48	**26J**	< 48	**52**	**27J**	< 48	< 48	< 50
Carbon Chain C33-C36	SW8015B	µg/L	< 50	**13J**	< 48	< 48	< 48	< 48	< 48	< 48	**14J**	< 48	**32J**	**18J**	< 48	< 48	< 50
Carbon Chain C37-C40	SW8015B	µg/L	< 50	< 50	< 48	< 48	**8.9J**	< 48	< 48	< 48	< 50	< 48	**12J**	**9.3J**	< 48	< 48	< 50
Carbon Chain C41-C44	SW8015B	µg/L	< 50	< 50	< 48	< 48	< 48	**15J**	< 48	< 48	< 50	< 48	< 48	< 50	< 48	< 48	< 50
Total Petroleum Hydrocarbons (C6-C44)	SW8015B	µg/L	< 50	**260**	< 48	**150**	**460**	**370**	**180**	< 48	**420**	< 48	**2900**	**520**	< 48	< 48	< 50
TPH as Gasoline	SW8015B	µg/L	**360HD**	**290HD**	**100HD**	**290HD**	**510HD**	< 50	**160HD**	< 50	**98HD**	< 50	**1600HD**	**240HD**	**92HD**	< 50	**160HD**
TPH as Diesel	SW8015B	µg/L	**34HDJ**	**220HD**	**42HDJ**	**110HD**	**400HD**	**410HD**	**200HD**	< 48	**390HD**	< 48	**2600HD**	**420HD**	**59HD**	**41HDJ**	**42HDJ**
TPH as Motor Oil	SW8015B	µg/L	< 250	**220HDJ**	< 240	< 240	**210HDJ**	**250HD**	< 240	< 240	**330HD**	< 240	**1300HD**	**350HD**	< 240	< 240	< 250

Notes:
Bold indicates results above lab reporting limit
ug/L = micrograms per liter
J = Estimated value; result between MDL and RL
JA = Estimated value
HD = Chromatographic pattern inconsistent

TABLE B-2
Second Quarter 2014 Groundwater Monitoring Results
Gage Wells
VOCs and Hydrocarbons

LOCATION NAME			MW-G01D	MW-G01S	MW-G02D	MW-G02D	MW-G02S	MW-G03D	MW-G03S	MW-G04D	MW-G04S
SAMPLE DATE			4/22/2014	4/22/2014	4/21/2014	4/21/2014	4/23/2014	4/22/2014	4/23/2014	4/21/2014	4/23/2014
SAMPLE NAME			MW-G01D	MW-G01S	MW-G02D	MW-G02D-DUP	MW-G02S	MW-G03D	MW-G03S	MW-G04D	MW-G04S
SAMPLE DELIVERY GROUP (SDG)	Method	Unit	14-04-1614	14-04-1614	14-04-1535	14-04-1535	14-04-1729	14-04-1614	14-04-1729	14-04-1535	14-04-1729
1,1,2-Trichloroethane	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	SW8260B	µg/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	SW8260B	µg/L	< 0.50	< 0.50	< 0.50	< 0.50	**1.7**	< 0.50	**3**	< 0.50	< 0.50
1,3,5-Trimethylbenzene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Acetone	SW8260B	µg/L	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Benzene	SW8260B	µg/L	< 0.50	< 0.50	< 0.50	< 0.50	**0.19J**	< 0.50	**0.24J**	< 0.50	**120**
Chlorobenzene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**12**	< 1.0	< 1.0
Cumene (Isopropylbenzene)	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diisopropyl Ether (DIPE)	SW8260B	µg/L	< 2.0	< 2.0	< 2.0	< 2.0	**2**	< 2.0	**0.48J**	< 2.0	< 2.0
Ethylbenzene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.50J**
Methyl-tert-Butyl Ether	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	SW8260B	µg/L	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
n-Butylbenzene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p/m-Xylene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Propylbenzene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butyl Alcohol (TBA)	SW8260B	µg/L	< 10	< 10	< 10	< 10	**15**	< 10	**46**	< 10	**160**
Tetrachloroethene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.25J**
trans-1,2-Dichloroethene	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.69J**	< 1.0	< 1.0
Trichloroethene	SW8260B	µg/L	< 1.0	**0.89J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	SW8260B	µg/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Notes:
Bold indicates results above lab reporting limit
ug/L = micrograms per liter
J = Estimated value; result between MDL and RL
HD = Chromatographic pattern inconsistent

TABLE B-2
Second Quarter 2014 Groundwater Monitoring Results
Gage Wells
VOCs and Hydrocarbons

LOCATION NAME			MW-G01D	MW-G01S	MW-G02D	MW-G02D	MW-G02S	MW-G03D	MW-G03S	MW-G04D	MW-G04S
SAMPLE DATE			4/22/2014	4/22/2014	4/21/2014	4/21/2014	4/23/2014	4/22/2014	4/23/2014	4/21/2014	4/23/2014
SAMPLE NAME			MW-G01D	MW-G01S	MW-G02D	MW-G02D-DUP	MW-G02S	MW-G03D	MW-G03S	MW-G04D	MW-G04S
SAMPLE DELIVERY GROUP (SDG)	Method	Unit	14-04-1614	14-04-1614	14-04-1535	14-04-1535	14-04-1729	14-04-1614	14-04-1729	14-04-1535	14-04-1729
Xylenes, Total	SW8260B	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbon Chain C6	SW8015B	µg/L	< 48	< 48	< 50	< 50	**11J**	< 48	**6.4J**	< 50	**58**
Carbon Chain C7	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	**15J**
Carbon Chain C8	SW8015B	µg/L	< 48	< 48	< 50	< 50	**11J**	< 48	**12J**	< 50	**30J**
Carbon Chain C9-C10	SW8015B	µg/L	< 48	< 48	< 50	< 50	**27J**	< 48	**24J**	< 50	**47J**
Carbon Chain C11-C12	SW8015B	µg/L	< 48	< 48	< 50	< 50	**18J**	< 48	< 48	< 50	**21J**
Carbon Chain C13-C14	SW8015B	µg/L	< 48	< 48	< 50	< 50	**22J**	**16J**	< 48	< 50	**17J**
Carbon Chain C15-C16	SW8015B	µg/L	< 48	< 48	< 50	< 50	**23J**	< 48	< 48	< 50	< 48
Carbon Chain C17-C18	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	< 48
Carbon Chain C19-C20	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	< 48
Carbon Chain C21-C22	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	< 48
Carbon Chain C23-C24	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	< 48
Carbon Chain C25-C28	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	< 48
Carbon Chain C29-C32	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	< 48
Carbon Chain C33-C36	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	< 48
Carbon Chain C37-C40	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	< 48
Carbon Chain C41-C44	SW8015B	µg/L	< 48	< 48	< 50	< 50	< 48	< 48	< 48	< 50	< 48
Total Petroleum Hydrocarbons (C6-C44)	SW8015B	µg/L	< 48	< 48	< 50	< 50	**110**	< 48	< 48	< 50	**190**
TPH as Gasoline	SW8015B	µg/L	< 50	< 50	< 50	< 50	**49J**	< 50	**50**	< 50	**280HD**
TPH as Diesel	SW8015B	µg/L	< 48	< 48	< 50	< 50	**110HD**	**41HDJ**	**59HD**	< 50	**89HD**
TPH as Motor Oil	SW8015B	µg/L	< 240	< 240	< 250	< 250	< 240	< 240	< 240	< 250	< 240

Notes:
Bold indicates results above lab reporting limit
ug/L = micrograms per liter
J = Estimated value; result between MDL and RL
HD = Chromatographic pattern inconsistent

TABLE B-3
Second Quarter 2014 Groundwater Monitoring Results
Shallow Zone (Water Table) Wells
General Minerals and Metals

LOCATION NAME			MW-01	MW-02	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10	MW-11	MW-13	MW-14	MW-15	MW-16	MW-17
SAMPLE DATE			4/24/2014	4/24/2014	4/23/2014	4/25/2014	4/25/2014	4/25/2014	4/25/2014	4/22/2014	4/24/2014	4/22/2014	4/25/2014	4/24/2014	4/23/2014	4/22/2014	4/24/2014
SAMPLE NAME			MW-01	MW-02	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10	MW-11	MW-13	MW-14	MW-15	MW-16	MW-17
SAMPLE DELIVERY GROUP (SDG)	Method	Unit	14-04-1832	14-04-1832	14-04-1729	14-04-1979	14-04-1979	14-04-1979	14-04-1979	14-04-1614	14-04-1832	14-04-1614	14-04-1979	14-04-1832	14-04-1729	14-04-1614	14-04-1832
Antimony	SW6020	mg/L	**0.000284J**	**0.000108J**	**0.000211J**	**0.000144J**	**0.000203J**	**0.00029J**	< 0.001	**0.000123J**	**0.000125J**	**0.000209J**	**0.000223J**	< 0.001	**0.000212J**	**0.000174J**	**0.000126J**
Arsenic	SW6020	mg/L	**0.000458J**	**0.000998J**	**0.00773**	**0.199**	**0.00892**	**0.00232**	**0.102**	**0.000523J**	**0.00205**	**0.00456**	**0.0453**	**0.00126**	**0.0952**	**0.000946J**	**0.00199**
Barium	SW6020	mg/L	**0.0961**	**0.121**	**0.236**	**0.165**	**0.445**	**0.296**	**0.478**	**0.145**	**0.507**	**0.169**	**0.588**	**0.171**	**0.142**	**0.159**	**0.0647**
Beryllium	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cadmium	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.000138J**
Chromium	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.000501J**	< 0.001	< 0.001	**0.00163**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	SW6020	mg/L	**0.000733J**	**0.000502J**	**0.000952J**	**0.000786J**	**0.000646J**	**0.00207**	**0.000706J**	**0.000571J**	**0.000826J**	**0.000565J**	**0.00113**	**0.000566J**	**0.000594J**	**0.000542J**	**0.00126**
Copper	SW6020	mg/L	**0.00609**	**0.00213**	**0.00213**	**0.00256**	**0.00251**	**0.00633**	**0.00195**	**0.00165**	**0.00323**	**0.00152**	**0.00391**	**0.00223**	**0.00174**	**0.00385**	**0.00245**
Lead	SW6020	mg/L	**0.000353J**	**0.0000902J**	**0.000363J**	**0.00088J**	**0.000135J**	**0.000228J**	< 0.001	**0.000136J**	**0.000163J**	**0.000179J**	**0.000268J**	**0.0002J**	**0.000193J**	**0.000214J**	**0.000172J**
Mercury	SW7470A	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	**0.00634**	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Molybdenum	SW6020	mg/L	**0.000902J**	**0.000644J**	**0.000947J**	**0.00781**	**0.00143**	**0.00991**	**0.00544**	**0.00165**	**0.00128**	**0.00231**	**0.000696J**	**0.00189**	**0.00205**	**0.00266**	**0.000232J**
Nickel	SW6020	mg/L	**0.0165**	**0.012**	**0.0119**	**0.0141**	**0.0116**	**0.0296**	**0.0164**	**0.0161**	**0.0187**	**0.0116**	**0.0172**	**0.0159**	**0.0111**	**0.0147**	**0.0153**
Selenium	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.000732J**	**0.000234J**	< 0.001	< 0.001	< 0.001	**0.00019J**	< 0.001	< 0.001	< 0.001	**0.00956**
Silver	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.00026J**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Thallium	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Vanadium	SW6020	mg/L	**0.0009J**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.000684J**	< 0.001	< 0.001	< 0.001	< 0.001
Zinc	SW6020	mg/L	**0.0207**	**0.0116**	**0.0289**	**0.0154**	**0.0113**	**0.014**	**0.0385**	**0.0171B**	**0.00944**	**0.019B**	**0.0145**	**0.0167**	**0.0491**	**0.0148B**	**0.0155**

Notes:
Bold text indicates results above laboratory reporting limit.
mg/L = milligrams per liter
J = Estimated value; the result is betweenthe MDL and the RL
B = Analyte detected in associated blanks

TABLE B-4
Second Quarter 2014 Groundwater Monitoring Results
Gage Wells
General Minerals and Metals

LOCATION NAME			MW-G01D	MW-G01S	MW-G02D	MW-G02D	MW-G02S	MW-G03D	MW-G03S	MW-G04D	MW-G04S
SAMPLE DATE			4/22/2014	4/22/2014	4/21/2014	4/21/2014	4/23/2014	4/22/2014	4/23/2014	4/21/2014	4/23/2014
SAMPLE NAME			MW-G01D	MW-G01S	MW-G02D	MW-G02D-DUP	MW-G02S	MW-G03D	MW-G03S	MW-G04D	MW-G04S
SAMPLE DELIVERY GROUP (SDG)	Method	Unit	14-04-1614	14-04-1614	14-04-1535	14-04-1535	14-04-1729	14-04-1614	14-04-1729	14-04-1535	14-04-1729
Antimony	SW6020	mg/L	**0.000761J**	**0.000214J**	**0.000261J**	**0.000409J**	**0.000224J**	**0.00056J**	**0.000189J**	**0.000149J**	**0.000288J**
Arsenic	SW6020	mg/L	**0.00341**	**0.00255**	**0.00473**	**0.00467**	**0.00312**	**0.00843**	**0.00802**	**0.0046**	**0.0196**
Barium	SW6020	mg/L	**0.024**	**0.126**	**0.0403**	**0.0484**	**0.269**	**0.0549**	**0.263**	**0.0523**	**0.0355**
Beryllium	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.000636J**	< 0.001	< 0.001	< 0.001
Cadmium	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.00028J**	< 0.001	< 0.001	< 0.001
Chromium	SW6020	mg/L	< 0.001	**0.000602J**	< 0.001	< 0.001	< 0.001	**0.000776J**	< 0.001	< 0.001	< 0.001
Cobalt	SW6020	mg/L	**0.000207J**	**0.000475J**	**0.00024J**	**0.000371J**	**0.000374J**	**0.000769J**	**0.000315J**	**0.000442J**	**0.000164J**
Copper	SW6020	mg/L	**0.00128**	**0.00213**	**0.000519J**	**0.00112**	**0.0015**	**0.000927J**	**0.00096J**	**0.00134**	**0.0016**
Lead	SW6020	mg/L	**0.000181J**	**0.000187J**	< 0.001	**9.14E-05J**	**0.000136J**	**0.000294J**	< 0.001	**0.000331J**	**0.000175J**
Mercury	SW7470A	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Molybdenum	SW6020	mg/L	**0.00131**	**0.000975J**	**0.000748J**	**0.000822J**	**0.00287**	**0.00207**	**0.00177**	**0.00141**	**0.00292**
Nickel	SW6020	mg/L	**0.00794**	**0.0135**	**0.00451Bj**	**0.00842Bj**	**0.00998**	**0.0112**	**0.00961**	**0.00811B**	**0.00435**
Selenium	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Silver	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Thallium	SW6020	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.00056J**	< 0.001	< 0.001	< 0.001
Vanadium	SW6020	mg/L	**0.000218J**	< 0.001	**0.00044J**	< 0.001	< 0.001	**0.000689J**	< 0.001	< 0.001	**0.000331J**
Zinc	SW6020	mg/L	**0.0779B**	**0.0312B**	**0.00366Jb**	**0.00689b**	**0.0145**	**0.0374B**	**0.00543**	**0.0247b**	**0.0192**

Notes:
Bold text indicates results above lab reporting limit
mg/L = milligrams per liter
J, j = Noted as estimated by lab or data validation, respectively
B, b = Noted as present in blank by lab or data validation, respectively

APPENDIX C

SURFACE CONTAINMENT AND SOIL MANAGEMENT PLAN

SURFACE CONTAINMENT AND SOIL MANAGEMENT PLAN

INTRODUCTION

URS Corporation (URS) has prepared this Surface Containment and Soil Management Plan (SMP) as part of the Revised Remedial Action Plan (Revised RAP) for the Former Kast Property (Site) in Carson, California on behalf of Equilon Enterprises LLC, doing business as Shell Oil Products US (Shell or SOPUS). The SMP is submitted in accordance with Cleanup and Abatement Order (CAO) No. R4-2011-0046 issued to Shell by the California Regional Water Quality Control Board – Los Angeles Region (RWQCB or Regional Board) on March 11, 2011 and the RWQCB's letter dated January 23, 2014 directing Shell to submit a RAP and Human Health Risk Assessment for cleanup of the Carousel Tract pursuant to California Water Code Section 13304.

The Regional Board is the lead Regulatory Agency for this project; however, the protocols presented in this SMP are intended to apply to all parties involved in soil disturbance activities at the Site (e.g., excavation, landscaping, utility installation), including the City of Carson, County of Los Angeles Department of Public Works, local utility providers, contractors, and residents.

OBJECTIVE

This SMP provides the detailed approach to mitigate potential residential, construction, or utility worker exposure to soils that do not meet Remedial Action Objectives (RAOs) and that may remain at the Site following implementation of the excavation remedy outlined in the Revised RAP and forthcoming Remedial Design Implementation Plan (RDIP). For the purposes of this SMP, these soils will be referred to herein as "residual soils." The SMP details the long-term approach to address potential residual soils should the need arise to disturb these soils in the future. Residual soils may be present at depths below the depth of excavation, as well as in areas not excavated such as beneath homes, City sidewalks and streets.

BACKGROUND

Remediation of soil, soil vapor, and groundwater is required, as approved by the Regional Board, in portions of the Site that do not meet RAOs under existing conditions. In accordance with the CAO, this SMP specifies on-going monitoring requirements for residual soils that will remain in place after remedial excavation. The SMP summarizes protocols for containment, monitoring, and management of such residual soils. This SMP is designed to be used in conjunction with existing administrative controls (e.g., City of Carson and Los Angeles County Codes regarding construction, grading, landscaping, and excavation and encroachment permits).

Site-related constituents of concern (COCs, those COCs associated with the historic use of the Site as an oil storage facility) consist of petroleum hydrocarbon-derived constituents and some metals. In addition, other chemicals have been detected in Site soils that are unrelated to the former Site use as an oil storage facility and are referred to as non-Site-related COCs.

Proposed remedial actions include excavation to 5 feet bgs in landscaped areas of residential properties and areas covered by residential hardscape, including residential planters, walkways, and uncovered patios at properties where RAOs and the more stringent of the health risk-based or leaching to groundwater criteria are not met under existing conditions. Additionally, local targeted deeper excavations from 5 to 10 feet bgs will be conducted at properties in areas where significant additional hydrocarbon mass can be removed. Soil will not be excavated from areas beneath homes, City sidewalks and streets. Excavated areas will be backfilled and landscaping/hardscaping will be restored to like conditions. The backfill and landscaping will provide a protective barrier to minimize the potential for exposure to soils below the depth of excavation. Soils below a depth of 5 feet and soils beneath surface containment features (see below) will be addressed through a combined soil vapor extraction (SVE) and bioventing system that will include installation of SVE/bioventing wells both in City streets and on residential properties where RAOs are not met following soil excavation.

This Soil Containment and Soil Management Plan outlines procedures so that residents or construction/utility workers are not inadvertently exposed to soils that exceed the RAOs for the Site.

SURFACE CONTAINMENT

Physical barriers (e.g., presence of not impacted with COCs that exceed RAOs soil to a depth of 5 feet, hardscape, or structures, and City streets and sidewalks) will serve to contain and/or prevent exposure to underlying impacted soils and will restrict access and exposure to deeper soils. In areas where impacted soils will be excavated to 5 feet bgs, the clean imported soil backfill or controlled low strength materials (CLSM, or sand-cement slurry) will serve as a barrier restricting exposure to underlying soils. Additionally, Site soils that meet RAOs will provide surface containment preventing contact with underlying residual soils. Where soils are not removed as part of the remedial excavation, the existing cover (consisting of concrete foundations and floor slabs of houses, garages, City sidewalks, street pavement, etc.) will provide a protective barrier to minimize the potential for exposure to impacted soil below. Site features, such as homes, garages, City sidewalks, and roads are considered part of the protective barrier.

MANAGEMENT OF RESIDUAL SOILS CONTAINING SITE COCS ABOVE SSCGS

Following remedial excavation, residual soils may remain below 5 feet bgs and beneath homes, garages, streets and City sidewalks. The potential for contact with these residual soils will be mitigated by the surface containment features described above, except in limited instances where excavation deeper than 5 feet may be necessary. Because City Code requires permits for excavations deeper than 3 feet, there is an administrative control already in place to restrict potential contact with these deeper soils (i.e., a permit requirement). This administrative control and notification mechanism is further discussed below.

Based on the distributions of COCs on each property (e.g., Figures 3-3 through 3-14 of this Revised RAP) and the results of post-excavation soil sampling, Shell will have a means to identify soils remaining after remedial excavation and remedial system installation that do not meet RAOs. This will provide sufficient identification of the residual soils remaining at the Site to allow any entity performing future excavations at the Site to anticipate the environmental conditions they may

encounter. It is anticipated that SVE/bioventing will reduce COC concentrations in residual soils to meet RAOs within an estimated 30 to 40 years (see Section 8.2.4 of the Revised RAP).

