APPENDIX G HAZARDS AND HAZARDOUS MATERIALS DOCUMENTATION

APPENDIX G1 LOWER OPERABLE UNIT RAP

FINAL REMEDIAL ACTION PLAN FOR LOWER OPERABLE UNIT

CAL COMPACT LANDFILL
20400 SOUTH MAIN STREET
CARSON, CALIFORNIA

Prepared for:

CALCOMPACT DEFENSE GROUP

Prepared by:

URS

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January 2005

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January 2005

LIST OF FIGURES

LIST OF APPENDICES

bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CD	Consent Decree
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
cis-1,2-DCE	cis-1,2-dichloroethene
COC	Chemical of Concern
1,2-DCA	1,2-dichlorethane
DTSC	Department of Toxic Substances Control
EPA	Environmental Protection Agency
IS/ND	Initial Study and Issuance of a Negative Declaration
LBF	Lower Bellflower Aquitard
MCLs	Maximum Contaminant Levels
MBF B/C	Middle Bellflower Aquitard B/C Sands
msl	Mean Sea Level
NBAR	Nonbinding Allocation of Responsibility
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&M	Operation and Maintenance
OU	Operable Unit
PRP	Potentially Responsible Party
P&T	Pump & Treat
RAP	Remedial Action Plan
RAW	Removal Action Work Plan
SARA	Superfund Amendments and Reauthorization Act
SOR	Statement of Reason
SVE	Soil Vapor Extraction
TCE	Trichloroethene
VOCs	Volatile Organic Compounds

This Final Remedial Action Plan (RAP) addresses the potential impact of groundwater contamination in the Upper Operable Unit (OU) on the Lower OU at the Cal Compact Landfill in Carson, California (Site). This Final RAP was prepared in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); Chapter 6.8 of the California Health and Safety Code; and applicable guidance from the California Environmental Protection Agency – Department of Toxic Substances Control (DTSC) (DTSC, 1995). This Final RAP summarizes the results of the RAP process, describes the Site conditions, identifies removal action objectives, describes removal action alternatives, summarizes the evaluation of alternatives, and describes the recommended alternative.

The Site is an inactive Class II landfill located at 20400 South Main Street in Carson, County of Los Angeles, California. The approximately 157-acre landfill was active between 1959 and 1964, during which time it accepted both solid municipal wastes and industrial semi-liquid wastes for disposal. The Site has been vacant and unused since the closure of the landfill in 1965. In 1978, the California Department of Health Services (now, DTSC) began investigating the Site for soil and shallow groundwater contamination that allegedly resulted from the prior waste disposal practices. In 1988, the DTSC issued a Remedial Action Order under California Health and Safety Code 25355.5(a)(1)(B) to fourteen potentially responsible parties (PRPs). The order alleged the existence of a release or threatened release and public nuisance, and required the submittal of a workplan to identify the hazardous substances present and determine the extent of cleanup required.

In 1995, the DTSC entered into a Consent Order and Remedial Action Order with the former landfill owner (BKK), successor to Cal Compact Inc., for preparation of a RAP for the Upper OU. In 1995, the DTSC also entered into a Consent Decree (CD) with the Site owners, L.A. Metro Mall, LLC and Commercial Realty Projects, Inc., for implementation of the Upper OU RAP. In the CD, the DTSC divided the Site vertically into two principal OUs. The Upper OU was defined to include the shallow soil, the "waste zone", and the Bellflower aquitard, which was described to extend to a depth of approximately 110 feet below the Site. The Lower OU was defined as the deeper hydrostratigraphic units beginning with the Gage aquifer and extending down to the Silverado aquifer. The DTSC established the OU designations in prioritizing the remedial response to the areas of known impacts (Upper OU) versus potential impacts (Lower OU). Since contamination was known to be present in the Upper OU, the CD focused on the remediation of the Upper OU. The Lower OU was not addressed in the CD, but it did contain provisions for the DTSC to address the investigation and remediation of the Lower OU at a later date. Since that time, the Upper OU investigations and remediation activities have been addressed separately.

During this same time period, the validity of the hydrostratigraphic Site model used by the DTSC for defining OU boundaries had come under question based on noted differences with the hydrostratigraphic model developed for the nearby Montrose-Del Amo Superfund site (Dames & Moore, 1998). To address this uncertainty, URS/Dames & Moore conducted a detailed hydrostratigraphic investigation, which established the Upper OU/Lower OU boundary, as defined by the top of the Gage aquifer, to be deeper by approximately 100 feet than previously considered (URS/Dames & Moore, 2000). The DTSC has concurred with the findings of this study, which places the Upper OU/Lower OU boundary at a depth of approximately 200 feet below the Site. This redefinition of the Upper OU/Lower OU boundary has subsequently affected the remedial strategy for the Lower OU.

