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.

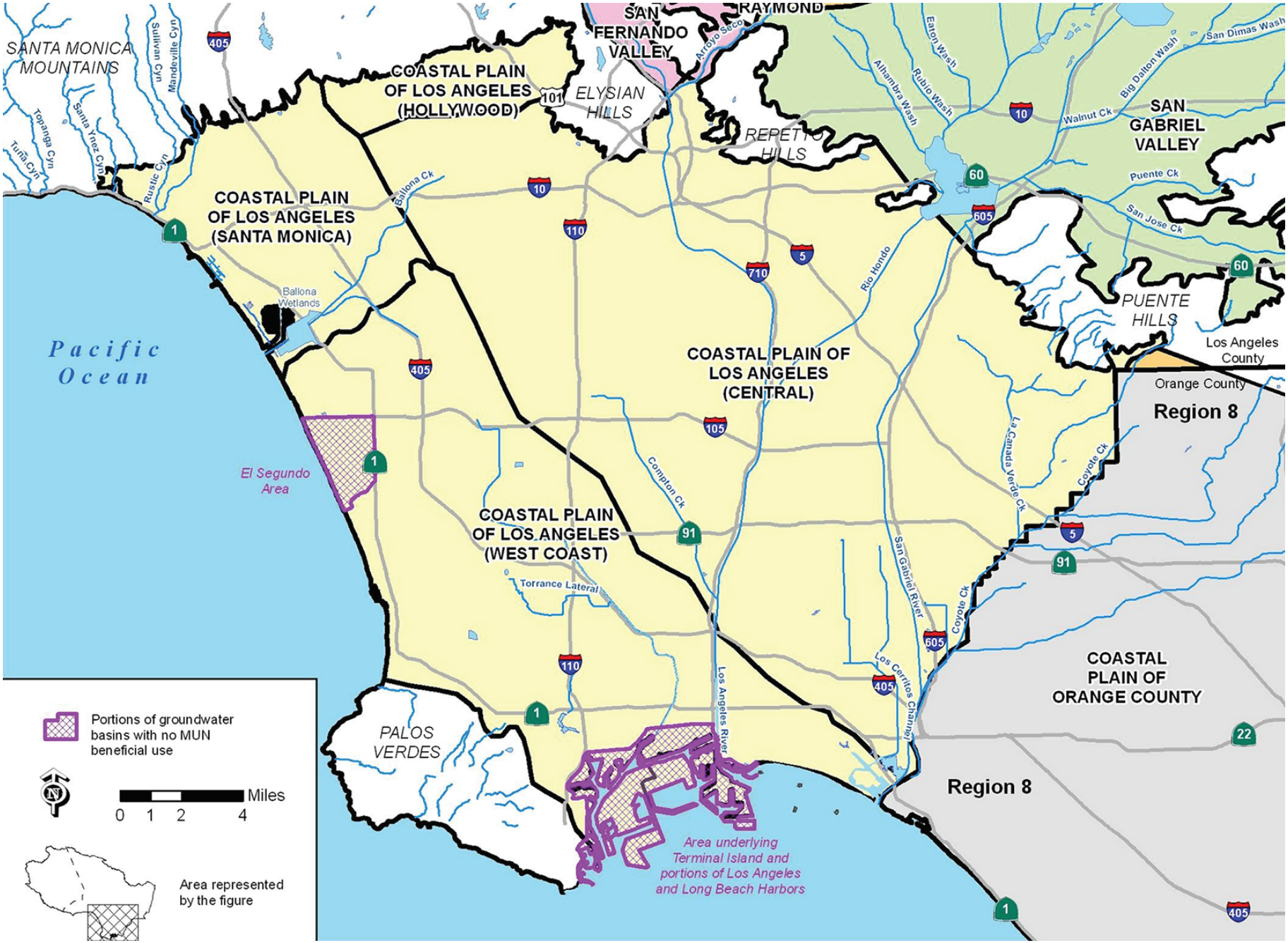
Existing Conditions

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.*



PCR