Administrative Controls

The City of Carson Building Code Section 8105, which amends the L.A. County Building Code Section 7003.1, is an existing institutional control that would limit, through permitting processes, contact with impacted soils beneath a depth of 3 feet. This existing institutional control supports the planned 5-foot soil excavation remedy. Because of this code provision, the City must be notified and approve excavations deeper than 3 feet. The City could readily inform residents and workers of other appropriate precautions necessary for excavations below the 5-foot depth of planned remedial excavation through existing administrative processes, and also notify Shell that monitoring and disposal may be required. Shell would coordinate with the City of Carson to establish a process through existing building and grading permit reviews, General Plan overlay or footnote, area plan, or similar process, to ensure that if a property owner were to conduct activities involving excavations greater than 5 feet deep (such as building renovation, installation of a pool or deeper landscape alterations), Shell would be notified so that the company could arrange for sampling and proper handling of impacted soils.

Because an institutional control is already in place in the City of Carson requiring grading permits in order to excavate at depths below 3 feet, these requirements would not interfere with a homeowner's unrestricted property use and enjoyment. Depending on the selected remedy, LUCs (e.g., restrictive covenants, easements), may also may be appropriate to fully implement remedial alternatives for the Site. Under certain remedial scenarios such as a homeowner requesting that certain landscaping or hardscape not be removed, a new LUC would be required to advise of the residual soils present, but it would not be effective absent homeowner agreement and cooperation.

Anyone performing excavation is required by law to notify the Underground Service Alert (USA) one-call system. Additionally, Shell's contractors are, and would continue to be, set up within the USA one-call system to receive notification of planned excavation work in the Carousel Tract. Upon notification of planned excavations, Shell or their contractors would coordinate with the entity that contacted USA (whether the homeowner or their representative, a homeowner's contractor, or utility company such as Cal-Water, Southern California Gas Company, or AT&T) to provide monitoring and management and handling of residual soils during excavation activities.

Additionally, Shell will implement a community outreach program to inform and educate residents in the community of residual impacted soils and of the notification procedures for management of these materials via the Surface Containment and Soil Management Plan.

Monitoring

A number of types of monitoring may be performed to support excavation activities, depending on the volume and extent of excavation. Appropriate monitoring for dust, odor, and vapors will be conducted. Where required, Shell will offer to perform monitoring if not otherwise being performed by the party doing the work. At a minimum, real-time monitoring of the work area and excavations will be conducted using a photoionization detector (PID) during excavation operations. Monitoring may also be conducted with a flame-ionization detector (FID) for methane in the parts per million by volume (ppmv) range and a four-gas meter for methane in the percent level, oxygen, carbon dioxide,

and hydrogen sulfide. Monitoring for odors may also be conducted based on worker perception, at the downwind property boundary of the residential property where excavation is occurring.

To mitigate offsite dust migration and resultant impacts to neighboring properties, dust monitoring will be conducted for large excavations. If visible dust is encountered, periodic watering of the active excavation areas will be recommended throughout the excavation and backfill activities. In addition to dust suppression efforts, odor suppressants will be recommended to mitigate offsite migration of odors from the work area.

Soils Management

As discussed above, notification through participation in the USA system or City of Carson permit requirements would allow Shell's representatives to collect appropriate samples and arrange for disposal of soil generated from utility work, if appropriate. If excavation of the soil is necessary for residential or utility provider construction activities, it is likely that impacted soil would not be suitable for re-use. If requested by the property owner or utility service provider, Shell would arrange for the removal, transportation, and offsite disposal of impacted soil by a qualified waste contractor. If potentially impacted soil is observed during urgent or emergency construction activities (e.g., a gas line repair), and an authorized representative is not onsite, Shell should be notified as early as possible to allow the material to be profiled and properly disposed. If Site soils are being excavated on an urgent basis, the property owner or contractor should ensure that potentially affected soil is segregated and stockpiled to allow for proper soil profiling and management.

After receiving notification that potentially impacted soil could be encountered during the course of construction activities, Shell would arrange for a contractor to collect samples of the soil (either in situ or from a segregated stockpile) for profiling purposes if an updated waste profile is needed.

To the extent possible, impacted soil would be direct loaded into approved waste containers for transport to the appropriate recycling or disposal facility. With advance notice, Shell would provide suitable containers based on the nature of the excavation work being conducted. In the event that it is necessary to temporarily stockpile soil onsite before loading, soils should be placed upon plastic sheeting and covered with plastic until they could be loaded into approved waste containers to be provided.

Excavated impacted soil would be transported offsite to appropriately licensed recycling/disposal facilities by a state-licensed waste hauler for appropriate recycling or disposal. To the extent possible, soils would be pre-profiled, and approval would be obtained from the recycling/disposal facilities before excavation activities begin. Documentation pertaining to waste disposal profiles and waste disposal acceptance would be in place prior to any offsite shipments of waste.

CONTACTS

Information regarding the implementation of this SMP can be obtained by calling the Regional Water Quality Control Board project manager at the number listed below. Other governmental agencies that may be responsible for implementing the Soil Management Plan include the South Coast Air Quality Management District (SCAQMD), Los Angeles County Department of Public Works, Los

Angeles County Fire Department, Los Angeles County Department of Health, and the City of Carson.

If you have any questions or wish to discuss the project, please contact:

Teklewold Ayalew, PhD, PG
Regional Board Project Manager
(213) 576-6739
tayalew@waterboards.ca.gov

Shell's Kast Community Information Line
(310) 857-2335
info@kastproperty.com

APPENDIX D

PRELIMINARY RELOCATION PLAN

PRELIMINARY RELOCATION PLAN

Introduction

As part of implementation of the Revised Remedial Action Plan (RAP), Shell Oil Products US (SOPUS or Shell) will provide temporary alternative accommodations to eligible residents of properties while remedial actions (in particular remedial excavations) are performed in the yards of their residences, in compliance with recommendations of the Revised Human Health Risk Assessment (Revised HHRA), Revised Feasibility Study (Revised FS), and this Revised RAP, and under the oversight of the Los Angeles Regional Water Quality Control Board (RWQCB or Regional Board). During remedial excavation, backfill, and restoration work, residents of the properties where excavation is conducted will be temporarily relocated as described herein. Following backfill and utility and hardscape restoration, residents would move back into their homes during landscape restoration and fence/block wall construction, or, at their option, wait to return until after the landscape restoration work is completed.

Residents of properties adjacent to locations where excavations are occurring will be offered alternative accommodations if necessary based on the nature of the excavation work, the potential for interruptions of access to the property, or due to disruptions in utility service to the property. Relocation of residents at adjacent or nearby properties will include services and security as described herein.

This is an overview of the Program and the services being offered. If desired by a resident, a Cartus Program counselor will be available to review a resident's particular needs during relocation and present the Program features and options available.

About the Program

The Program is being offered to eligible residents of properties where excavation will be performed that may cause a temporary inconvenience to the residents and necessitate temporary alternative living arrangements during excavation and restoration.

The Program:

- Offers a payment that can be applied towards temporary living expenses for the members of the household living at the residence;
- Provides assistance, if desired, with making temporary living arrangements and/or hotel accommodations billed directly to Cartus, a Shell relocation contractor;
- Provides an inconvenience allowance as part of the payment.

It is anticipated that Cartus, a nationwide real estate services company, will administer the Program.

Alternative accommodations may be offered on a case-by-case basis to residents of neighboring properties to minimize disruptions (due to interruptions of access to the property resulting from

equipment staging, or due to disruptions in utility service to the property, noise, or other conditions) to those residents.

Program Eligibility

Residing owners or tenants of a residential property that qualifies for temporary living arrangements (as determined by Shell or its consultants/contractors as set forth above) due to remediation-related excavation activities are eligible for the Program.

It is a requirement of the Program that the resident sign a "Use of Home and Acknowledgement of Payment to Occupants" form in order to receive program benefits. Please see Attachment A – "Use of Property and Acknowledgement of Payment of Occupants."

Planned Remediation Activities

Overview

As described in the Revised RAP, Shell intends to conduct the following multi-media remedial actions for the Site:

- Excavation of shallow soils to 5 feet below ground surface (bgs) at impacted residential properties where Remedial Action Objectives (RAOs) are not met under existing conditions, and targeted excavation of deeper soils between 5 and approximately 10 feet bgs at certain properties where significant hydrocarbon mass can be reduced based on the distribution and concentration of hydrocarbons detected.
- Following excavation, a combination of soil vapor extraction (SVE) and bioventing will be conducted to address residual petroleum hydrocarbons and volatile organic compounds (VOCs) and methane in soils below the depth of excavation and areas not excavated. . SVE/bioventing wells will be installed in City streets and on residential properties, as appropriate.
- Sub-slab mitigation will be implemented at properties where RAOs are not met based on theoretical calculations of vapor intrusion risk or where methane concentrations in sub-slab soil vapor exceed the upper RAO for methane of 0.5%. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site.

Excavation of soils is the only activity anticipated to require temporary relocation of residents of the affected properties. Based on findings of the Revised Human Health Risk Assessment, Shell will excavate shallow soils at approximately 202 residential properties to a depth of 5 feet below existing grade, and additional targeted excavation of deeper soils between 5 and approximately 10 feet bgs at approximately 82 of those properties, where significant hydrocarbon mass can be reduced based on the distribution and concentration of hydrocarbons detected.

Soils will be excavated from both landscaped areas and areas currently covered by hardscape, including walkways, driveways, patio areas, and hardscape associated with landscaping. Hardscape and landscaping will be removed during the initial stage of excavation and restored to like conditions

following completion of excavation. Shell also anticipates that it may be necessary to remove most fences and block walls between yards and ornamental or partitioning walls on individual properties, as the depth of excavation will exceed footing depths, and removal of fences and walls separating side yards will facilitate equipment access to back yards. As with other hardscape, fences and walls will be restored following completion of excavation along with restoration of landscaping. Exceptions to excavation beneath hardscape include patios covered by structures and roofs, and swimming pools and pool decking surrounding swimming pools. These hardscape areas will not be excavated to avoid structural demolition and potential damage to swimming pools and appurtenant equipment. In addition, property-specific features may limit excavation in some localized areas and this will be considered as the individual Property-Specific Remediation Plans are developed.

Following approval of the RAP, a Site-wide Remedial Design and Implementation Plan (RDIP) will be prepared along with a Property Specific Remediation Plan (PSRP) for each property that requires remedial action. As part of PSRP preparation, Shell contractors will meet with homeowners and/or residents, and their legal representatives, as appropriate, to obtain necessary information for relocation during remedial implementation and to discuss hardscape and landscape restoration.

Remedial excavation is anticipated to proceed in phases, with each phase of work including approximately eight contiguous properties, if access can be obtained. Where possible, each phase will include homes on both sides of a city block (e.g., the east side of Marbella and west side of Neptune Avenues or the west side of Ravenna and east side of Panama Avenues). For properties on the perimeter of the tract, work will likely proceed at a smaller number of properties for each phase. This approach will be used so that back-of-lot and side yard fences or block walls can be removed one time and excavation conducted in both yards before the fences are restored.

Preliminarily, based on working five days per week, it is estimated that excavation and backfill will take approximately six weeks per property and site restoration will take an additional approximately two weeks. Approximately 10 weeks would be needed to complete a phase of eight properties. Thus, residents may be relocated for a period of approximately eight weeks, with potential for shorter or longer durations. Following backfill and utility and hardscape restoration, residents would move back into their homes during landscape restoration and fence/block wall construction, or, at their option, wait to return until after the landscape restoration work is completed. For non-excavated properties adjacent to properties where excavation work is being conducted, residents of adjacent properties and will be offered relocation as necessary.

Temporary Living Assistance

Overview

The goal of the Program is to provide eligible households with financial assistance toward the temporary living expenses that participants may incur due to temporary relocation during remediation activities. In addition, if desired, assistance with temporary living arrangements may be provided.

How the Program Assistance Payment is Established

At least two weeks prior to the relocation date, a meeting will be held with the residents to provide information about financial assistance to facilitate relocation, including relocation or boarding of pets

and assistance with transportation, if needed. Residents will be asked for general information about persons living in the home, such as the number of adults and children and the ages of the children. Special needs, such as long-term vehicle storage, special medical needs, or transportation needs will be discussed and accommodations will be made to ensure the relocation is as comfortable as possible for the residents. Refer to Attachment B for information to be obtained during the interview. Once the interview is completed, a financial assistance calculation will be completed and the residents will be informed of the amount to be provided.

Assistance with Temporary Living Arrangements

Residents will have the option to stay at a hotel of their choice and make their own arrangements subject to the daily payment amounts provided below. If requested, residents may choose to stay at a hotel arranged by and direct billed to Cartus. Available hotels for direct billing include:

- Marriott Residence Inn Torrance, 3701 Torrance Boulevard, Torrance, California;
- Marriott Residence Inn Manhattan Beach, 1700 North Sepulveda Boulevard, Manhattan Beach, California;
- Marriott Courtyard Torrance, 2633 Sepulveda Boulevard, Torrance, California;
- Marriott Residence Inn Downtown Long Beach, 600 Queensway Drive, Long Beach, California; and
- Marriott Residence Inn Long Beach, 4111 East Willow Street, Long Beach, California

In either instance, Shell will pay any pet fees charged by the hotel or pet boarding charges subject to daily limits.

If requested, Cartus can make the initial reservations and will provide contact information at the hotel in case any changes need to be made. In addition, direct billing can be set up for the room, pet fees, and tax. However, all other expenses (meals, etc.) shall be paid directly by the participating residents. Meals and other miscellaneous assistance based on the family profile will be provided in the payment amount. Any damage to hotel rooms, furnishings or other property during relocation periods will be the responsibility of the relocated residents.

Program Payment

The Program will provide eligible participants with assistance towards the temporary living expenses such as lodging and meals that may be incurred as a result of the remediation being completed at their home. The Program payment will be calculated by Cartus and will be communicated after the interview conducted as part of the RDIP and PSRP process.

Payment will be provided in the form of funds loaded onto one debit card per property. As noted above, the resident will need to sign a “Use of Property and Acknowledgement of Payment to Occupants” form in order to receive the payment. Please see Attachment A for further information.

Shell will provide relocated residents a daily meal allowance of $71 per day per adult, and $36 per day per child. These amounts are based on the 2014 Federal per diem allowance for the Los Angeles area (http://www.gsa.gov/portal/category/100120). For the purposes of meal allowance calculations, a child is considered a person 12 years of age or younger. If a resident chooses to make their own

hotel arrangements, the hotel allowance is $165 per night per room, based on 2 people per room. This amount is higher than the 2014 Federal per diem allowance for the area. Additionally, an inconvenience allowance will also be provided.

If the resident has pets that will not be staying at the hotel, the resident will be given the option to board the pets at a facility selected and reserved by Cartus, or to make their own arrangements to board pets with an allowance of $30 per day per pet. Additionally, Shell will pay for updated shots if the pet is not current on vaccinations required for boarding. Shell understands that some pets have special needs, such as regular medication, that might increase the cost of boarding a pet, and will take such special needs requests under consideration when provided an explanation of the need.

Security

While residents are temporarily relocated, onsite security, consisting of an off-duty law enforcement officer, will be present at each area where active remediation work is being conducted and the residents are relocated during the hours that URS or its subcontractor personnel are not present onsite. When working on both sides of a block, a security officer will be stationed on each street. A relief officer will be present in the neighborhood to relieve the onsite officer(s) for meal and rest breaks. In the event of an emergency, including suspicious persons/activities at or near the residence, emergency services will be contacted immediately by calling 911, followed by the resident or their designated legal representative, and URS. If the situation is not an emergency, URS will be notified immediately or, if after hours, at the start of the next working day. All verbal notifications will be followed by written documentation of the incident within 24 hours; including date, time, and description of the incident; who was contacted, and time the resident or their legal representative and URS representative were notified.

Attachment A

USE OF PROPERTY AND ACKNOWLEDGMENT OF PAYMENT TO OCCUPANTS

Company and Responsible Occupants agree as follows:

Agreement: This Use of Property and Acknowledgment of Payment to Occupants

Property Address:

Responsible Occupants (Owner or Tenant):

Company: Shell Oil Company

Activities: Excavation yard of Property including hardscape, and Restoration of Property

Leave Date:

Return Date:

Excavation and Restoration Period:

Number of Days in Excavation and Restoration Period: X days

Number of Nights in Excavation and Restoration Period: X-1 nights

Number of Occupants in Home (including Responsible Occupants) and Number of Pets to be Boarded:
X Occupants 13 years and older, X Occupants 12 years and younger, and X Pets to be boarded.

Payment to Responsible Occupants: $XXX TOTAL PAYMENT AMOUNT If one or more Occupants decide to stay at the house after having asked for alternative accommodations, the amounts provided for those accommodations will be adjusted accordingly.

What Company will do: (a) Have the right to use the Property for Remediation purposes during the Excavation and Restoration Period; (b) Pay to the Responsible Occupants the Total Payment Amount; (c) Repair any damage to the Property caused by Company's use of the Property during the Excavation and Restoration Period.

What Responsible Occupants will do: (a) Have all of the Occupants and pets leave the Home on or before the Leave Date and keep all Occupants and pets away from the Property during the entire Excavation Period until the specified Return Date; (b) Allow Company to use the Property during the Period for Excavation and Restoration (even if occupant elects to return during Restoration activities); (c) Notify Company of all known hazards or risks in the Property and in the Home; (d) Comply with all Rules of Occupancy at the temporary living facility/hotel during the Occupants' stay.

No Admission of Liability: Company is not admitting to any liability relating to the Property or the Home or any environmental matter relating to the Property or the Home by signing and performing this Agreement or conducting the Excavation and Restoration.

Signed as of <Date>.

RESPONSIBLE OCCUPANTS:

_____

[Signature]

_____

[Signature]

COMPANY:

_____

[Signature]

Attachment B

Sample Resident Questionnaire for Determining Temporary Relocation Assistance

Please provide all applicable information.		
Head of Household (Select one adult to represent the family. This is the name of the person that the temporary assistance payment will be made out to or to whose account the payment will be sent):		
Primary Residence Address:		
Occupancy Basis at Primary Address:	☐ Owner ☐ Tenant ☐ Living with Friend or Family. No rent paid.	
Type of Primary Residence	☐ House ☐ Apartment	☐ Mobile Home ☐ Other
Name and Address of Landlord/Mortgage Holder at Primary Address:		

Phone Numbers of Residents

Residence phone	
Cell phone (and name)	
Head of Household work or other #	

Occupants at Primary Address

Name	Age	Sex	Relationship to Head(s) of Household
1.			
2.			
3.			
4.			
5.			
6.			

Special Needs? (e.g., handicap accessible, special provisions for health concerns)
How many cars/trucks do you currently have that will require parking at the temporary address?

Hotel/Extended Stay Facility Needs *(Delete if not needed) (The company has ultimate discretion to determine the number of rooms needed.)*	
Number of Rooms: _____ Adjoining Rooms: ☐ No ☐ Yes Explain:	Refrigerator: ☐ No ☐ Yes Explain:

Apartment Needs *(Delete if not needed) (The company has ultimate discretion to determine the number of bedrooms needed.)*	
Number of bedrooms needed:	Other needs:

Staying with Friends or Family:	
Name and address of friend or family:	Phone number of friend or family:

Pet Needs

Do you have pets that will need to be temporarily relocated? ☐ No ☐ Yes	
How many pets and what type:	Are your pets up to date on all required shots? ☐ No ☐ Yes
Do any of your pets have unique needs? (e.g. daily medication, large aquariums, etc.) ☐ No ☐ Yes If yes, please explain:	

Transportation Needs

How do your children get to school currently?
What is the name of the school(s) your children attend:
Will your children require transportation to school from the temporary living facility? ☐ No ☐ Yes If yes, please provide details:
How far away is your workplace from your children's school(s)?
Do you have any other transportation needs?

Additional Information

Please provide any other information that you feel would be helpful in addressing your temporary living needs.

I certify that the above information is accurate and true. I understand that if any information on this form changes, I need to inform the Company. I also understand that if any information on this form is found to be inaccurate, some or all of my temporary relocation assistance may be denied or withdrawn.

Signature:_____

Printed name:_____

Date:_____

Addendum to Revised Remedial Action Plan

ADDENDUM TO REVISED REMEDIAL ACTION PLAN

ADDENDUM TO
REVISED REMEDIAL ACTION PLAN

FORMER KAST PROPERTY
CARSON, CALIFORNIA

Prepared for

Shell Oil Products US
20945 S. Wilmington Avenue
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October 15, 2014

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ADDENDUM TO REVISED REMEDIAL ACTION PLAN

FORMER KAST PROPERTY
CARSON, CALIFORNIA
Site Cleanup No. 1230
Site ID 2040330
Cleanup and Abatement Order No. R4-2011-0046

This Addendum to the Revised Remedial Action Plan dated October 15, 2014 (Addendum) for the former Kast Property was prepared on behalf of Equilon Enterprises LLC, doing business as Shell Oil Products US (Shell or SOPUS), by URS Corporation (URS) and Geosyntec Consultants, Inc. (Geosyntec). This Addendum is being submitted in response to Cleanup and Abatement Order No. R4-2011-0046 issued by the California Regional Water Quality Control Board, Los Angeles Region (RWQCB or Regional Board) on March 11, 2011, as modified by RWQCB correspondence, directing Shell to submit a Remedial Action Plan and Human Health Risk Assessment pursuant to California Water Code Section 13304. This Addendum is being submitted to respond to comments and questions by the California Regional Water Quality Control Board, Los Angeles Region (RWQCB or Regional Board) staff during meetings and conference calls pertaining to the Revised RAP dated June 30, 2014 and to clarify certain aspects of the proposed remedy.