Results from the previous Upper OU investigations had indicated that the primary chemicals of concern (COCs) in groundwater were dissolved chlorinated and aromatic volatile organic compounds (VOCs), primarily trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), 1,2-dichlorethane (1,2-DCA), vinyl chloride and benzene, toluene, ethylbenzene, xylenes (BTEX). These VOCs had been detected in localized areas within the Bellflower aquitard at concentrations above their respective maximum contaminant levels (MCLs) for drinking water. The results of the hydrostratigraphic investigation conducted by URS/Dames & Moore in 2000 confirmed that VOCs were locally present in the Bellflower aquitard (Middle Bellflower B/C sands [MBF B/C]), but not in the underlying Gage aquifer of the Lower OU, which is separated from the MBF B/C by approximately 50 feet of comparatively fine grained and low-permeability sediments comprising the Lower Bellflower aquitard (LBF).

Based upon the available groundwater monitoring and chemical fate and mobility modeling data, in conjunction with remedial actions for the Upper OU, the risk posed to the Lower OU is considered to be minimal. However in the interest of satisfying the provisions set forth in CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] §300.415 (b)(2)), and the California Health and Safety Code section 25323, a response action (herein referred to as a removal action) is merited given the potential for contamination of drinking water or sensitive ecosystems.

In accordance with the NCP requirement, two alternative actions were identified and considered: Alternative 1 - No Action; and Alternative 2 - Groundwater monitoring. Based on the comparison of these two alternatives, Alternative 1 would not provide sufficient protection to the Lower OU. However, Alternative 2 would achieve the NCP criteria of overall protectiveness of human health, short-term and long-term effectiveness, implementability, and State and community acceptance.

A groundwater monitoring plan for the Gage aquifer has already been prepared and approved by the DTSC (DTSC, 2002). Upon approval of the Final RAP for the Lower OU, a groundwater monitoring program will be implemented in accordance with techniques and methods described in the approved plan.

This Final Remedial Action Plan (RAP) identifies proposed removal/remedial action alternatives for groundwater in the Lower Operable Unit (OU) at the Cal Compact Landfill in Carson, California (Site). It has been prepared by URS Corporation (URS) on behalf the Cal Compact Defense Group pursuant to the Consent Decree (CD) entered in *Department of Toxic Substances Control, et al., versus Commercial Realty Projects, Inc., et al., United States District Court, Central District (No. 95-8773 MRP (MANx))*.

The proposed removal/remedial action area is located within a hazardous substance release Site; therefore, the action will be implemented in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 CFR §300.415]. CERCLA and NCP define removal action to include:

> *"the cleanup or removal of released hazardous substances from the environment; such actions as may necessarily be taken in the event of the threat of release of hazardous substances into the environment; such action as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release."*

The United States Environmental Protection Agency (EPA) has classified removal actions into three types based on the circumstance surrounding the release or threat of release: emergency removal actions; time critical removal actions; and non-time critical removal actions. The California Health and Safety Code specifies preparation of necessary work plan documentation depending on the type and cost of the removal action (i.e., RAP, RAP equivalent or Removal Action Work Plan [RAW]), and authorizes the California Environmental Protection Agency – Department of Toxic Substance Control (DTSC) oversight responsibility of the process. For the Cal Compact Landfill, the DTSC has made the determination (DTSC, 2001) that a standard RAP should be prepared in accordance with the California Health and Safety Code section 25356 subdivisions (e) and (f). Subdivisions (e) and (f) outline the requirements for a Statement of Reason (SOR), evaluation of alternatives, evaluation of consistency with federal regulations, Nonbinding Allocation of Responsibility (NBAR), and public involvement during the RAP review process, including a public meeting and response to comments.

The Cal Compact landfill is an inactive Class II landfill located at 20400 South Main Street in Carson, County of Los Angeles, California (Figure 1, Vicinity Map). It is bounded to the north by the Dominguez Golf Course and vacant property, to the east by the San Diego Freeway (Interstate Highway #405), and to the south and west by single-family residences and mobile home parks. The Harbor Freeway (Interstate Highway #110) is located approximately 0.25 to 0.50 mile west of the Site. The approximately 157-acre landfill was active between 1959 and 1964, during which time it accepted both solid municipal wastes and industrial semi-liquid wastes for disposal. The Site has been vacant and unused since the closure of the landfill in 1965. Previous investigations had indicated that the primary chemicals of concern (COCs) threatening the Lower OU (Gage aquifer, Lynwood aquifer, and Silverado aquifer) were volatile organic compounds (VOCs), primarily trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), 1,2-dichlorethane (1,2-DCA), vinyl chloride and benzene, toluene, ethylbenzene, xylenes (BTEX). These VOCs had been detected in localized areas within the Bellflower aquitard of the Upper OU at concentrations above their respective maximum contaminant levels (MCLs) for drinking water. The results of a recent hydrostratigraphic investigation indicate that VOCs were present in the Upper OU but not in the Lower OU (URS/Dames & Moore, 2000).