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.*

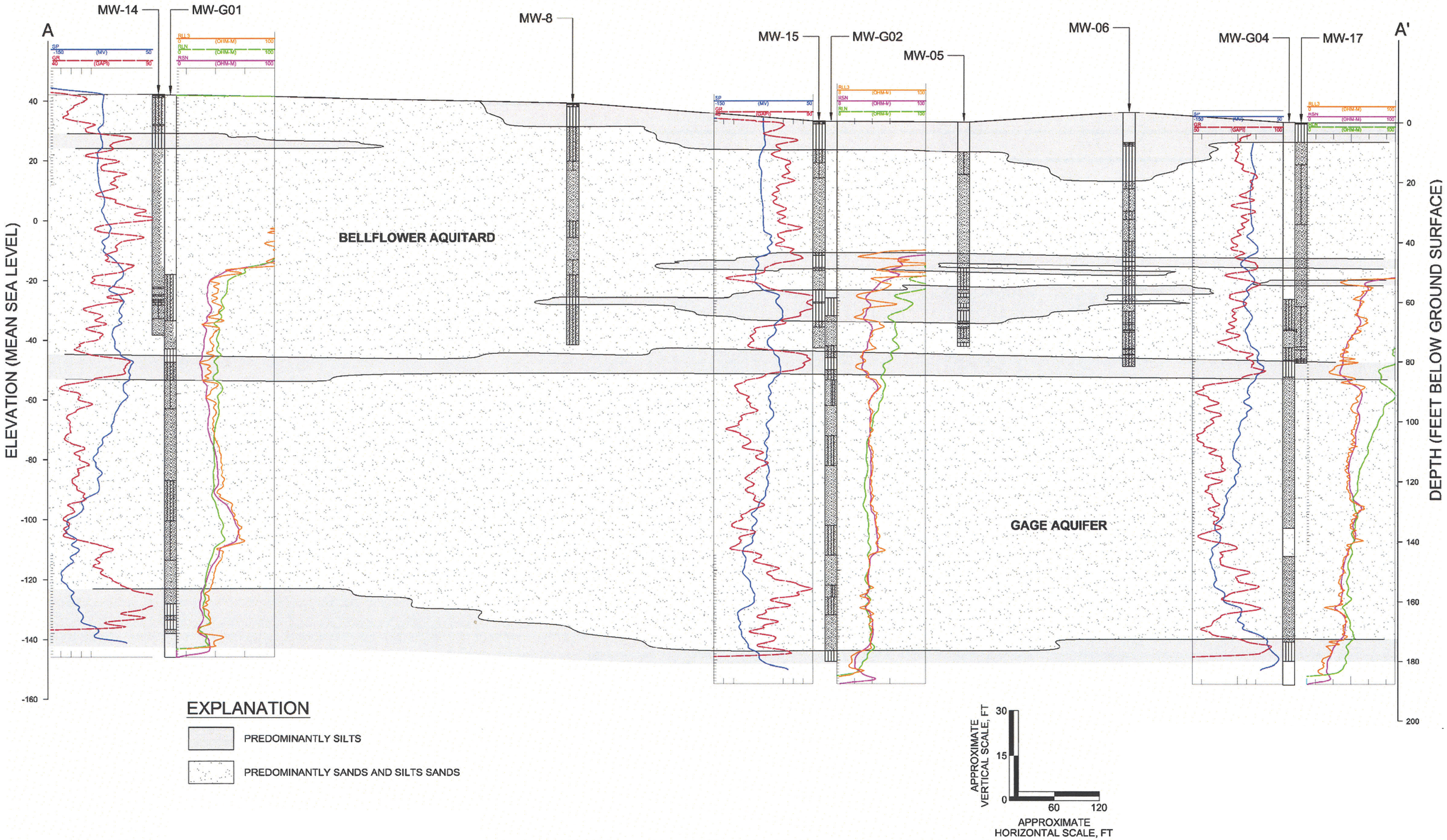
[15] *URS Corporation, Final Phase I Site Characterization Report, Former Kast Property, Carson, California, October 15, 2009, page 3-19.*