The scope of services performed in preparation of this Addendum to the Revised RAP may not be appropriate to satisfy the needs of other users, and any use or reuse of this document or the information contained herein is at the sole risk of said user. No express or implied representation or warranty is included or intended in this Addendum except that the work was performed within the limits prescribed by the client with the customary thoroughness and competence of professionals working in the same are on similar projects. This report was prepared under the technical direction of the undersigned.

URS Corporation

Roy H. Patterson, P.G.
Vice President and Principal Geologist
October 15, 2014

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Senior Project Engineer

Glen T. Davis, PE
Senior Project Engineer

Geosyntec Consultants

Mark Grivetti, P.G., C.Hg.
Principal Hydrogeologist
October 15, 2014

Robert Ettinger
Principal

Ruth Custance
Principal

CERTIFICATION
ADDENDUM TO REVISED REMEDIAL ACTION PLAN

FORMER KAST PROPERTY
CARSON, CALIFORNIA

I am the Senior Project Manager for Equilon Enterprises LLC, doing business as Shell Oil Products US, for this project. I am informed and believe that the matters stated in the this Addendum to the Revised Remedial Action Plan for the former Kast Property, Carson, California are true, and on that ground I declare, under penalty of perjury in accordance with Water Code section 13267, that the statements contained therein are true and correct.

Douglas Weimer
Sr. Principle Program Manager
Shell Oil Products US
October 15, 2014

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Revised Figure 6-4 Properties Exceeding Human Health Criteria for Sub-Slab Soil Vapor to Indoor Air

LIST OF ACRONYMS AND ABBREVIATIONS

ACI	American Concrete Institute
bgs	Below ground surface
BTV	Background Threshold Value
Cal-EPA	California Environmental Protection Agency
CAO	Cleanup and Abatement Order
CEQA	California Environmental Quality Act
CLSM	Controlled low-strength materials
cm	Centimeters
COCs	Constituents of Concern
CY	Cubic yard
DTSC	Department of Toxic Substances Control
EIR	Environmental Impact Report
FS	Feasibility Study
g	Grams
Geosyntec	Geosyntec Consultants, Inc.
HHRA	Human Health Risk Assessment
HI	Hazard Index
ILCR	Incremental lifetime cancer risk
L	Liter
LABC	Los Angeles Building Code
LACDPW	Los Angeles County Department of Public Works
mg/kg	Milligrams per kilogram
MNA	Monitored natural attenuation
NAPL	Non-aqueous phase liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NRMCA	National Ready Mixed Concrete Association
O&M	Operations and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
PAHs	Polycyclic aromatic hydrocarbons
PCE	Tetrachloroethene
pcf	Pounds per cubic foot
psi	Pounds per square inch
PSRP	Property-specific Remediation Plan
RACR	Remedial Action Completion Report
RAP	Remedial Action Plan
RAOs	Remedial Action Objectives
RDIP	Remedial Design and Implementation Plan
Regional Board	Regional Water Quality Control Board
ROVI	Radius of vacuum influence
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
scfm	Standard cubic feet per minute
Site	Former Kast Property, Carson, California
SOPUS	Shell Oil Products United States
SSCGs	Site-specific cleanup goals
SSD	Sub-slab depressurization

SVE	Soil vapor extraction
SVOCs	Semi-volatile organic compounds
SWRCB	State Water Resources Control Board
TCE	Trichloroethene
THMs	Trihalomethanes
TPH	Total petroleum hydrocarbons
TPHd	Total petroleum hydrocarbons as diesel
TPHg	Total petroleum hydrocarbons as gasoline
TPHmo	Total petroleum hydrocarbons as motor oil
URS	URS Corporation
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit
VOCs	Volatile organic compounds
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
$\mu g/m^3$	Micrograms per cubic meter
%	Percent

EXECUTIVE SUMMARY

This Addendum to the Revised Remedial Action Plan (Revised RAP) for the former Kast Property (Site) in Carson, California was prepared by URS Corporation (URS) and Geosyntec Consultants, Inc. (Geosyntec) on behalf of Equilon Enterprises LLC, doing business as Shell Oil Products US (Shell or SOPUS) in accordance with Cleanup and Abatement Order (CAO) No. R4-2011-0046 issued to Shell by the California Regional Water Quality Control Board – Los Angeles Region (RWQCB or Regional Board) on March 11, 2011 and the RWQCB's letter dated January 23, 2014 directing Shell to submit a RAP and Human Health Risk Assessment (HHRA) pursuant to California Water Code Section 13304. A RAP, Feasibility Study (FS) and HHRA were timely submitted to the Regional Board on March 10, 2014 as directed in the RWQCB's January 23, 2014 letter. The Regional Board, along with the Office of Environmental Health Hazard Assessment (OEHHA) and UCLA Expert Panel reviewed these documents, and the Regional Board provided comments in its letter dated April 30, 2014. The April 30, 2014 letter directed Shell to submit a Revised RAP, FS, and HHRA addressing the RWQCB, OEHHA and the Expert Panel's comments and directives by June 16, 2014. Per the Regional Board's letter dated June 4, 2014, the submittal date was revised to June 30, 2014, on which date the Revised RAP (URS and Geosyntec, 2014), Revised HHRA (Geosyntec, 2014b) and Revised FS (Geosyntec, 2014c) were submitted. This Addendum to the Revised RAP is being submitted to respond to comments and questions by RWQCB staff during meetings and conference calls and to clarify certain aspects of the proposed remedy. Addenda to the Revised HHRA (Geosyntec, 2014d) and Revised FS (Geosyntec, 2014e) are being submitted concurrently as separate documents.

This Executive Summary includes all of the information previously presented in the Executive Summary from the Revised RAP dated June 30, 2014 amended with updated information from this Addendum.

The Revised RAP, along with the Revised HHRA and Revised FS, were prepared to fully address the Regional Board's directives provided beginning on Page 15 of the April 30, 2014 letter. The Revised RAP summarizes the remedial alternative evaluation process provided in the companion Revised FS and identifies and describes recommended full-scale remedial actions for impacted shallow soil and other media at the Site in accordance with requirements of the CAO and directives in the Regional Board's January 23 and April 30, 2014 letters. The Revised RAP and the recommended remedy comply with applicable provisions of the California Health and Safety Code, California Water Code, and State Water Resources Control Board (SWRCB) Resolution 92-49, and in particular, the Regional Board and Expert Panel's comments on the previously submitted RAP dated March 10, 2014.

The Revised RAP and the companion HHRA and FS were prepared following extensive multimedia investigations at the Site from 2008 to present. Key assessment work completed at the Site includes:

- Assessment in public rights-of-way, the adjacent railroad right-of-way, and other non-residential areas including soil, soil vapor, groundwater, and outdoor air media;
- Assessment at 95% of the individual residential properties, including soil, sub-slab soil vapor, and indoor air testing;
- Assessment of environmental impact and feasibility of removal of residual concrete reservoir slabs;
- Pilot testing to evaluate different potential remedies for Site impacts; and
- Development of Site-Specific Cleanup Goals.

The Site has been impacted with petroleum hydrocarbons associated with crude oil storage during the period prior to residential redevelopment. Total petroleum hydrocarbon (TPH) impacts occur in shallow and deep soils together with volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs), and some metals. VOCs, including benzene, and methane resulting from degradation of petroleum hydrocarbons are present in soil vapor[1]; dissolved-phase VOC and TPH impacts are present in groundwater, and LNAPL consisting of crude oil is locally present in the groundwater underlying a portion of the Site. In addition to hydrocarbon-related impacts, the Site is also locally impacted by chlorinated solvents, such as tetrachloroethene (PCE) and trichloroethene (TCE), and from a class of chlorinated compounds associated with potable water treatment referred to as trihalomethanes (THMs). Because THMs are related to residential water use, they are not considered constituents of concern (COCs) at the Site.

Some of these compounds, referred to as COCs, are present at concentrations that may pose an incremental cancer risk or human health hazard greater than the *de minimis* risk level of one in a million or Hazard Index greater than 1. Although it does not present a human health risk based on exposure, methane can potentially pose an explosion hazard where present in an enclosed space at a concentration between 5 and 15% in air and there is a source of ignition. In addition, concentrations for some COCs exceed criteria for the potential leaching to groundwater pathway.

A set of final recommended Site-Specific Cleanup Goals (SSCGs) was developed in the HHRA (Geosyntec, 2014a). SSCGs were developed for COCs in soil, soil vapor, and groundwater. The Regional Board commented on certain of these SSCGs, and the Revised RAP was modified to incorporate RWQCB-directed and approved SSCGs.

Medium-specific (i.e. soil, soil vapor, and groundwater) Remedial Action Objectives (RAOs) were developed. These RAOs include:

- Prevent human exposures to concentrations of COCs in soil, soil vapor, and indoor air such that total (i.e., cumulative) lifetime incremental cancer risks are within the National Oil and

[1] Unless otherwise specified in this document, the term "soil vapor" is used to address both sub-slab and deeper soil vapor.

Hazardous Substances Pollution Contingency Plan (NCP) risk range of one in one million to one hundred in one million (1×10^{-6} to 1×10^{-4}) and noncancer Hazard Indices are less than 1 or concentrations are below background, whichever is higher. Potential human exposures include onsite residents and construction and utility maintenance workers. For onsite residents, the lower end of the NCP risk range (i.e., 1×10^{-6}) and a noncancer Hazard Index less than 1 have been used.

- Prevent fire/explosion risks in indoor air and/or enclosed spaces (e.g., utility vaults) due to the accumulation of methane generated from the anaerobic biodegradation of petroleum hydrocarbons in soils. Eliminate methane in the subsurface to the extent technologically and economically feasible.
- Remove or treat LNAPL to the extent technologically and economically feasible, and where a significant reduction in current and future risk to groundwater will result.
- Reduce COCs in groundwater to the extent technologically and economically feasible to achieve, at a minimum, water quality objectives in the Basin Plan to protect the designated beneficial uses, including municipal supply.

A further consideration is to maintain residential land-use of the Site and avoid displacing residents from their homes or physically dividing the established Carousel community.

The Revised FS (Geosyntec, 2014c) and Addendum to the Revised FS (Geosyntec, 2014e) identified and screened a range of remedial technologies potentially applicable to site cleanup. Remediation technologies were screened and then assembled into remedial alternatives that were subjected to initial screening and detailed evaluation for cleanup of the Site. Detailed evaluation conducted for the Revised FS and Addendum to the Revised FS included evaluation of costs associated with each of the alternatives considered and incremental costs vs. benefits of different alternatives in accordance with SWRCB Resolution 92-49. Estimates of mass proposed to be left in place and the basis for estimating the time and cost to reduce the concentrations of constituents of concern is detailed in the Revised FS and formed a part of the basis for selecting the recommended Alternative 4D. The estimated cost for the recommended remedy is $146 million. The detailed evaluation of alternatives, along with the April 30, 2014 comments and consideration of State Acceptance, led to selection of the following recommended alternative and multi-media remedial action approach:

- Excavation of shallow soils from both landscaped and hardscaped areas of residential yards at impacted residential properties where RAOs are not met under existing conditions.
    - Excavation will be conducted to a depth of 5 feet below ground surface (bgs) throughout the accessible areas of front and back yards at approximately 207 properties identified based on Site characterization data, the soil concentration contour maps, results of the HHRA, and where groundwater protection SSCGs are exceeded, subject to setbacks to protect structures and sensitive utilities.
    - The 207 properties include those identified in the Revised RAP, four additional properties identified in the Addendum to the Revised HHRA (Geosyntec, 2014d), plus one property where all testing has been completed except soil sampling due to hardscape

cover and utility conflicts that was added based on information from surrounding properties. The excavation will also remove residual concrete slabs, to the extent practicable, if encountered within the depth excavated.

- The 207 properties identified for excavation to 5 feet bgs are shown on the figure on page ES-7.

- Excavation of deeper soils between 5 and approximately 10 feet bgs at approximately 85 properties where significant hydrocarbon mass can be reduced based on the distribution and concentration of hydrocarbons detected. Included are properties identified for this Addendum based on examining different spatial distribution mapping methods: point-by-point maps, two-dimensional contour maps, and three-dimensional contours together with a cost-benefit analysis in the Addendum to the Revised FS (Geosyntec, 2014e).
  - In total, 123 yards at 85 properties are now identified for targeted deeper excavation. Some properties were identified for excavation of both front and back yards, while others were identified for excavation of only the front or back yard.
  - Targeted deeper excavation will be conducted where equipment access is feasible and excavation can be achieved safely, subject to allowable setbacks from structures and sensitive utilities.
  - The 85 properties identified for targeted excavation from 5 to 10 feet bgs are shown on the figure on Page ES-7.
  - In addition, there are 12 properties for which no environmental characterization data have been collected as of September 9, 2014. For purposes of the Environmental Impact Report (EIR) being prepared in accordance with the California Environmental Quality Act (CEQA), it has been assumed that these 12 properties will be excavated to 10 feet bgs. Whether excavation is needed at these 12 properties, and the scope of any such work, would be established based on analysis of sampling data obtained when access is obtained.
  - This brings the assumed total to 219 properties for excavation to 5 feet bgs and 146 yards at 97 properties for excavation to 10 feet bgs for EIR planning purposes.

- The total soil volume to be excavated is approximately 161,700 cubic yards (CY) and includes up to approximately 133,810 CY of soil for excavation to 5 feet bgs, up to 27,855 CY of soil for targeted deeper excavations to 10 feet bgs. These volumes include assumed excavation of the 12 remaining properties that have not been sampled. An additional approximately 8,100 CY of soils will be excavated for SVE piping installation.

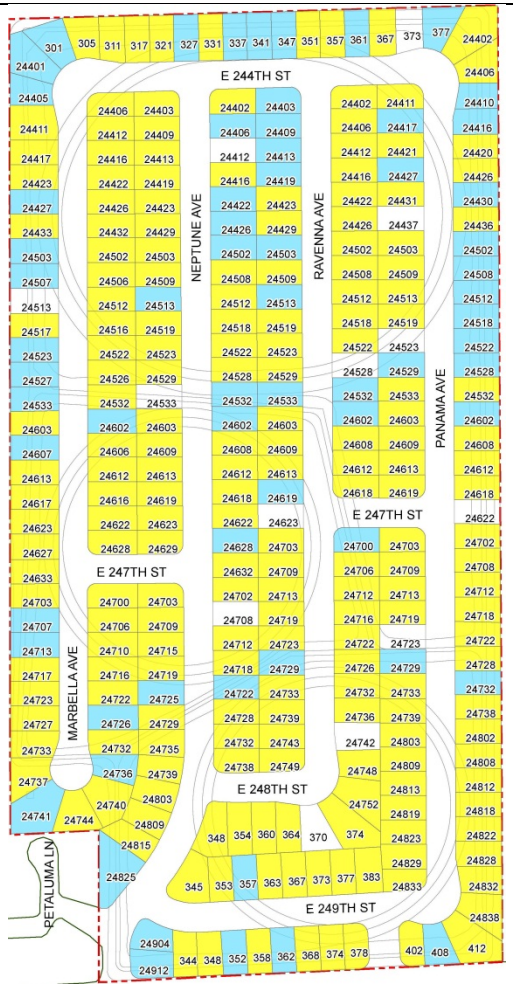
- Potential additional lateral or vertical excavation based on findings from excavations to 5 feet bgs or from 5 to 10 feet bgs has been considered in this Addendum to the Revised RAP where evidence of mobile hydrocarbons are observed during excavation.

- Excavation may be accomplished using a variety of methods, including track-mounted excavators, backhoes, track-mounted limited access auger drill rigs, and by hand, where necessary. Specific equipment to be used will be identified in the Remedial Design and

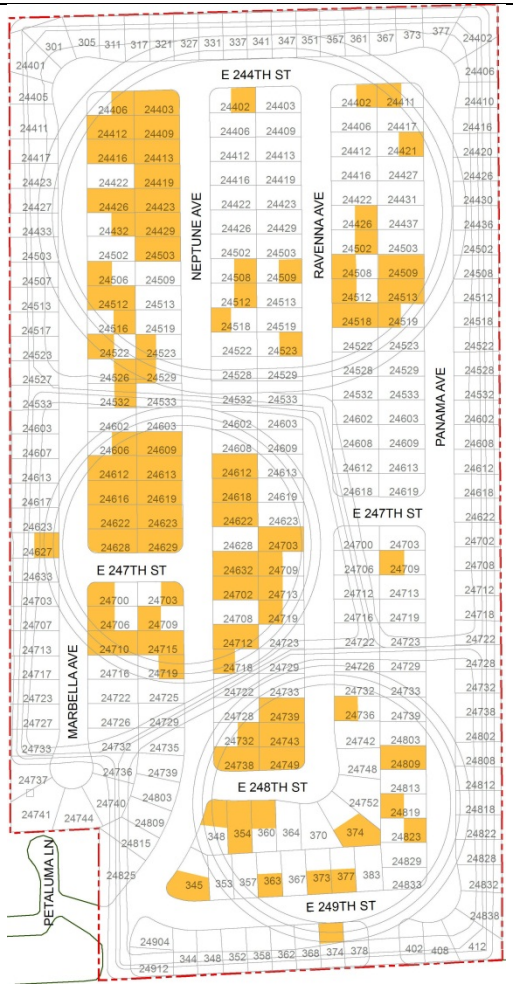
Implementation Plan (RDIP) and in Property-specific Remediation Plans (PSRPs) to be developed after approval of the RAP.

- This Addendum to the Revised RAP includes additional information regarding the use of controlled low-strength materials (CLSM or sand-cement slurry) for backfill of auger and slot-trench excavations. These materials will be used where deeper excavations require backfill the same day and for large-diameter auger borings drilled for soil excavation purposes. Where placed shallower than 3 feet bgs, CLSM will be removed and the upper 3 feet will be backfilled with clean imported soil.
- The possibility of exposure to soils remaining below 5 feet bgs and impacted soils beneath City streets and sidewalks is addressed through existing institutional controls that require a Grading Permit be issued by the City of Carson for excavations deeper than 3 feet and a Surface Containment and Soil Management Plan to address notifications, management, and handling of residual soils that are impacted by COCs at concentrations greater than risk-based levels. This plan is included in Appendix C of the Revised RAP (URS and Geosyntec, 2014).
- Shell will implement a community outreach program to inform and educate residents in the community of residual impacted soils and of the notification procedures for management of these materials via the Surface Containment and Soil Management Plan.
- Following excavation, a combined system of soil vapor extraction (SVE) and bioventing will be used to address residual petroleum hydrocarbons and VOCs in soils below the depth of excavation and areas not excavated. Soil vapor, including methane, will be addressed by active extraction using SVE. Residual longer-chain and less volatile hydrocarbons in soils will subsequently be treated by promoting degradation via bioventing where RAOs are not met following shallow soil excavation. SVE wells will be installed in City streets and on approximately 224 residential properties, as appropriate.
- Bioventing will be conducted via cyclical operation of SVE wells to increase oxygen levels in subsurface soils and promote microbial activity and degradation of longer-chain petroleum hydrocarbons. The same wells will be used for SVE and bioventing through cyclical operation of SVE, which will enhance oxygen flow to the subsurface to promote biodegradation of hydrocarbons during periods when SVE is not active. If intermediate products are generated from biodegradation of hydrocarbons, they will be removed via SVE operation and treated in the SVE treatment system.
- A total of 63 SVE well clusters and an additional 65 shallow zone SVE wells will be installed in the streets. Approximately two SVE wells will be installed on each residential property identified for SVE/bioventing. The distribution and numbers of wells to be installed on each property will be determined during the design phase in individual PSRPs and will take into account areas of properties and locations available for well installation.
- Sub-slab mitigation will be implemented at 28 properties where RAOs are not met and calculated vapor intrusion risk is greater than 1×10^{-6} calculated using an attenuation factor of 0.002 or methane concentrations in sub-slab soil vapor exceed the upper RAO for methane of

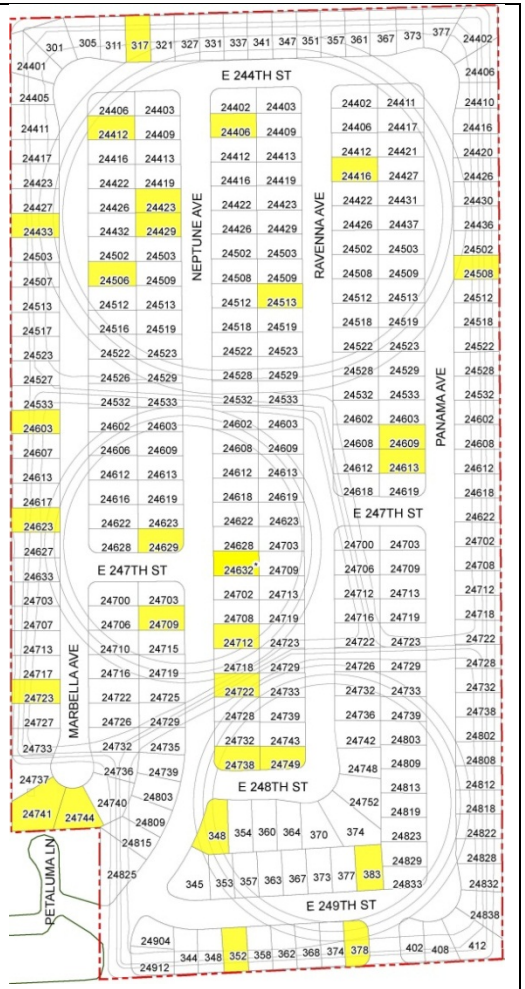
0.5%. The 28 locations where sub-slab mitigation systems will be installed are shown on the figure on Page ES-7. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site.