This Final Lower OU RAP addresses the applicable regulatory requirements set forth in California Health and Safety Code section 253561.1 (d), and presents the evaluation of the two non-time critical removal action alternatives under consideration for the Site, including (1) no action and (2) groundwater monitoring. This Final RAP will be used as the basis for the CERCLA removal action at the Site. The Administrative Record is included in Appendix A of this document. The Statement of Reasons, including the Nonbinding Allocation of Responsibility (NBAR), is included in Appendix B, and the California Environmental Quality Act (CEQA) documentation is included in Appendix C. The Responsiveness Summary is included in Appendix D of this Final RAP. The DTSC-approved Groundwater Monitoring Plan for the Lower OU is included in Appendix E.

This Final RAP is being issued in accordance with the DTSC public involvement policy, in which the public is encouraged to review and comment on the proposed removal action. To gain a more thorough understanding of the activities associated with this removal action, the public is encouraged to review the official administrative record, available at the Carson Public Library, 151 East Carson Street, Carson, California (telephone: 310.830.0901).

The Site background information presented below has been summarized from a variety of prior technical studies, including Brown and Root, 1995a, 1995b; Allwest Geoscience, 1999a, 1999b; Dames & Moore, 1998a; and URS/Dames & Moore, 2000. This section presents a brief description of the Site conditions and background, and is intended to satisfy the requirements of a RAP as defined in CERCLA.

According to disposal records, the Cal Compact landfill accepted more than six million cubic yards of material including municipal rubbish and construction debris, accounting for about 94% of the waste volume at the Site. It also accepted about 540,000 cubic yards (volume equivalent) of semi-liquid waste, principally drilling muds, accounting for about 6% of the waste volume at the Site. The landfill used the "excavate-fill-cover" method of disposal; the daily cover was estimated to total 1 million cubic yards of soil.

Two initial investigations were conducted at the Cal Compact landfill in 1978 and 1981. They encountered landfill gases (methane and carbon dioxide) as well as VOCs (mainly BTEX, TCE, cis-1,2-DCE, 1,2-DCA, and vinyl chloride) and metals in the Site soil and groundwater. In 1988, the California Department of Health Services (now, the DTSC), lead agency for the Site, issued a Remedial Action Order under California Health and Safety Code 25355.5(a)(1)(B) to fourteen potentially responsible parties (PRPs). The order alleged the existence of a release or threatened release and public nuisance, and required the submittal of a workplan to identify the hazardous substances present and determine the extent of cleanup required.

In 1995, the DTSC entered into a Consent Order and Remedial Action Order with the former landfill owner (BKK), successor to Cal Compact Inc., for preparation of a RAP for the Upper OU. In 1995, the DTSC also entered into a CD with the Site owners, L.A. Metro Mall, LLC and Commercial Realty Projects, Inc., for implementation of the Upper OU RAP. In the CD, the DTSC divided the Site vertically into two principal OUs. The Upper OU was defined to include the Site soils, the "waste zone" above and within the Bellflower aquitard and the Bellflower aquitard down to, but not including the Gage aquifer. The Lower OU was defined as the deeper hydrostratigraphic units beginning with the Gage aquifer and extending down to the Silverado aquifer. The DTSC established the OU designations in prioritizing the remedial response to the areas of known impacts (Upper OU) versus potential impacts (Lower OU). Since contamination was known to be present in the Upper OU, the CD focused on the remediation of the Upper OU. The Lower OU was not addressed in the CD, but it did contain provisions for the DTSC to address the investigation and remediation of the Lower OU at a later date. Since that time, the Upper OU investigations and remediation activities have been addressed separately.

The Lower OU was initially addressed in response to the concern over the definition of the hydrostratigraphic boundary between the Upper OU and Lower OU in relation to the vertical extent of known contamination (defined as "waste zone") that was used in the RAP for the Upper OU. The DTSC acknowledged at the time that the base of the Bellflower aquitard and top of the Gage aquifer were poorly defined and that accurate boundary definition was required in order to meet the remedial objectives for the Upper OU.