[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.*

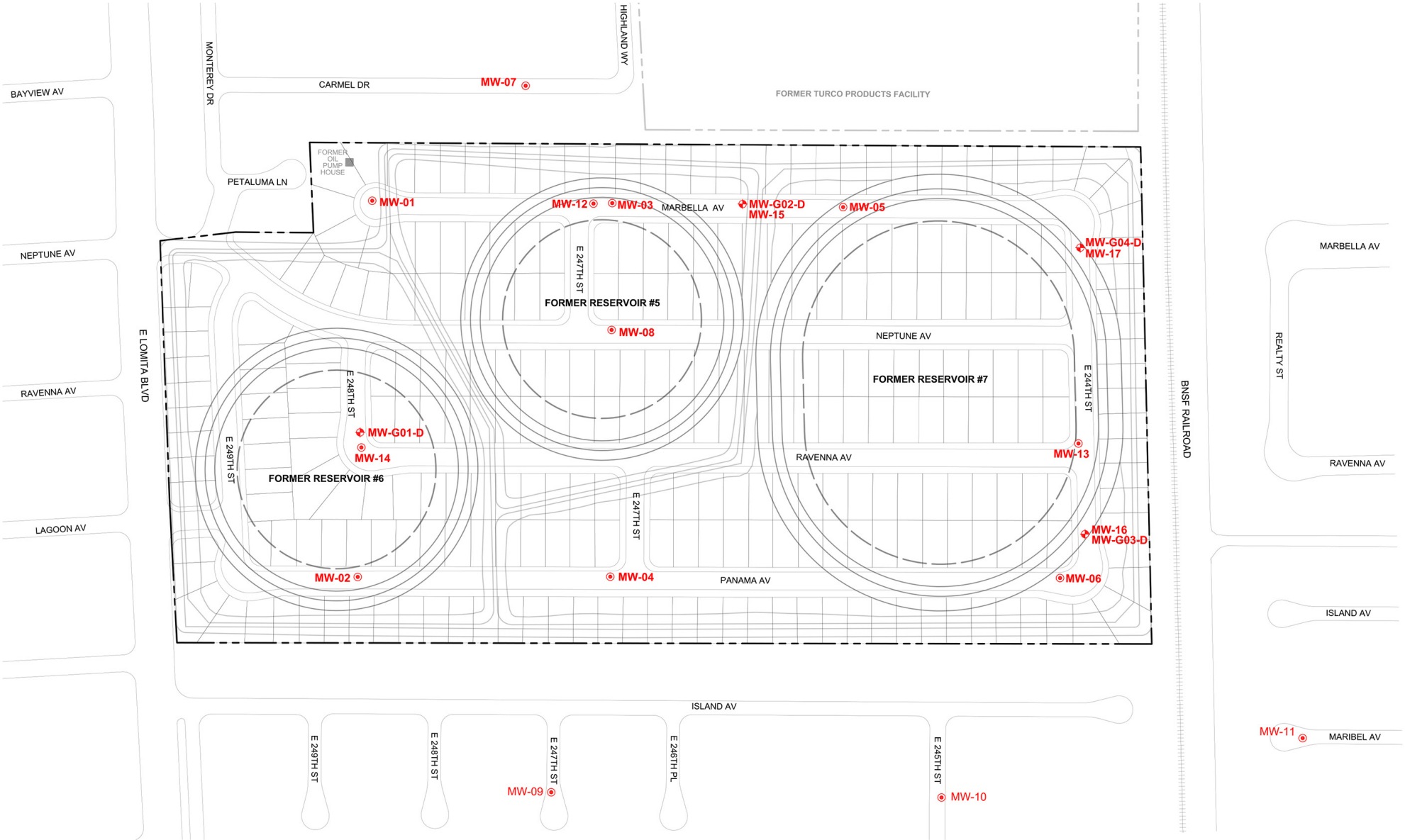
Note: MCLs for iron, manganese, chloride, Total Dissolved Solids and Specific Conductance are secondary MCLs. MCLs shown for chloride, Total Dissolved Solids and Specific Conductance are the "Upper" Secondary MCLs.