Properties identified for excavation to 5 ft bgs shown in (yellow)
Properties shown in blue not excavated;
Properties shown in white not investigated
(see Revised Figure 6-1 for details)



Properties identified for targeted excavation from 5 to 10 feet bgs shown in Orange
(see Revised Figure 6-3 for details)



Properties identified for sub-slab mitigation as part of remediation shown in yellow
(see Revised Figure 6-4 for details)

- LNAPL will be recovered where LNAPL has accumulated in monitoring wells MW-3 and MW-12 and in additional wells if it accumulates at a measurable thickness to the extent technologically and economically feasible, and where a significant reduction in current and future risk to groundwater will result. The goal for LNAPL recovery will be an end point of no measurable LNAPL accumulation in monitoring wells at the Site.
- COCs in groundwater will be reduced to the extent technologically and economically feasible via source reduction and monitored natural attenuation (MNA). MNA could be paired with contingency groundwater remediation of oxidant injection in areas where Site-related COCs exceed 100x MCL if, after a five-year review following start of SVE/bioventing operations, the groundwater plume is not stable or decreasing. In addition, it is assumed that upgradient sources would need to be addressed by the overseeing agencies.
- The recommended remedy includes a comprehensive long-term monitoring plan that will include monitoring of:
  - Sub-slab soil vapor probes at properties scheduled for remedial excavation until the SVE/bioventing system becomes operational and periodically thereafter;
  - Select soil vapor probe locations in City streets until the SVE/bioventing system becomes operational; thereafter, monitoring will be conducted at newly installed shallow and multi-depth soil vapor probes;
  - Utility boxes and other Site features previously monitored until after the SVE/bioventing system becomes operational and site conditions demonstrate it is no longer necessary, as approved by the Regional Board;
  - SVE/bioventing system operations and maintenance (O&M) and system effectiveness sampling will be conducted periodically.
- As part of implementation of the Revised RAP, Shell is providing a Temporary Relocation Program that provides temporary alternative accommodations to eligible residents of properties while remedial actions (in particular remedial excavations) are performed in the yards of their residences. A Preliminary Relocation plan was included in the Revised RAP, but was superseded by the RAP Relocation Plan transmitted to the Regional Board on September 19, 2014. This plan includes:
  - During remedial excavation, backfill, and restoration work, residents of the properties where excavation is conducted will be temporarily relocated as described in the RAP Relocation Plan.
  - Residents of properties adjacent to locations where excavations are occurring will be offered alternative accommodations if necessary based on the nature of the excavation work, the potential for interruptions of access to the property, or due to disruptions in utility service to the property.
  - In addition to the Temporary Relocation Program described above, Carousel homeowners are also being offered an Optional Real Estate Program.

For at the 207 locations where soils will be excavated to 5 feet bgs, 85 locations identified for targeted deeper excavation, and at 28 locations where sub-slab depressurization will be conducted, potential exposures and potential nuisance concerns will be addressed in the short term. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site. Deeper soil, soil vapor, and groundwater risk reduction will be implemented over a longer period of time through SVE/bioventing and MNA. These remedial actions are intended to achieve the RAOs and the SSCGs for soil, soil vapor, and groundwater as directed in the Regional Board's Review of the Revised SSCG Report and Directive dated January 23, 2014, comments received on the March 10, 2014 HHRA, FS, and RAP on April 30, 2014, and in accordance with RWQCB-directed and corrected SSCGs.

Although there is no indication that there are any long-term health risks, water quality, or nuisance concerns caused by COCs associated with residual concrete slabs, residual concrete slabs will be removed where practicable and where they can be removed safely when encountered during excavation. SVE/bioventing would address any concerns at the Site related to impacted soils that may be associated with the residual reservoir slabs left in place.

Following approval of the RAP, a Site-wide Remedial Design and Implementation Plan (RDIP) will be prepared. The Site-wide RDIP will provide details on the design and implementation of the planned remedy, including excavation, SVE/bioventing, and sub-slab vapor mitigation activities. It will include detailed plans for installation of the site-wide components of the SVE/bioventing system. In addition, Property Specific Remediation Plans (PSRPs) will be prepared for each property where remedial work will occur that will present detailed plans for remedial activities on a property-by-property basis, including site restoration. Property owners will be consulted regarding scheduling and logistics, particularly regarding site restoration, including any necessary removal and replacement of hardscape and landscaping features.

A tentative schedule of actions to implement the RAP has been developed and is discussed in Section 9 of the Revised RAP. A Gantt chart reflecting this schedule based on excavating four properties at a time has been included as Figure 2-1 to this Addendum. Certain items, including agency review of the RDIP and PSRPs, review of grading plans and permit applications by the City of Carson, Los Angeles County Department of Public Works (LACDPW) and South Coast Air Quality Management District (SCAQMD), and obtaining access at the individual properties, may take longer than estimated and are outside the control of Shell and its consultants. Following agency approval of the RDIP and PSRPs, issuance of Grading Permits by the City of Carson and the Permit to Operate/Construct for the SVE/bioventing treatment system by the SCAQMD, and granting of access, the construction phase of Site remediation, including installation of the SVE/bioventing system is expected to take approximately 6 years.

This Addendum to the Revised RAP addresses the option to increase the pace of remedial excavation as the work progresses to shorten the time required to implement this phase of the remedy. As the work proceeds, and work has been completed on several blocks of eight properties, Shell's contractors will evaluate whether the pace of excavation work can be increased by working on two

blocks of eight properties simultaneously. This determination will consider whether this work can be done safely and efficiently when considering the increased level of effort and amount of equipment and trucks that will be operating in the neighborhood concurrently as well any additional impact to the residents.

Following the active construction phase, operations and maintenance of the SVE/bioventing system will occur for approximately 30 to 40 years. SVE/bioventing system and other monitoring activities, as required, will occur for an estimated 30 to 40 years.

1.0 INTRODUCTION

URS Corporation (URS) and Geosyntec Consultants, Inc. (Geosyntec) prepared this Addendum to the Revised Remedial Action Plan (Addendum) for the former Kast Property on behalf of Equilon Enterprises LLC, doing business as Shell Oil Products US (Shell or SOPUS). This Addendum is being submitted in response to Cleanup and Abatement Order No. R4-2011-0046 issued by the California Regional Water Quality Control Board, Los Angeles Region (RWQCB or Regional Board) on March 11, 2011, as modified by RWQCB correspondence, directing Shell to submit a Remedial Action Plan and Human Health Risk Assessment pursuant to California Water Code Section 13304. On behalf of SOPUS, URS and Geosyntec submitted a Remedial Action Plan (RAP) and companion Feasibility Study (FS), and Human Health Risk Assessment (HHRA) on March 10, 2014. The RWQCB reviewed and commented on the March 10, 2014 RAP, FS, and HHRA and directed Shell to submit a Revised RAP, Revised FS, and Revised HHRA by June 30, 2014, all of which were submitted as directed. This Addendum is being submitted to respond to comments and questions by RWQCB staff during meetings and conference calls and to clarify certain aspects of the proposed remedy. Addenda to the Revised HHRA (Geosyntec, 2014d) and Revised FS (Geosyntec, 2014e) are being submitted concurrently as separate documents.

The Revised RAP (URS and Geosyntec, 2014) recommended the following multi-media remedial actions:

- Excavation of shallow soils to a depth of 5 feet below ground surface (bgs) from both landscaped and hardscaped areas of residential yards at approximately 202 properties where RAOs are not met under existing conditions. Excavation will be conducted throughout the accessible areas of front and back yards identified based on Site characterization data, soil concentration contour maps, results of the Revised HHRA (Geosyntec, 2014b), and where groundwater protection site-specific cleanup goals (SSCGs) are exceeded, subject to setbacks to protect structures and sensitive utilities. Residual concrete slabs will also be removed, to the extent practicable, if encountered within the depth excavated.
- Targeted deeper excavation of soils between 5 and approximately 10 feet bgs at approximately 82 properties where significant hydrocarbon mass can be reduced based on the distribution and concentration of hydrocarbons detected. This targeted deeper excavation will be conducted where equipment access is feasible and excavation can be achieved safely, subject to allowable setbacks from structures and sensitive utilities.
- A Remedial Design and Implementation Plan (RDIP) and Property-specific Remediation Plans (PSRPs) will be developed after approval of the RAP to describe in detail planned remedial actions at individual properties.
- Following excavation, a combination of soil vapor extraction (SVE) and bioventing will be used to address residual petroleum hydrocarbons and VOCs in soils below the depth of excavation and areas not excavated. Soil vapor, including methane, will be addressed by active extraction using SVE and subsequent treatment by promoting degradation of residual hydrocarbons via bioventing. SVE wells will be installed in City streets and on approximately 221 residential properties, as appropriate.

- Bioventing will be conducted via cyclical operation of SVE wells to increase oxygen levels in subsurface soils and promote microbial activity and degradation of longer-chain petroleum hydrocarbons. The same wells will be used for SVE and bioventing through cyclical operation of SVE, which will enhance oxygen flow to the subsurface to promote biodegradation of hydrocarbons during periods when SVE is not active.
- Sub-slab mitigation will be implemented at 28 properties where RAOs are not met and calculated vapor intrusion risk is greater than 1×10^{-6} or methane concentrations in sub-slab soil vapor exceed the upper RAO for methane of 0.5%. In addition, while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site.
- LNAPL will be recovered where LNAPL has accumulated in monitoring wells MW-3 and MW-12 and in additional wells if it accumulates at a measurable thickness to the extent technologically and economically feasible, and where a significant reduction in current and future risk to groundwater will result. The goal for LNAPL recovery will be an end point of no measurable LNAPL accumulation in monitoring wells at the Site.
- COCs in groundwater will be reduced to the extent technologically and economically feasible via source reduction and monitored natural attenuation (MNA). MNA could be paired with contingency groundwater remediation of oxidant injection in areas where Site-related COCs exceed 100x MCL if, after a five-year review following start of SVE/bioventing operations, the groundwater plume is not stable or decreasing. Upgradient sources would need to be addressed by the overseeing agencies.
- The recommended remedy includes a comprehensive long-term monitoring plan that will include monitoring of:
    - Sub-slab soil vapor probes at properties scheduled for remedial excavation until the SVE/bioventing system becomes operational and periodically thereafter;
    - Select soil vapor probe locations in City streets until the SVE/bioventing system becomes operational; thereafter, monitoring will be conducted at newly installed shallow and multi-depth soil vapor probes;
    - Utility boxes and other Site features previously monitored until the SVE/bioventing system becomes operational and Site conditions demonstrate it is no longer necessary, as approved by the Regional Board; and
    - SVE/bioventing system operations and maintenance (O&M) and system effectiveness sampling will be conducted periodically.

The Revised RAP, Revised HHRA Report (Geosyntec, 2014b), and Revised FS (Geosyntec 2014c) were submitted to the Regional Board on June 30, 2014. While Shell believes these documents, and the Remedial Action Plan, HHRA Report and Feasibility Study originally submitted on March 10, 2014, proposed a remedial approach that would address the environmental conditions in the Carousel neighborhood and be protective of residential land use, Shell and its consultants have prepared this Addendum and the companion Addenda to the Revised FS and Revised HHRA to address the

comments and clarifications requested by the Regional Board during a July 30, 2014 meeting and subsequent meetings and discussions with the Regional Board's technical staff.

2.0 DISCUSSION OF ISSUES FOR CLARIFICATION AND RAP REVISIONS

2.1 UPDATED ASSESSMENT OF ARSENIC CONCENTRATIONS THAT ARE GREATER THAN THE ARSENIC SOUTHERN CALIFORNIA UPPER TOLERANCE LIMIT (UTL) CONCENTRATION

As discussed in the revised HHRA, metals may be associated with petroleum hydrocarbons, but are also naturally occurring in the environment. For each metal, an Upper Tolerance Limit (UTL) has been developed as a Background Threshold Value (BTV) based on local background (Revised HHRA Appendix A, Geosyntec, 2014b). These values are used with upper-bound Site concentration estimates to determine if a metal is above background and should be considered further. For arsenic, the Cal-EPA Department of Toxic Substances Control (DTSC) background concentration UTL of 12 milligrams per kilogram (mg/kg) for southern California sites (Cal-EPA DTSC, 2007) and a more detailed statistical evaluation were used as presented in Appendix A of the Revised HHRA. Based on the results of the detailed analysis five properties were identified in the Revised HHRA that were considered to have arsenic concentrations above background.

In response to verbal comments received from the Office of Health Hazard Assessment (OEHHA), arsenic concentrations were re-evaluated in the Addendum to the Revised HHRA (Geosyntec, 2014d) with respect to the DTSC background concentration of 12 mg/kg. Properties that had a maximum arsenic concentration greater than the DTSC background value of 12 mg/kg within the 0 to 10-foot depth interval were identified. A total of 94 properties were identified with a maximum concentration greater than 12 mg/kg. Many of these properties have only 1 or 2 samples that exceed the background value of 12 mg/kg, and the arsenic concentrations were typically within the range of background data DTSC used to derive the value of 12 mg/kg (the DTSC background dataset has a maximum concentration of 19.6 mg/kg). In addition, many of these properties have been identified for shallow excavation in the Revised RAP for other constituents.

The list of 94 properties where the maximum concentration exceeded the UTL value of 12 mg/kg along with the list of properties identified for 0 to 5-foot excavation in the Revised RAP were reviewed. Seventy-six of the properties were included in the Revised RAP for shallow excavation, which will remove arsenic concentrations above the UTL value of 12 mg/kg from the 0 to 5-foot depth interval. For the remaining 18 properties, arsenic concentrations and depth interval were further reviewed with respect to the remediation plan in the Revised RAP (see Addendum to Revised HHRA). Nine properties did not have a maximum concentration of arsenic above the background UTL of 12 mg/kg in the 0 to 5-foot depth interval. Of the nine remaining properties, the arsenic concentrations are within the background range of the dataset used by DTSC to derive the background value of 12 mg/kg with the exception of two properties: 20.6 mg/kg at 24417 Marbella Avenue, and 28.3 mg/kg at 24423 Marbella Avenue. At each of these properties only two samples exceeded the background UTL of 12 mg/kg within the 0 to 5-foot interval. These two properties have been included in the 0 to 5-foot excavation program in this Addendum to the Revised RAP.

In response to OEHHA's comments, Tables 14 and 15 of the Revised HHRA were modified to include the maximum detected arsenic concentrations for each property as compared to the value of 12 mg/kg. The two properties that have been identified for inclusion in the remediation plan based on the data evaluation summarized above are identified by the hatched symbol on Revised Figures 6-1 and 6-2. These two properties will be added to the remediation plan for the 0 to 5-foot excavation.

2.2 UPDATE OF HHRA FINDINGS FOR PROPERTIES WITH SOIL SAMPLES THAT WERE NOT INCLUDED IN THE REVISED FS AND REVISED RAP

The Revised HHRA (Geosyntec, 2014b) presented in June 2014 included data that were reported as of May 23, 2014. Since the Revised HHRA was prepared, soil samples have been collected for two properties (24527 Marbella Avenue and 24519 Ravenna Avenue) and additional soil samples were collected at 357 244th Street. The data for these properties (including any new soil vapor data that were collected) were evaluated following the methodology outlined in the Revised HHRA. The results of the evaluation are presented in Tables 14 through 20 of the Addendum to the Revised HHRA (Geosyntec, 2014d) and are presented graphically on Figures 4, 5, 6 and 7 of the same document. Property addresses that exceeded the lower bound of the risk management range for incremental lifetime cancer risk (ILCR) and a noncancer Hazard Index of 1 for soil and sub-slab soil vapor, respectively, were identified. In addition, soil leaching to groundwater and metals present above background were considered. For 24527 Marbella Avenue, the results indicated that this property met the RAOs established in the Revised RAP and therefore are not included in the Revised RAP Addendum. For 24519 Ravenna Avenue, the results indicated that the property should be considered in the Revised RAP Addendum for human health and potential leaching to groundwater considerations for the 0 to 5-foot depth interval and potential leaching to groundwater considerations for the greater that 5 to 10-foot depth interval. For 357 E. 244th Street, the results indicated that the property should be considered in the Revised RAP Addendum for potential leaching to groundwater considerations for the 0 to 5 foot-depth interval. Based on these evaluations, these properties have been included in this Addendum to the Revised RAP for excavation in the 0 to 5-foot interval and SVE/bioventing. In addition, the 24533 Neptune property was not able to be sampled but has been identified for remedial action based on surrounding property results for the 0 to 5-foot and 5 to 10-foot depth intervals.

The number of properties that have been identified for consideration in the Revised FS Addendum and Revised RAP Addendum based on updated HHRA findings are summarized in the table below:

Media	Depth	Number of Properties for Consideration
Soil	≤5 ft bgs	207
Soil	≤5 ft bgs and >5 to ≤10 ft bgs combined	229
Soil Vapor	Sub-Slab	28

2.3 ADDITIONAL EVALUATION OF PROPERTIES FOR TARGETED MASS REMOVAL EXCAVATIONS TO 10 FEET BGS

An alternative that evaluates local targeted excavation between 5 and 10 feet bgs was included in the Revised FS and in the Revised RAP (Alternative 4D). Targeted excavation areas were identified where, based on distribution of hydrocarbon impacts in the 5 and 10-foot bgs interval, the potential exists for substantial hydrocarbon mass removal via deeper excavation. The assessment of areas for targeted excavation also considers the technical feasibility and cost effectiveness of the mass removal.

Properties for targeted deeper excavation under Alternative 4D were previously identified by reviewing the distribution of TPH in soil in the 5 to 10-foot bgs interval and by considering a cost-benefit analysis of the proposed targeted excavation. The contoured and point-by-point distribution of the TPH fractions (as depicted on Figures 3-3 through 3-5, 3-9 through 3-11, and 6-3 of the Revised RAP) were reviewed to identify areas of elevated TPH concentrations, including areas with TPH above residual concentrations. At the request of Regional Board staff, and in an effort to address the uncertainty in contouring, the TPH distribution was additionally evaluated by examining different spatial distribution mapping methods: point-by-point maps, two-dimensional contour maps, and three-dimensional contours. Based on this data evaluation, an additional eight front yards were identified for deeper excavation; five of these are at properties where the back yard was previously identified for deeper excavation, and three are at additional properties not previously identified. In total, 123 yards at 85 properties are now identified for targeted deeper excavation. Properties identified for targeted deeper excavation from 5 to 10 feet bgs are summarized in Revised Table 6-1 and shown on Revised Figure 6-3. Some properties were identified for excavation of both front and back yards, while others were identified for excavation of only the front or back yard.