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

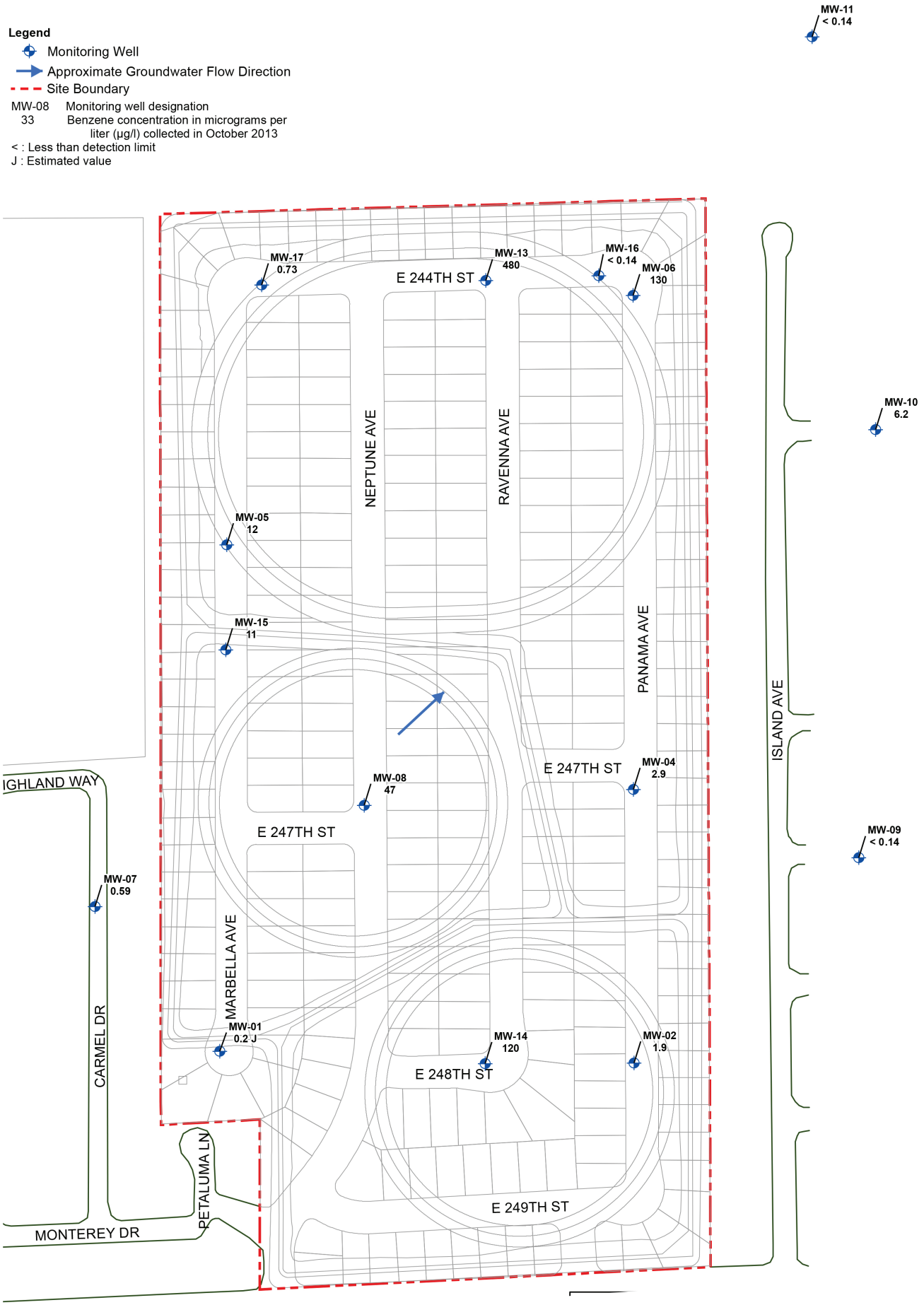
Monitoring Well Locations

Former Kast Property Tank Farm Site Remediation Project

Source: URS, 2014.