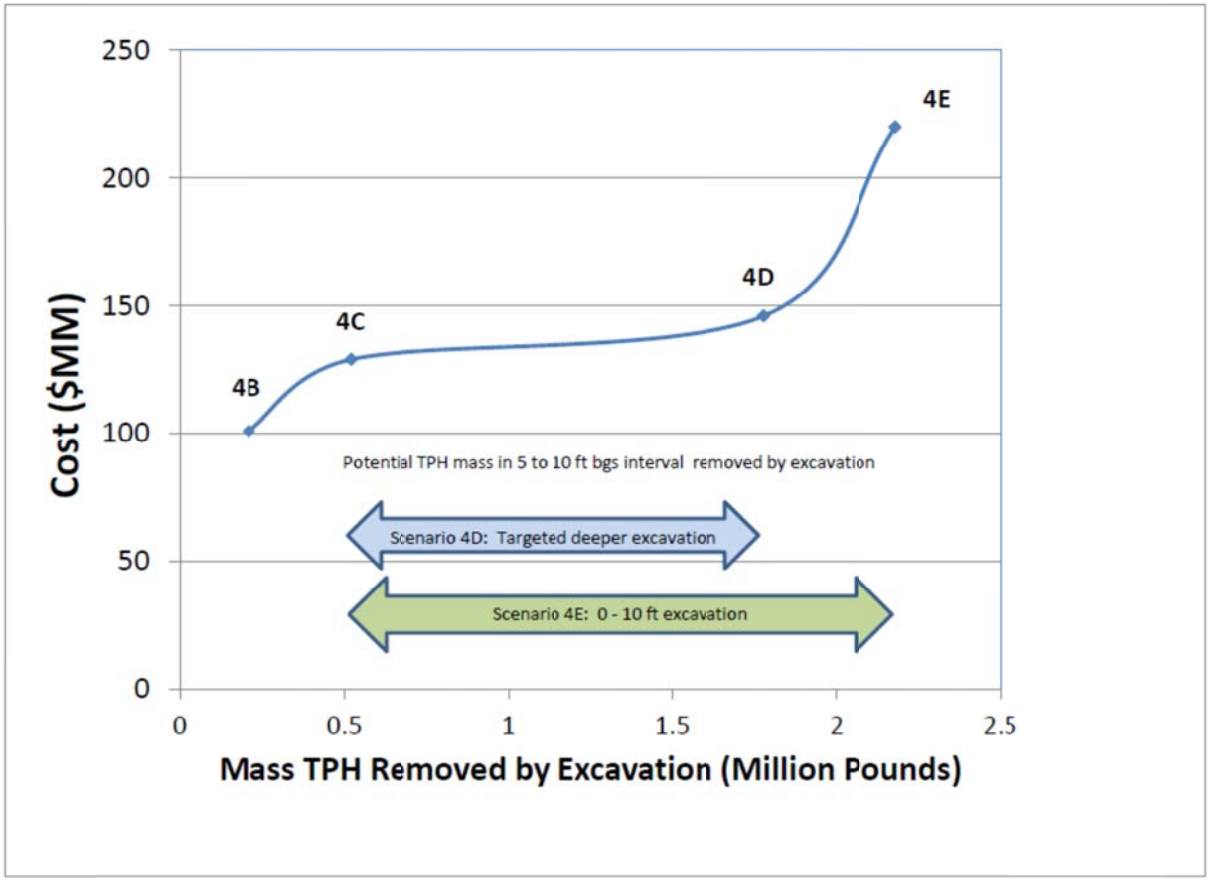
Factors that affect the cost and feasibility of conducting excavations between 5 and 10 feet bgs were considered in identifying properties for targeted deeper excavation under Alternative 4D:

- Targeted deeper excavation is not proposed for properties that are not identified for excavation in the 0 to 5-foot bgs interval. The added cost and time to excavate the 0 to 5-foot bgs interval for the sole purpose of hydrocarbon mass removal in the 5 to 10-foot bgs interval would have a dramatic effect on the practicability of targeted deeper excavations under these circumstances.
- Targeted deeper excavation is not proposed for yards where a swimming pool is present. If a swimming pool is present in a yard, then excavation for a large portion of the yard has already taken place and given the technical difficulties of excavating around a swimming pool and the potential damage to swimming pools and its appurtenant equipment, targeted deeper excavation in these areas is not considered practicable.
- Targeted deeper excavation is not proposed for yards where a limited mass is expected to be removed. For example yards with one or two samples with elevated TPH concentrations at depth or where the contours of elevated TPH concentrations cover a small portion of the yard are not identified for targeted deeper excavation.

Excavation to 5 feet bgs for properties exceeding human health criteria or soil SSCGs for leaching to groundwater criteria is estimated to result in 520,000 pounds of hydrocarbon mass removal. The proposed targeted deeper excavation (Alternative 4D) is estimated to result in an additional 1,260,000 pounds of hydrocarbon mass removal, for a total of 1,780,000 pounds of hydrocarbon mass removed under this proposed remedy. For comparison, excavation to 10 feet bgs for all properties exceeding human health criteria or soil SSCGs for leaching to groundwater criteria (Alternative 4E) is estimated to result in approximately 2,180,000 pounds of hydrocarbon mass removal, of which 1,660,000 is in the 5 to 10-foot bgs interval. Consequently, the targeted deeper excavation (Alternative 4D) is estimated to remove approximately 76% of the TPH mass that could potentially be excavated in the 5 to 10 feet bgs interval at all properties where leaching to groundwater SSCGs were exceeded (Alternative 4E). It should be noted that these mass estimates are for the excavation portion of the recommended remedy. Significant further mass removal will occur through SVE/bioventing which will be implemented Site-wide upon completion of the excavation program.

A cost-benefit analysis of this proposed targeted deeper excavation (Alternative 4D) was conducted by comparing the TPH mass that would be removed under the different excavation scenarios evaluated to the cost for removal (similar to the incremental cost per pound of TPH removed presented in the Revised RAP). This cost-benefit analysis is summarized on the figure below.

Cost vs Mass of TPH Removed



This figure shows a substantial increase in the estimated incremental cost for TPH mass removal (i.e., the slope of the curve) for additional excavation beyond what is proposed for the targeted deeper excavation. There is likewise a declining benefit of mass removal for additional excavation of TPH-impacted soil in the 5 to 10-foot bgs interval beyond what is proposed for the targeted deeper excavation. Based on this cost-benefit analysis, the proposed remedy of targeted deeper excavations followed by SVE/bioventing (Alternative 4D) is the most efficient pathway for reduction of TPH and related compounds at the Site.

2.4 UPDATE OF PROPERTIES IDENTIFIED FOR REMEDIAL ACTIONS

The Revised RAP recommended various remedial actions to be conducted at specific properties, as summarized above in Section 1.0, based on evaluation of data collected through May 1, 2014. The number of specific properties identified was used for estimating cost and schedule of RAP implementation. Based upon these data, 202 properties were identified for excavation to 5 feet bgs, 82 properties were identified for targeted deeper excavation from 5 to approximately 10 feet bgs, and 221 properties were identified for SVE/bioventing system installation.

Additional soils data were collected at three properties since the evaluations were performed for the June 30, 2014 Revised RAP. As discussed in Section 2.2, the updated HHRA evaluation identified two of those properties as not meeting RAOs in in the 0 to 5-foot bgs interval. Consistent with the approach described in the Revised RAP, excavation will be conducted at these properties to a depth of 5 feet bgs throughout the accessible portions of front, back, and side yards subject to setbacks to protect structures and sensitive utilities. Additionally, based on the evaluations for these properties presented in the Addendum to the Revised HHRA, three additional properties were identified for SVE/bioventing system installation.

Based on further evaluation of metals data for properties not identified for excavation due to presence of other constituents of concern (COCs), two additional properties were identified for excavation to 5 feet bgs in the Addendum to the Revised HHRA. These properties were included based on presence of arsenic in soils at concentrations exceeding the regional background concentration adopted by the DTSC. (See Section 2.1 for discussion of the evaluation of arsenic concentrations relative to background.)

One additional property, for which sampling is completed but soil data were not collected due to presence of a swimming pool, hardscape cover, and utility conflicts, has been added to the list of properties for excavation to 5 feet bgs and for SVE/bioventing system installation, based on evaluation of data from neighboring properties. This increases the total number of properties identified for excavation to 5 feet bgs to 207, increases the properties identified for SVE/bioventing to 224, and reduces the number of properties with no data to 12. Consistent with the approach described in the Revised RAP, excavation will be conducted at these 207 properties to a depth of 5 feet bgs throughout the accessible portions of front, back, and side yards subject to setbacks to protect structures and sensitive utilities.

The Revised RAP identified 82 properties for targeted deeper excavation from 5 to approximately 10 feet bgs. Some of these properties would have targeted excavations to 10 feet bgs in both front and

back yards, and some properties would have deeper excavation in only one yard (front or back). A total of 115 yard areas were identified for deeper excavation in the Revised RAP. In response to Regional Board staff comments, Geosyntec conducted further data evaluation to identify additional properties where substantial hydrocarbon mass could be achieved by targeted deeper excavation to 10 feet bgs. Based on this data evaluation, an additional eight front yards were identified for deeper excavation; five of these are at properties where the back yard was previously identified for deeper excavation, and three are at additional properties not previously identified. This evaluation is described in Section 2.3 above. Revised Table 6-1 lists properties identified for soil excavation to 5 feet bgs and properties identified for targeted deeper excavation from 5 to 10 feet bgs.

There remain 12 properties with no soil matrix data as of September 9, 2014. Evaluations will be conducted when access is obtained, sampling is conducted, and data are evaluated to assess whether RAOs are met under existing conditions based on unrestricted land use. If the RAOs are not met, these properties will receive the same remedial approach, as appropriate based on property-specific conditions, as other properties identified for remediation. Per Regional Board direction, for purposes of evaluating potential environmental impacts associated with RAP implementation, the Environmental Impact Report (EIR) being prepared in accordance with the California Environmental Quality Act (CEQA) assumes that all 12 properties will be excavated to a depth of 10 feet bgs in front and back yards, where possible, and to 5 feet bgs only in side yards. The actual need for remedial action at these properties will be evaluated when and if access becomes available, soil sampling is conducted, and data are obtained.

Sub-slab mitigation will be implemented at 28 properties where RAOs are not met and while the data do not indicate that vapor intrusion is an issue at any of the residences, Shell is prepared to offer installation of a sub-slab mitigation system to any of the homeowners in the Carousel neighborhood to alleviate concerns about potential impacts to their indoor air from the Site. The additional data collected and evaluations conducted since the June 30, 2014 submittal of the Revised HHRA, FS, and RAP have not impacted the anticipated number of properties for implementation of this portion of the proposed remedy.

Additionally, it is understood that some individual homeowners may choose not to allow the proposed remedial actions to be conducted at their properties. This homeowner decision would decrease the number of properties for a selected remedial action activity.

2.5 UPDATED TABLES AND FIGURES SHOWING PROPERTIES IDENTIFIED FOR REMEDIAL ACTIONS

Revised Table 6-1 lists properties identified for soil excavation to 5 feet bgs and properties identified for targeted deeper excavation from 5 to 10 feet bgs; this table replaces Table 6-1 from the Revised RAP. These properties are shown on Revised Figures 6-1 and 6-3, respectively. Also included are revised Figures 6-2 and 6-4 from the Revised RAP updated to include data available as of September 9, 2014.

2.6 UPDATED EXCAVATION SOIL VOLUME ESTIMATES

The updated estimated excavation soil volumes for recommended Alternative 4D per this Addendum to the Revised RAP include:

- Up to 133,810 cubic yards (CY) for excavation to 5 feet bgs at 219 properties (average of approximately 611 CY of soil per property):
  - 126,477 CY of soil is for excavation to 5 feet bgs at 207 properties identified on the basis of human health risk or potential for leaching of COCs to groundwater.
  - 7,332 CY is for excavation to 5 feet bgs at 12 properties that have no soil characterization data. These 12 properties with no data have been included as a contingency. The actual need for remedial action at these properties will be evaluated when access becomes available, sampling is conducted, and data are obtained. This estimated volume assumes excavation of front, back and side yards to 5 feet bgs.
  - The 133,810 CY value is an upper-bound volume estimate for excavation to 5 feet bgs, as it does not include a reduction in volume for setbacks, sloping of excavation walls, and avoidance of sensitive utilities (particularly the transite pipe water mains located in front yards of approximately half the properties in the Carousel tract).
- Up to 27,855 CY of additional soil for targeted deeper excavation of 146 yards to 10 feet bgs:
  - 123 yards would be excavated at 85 properties identified where targeted deeper excavation would result in significant hydrocarbon mass reduction based on a technological and economic evaluation.
  - 23 yards (both front and back yards of 11 properties and front yard only of one property with a pool) may be excavated at 12 properties that do not have soil characterization data. These 12 properties are included as a contingency; the actual need for remedial action at these properties will be evaluated when access becomes available, soil sampling is conducted, and data are obtained and evaluated.
  - Both front and back yards would be excavated at 49 properties (includes 11 of the 12 properties with no data); front yards only would be excavated at 24 properties, and back yards only would be excavated at 24 properties.
  - None of these estimates take into account volume reductions for setbacks, sloping of excavation walls, and avoidance of sensitive utilities.
- The total estimated soil volume that potentially may be excavated is 133,810 + 27,855 = 161,655 CY, rounded to 161,700 CY.
- For purposes of estimating the upper bound soil volume that may be excavated for evaluation of potential project impacts in the EIR being prepared for the project, the RWQCB has directed Shell and the EIR preparer to assume a contingency for over excavation of 10% of the total soil volume.

  - Ten percent of 161,700 = 16,170 CY, rounded to 16,200 CY. This would bring the total soil volume from residential excavations for consideration in the EIR to approximately 177,900 CY.
  - The total number of properties that would be excavated would be 219 (207 + 12). For estimation of truck trips, we have assumed that 239 properties would be excavated to accommodate the 10% contingency soil volume per direction from the RWQCB for purposes of impact evaluation in the EIR. This additional contingency soil volume is not, however, a planned component of the RAP.

- In addition to this estimated volume for residential excavation, there would be approximately 8,100 CY of soil excavated from trenches installed in City streets for SVE piping installation.
- This will bring the grand total upper bound soil excavation volume to for consideration in the EIR 186,000 CY.

2.7 POTENTIAL ADDITIONAL EXCAVATION BASED ON FINDINGS DURING EXCAVATION

The RWQCB has directed that the EIR for implementation of the RAP include a contingency soil volume equal to 10 percent of the planned excavation volume to allow additional excavation if warranted based on Site conditions encountered during planned excavation. This section of the RAP Addendum includes a discussion of criteria that may be used to make decisions regarding conducting additional vertical or lateral excavation.

The primary purpose of the additional excavation would be to remove hydrocarbon mass. In an excavation-only remediation scenario, confirmation samples are typically collected to determine if the RAOs have been met and thus whether the remedial action is complete. In the proposed remedy, however, any VOCs or hydrocarbon mass remaining after excavation is completed that exceed the RAOs will be addressed by the combined SVE/bioventing system. Therefore, decisions regarding additional excavation beyond the planned lateral or vertical limits of excavation will be based on field conditions and will focus on observation of mobile non-aqueous phase liquid (mobile NAPL).

Field observational criteria will be used to make decisions regarding whether additional excavation is warranted at a particular property or properties. Observations that may trigger additional excavation include: 1) observation of obvious mobile NAPL; 2) hydrocarbons seeping or oozing from excavation walls; 3) wet crude oil-like residue on gloves when soils are handled; 4) use of paint filter tests and to determine whether mobile NAPL is present and using a graduated cylinder to separate water from hydrocarbons in recovered liquids.

Once an excavation has reached the planned lateral or vertical limits, the decision to conduct additional excavation will be based on field observation of the presence of mobile NAPL. Soils from the excavation sidewalls and bottom will be examined by the supervising onsite geologist/engineer for the obvious presence of mobile NAPL to assess the need for additional excavation. This will include observations of migrating NAPL (oozing or seeping into excavation) or wet crude oil residue on gloves when soils are handled. If mobile NAPL appears to be present in the soils, the soils/liquids

will be collected directly from the excavation or from the bucket of the excavator and tested for the presence of liquids using the paint filter test (EPA Method 9095B). Any liquids passing the paint filter will then be placed in a graduated and allowed a 5-minute time period to assess whether mobile NAPL is present. The presence of mobile NAPL will be assessed by visual inspection of the liquids in the glassware.

Additional excavation will be conducted if the presence of mobile NAPL is confirmed using field observations/testing as discussed below:

- If, during a 5-foot excavation, the presence of mobile NAPL is confirmed:
  - At the base of the 5-foot excavation, the excavation will locally proceed deeper to remove soils containing mobile NAPL, to the extent it can be done safely and without damaging property. The vertical extent of excavation will not exceed 10 feet.
  - Along an excavation sidewall that adjoins a property that is already planned for 5-foot excavation, the excavation will occur at that adjacent property in accordance with the PSRP and Grading Permit for that property.
  - Along an excavation sidewall that adjoins a property that was not identified for excavation to 5 feet, a PSRP would need to be prepared and a Grading Permit would need to be obtained before soils beneath the adjacent property are excavated to remove impacted soils. Localized lateral excavation onto the adjoining property would be performed, to the extent it can be done safely and practicably, to remove the NAPL-impacted material only after a Grading Permit is obtained, or a waiver is granted by the City, for the additional excavation work. This may delay restoration of both properties until the Grading Permit can be obtained creating an inconvenience to the residents.
- If, during a 10-foot targeted excavation for mass removal (i.e., during excavation from 5 to 10 feet bgs) the presence of mobile NAPL is confirmed:
  - At the base of the 10-foot excavation, mobile NAPL would be removed to the extent practicable, but in no case will the vertical extent of excavation exceed 10 feet.
  - Along the excavation sidewall for a partial yard excavation, lateral excavation will continue to the extent it can be done safely and without damaging property until the mobile NAPL has been removed or the property line or other boundary has been reached.
  - Along an excavation sidewall that adjoins a property that was not identified for excavation, soils beneath the adjacent property would not be excavated to remove impacted soils below 5 feet.
  - Along an excavation sidewall that adjoins a property that was identified for excavation to 5 feet, but not identified for excavation to 10 feet:
    - If that adjacent property has not yet been excavated, the PSRP and Grading Permit would be amended to allow limited deeper excavation to remove targeted mass, and localized lateral excavation would be performed, to the extent it can be done safely and practicably, to remove the NAPL-impacted material.

        - If the adjacent property has been excavated but not yet backfilled, the PSRP and Grading Permit would be amended to allow limited deeper excavation to remove targeted mass, and localized lateral excavation would be performed, to the extent it can be done safely and practicably, to remove the NAPL-impacted material.
        - If the adjacent property has been excavated and backfilled, localized limited lateral excavation would be performed, as can be done safely and practicably, to remove the targeted material, and documentation would be amended as applicable.
    - If the mobile NAPL encountered is due to smear on top of the residual concrete base, no additional lateral excavation will be performed.
- Mobile NAPL will not be removed from an excavation sidewall if that sidewall adjoins a building foundation, city sidewalk/street, or utility line.

2.8 POST-EXCAVATION SAMPLING

Post-Excavation sampling is discussed in Section 8.1.7 of the Revised RAP as follows:

> "Post-excavation soil samples will be collected from the walls of excavations adjacent to residential structures. Samples will only be collected from walls of excavations along property lines, where the adjacent property has not been or is not scheduled to be excavated. Samples will be collected from two depths at two locations along each side of the residences (8 locations, 16 samples total) and from two locations at the bottom of each excavation in the back and front yards (4 samples), yielding a total of 20 samples per property. Samples will be collected from two locations at two depths along property lines in the front and back yards of properties where the adjacent property will not be excavated. Depths of sidewall samples will be established in the field based on visual observations. These samples will be analyzed for COCs with the potential to migrate to soil vapor and groundwater, including TPHg, TPHd, TPHmo, and VOCs. Because of their very low solubility and migration potential, post-excavation samples will not be analyzed for SVOCs, PAHs, or metals."

Based upon discussions with Regional Board staff, the post-excavation sampling approach is modified as follows:

- Post-excavation soil samples will be collected only as can be performed safely and efficiently due to physical constraints based on the types and locations of excavation being performed.
    - At locations where excavations are conducted using slot trenching, shallow samples (0.5 and 2 feet bgs) may be collected by personnel located within the trench or at ground surface adjacent to the trench using appropriate safety precautions and hand auger or other sampling equipment. Deeper samples will be collected from ground surface adjacent to the trench using appropriate safety precautions and hand auger or other sampling equipment. Personnel will not enter trenches deeper than 4 feet bgs for sample collection purposes.

- At locations where excavations are conducted using large diameter auger methods, all samples will be collected by personnel at ground surface adjacent to the boring using appropriate safety precautions. Samples collected from the bottom of targeted excavations from 5 to 10 feet bgs will need to be collected from the auger bucket or soil cuttings, as the diameter of the boring will not permit using tools to collect samples at 10 feet bgs from the ground surface. Therefore these samples would be from materials excavated and would not document concentrations of COCs that remain after excavation. Under no circumstances will personnel enter auger excavation borings.

- Post-excavation soil samples will be collected from the walls of excavations at two lateral locations adjacent to each side of residential structures at depths of 2 and 5 feet bgs. If feasible within operational and safety constraints, a sample will be collected at 10 feet bgs from properties where targeted deeper excavation is conducted. A sample will not be collected from 0.5 feet bgs adjacent to residences, as it is anticipated that the foundation of the residence and its concrete footings will extend below this depth.
- Samples will be collected from excavations adjacent to property lines only from walls of excavations where the adjacent property is not scheduled to be excavated, or where the adjoining yard will be/has been excavated to a shallower depth. Samples will be collected from two lateral locations in each yard at depths of 0.5, 2 and 5 feet bgs. If feasible within operational and safety constraints, a sample will be collected at 10 feet bgs at properties where targeted deeper excavation extends to 10 feet bgs and the adjoining property is not targeted for the same depth.
- At properties where targeted deeper excavation to 10 feet bgs is conducted for a partial yard, samples will be collected from one or two lateral locations along the excavation wall remaining on the property at a depth 10 feet bgs, if feasible within operational and safety constraints. (Samples will not be collected at 0.5, 2 and 5 feet bgs because the remainder of the yard will be or already have been excavated to 5 feet bgs.)
- Samples will be collected from the excavation adjacent to the City sidewalk, subject to operational and safety constraints, including protection of utilities. Samples will be collected from two lateral locations in each front yard at depths of 2 and 5 feet bgs. If feasible within operational and safety constraints, a sample will be collected at 10 feet bgs at properties where excavation extends to 10 feet bgs.
- Samples will be taken from the excavation wall along the back of the property line for those properties bordering on the outer edge of the tract and that back up to homes along Carmel Drive in the Monterey Pines community and the former Turco Products Facility west of the Site, the MTA Railroad right-of-way north of the Site, homes along Island Avenue east of the Site, and Lomita Boulevard south of the Site. Samples will be collected from two lateral locations in each yard at depths of 0.5, 2 and 5 feet bgs. If feasible within operational and safety constraints, a sample will be collected at 10 feet bgs where excavations extend to this depth.
- Samples will be collected from the bottom of each excavation at either 5 or approximately 10 feet bgs in the back and front yards, subject to operational and safety constraints, as follows:

- At least two samples each will be collected from the excavation bottom from the front and back yards of the residence (at least four samples total);
- Samples will be collected at the intersection of the sidewall and the base of the excavation as discussed above. These include:
  - Two samples from the excavation bottom from each front yard and back yard adjacent to the residence (four samples total);
  - Two samples from the excavation bottom from each front part and back part of the side yards adjacent to the residence (four samples total);
  - Two additional samples from the excavation adjacent to City sidewalks in front yards (two additional samples from front yards only); and
  - Additional samples may be collected from the excavation bottom at the wall along property lines at locations where the adjacent property is not scheduled for or has not been excavated, or along the tract perimeter as described above.
- In combination, this will result in a minimum of 14 excavation bottom samples per property for a typical rectangular-shaped approximately 50 by 100-foot lot.
- Additional base of excavation samples will be collected from larger irregularly shaped lots so that there will be a minimum of one sample collected for approximately every 400 square feet of excavated area.

- Post-excavation samples will be analyzed for COCs with the highest potential to migrate to soil vapor and groundwater, including VOCs, TPHg, TPHd, and TPHmo. Because of their very low solubility and migration potential, post-excavation samples will generally not be analyzed for SVOCs, PAHs, or metals. For the 12 properties shown on Revised Figure 6-1 where antimony, arsenic, or thallium concentrations exceed background, the post-excavation samples collected from depths of 0.5, 2 and 5 feet bgs will also be analyzed for these metals.
- Provisional property-specific sample locations will be identified in the PSRP to be prepared for each property.

2.9 USE OF CONTROLLED LOW-STRENGTH MATERIALS (SAND/CEMENT SLURRY) FILL MATERIALS

Placement of cement-sand slurry (slurry), more properly referred to as controlled low-strength material (CLSM), in the lower part of slot-trench and auger excavations is a safe and necessary component of the excavation portion of the selected remedy. CLSM is a self-compacting, flowable fill material used primarily as backfill in lieu of compacted or granular backfill. CLSM is pumpable using a standard concrete pumper, flows easily, and is self-leveling. Its consistency is like that of a slurry or lean grout (comparable to that of a milk shake), yet several hours after placement the material is hard enough to support traffic loads without settling.

2.9.1 CLSM – General Properties and Uses

CLSM is not concrete or soil cement. It is a fluid mixture made of Portland cement, water, and fine aggregate or fly ash. It contains the same components as concrete, but in different proportions. By using a lower proportion of cement than used for concrete, CLSM has in-place properties following curing similar to compacted fill soils (ACI, 1999). The American Concrete Institute (ACI) defines CLSM as having a compressive strength less than 1,200 pounds per square inch (psi); however, most current CLSM applications require unconfined compressive strengths of less than 300 psi to allow for possible future excavation (ACI, 1999). CLSM with an unconfined compressive strength of less than 150 psi is considered excavatable by hand tools (National Ready Mixed Concrete Association (NRMCA) *Guide Specification for Controlled Low Strength Materials (CLSM)*, undated).

Because excavatable CLSM has physical properties similar to compacted soils, there is no reason to believe that tree and shrub roots would not penetrate the cured fill materials. The density of typical CLSM ranges from 115 to 145 pounds per cubic foot (pcf) (Smith, 1991), which is consistent with the density of Site soils of 125 pcf established by geotechnical materials testing of Site soils to support the excavation pilot tests.

The CLSM fill materials will be designed to achieve permeability generally comparable to that of the surrounding soil so as not to cause short circuiting or reduced radius of vacuum influence during SVE/bioventing operation. CLSM may be designed to be as permeable as a uniform coarse sand with a hydraulic conductivity of 4.0×10^{-1} centimeters per second (cm/sec) or as impermeable as clay with a hydraulic conductivity of 1.0×10^{-7} cm/sec. Permeability of most excavatable CLSM is in the range of 10^{-4} to 10^{-5} cm/sec (ACI, 1999). It is often desirable to have the permeability of backfill material equal to or greater than the surrounding soil, and the NRMCA (undated) recommends designing CLSM mixtures to have a hydraulic conductivity coefficient equal to that of fine sand (4.0×10^{-4} cm/sec).

CLSM is ordinarily slightly alkaline and its resistivity increases as the material hardens and the cement continues to hydrate, so that within a few days, CLSM usually has an electrical resistivity that is sufficient to alleviate most corrosivity concerns (Federal Highway Administration, 1997).

CLSM is used widely in the construction industry as a structural fill or backfill material in place of compacted soil around structures, particularly in confined or limited spaces. Conventional compacted soil backfill in trenches and around small structures involves placement of soil fill material in thin layers and mechanical compaction followed by compaction density testing. Because CLSM flows and needs no compacting, it is ideal for use in tight or restricted-access areas where placing and compacting soil or granular fill is difficult or impossible. Also, because CLSM is self-compacting, it eliminates the need for mechanical compaction and associated safety hazards for workers.

Further advantages of using CLSM over compacted soil and granular fill include (modified from University of Florida, 2004):

- CLSM has a fast setup time, providing support for construction equipment the following day.

- It sets up with sufficient strength that it stabilizes trenches and prevents future trench settlement.
- The additional costs for CLSM compared to compacted soil backfill are offset by the elimination of soil compaction and testing labor, reducing the required equipment, manpower and inspection requirements.
- CLSM does not form voids and is less prone to settlement than compacted soil.
- CLSM mix designs can be varied to achieve desired density and permeability.
- It can be used to fill deeper excavations that would otherwise require shoring to allow personnel entry to conduct soil compaction and testing, thereby reducing safety hazards to workers.

The use of CLSM/slurry is common in the construction industry and has been approved by the City of Carson for use at other locations below streets and sidewalks in the City. Also, the Los Angeles County Department of Public Works, Geotechnical and Materials Engineering Division allows the use of CLSM as engineered fill or as trench backfill material, and the City of Los Angeles Building Code (LABC) allows the use of CLSM for the backfill of excavations.

2.9.2 Use of CLSM or Slurry in the Proposed Remedy

In its review comments on the March 10, 2014 RAP, the RWQCB directed Shell to consider comments by the UCLA Expert Panel and address these comments in the Revised RAP. Two of the Expert Panel's comments related to achieving additional hydrocarbon mass removal by localized deeper excavation and using auger excavation methods to achieve deeper soil removal. These comments were addressed in the Revised RAP, and targeted deeper excavation from 5 to 10 feet bgs using a combination of auger excavation with a limited-access bucket auger drill rig and conventional excavation using slot trenching was included in the proposed remedy, Alternative 4D.

Use of slurry backfill is a required element of bucket auger excavation. Using this approach, a vertical large-diameter boring is advanced to the intended depth of excavation. The boring must then be backfilled with slurry the same day for stabilization and safety purposes, and to allow continuing the excavation process by advancing a large-diameter boring directly adjacent to the first boring. This process is repeated until the planned scope of auger excavation is completed at that location. The auger excavation method recommended by the Expert Panel cannot be utilized without use of CLSM backfill.

In a similar manner for targeted deeper excavation by slot trenching, CLSM will be used to stabilize slot trench sidewalls and backfill slot trenches to allow excavation of the adjacent slots. Flowable slurry will be used to backfill slot trenches from the base of the trench to the approximate ground surface. This fill material will provide a footing for equipment to operate when excavating the adjacent slots, which will in turn be backfilled with slurry. When the excavation is completed to its planned lateral limits, the upper part of the slurry section extending to an approximate depth of 3 feet bgs will be removed and replaced with imported certified clean fill soil and compacted as required in the County-approved Grading Plans and City of Carson-issued Grading Permits, and the yard re-landscaped.

Coarse granular (gravel) fill could be placed without mechanical compaction; however, this backfill method would not allow adjacent auger excavation or slot trenching, as the granular fill would run into the new excavation, undermining the fill and potentially the adjacent structure as well as creating a hazardous condition for workers. Additionally, use of coarse granular fill would create short circuiting of the SVE/bioventing system and defeat its purpose.

During the excavation pilot testing, the County Department of Public Works required that slot trenches be excavated and backfilled the same day as part of Grading Permit conditions. We anticipate that this approach will be required during RAP implementation, particularly for filling of slot trenches adjacent to structures. For the reasons described above, use of CLSM will be required in order to perform targeted deeper excavation to 10 feet bgs for purposes of hydrocarbon mass removal, and is a safe and necessary component of the excavation portion of the selected remedy.

2.10 Expedited Implementation Option to Accelerate Remediation of Residential Properties

As described in the Revised RAP, excavation will proceed in phases, with each phase of work including approximately eight contiguous properties, assuming access can be obtained. Where possible, each phase will include homes on both sides of a city block (e.g., the east side of Marbella and west side of Neptune Avenues or the east side of Ravenna and west side of Panama Avenues). This approach will be used so that back-of-lot fences or block walls can be removed one time and excavation conducted in both adjoining yards before the fences are restored. Removal of the side and back fences/walls will also facilitate equipment access and ability to conduct bulk excavations rather than more time consuming slot trenching.

Each phase will include approximately eight properties with work occurring on properties in sequence. For properties on the perimeter of the tract, work will likely proceed at a smaller number of properties for each phase. The work will begin with demolition and removal of hardscape and landscaping at two properties simultaneously. As currently envisioned and assuming approval through the EIR process of the number of daily truck trips required, excavation will then proceed working concurrently on four properties. As the excavations are completed, backfill will occur followed by restoration of hardscape and landscaping. Work on the second phase of properties (i.e., the next eight properties working down the block), will begin approximately at the end of week six or eight of work on the first phase. By excavating on four properties concurrently, the overall duration to complete remedial excavation is shortened and excavations can be accomplished more efficiently.

Regional Board staff has requested that Shell evaluate an expedited implementation option wherein excavation work would proceed at a larger number of properties than described in the Revised RAP. As the demolition, excavation, backfill and restoration work proceeds, and work has been completed on several blocks of eight properties, Shell's contractors will evaluate whether the pace of excavation work can be increased by working on two blocks of eight properties simultaneously. This determination will involve consideration of whether this work can be done safely and efficiently when considering the increased level of effort and amount of equipment and trucks that will be operating in the neighborhood concurrently as well as any additional impact to the residents. It may be more feasible to conduct operations at a second set of eight properties that are not contiguous with

the initially planned set of eight properties and are located in a different area of the community to reduce congestion from trucks and construction vehicles. This accelerated implementation option would roughly double the level of activity in the neighborhood, including truck and construction vehicle traffic, and these and other impacts associated with this approach will be evaluated in the project EIR.

Another expedited option that Shell will evaluate, and which may be more feasible, is to conduct demolition, excavation, backfill and restoration work at properties located at the outer edges of the tract on Marbella and Panama Avenues and 244th and 249th Streets while simultaneously conducting remedial excavation and related activities in the interior blocks of the tract. These remediation activities on exterior parcels within the neighborhood would be sequenced so that work is not occurring across the street or in close proximity to work on interior blocks to avoid complete closure of streets and sidewalks. Again, evaluation of the feasibility of this expedited work approach would be conducted after completing work on several blocks of properties and will consider whether this work can be done safely and efficiently.

2.11 CLARIFICATION OF SVE/BIOVENTING DESIGN

2.11.1 SVE/Bioventing Approach

Cyclical operation of a combined SVE and bioventing system is the selected remedial technology to address petroleum hydrocarbons, VOCs, and methane in soil vapor and to promote degradation of residual hydrocarbon concentrations in soils that do not meet RAOs and are not removed by excavation. Use of SVE/bioventing will address impacted areas beneath existing paved areas, City sidewalks, and concrete foundations of the homes, in addition to addressing reduction of COC concentrations in excavated areas below 5 or 10 feet bgs and areas not targeted for deeper excavation for mass removal, with the ultimate goal of achieving RAOs over time. Operation of the SVE/bioventing system will also address impacted soils that may be associated with residual concrete reservoir slabs left in place below the depth of excavation.

The SVE system will be operated in a cyclical manner, with active extraction occurring in different portions of the Site at different times. The SVE/bioventing system(s) will be operated cyclically (pulsed) to extract impacted soil vapor and introduce oxygen to the subsurface to stimulate degradation of the heavier fraction of diesel-range hydrocarbons and motor oil-range hydrocarbons in a bioventing operational mode. During periods of active vapor extraction from a sub-set of wells ("on cycle"), the SVE system will not only remove hydrocarbon vapors, but will also draw oxygen into the subsurface to enhance the biodegradation of residual petroleum hydrocarbons in soil. During periods when no extraction is occurring for the set of wells ("off cycle"), remediation will be achieved through biodegradation alone (i.e., bioventing). The system will be designed to use the same infrastructure (i.e., extraction wells) for both SVE and bioventing, and the cyclical operating conditions will be used to implement both remedial actions. The SVE/bioventing system will be operated in manner to achieve the soil oxygen demand estimated from the bioventing pilot tests (Geosyntec, 2012).

The SVE pilot test examined vertical extraction wells and the bioventing pilot test examined both vertical and horizontal extraction wells. Although horizontal and vertical extraction wells were both effective in treating soils through bioventing during pilot testing, the physical and operational limitations of using horizontal wells make vertical extraction wells the preferred option for the proposed remedy. Vertical extraction wells will be used for implementation of the SVE/bioventing system for the Site based on the following rationale:

- The lateral radii of influence for horizontal and vertical wells are similar. The estimated radius of influence for the horizontal wells during the bioventing pilot test ranged from 6 to 20 feet while the radius of influence for the vertical wells during the bioventing pilot test ranged from <5 to 15 feet.
- The vertical wells will provide better remediation for impacted soils deeper than 5 feet bgs. The horizontal wells were installed at a depth of 5 feet bgs during the bioventing pilot test. With this placement, the effect of the horizontal wells on soils within the 5 to 10-foot depth interval is likely limited due to short-circuiting via the granular soil backfill that will be placed following excavation to 5 feet bgs. The vertical SVE/bioventing wells with screened interval from 5 to 10 feet bgs within the soils targeted for remediation will have a greater impact on this zone.
- The vertical wells can be placed closer to the buildings and consequently provide greater reduction of COCs in soils beneath the homes. Based on the proposed excavation approach, it will be logistically impractical to place horizontal SVE wells within a few feet of the building foundation. Because the vertical wells will be installed with hand tools, the vertical wells can be located much closer to the building foundation.

2.11.2 SVE/Bioventing Conceptual Design

SVE/bioventing will be implemented throughout the Site to remediate volatile petroleum hydrocarbons (i.e., gasoline-range petroleum hydrocarbons and the lighter fractions of the diesel range petroleum hydrocarbons), VOCs, and methane, and induce increased airflow to promote microbial degradation of longer-chain hydrocarbons (diesel and motor oil-range petroleum hydrocarbons). The SVE/bioventing infrastructure will consist of a system of extraction wells, belowground conveyance piping, aboveground manifold and treatment compound(s), vapor treatment system(s), and various system controls and instrumentation. SVE will be applied in the shallow zone from approximately 5 to 10 feet bgs, intermediate zone from approximately 15 to 25 feet bgs, and deep zone from approximately 30 to 40 feet bgs and locally deeper depending on depths of soil impact and depth to groundwater. Nested shallow, intermediate, and deep zone wells will be installed in the streets of the Site, which provide ready access for installation. Shallow zone wells will also be installed within the front and back yards of select residences. In general, two wells will be installed on each residential property identified for SVE/bioventing; however, locations and actual numbers of these shallow-zone wells in the front and back yards will be designed during preparation of PSRPs for individual properties and will be based on locations where RAOs are not met in the 0 to 10-foot bgs depth interval and to achieve SVE/bioventing coverage beneath houses. Well and piping components for SVE/bioventing wells installed on residential properties will be entirely below grade. These shallow wells will be screened from 5 to 10 feet bgs and will be connected to the SVE system via conveyance piping, which will be installed in the streets.

Based on the SVE pilot test ROVI results for the intermediate zone, a total of 63 nested well clusters (shallow, intermediate, and deep zone) will be installed in the streets with an average spacing of approximately 125 feet. Based on the estimated ROVI of 50 feet for the shallow zone from the SVE pilot test, an additional 65 shallow zone wells will be installed between the nested wells in the streets of the Site to provide increased vapor extraction coverage within the shallow zone. Additionally, shallow zone wells will be installed in the front and back yards of residences requiring remediation of the shallow zone soil by SVE/bioventing. Due to potential short-circuiting from surface landscaping, the shallow zone ROVI for the residential wells has conservatively been reduced to 25 feet.

The ROVI for the SVE/bioventing system is based on the results of the SVE pilot test rather than the bioventing pilot test, because the blower planned for vapor extraction of the combined system is a robust unit with large capacity and vacuum and a system to treat extracted vapors (see Section 8.2.2 of the Revised RAP). The estimated radius of influence reported for the bioventing pilot test (Geosyntec, 2012) assumed small fans would be used to minimize the concentrations of extracted vapors. The radii of influence estimated from the bioventing pilot test are not applicable for the proposed SVE/bioventing system. Data from the SVE pilot test indicates the expected ROVI for shallow wells will range from 25 to 78 ft. This is consistent with the pilot test results reported for the Turco facility adjacent to the former Kast property, wherein they established a shallow zone ROVI of approximately 26 to 32 feet (ERM-West, 2008). Additionally, the concurrent application of SVE at greater depths in the areas where shallow SVE is proposed will enhance the potential ROVI due to superposition of vacuum influence of the different wells.

As shown in Revised Table 6-1, a total of 224 residences are identified for SVE/bioventing remediation. A total of 229 properties are identified in Table 6-1 as exceeding either human health risk or leaching to groundwater criteria in the ≤5 foot or >5 to 10 foot depth interval. Five of these properties were identified based on metals concentrations alone, reducing the number of properties for SVE/bioventing to 224.

Following approval of the RAP, a RDIP providing the well field layout, SVE system(s) location(s) and specifications, and conveyance piping layout will be submitted for RWQCB approval.

2.11.3 SVE/Bioventing Equipment

Based on the estimated quantity of extraction wells (63 nested street wells, 65 shallow zone street wells, and approximately 474 shallow zone residential wells), it is impractical to construct an SVE system to extract simultaneously from all of the proposed wells. As a result, a system or systems rated for a combined 3,000 standard cubic feet per minute (scfm) at up to 12 inches of mercury (in-Hg) vacuum is planned.

Shell is currently evaluating offsite locations for the installation of the remediation equipment. Potential offsite SVE system locations are being evaluated in terms of technological feasibility, accessibility and availability of the locations. These potential SVE locations are shown on Figure 8-8 of the Revised RAP.

2.12 REVISIONS TO POST-CONSTRUCTION LONG-TERM MONITORING AND SAMPLING PLAN

2.12.1 SVE/Bioventing System Effectiveness Monitoring

Section 8.6 of the Revised RAP provides a recommended long-term post-construction monitoring and sampling plan for the Site. To monitor SVE/bioventing system effectiveness, 16 multi-depth soil vapor monitoring wells/probes will be installed in City streets. As described in the Revised RAP, well screens will be installed at depths of approximately 1.5, 5, 7.5, 20, and 35 feet bgs in each of the 16 cluster vapor wells. The locations and design of the vapor wells/probes will be presented in the RDIP.

To address comments from Regional Board staff, the frequency of sampling of the multi-depth soil vapor wells has been increased and the nature of monitoring clarified, as described below:

- Soil vapor samples will be collected from each of the vapor wells following system startup and analyzed by a National Environmental Laboratory Accreditation Program (NELAP)-certified laboratory for VOCs by USEPA Method TO-15 and fixed gases (including methane) by ASTM Method D-1946 with the following frequency:
  - Quarterly for a period of 2 years
  - Semi-annually for a period of 3 years
  - Annually for a period of 5 years, and
  - Every 5 years thereafter.

  Analytical results for these sampling events will be reported semi-annually along with semi-annual groundwater monitoring data.

- In addition to collection for laboratory analysis, the soil vapor wells/probes will be monitored using field instruments, including a landfill-gas meter (Landtec GEM-2000 or equivalent) to monitor methane, carbon dioxide and oxygen (fixed gases) in percent levels, a flame ionization detector (FID) to monitor for total VOCs including methane in the parts per million (ppm) level, and a photo ionization detector (PID) to monitor for total non-methane VOCs, and a manometer to monitor for initial pressure with the following frequency:
  - Monthly for a period of 1 year,
  - Quarterly for a period of 4 years, and
  - Annually thereafter.

  Field monitoring data for these monitoring events will be reported semi-annually along with semi-annual groundwater monitoring data.

2.12.2 Residential Sub-Slab Soil Vapor Probe Monitoring

Section 8.6.4.1 of the Revised RAP presents the recommended monitoring program for sub-slab soil vapor probes prior to and following SVE/bioventing system startup. As presented in the Revised RAP, this monitoring would be conducted would be conducted at the 202 properties identified for

soil excavation from 0 to 5 feet bgs. The number of properties to be monitored is amended to 207 to coincide with the revised number of properties identified for soil excavation from 0 to 5 feet bgs.