FIGURE

5.5-3



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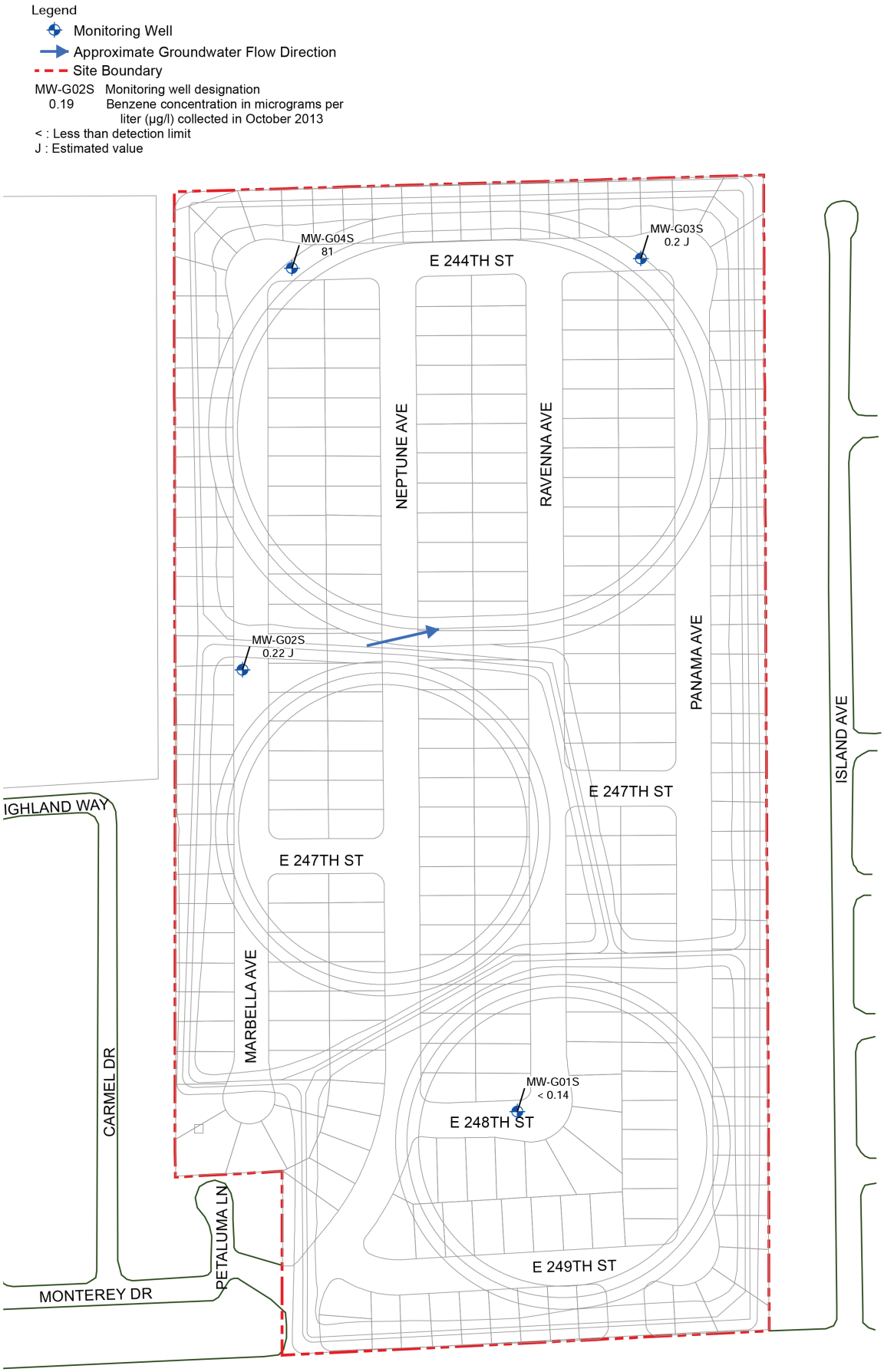
Benzene Concentrations in Groundwater – Shallow Zone

Former Kast Property Tank Farm Site Remediation Project

Source: Geosytec Consultants, 2014.

FIGURE

5.5-4



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N

0 350 Feet

Benzene Concentrations in Groundwater – Shallow Gage Aquifer

Former Kast Property Tank Farm Site Remediation Project

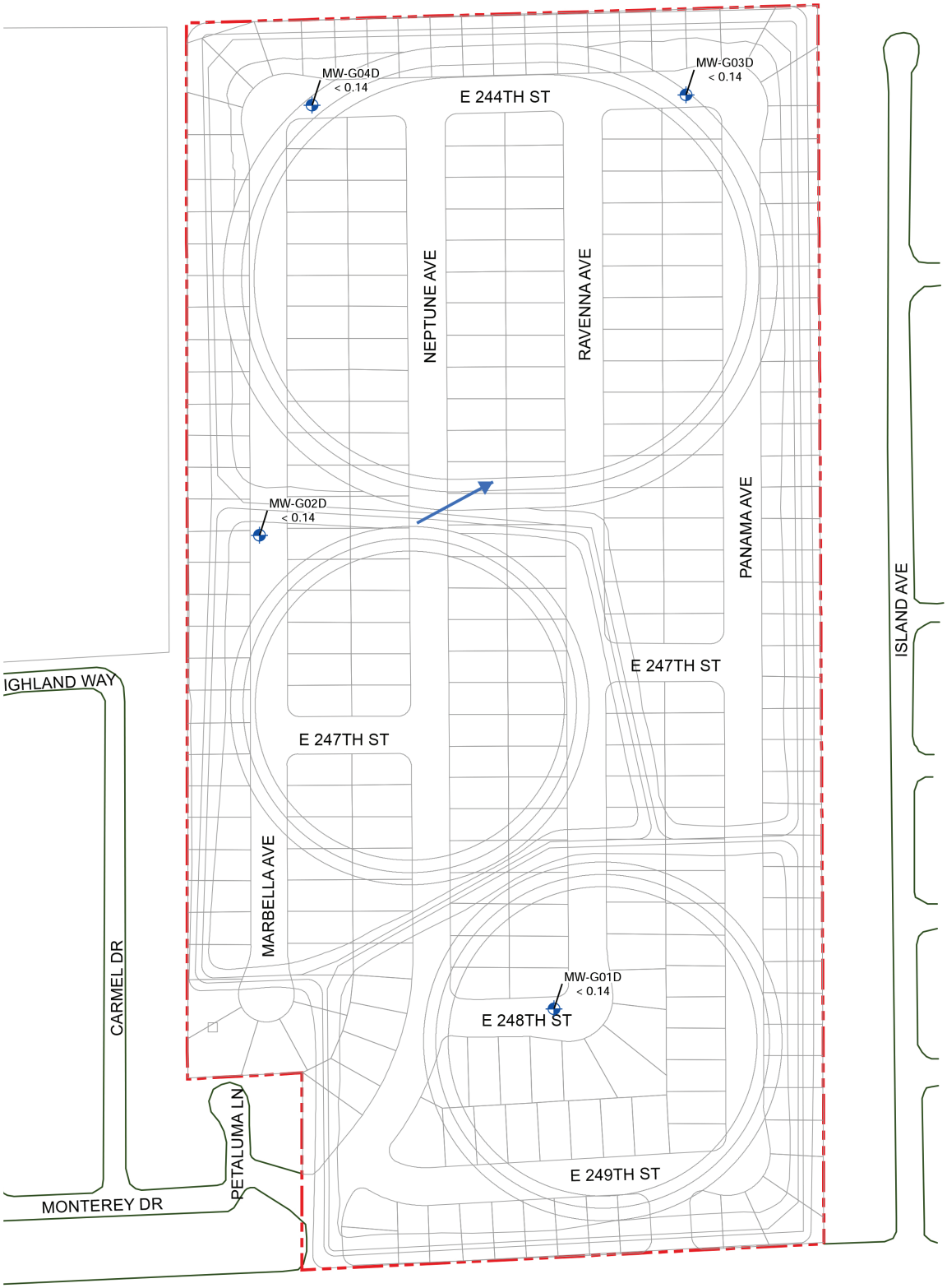
Source: Geosytec Consultants, 2014.

FIGURE

5.5-5

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

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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.