2.13 REPORTING ON RAP IMPLEMENTATION AND MONITORING

Following approval of the Revised RAP, Shell's contractors will submit Remediation Progress Reports on a quarterly basis. The progress reports will detail work accomplished during the previous quarter, any impediments or problems encountered and measures taken to resolve those issues, documents or other items submitted for review for which review comments or approval is outstanding, and work planned for the following quarter. The quarterly reports will also include an evaluation of whether the work is proceeding according to schedule and provide recommendations for steps that may be taken to accelerate the work and maintain schedule, as appropriate.

A Remedial Design and Implementation Plan (RDIP) will be prepared and submitted approximately 12 weeks following approval of the RAP for Regional Board review and approval. The RDIP will provide a detailed discussion of the specific tasks necessary to implement the Site-wide remedy, including engineering design of the selected remedial actions, project phasing, and operation/ monitoring/maintenance of different components of the remedy.

The Site-wide RDIP will address non-property specific elements of the remedial design, including general excavation methodologies, identification of suitable backfill criteria, surveying, traffic plans, notifications and site preparation, proposed odor, dust, and noise control measures, etc. It will additionally provide discussion of staging and logistical issues related to the excavation portion of the work. The overall sequencing and preliminary schedule will be discussed, including activities necessary to fully implement each of the components of the remedy, how these activities will be coordinated to facilitate construction/implementation, and identification of potential major scheduling problems or delays which may impact the overall schedule.

For the SVE/bioventing system, the RDIP will include the proposed well field layout, SVE system(s) location(s) and specifications, and conveyance piping layout. This will include treatment system design criteria. The RDIP will detail the periodic monitoring, maintenance requirements, and reporting for SVE system operation. SVE/bioventing system recordkeeping requirements, including operating parameters; monitoring of the influent, effluent, and extraction wells using field instrumentation; and the performance of routine system preventive maintenance and troubleshooting will also be addressed in the RDIP. The general sub-slab mitigation design will be included in the RDIP.

The RDIP will also identify anticipated permitting requirements and regulatory compliance activities, including Grading Permits, Stormwater Discharge Permits, dust control requirements, SCAQMD Rule 1166 Mitigation Plan requirements for excavation, SCAQMD Permit to Construct/Operate for SVE/bioventing operation, SCAQMD permits for asbestos removal to install the sub-slab mitigation systems, permits for treatment of sub-slab mitigation effluent and other required permits.

In addition to the RDIP, Property Specific Remedial Plan (PSRPs) will be prepared for each property where remedial actions are planned. The PSRPs will define areas to be excavated, depths of

excavations, features to be removed and those that will be protected in place, and locations of underground utilities that need to be either protected in place or removed and restored. The PSRPs will include lot-specific grading plans and geotechnical evaluations, as required, to support the grading plans. The PSRPs will also include landscape restoration plans that will be developed in consultation with the property owners/residents. The PSRPs will be submitted to the Regional Board for initial review. The PSRPs will then be submitted to the Los Angeles County Department of Public Works (LACDPW), Department of Building and Safety (DBS) and Geotechnical Materials Engineering Division (GMED) for review and approval of grading plans prior to issuance of Grading Permits by the City of Carson.

Following completion of remedial actions (excavation, backfill and restoration; on-property SVE well and piping installation; and installation of sub-slab mitigation systems), and receipt of permit closure approval and post-excavation sample analytical results, property-specific Remedial Action Completion Reports (RACRs) will be prepared and submitted to document remedial actions implemented and concentrations of specific COCs remaining in onsite soils following excavation. The RACRs will include record drawings as part of documentation of work performed. RACRs will be submitted 45 days after receipt of permit closure approval or receipt of post-excavation sample results, whichever is later.

At the properties identified for a sub-slab depressurization (SSD) system installation, sub-slab soil vapor probes will be monitored and sampled, and annual inspections of the SSD systems will be performed as discussed in Section 8.4.6.2 of the Revised RAP. At the properties identified for soil excavation from 0 to 5 feet bgs, sub-slab soil vapor probes will be monitored and sampled as discussed in Section 8.4.6.1 of the Revised RAP. These sampling results will be evaluated in accordance with the procedures included in the Revised HHRA and Addendum to the Revised HHRA, and reported in the quarterly progress reports. If results of sub-slab soil vapor analysis indicate that potential vapor intrusion risk exceeds 1×10^{-6} and RAOs for potential vapor intrusion are exceeded, and the property has not previously been identified for installation of sub-slab mitigation, a SSD system will be installed. If a SSD system has previously been installed, it will be checked to confirm it is working as designed, and if not, corrective steps such as installing a larger fan or expanding the system will be evaluated.

Following RAP approval, monitoring of groundwater in both shallow zone and Gage wells will be conducted and reported semi-annually, on a synchronized groundwater monitoring schedule with neighboring facilities as discussed in the RWQCB's March 23, 2011 directive. Installation of the SVE/bioventing system is anticipated to impact the integrity of the existing street soil vapor probes; however, quarterly monitoring and reporting of existing soil vapor probes at 1, 1.5 and 5 feet bgs at nine onsite probe locations and one offsite location in the streets will continue until site conditions demonstrate it is no longer necessary or feasible. Quarterly monitoring and reporting of 69 onsite and offsite utility vaults will continue until after the SVE/bioventing system becomes operational and site conditions demonstrate it is no longer necessary, as approved by the Regional Board.

After installation and startup of the SVE/bioventing system, periodic monitoring will be conducted as specified in the South Coast Air Quality Management District (SCAQMD) Permit. These reports will be submitted to the SCAQMD in accordance with the schedule stipulated in the Permit to

Construct and Operate issued by SCAQMD and will be copied to the Regional Board. Mass removal estimates will be provided to the RWQCB on an annual basis.

Additionally, periodic monitoring of street soil vapor probes and soil and soil vapor sampling will be performed to confirm effectiveness of the SVE/bioventing system as discussed in Section 8.6.3 of the Revised RAP and Section 2.12.1, above. As discussed in the Revised RAP, results of the baseline and periodic sampling will be used to evaluate overall system effectiveness as well as optimize system operation and will be evaluated in an initial 5-year review report to be submitted five years after SVE system start-up, and subsequent SVE system operational review reports submitted on a 5-year basis. System operational VOC and methane monitoring data, in conjunction with system effectiveness data will be evaluated to establish when soil vapor SSCGs have been met or asymptotic concentrations have been achieved. At that time, a recommendation may be made to terminate the SVE operational mode, in which case the system operational status would change to bioventing only mode and the extraction system would only be operated periodically to induce oxygen flow to the subsurface.

Anticipated reports and their frequency of submittal are summarized below:

Report	Frequency
Remedial Design and Implementation Plan (RDIP)	12 weeks following approval of the RAP
Remediation Progress Reports	Quarterly
Property Specific Remedial Plan (PSRPs)	As completed
Property Specific Remedial Action Completion Reports (RACRs)	45 days following completion of remedial actions (excavation, backfill and restoration; on-property SVE well and piping installation; and installation of sub-slab mitigation systems), and receipt of permit closure approval and post-excavation sample analytical results, whichever is later
Groundwater monitoring	Semi-annually
LNAPL removal	Removal monthly, reported in Semi-annual Groundwater Report
Monitoring of existing soil vapor probes at nine onsite probe locations and one offsite location in the streets.	Quarterly until no longer necessary or feasible
Monitoring of 69 onsite and offsite utility vaults	Quarterly until after SVE/bioventing system becomes operational and site conditions demonstrate it is no longer necessary, as approved by the RWQCB
SCAQMD Permit monitoring	TBD, in accordance with the schedule stipulated in the Permit to Construct and Operate
SVE/bioventing mass removal estimates	Annual
Annual inspections of the SSD systems	Reported in the quarterly progress reports
Sub-slab soil vapor probes sampling	Reported in the quarterly progress reports
Periodic monitoring of street soil vapor probes and soil and soil vapor sampling to confirm effectiveness of the SVE/bioventing system	Analytical results and field data will be reported semi-annually along with semi-annual groundwater monitoring data. Evaluation will be conducted in initial 5-year review report to be submitted five years after SVE system start-up, and subsequent SVE system operational review reports submitted on a 5-year basis

2.14 PRELIMINARY CONCEPTUAL SCHEDULE FOR RAP IMPLEMENTATION

Section 9.5 of the Revised RAP presents a narrative discussion of the tentative schedule for implementation of the RAP. This preliminary conceptual schedule is presented in Gantt chart format on Addendum Figure 2-1. The Gantt chart schedule is based on a start date of May 12, 2015 following anticipated certification of the EIR and approval of the RAP the first week in April 2015 and the CEQA-required 30-day EIR appeal period. This schedule is conditioned on a number of actions by others that will affect implementation of subsequent activities and therefore must be considered tentative. This preliminary schedule assumes homeowners/residents will provide timely access for meetings to support preparation of PSRPs and so that the remedial excavation work and restoration can be implemented in a logical progression as series of blocks of eight homes in sequence working down a city block, as described as the recommended remedy in the Revised RAP and this Addendum. If homeowners do not provide access to allow the work to proceed in this manner, additional time will be required. The preliminary schedule also assumes timely approval of grading plans and issuance of Grading Permits by the LA County DPW and City of Carson, and allows up to six weeks for plan review and approval. The schedule also does not account for delays due to inclement weather or other acts of God.

This preliminary conceptual schedule will be updated with a more detailed schedule during preparation of the RDIP with input from the selected remediation contractor. Additionally, this schedule may be updated periodically as the work progresses; these updates would be communicated in the Remediation Progress Reports.

3.0 REFERENCES

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TABLES

Table 6-1 (REVISED September 2014 for RAP and FS)
Property Addresses for Consideration in Remedial Planning

Address	Shallow Excavation		SVE/Bioventing	Targeted Excavation for >5 to ≤10 ft bgs depth interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to <10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24402 NEPTUNE AVE	X	X	X		X		
24402 PANAMA AVE	X		X				
24402 RAVENNA AVE	X	X	X		X		
24403 NEPTUNE AVE	X	X	X	X	X	X	
24403 RAVENNA AVE		X	X				
24406 MARBELLA AVE	X	X	X		X		
24406 NEPTUNE AVE		X	X				X
24406 PANAMA AVE	X		X				
24406 RAVENNA AVE	X	X	X				
24409 NEPTUNE AVE	X	X	X	X	X	X	
24409 RAVENNA AVE		X	X				
24411 MARBELLA AVE	X		X				
24411 PANAMA AVE	X	X	X		X		
24412 MARBELLA AVE	X	X	X	X	X	X	X
24412 RAVENNA AVE	X	X	X				
24413 NEPTUNE AVE	X	X	X	X	X	X	
24413 RAVENNA AVE		X	X				
24416 MARBELLA AVE	X	X	X	X	X	X	
24416 NEPTUNE AVE	X		X				
24416 RAVENNA AVE	X	X	X				X
24417 MARBELLA AVE	a	a	a				
24417 PANAMA AVE		X	X				
24419 NEPTUNE AVE	X	X	X	X	X	X	
24419 RAVENNA AVE		X	X				
24420 PANAMA AVE	X		X				
24421 PANAMA AVE	X	X	X	X			
24422 MARBELLA AVE	X	X	X				
24422 NEPTUNE AVE		X	X				
24422 RAVENNA AVE	X	X	X				
24423 MARBELLA AVE	a	a	a				
24423 NEPTUNE AVE	X	X	X	X	X	X	X
24423 RAVENNA AVE	X	X	X				
24426 MARBELLA AVE	X	X	X	X	X	X	
24426 NEPTUNE AVE		X	X				
24426 PANAMA AVE	X		X				
24426 RAVENNA AVE	X		X		X		
24427 PANAMA AVE		X	X				
24429 NEPTUNE AVE	X	X	X	X	X	X	X
24429 RAVENNA AVE	X	X	X				
24431 PANAMA AVE	X	X	X				
24432 MARBELLA AVE	X	X	X		X		
24433 MARBELLA AVE	X		X				X
24436 PANAMA AVE	X		X				
24502 MARBELLA AVE	X	X	X				
24502 NEPTUNE AVE		X	X				
24502 RAVENNA AVE	X	X	X		X		
24503 NEPTUNE AVE	X	X	X	X	X	X	
24503 PANAMA AVE	X	X	X				
24503 RAVENNA AVE		X	X				

Table 6-1 (REVISED September 2014 for RAP and FS)
Property Addresses for Consideration in Remedial Planning

Address	Shallow Excavation		SVE/Bioventing	Targeted Excavation for >5 to ≤10 ft bgs depth interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to <10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24506 MARBELLA AVE	X	X	X	X			X
24508 NEPTUNE AVE	X	X	X		X		
24508 RAVENNA AVE	X	X	X	X			
24509 NEPTUNE AVE	X	X	X				
24509 PANAMA AVE	X	X	X	X	X	X	
24509 RAVENNA AVE	X	X	X	X			
24512 MARBELLA AVE	X	X	X	X	X	X	
24512 NEPTUNE AVE	X	X	X		X		
24512 RAVENNA AVE	X	X	X	X			
24513 NEPTUNE AVE		X	X				
24513 PANAMA AVE	X	X	X	X	X	X	
24513 RAVENNA AVE		X	X				X
24516 MARBELLA AVE	X	X	X		X		
24517 MARBELLA AVE	X		X				
24518 NEPTUNE AVE	X	X	X	X			
24518 RAVENNA AVE	X	X	X	X	X	X	
24519 NEPTUNE AVE	X	X	X				
24519 PANAMA AVE	X	X	X		X		
24519 RAVENNA AVE	X	X	X				
24522 MARBELLA AVE	X	X	X	X			
24522 NEPTUNE AVE	X	X	X				
24522 RAVENNA AVE	X	X	X				
24523 NEPTUNE AVE	X	X	X		X		
24523 RAVENNA AVE	X	X	X	X			
24526 MARBELLA AVE	X	X	X		X		
24528 NEPTUNE AVE	X	X	X				
24529 NEPTUNE AVE	X	X	X		X		
24529 RAVENNA AVE	X	X	X				
24532 MARBELLA AVE	X	X	X		X		
24532 PANAMA AVE	X	X	X				
24533 NEPTUNE AVE *	X	X	X				
24533 PANAMA AVE	X		X				
24602 MARBELLA AVE		X	X				
24602 PANAMA AVE		X	X				
24603 MARBELLA AVE	X		X				X
24603 NEPTUNE AVE	X	X	X				
24603 PANAMA AVE	X		X				
24603 RAVENNA AVE	X	a	X				
24606 MARBELLA AVE	X	X	X		X		
24607 MARBELLA AVE		X	X				
24608 NEPTUNE AVE	X	X	X				
24608 PANAMA AVE	X	X	X				
24608 RAVENNA AVE	X	X	X				
24609 NEPTUNE AVE	X	X	X	X	X	X	
24609 PANAMA AVE	X	X	X				X
24609 RAVENNA AVE	X		X				
24612 MARBELLA AVE	X	X	X	X	X	X	
24612 NEPTUNE AVE	X	X	X	X	X	X	
24612 PANAMA AVE	X	X	X				

Table 6-1 (REVISED September 2014 for RAP and FS)
Property Addresses for Consideration in Remedial Planning

Address	Shallow Excavation		SVE/Bioventing	Targeted Excavation for >5 to ≤10 ft bgs depth interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to <10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24612 RAVENNA AVE	X		X				
24613 MARBELLA AVE	a	a	a				
24613 NEPTUNE AVE	X	X	X	X	X	X	
24613 PANAMA AVE	X	X	X				X
24613 RAVENNA AVE	X	X	X				
24616 MARBELLA AVE	X	X	X	X	X	X	
24617 MARBELLA AVE	X	a	X				
24618 NEPTUNE AVE	X	X	X	X	X	X	
24618 PANAMA AVE	X	X	X				
24618 RAVENNA AVE	X		X				
24619 NEPTUNE AVE	X	X	X	X	X	X	
24619 PANAMA AVE	X	X	X				
24619 RAVENNA AVE		X	X				
24622 MARBELLA AVE	X	X	X	X	X	X	
24622 NEPTUNE AVE	X	X	X	X	X	X	
24623 MARBELLA AVE	X	X	X				X
24623 NEPTUNE AVE	X	X	X	X	X	X	
24627 MARBELLA AVE	X	X	X	X			
24628 MARBELLA AVE	X	X	X	X	X	X	
24628 NEPTUNE AVE		X	X				
24629 NEPTUNE AVE	X	X	X	X	X	X	X
24632 NEPTUNE AVE[b]	X	X	X	X	X	X	X
24633 MARBELLA AVE	X		X				
24700 MARBELLA AVE	X	X	X	X			
24702 NEPTUNE AVE	X	X	X	X	X	X	
24702 PANAMA AVE	X	X	X				
24703 MARBELLA AVE	X		X				
24703 NEPTUNE AVE	X	X	X	X			
24703 PANAMA AVE	X	X	X				
24703 RAVENNA AVE	X	X	X	X	X	X	
24706 MARBELLA AVE	X	X	X	X			
24706 RAVENNA AVE	X		X				
24708 PANAMA AVE	X	X	X				
24709 NEPTUNE AVE	X	X	X		X		X
24709 PANAMA AVE	X	X	X		X		
24709 RAVENNA AVE	X	X	X		X		
24710 MARBELLA AVE	X	X	X	X	X	X	
24712 NEPTUNE AVE	X	X	X	X	X	X	X
24712 PANAMA AVE	X	X	X				
24712 RAVENNA AVE	X		X				
24713 PANAMA AVE	X	X	X				
24713 RAVENNA AVE	X	X	X		X		
24715 NEPTUNE AVE	X	X	X	X	X	X	
24716 MARBELLA AVE	X	X	X				
24716 RAVENNA AVE	X		X				
24717 MARBELLA AVE	X		X				
24718 NEPTUNE AVE	X	X	X	X			
24718 PANAMA AVE	X	X	X				
24719 NEPTUNE AVE	X	X	X	X			

Table 6-1 (REVISED September 2014 for RAP and FS)
Property Addresses for Consideration in Remedial Planning

Address	Shallow Excavation		SVE/Bioventing	Targeted Excavation for >5 to ≤10 ft bgs depth interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to <10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24719 PANAMA AVE	X	X	X				
24719 RAVENNA AVE	X	X	X		X		
24722 MARBELLA AVE	X		X				
24722 PANAMA AVE	X		X				
24722 RAVENNA AVE	X		X				
24723 MARBELLA AVE	X		X				X
24723 RAVENNA AVE	X	X	X				
24726 RAVENNA AVE	X		X				
24727 MARBELLA AVE	X		X				
24728 NEPTUNE AVE	X	X	X				
24728 PANAMA AVE	X	X	X				
24729 NEPTUNE AVE	X		X				
24732 MARBELLA AVE	X		X				
24732 NEPTUNE AVE	X	X	X		X		
24732 RAVENNA AVE	X		X				
24733 MARBELLA AVE	X		X				
24733 PANAMA AVE	X		X				
24733 RAVENNA AVE	X	X	X				
24735 NEPTUNE AVE	X		X				
24736 RAVENNA AVE	X	X	X	X			
24737 MARBELLA AVE	X	X	X				
24738 NEPTUNE AVE	X	X	X	X	X	X	X
24738 PANAMA AVE	X		X				
24739 NEPTUNE AVE	X		X				
24739 PANAMA AVE	X	X	X				
24739 RAVENNA AVE	X	X	X	X	X	X	
24740 MARBELLA AVE	X		X				
24743 RAVENNA AVE	X	X	X	X	X	X	
24744 MARBELLA AVE	X		X				X
24748 RAVENNA AVE	X	X	X				
24749 RAVENNA AVE	X	X	X	X	X	X	X
24752 RAVENNA AVE	X	X	X				
24802 PANAMA AVE	X		X				
24803 NEPTUNE AVE	X		X				
24803 PANAMA AVE	X	X	X				
24808 PANAMA AVE	X		X				
24809 NEPTUNE AVE	X	X	X				
24809 PANAMA AVE	X	X	X	X	X	X	
24812 PANAMA AVE	X		X				
24813 PANAMA AVE	X	X	X				
24815 NEPTUNE AVE	X	X	X				
24818 PANAMA AVE	X		X				
24819 PANAMA AVE	X	X	X		X		
24822 PANAMA AVE	X	X	X				
24823 PANAMA AVE	X	X	X	X			
24828 PANAMA AVE	X	X	X				
24829 PANAMA AVE	X	X	X				
24832 PANAMA AVE	X	X	X				
24833 PANAMA AVE	X	X	X				

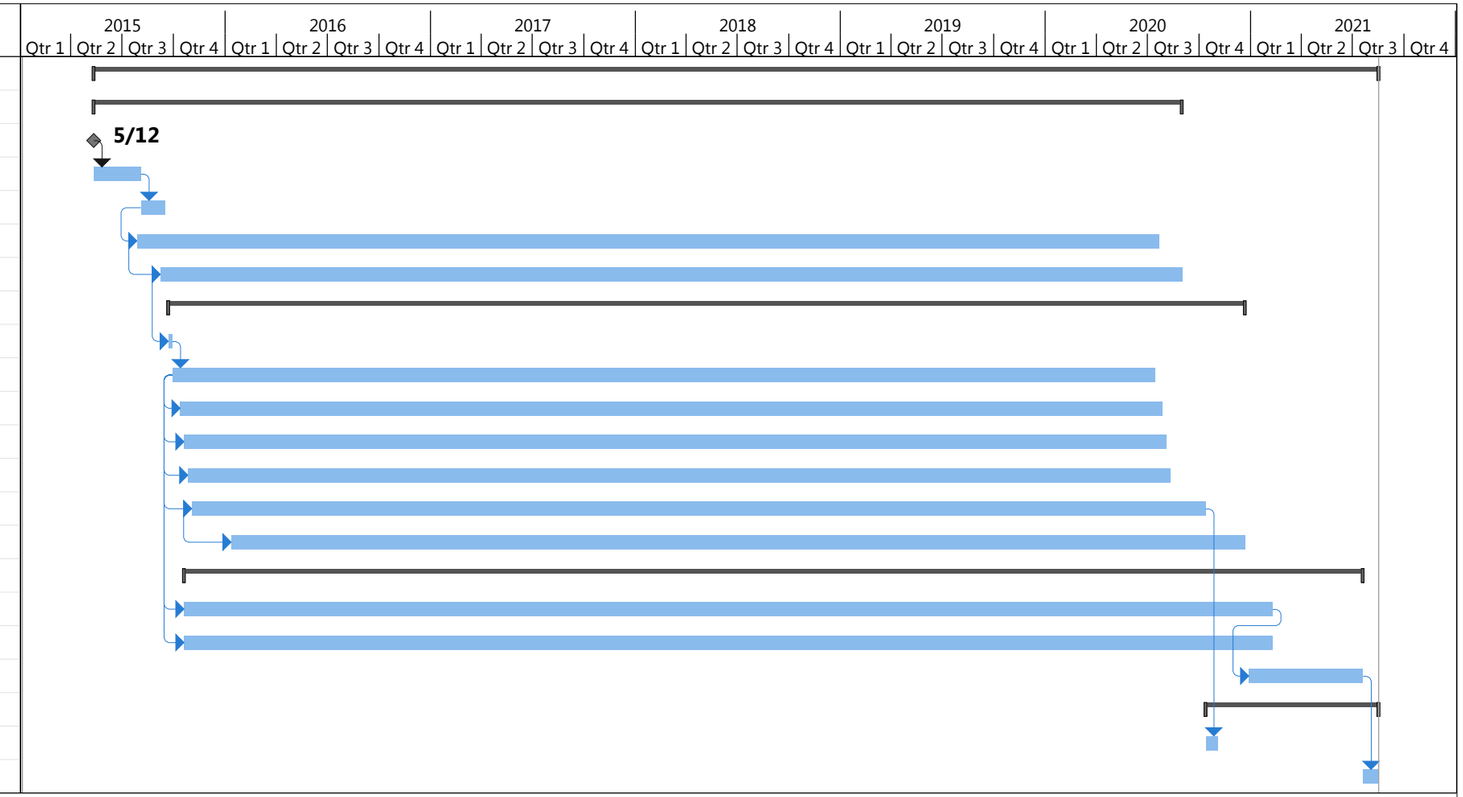
Table 6-1 (REVISED September 2014 for RAP and FS)
Property Addresses for Consideration in Remedial Planning

Address	Shallow Excavation		SVE/Bioventing	Targeted Excavation for >5 to ≤10 ft bgs depth interval			Sub-Slab Soil Vapor Mitigation
	Exceeds HH Criteria or Leaching to GW SSCGs < 5 ft bgs	Exceeds HH Criteria or Leaching to GW SSCGs >5 to <10 ft bgs	Exceeds in either ≤ 5ft or >5 to ≤10 ft bgs depth interval	Front Yard	Back Yard	Both Yards	Identified in HHRA based on > 1 E-6 Risk Level
24838 PANAMA AVE	X		X				
24904 NEPTUNE AVE		X	X				
24912 NEPTUNE AVE		X	X				
305 244TH ST	X	X	X				
311 244TH ST	X	X	X				
317 244TH ST	X		X				X
321 244TH ST	a	a	a				
331 244TH ST	a	a	a				
344 249TH ST	X		X				
345 249TH ST	X	X	X	X			
348 248TH ST	X	X	X	X			X
348 249TH ST	X	X	X				
351 244TH ST	X		X				
352 249TH ST		X	X				X
353 249TH ST	X	X	X				
354 248TH ST	X	X	X	X	X	X	
357 244TH ST	X		X				
357 249TH ST		X	X				
358 249TH ST	X		X				
360 248TH ST	X	X	X	X			
363 249TH ST	X	X	X	X			
364 248TH ST	X	X	X				
367 244TH ST	X		X				
367 249TH ST	X	X	X				
368 249TH ST	X	X	X				
373 249TH ST	X	X	X	X			
374 248TH ST	X	X	X		X		
374 249TH ST	X	X	X	X			
377 249TH ST	X	X	X	X			
378 249TH ST	X	X	X				X
383 249TH ST	X	X	X				X
402 249TH ST	X		X				
412 249TH ST	X	X	X				

"X" - Property Selected For Remediation based on results of Human Health Risk Assessment or additional considerations such as targeted mass removal (Excavation at some properties > 5 to ≤10 feet bgs) or risk management considerations (For subslab depressurization systems)

FIGURES

ID	Task Name	Duration	Start
1	**RAP Implementation**	**327 wks**	**Tue 5/12/15**
2	**Preconstruction Activities**	**277 wks**	**Tue 5/12/15**
3	RAP Approval	0 wks	Tue 5/12/15
4	RDIP Preparation (Including SVE, SSD Design and Pemitting)	12 wks	Tue 5/12/15
5	RDIP Review and Approval	30 days	Tue 8/4/15
6	PSRPs (27.4 Blocks of 8 houses)	260 wks	Tue 7/28/15
7	Permitting (Grading, Utilities, R/W, AQMD)	260 wks	Tue 9/8/15
8	**Excavation and Restoration Activities (219 houses)**	**274 wks**	**Tue 9/22/15**
9	Mobilization	1 wk	Tue 9/22/15
10	Hard and Softscape Demo	250 wks	Tue 9/29/15
11	Excavate and Load Impacted Soil, Backfill	250 wks	Tue 10/13/15
12	SVE Wells, Subslab Venting and Piping Installation at houses	250 wks	Tue 10/20/15
13	Utilities Restoration	250 wks	Tue 10/27/15
14	Landscape/Hardscape Restoration	258 wks	Tue 11/3/15
15	Property Specific Remedial Action Completion Reports	258 wks	Tue 1/12/16
16	**SVE/Bioventing Activities**	**300 wks**	**Tue 10/20/15**
17	Trenching and Piping Installation	277 wks	Tue 10/20/15
18	Well Installation in Street	277 wks	Tue 10/20/15
19	SVES Compound Construction and Equipment Installation	29 wks	Tue 12/29/20
20	**Post Excavation Construction**	**44 wks**	**Tue 10/13/20**
21	Asphalt Capping of Streets	3 wks	Tue 10/13/20
22	SVE system startup	4 wks	Tue 7/20/21

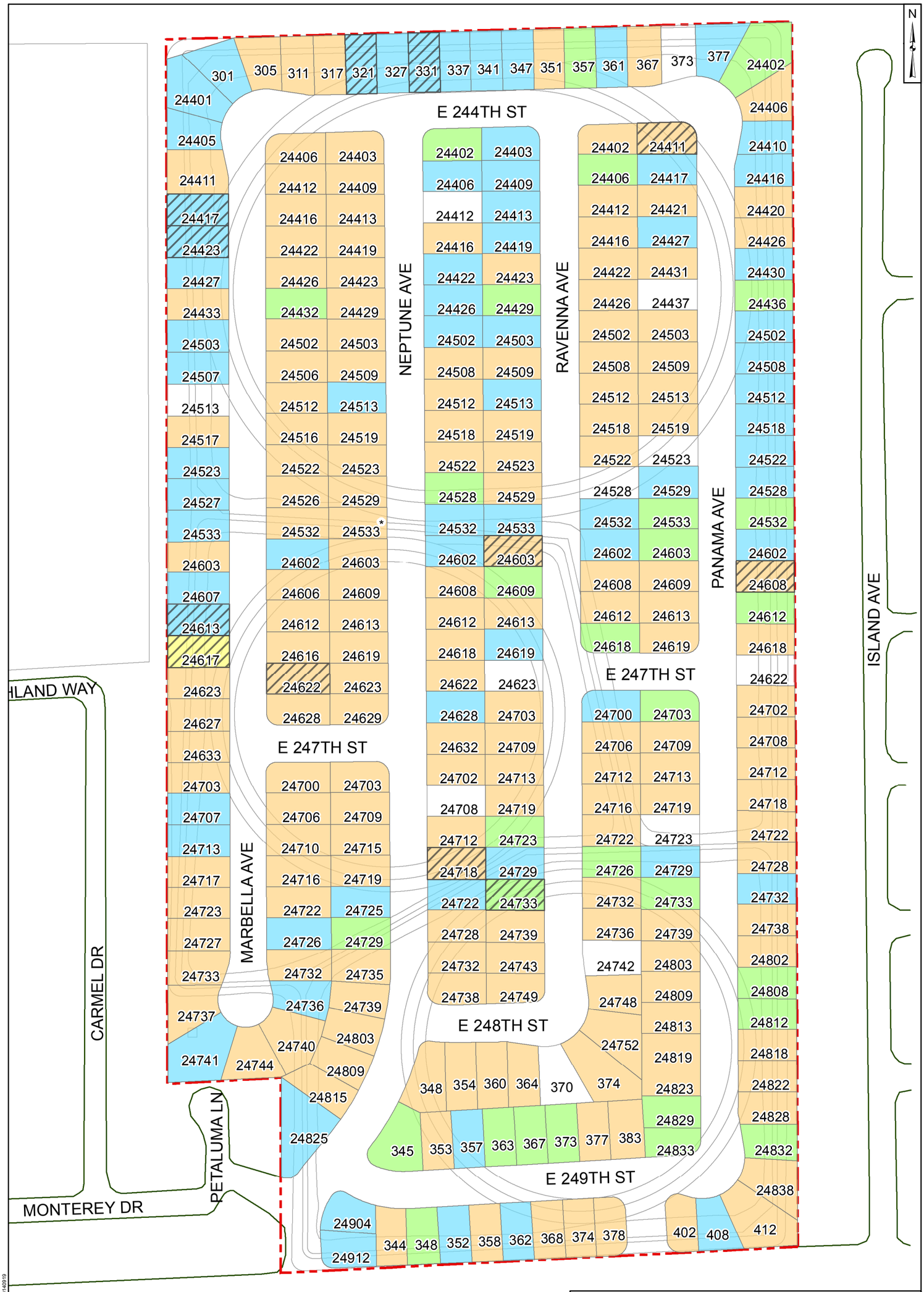


Project: FORMER KAST PROPERTY RAP IMPLEMENTATION
PRELIMINARY CONCEPTUAL SCHEDULE

Figure: 2-1 Date: Mon 10/13/14

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

URS



Legend

- < HHRA or Soil Leaching to GW Criteria
- > Soil Leaching to GW Criteria
- > HHRA Criteria
- > HHRA and Soil Leaching to GW Criteria
- No Data Available
- Antimony, Arsenic, or Thallium > Background

Notes:
ft bgs = feet below ground surface
* - 24533 Neptune property was not able to be sampled; identified for remedial action based on surrounding property results

Properties Exceeding Human Health and/or Leaching to Groundwater Criteria, ≤ 5 Feet Below Ground Surface

Former Kast Property

Geosyntec consultants

Santa Barbara | Revised September 2014

Figure 6-1

P:\GIS\Kast\Projects\2014-09 RAP-Addendum\Fig6-1_Soil_Lts\R_Kast_Residential.mxd 20140919

Legend
- < HHRA or Soil Leaching to GW Criteria
- > Soil Leaching to GW Criteria
- > HHRA Criteria
- > HHRA and Soil Leaching to GW Criteria
- No Data Available
- Antimony, Arsenic, or Thallium > Background

Notes:
ft bgs = feet below ground surface
* - 24533 Neptune property was not able to be sampled; identified for remedial action based on surrounding property results

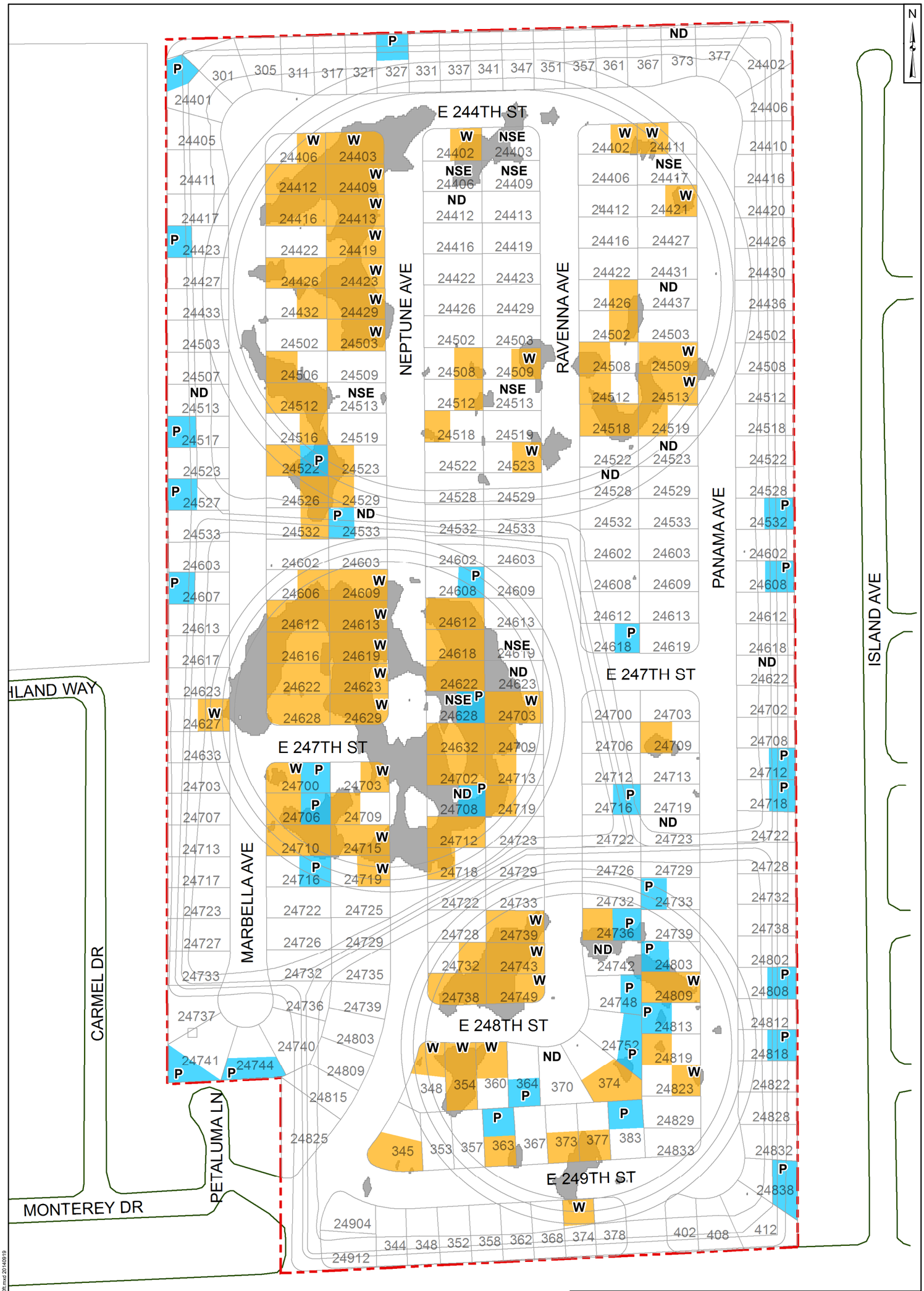
Properties Exceeding Human Health and/or Leaching to Groundwater Criteria, > 5 Feet and ≤ 10 Feet Below Ground Surface
Former Kast Property

Geosyntec consultants

Santa Barbara | Revised September 2014

Figure 6-2

P:\GIS\Kast\Projects\2014-09 RAP-Addendum\Fig6-2_Soil_Bp10ft_Kast_Residential.mxd 20140919



Legend

- TPH Concentrations > 10x SSCG
- Targeted Excavation Area
- Pool
- Site Boundary

Notes:

NSE = No Shallow Excavation Planned
P = Pool
W = Water Main
ND = No Data

150 75 0 150 Feet

Properties Identified for Targeted Excavation > 5 and ≤ 10 Feet Below Ground Surface

Former Kast Property

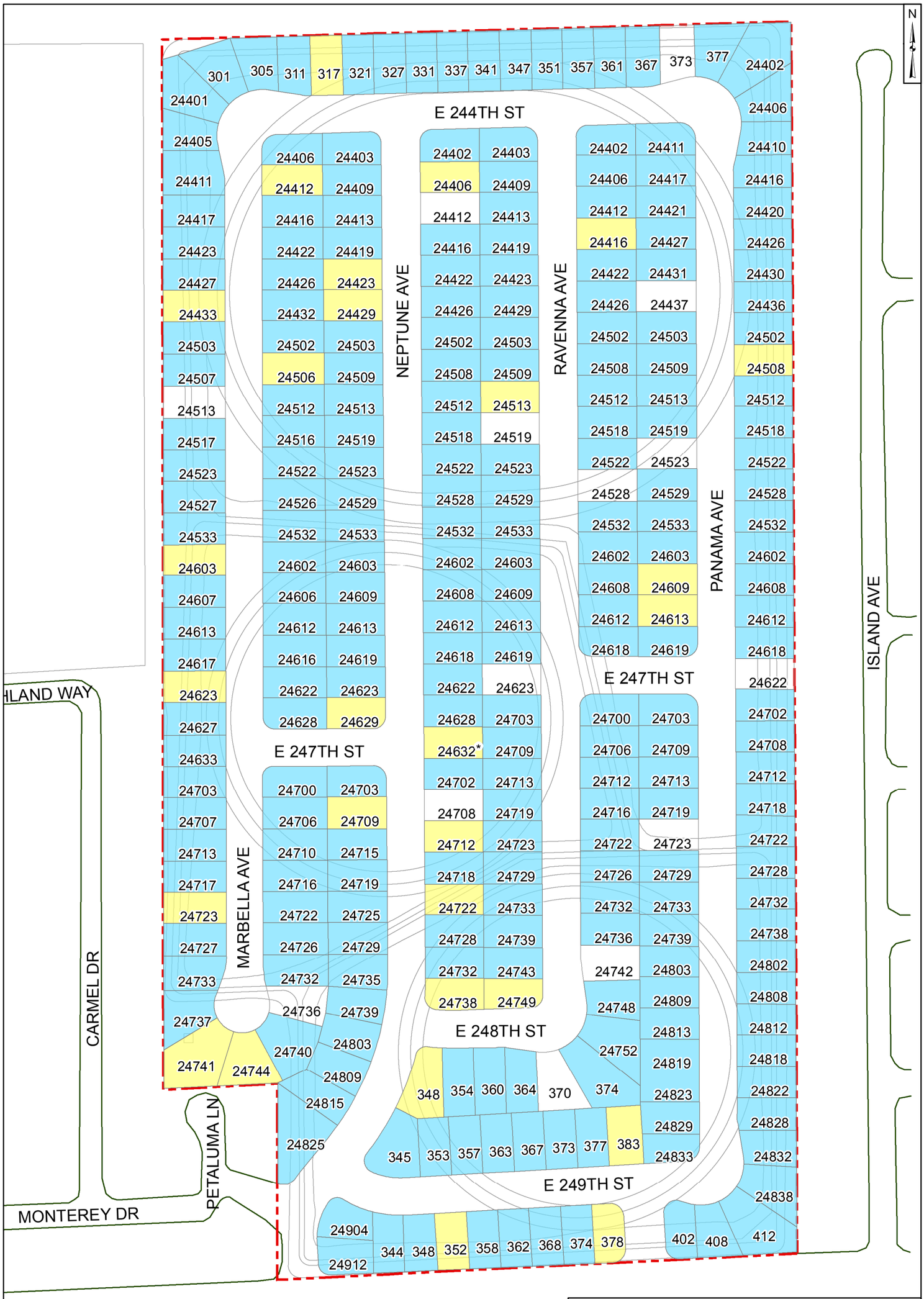
Geosyntec consultants

Santa Barbara

Revised September 2014

Figure 6-3

P:\GIS\Kast\Projects\2014-09 RAP Addendum\Fig6-3_Targeted_Excavation_Area_gf\land108.mxd 20140919



Legend

- ≤ 1 x 10^{-6} incremental lifetime cancer risk
- > 1 x 10^{-6} incremental lifetime cancer risk
- No Data Available

Notes:

-Background risks associated with trihalomethanes not Included

-* = 24632 Neptune Avenue property identified for sub-slab mitigation based on methane detection at 0.58%, slightly above the methane Site-Specific Cleanup Goal (SSCG) of 0.5%

Properties Exceeding Human Health Criteria for Sub-Slab Soil Vapor to Indoor Air

Former Kast Property

Geosyntec consultants

Santa Barbara

Revised September 2014

Figure 6-4

P:\GIS\Kast\Projects\2014-09 RAP-Addendum\Fig6-4_SSSV_IA_Resident.mxd 20140919

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