In 1998, Site-specific models (Dames & Moore, 1998) were developed to evaluate the hydrostratigraphic units of the Lower OU and Upper OU (specifically, the position of the Gage aquifer) and to assess the potential for downward migration of VOCs into the Lower OU. Input parameters for the models were based on the detailed work conducted at the nearby Montrose/Del Amo site and augmented by other available subsurface data, including drilling logs and geophysical logs from nearby water production wells. The interpretations placed the top of the Gage aquifer, which the DTSC defines as the top of the Lower OU, at an approximate elevation of –200 feet mean sea level (msl), or approximately 220 feet below ground surface (bgs). This is deeper than the interpretation presented in the Upper OU RAP, which puts the top of Gage aquifer at an approximate elevation of –90 feet msl, or approximately 100 feet bgs (Brown & Root, 1995c).

The result of the 1998 study supported the conclusion that the contamination previously attributed to the Gage aquifer actually reflected conditions in portions of the overlying Bellflower aquitard (Upper OU), specifically the Middle Bellflower B/C sands (MBF B/C) in the stratigraphic nomenclature adopted for the Montrose-Del Amo site. Figure 2 is a schematic hydrostratigraphic cross section illustrating the revised Site model.

In 2000, a hydrostratigraphic investigation was conducted to confirm the findings of the 1998 study. The stratigraphic conditions encountered during the 2000 investigation confirmed, with a high degree of precision, the interpretation that the Gage aquifer beneath the Site lies at a greater depth (by almost 100 feet) than previously interpreted for the Upper OU RAP. Furthermore, laboratory results for groundwater samples collected from the Gage aquifer indicated no VOCs or metals were present at detectable concentrations in the Lower OU, except for barium and zinc. The barium and zinc concentrations were reported well below MCLs.

Pursuant to a Consent Decree between DTSC and BKK Corporation (BKK) that was entered on February 4, 2004, BKK must implement the tasks and activities that are set forth in the final RAP for the Lower OU.

Numerous investigations have been conducted at the Site from 1978 to the present. These investigations evaluated environmental conditions with respect to potential chemical impacts to soil, groundwater and air at the Site and within the surrounding area. Early investigations focused on evaluating conditions in the vadose zone and shallow saturated zone, while later work evaluated conditions in deeper hydrostratigraphic levels.

The principal documents describing prior Site characterization studies include the following:

- McLaren/Hart – *Revised Integrated Remedial Investigation Report, Cal Compact Landfill,* December 10, 1992.
- Brown & Root – *Final Remedial Investigation Report of the Cal Compact Landfill.* Dated July 1995.
- Dames & Moore – *Hydrostratigraphy, Groundwater Flow, and Contaminant Transport, Cal Compact and Vicinity.* Dated December 22, 1998.
- Allwest Geoscience, Inc. – *Report of Supplemental Site Assessment and First Quarter Groundwater Sampling for LA Metromall (Former Cal Compact Site), 20400 South Main Street, Carson, California.* Dated January 8, 1999.
- URS/Dames & Moore – *Report of Hydrostratigraphic Investigation, Cal Compact Landfill, Carson, California.* Dated August 10, 2000.

The information presented below has been summarized from these prior technical studies. The reader is referred to the original source documents for a more detailed description of the nature and findings of prior investigations conducted at the Site.

Previous investigations at the Site have consisted of the following elements:

- Completion of soil borings and direct-push sampling points for the collection and laboratory analysis of soil and groundwater grab samples
- Completion of downhole geophysical profiles to aid in the evaluation of site hydrostratigraphy
- Installation of groundwater monitoring wells for the collection and laboratory analysis of groundwater samples
- Collection and laboratory analysis of surface water runoff samples

- Completion of hydraulic testing of monitoring wells to determine aquifer physical properties

- Completion of surface geophysical surveys to evaluate the depth of landfill wastes and locate former oil wells and water supply wells on Site

- Installation and sampling of vapor wells and vapor monitoring points to evaluate landfill gas conditions and the potential for lateral landfill gas migration

- Installation and operation of meteorological monitoring station and collection and laboratory analysis of ambient air samples

Prior investigations in the Upper OU have documented the presence of landfill gases (methane and carbon dioxide) as well as VOCs and metals in the Site soil and groundwater. Findings of these previous Upper OU investigations have indicated that the primary COCs in groundwater were dissolved chlorinated and aromatic VOCs, primarily TCE, cis-1,2-DCE, 1,2-DCA, vinyl chloride and BTEX. These VOCs had been detected in localized areas within the Bellflower aquitard at concentrations above their respective drinking water MCLs. Based upon the findings of prior remedial investigations completed for the Upper OU (McLaren/Hart, 1992; Brown & Root, 1995a), the following remedial actions have been proposed to mitigate threats posed by the contaminants detected in the Upper OU: (1) containment of impacted soil and buried waste by installation of an engineered landfill cap; (2) extraction and treatment of contaminated groundwater; (3) collection and treatment of landfill gasses; and (4) long-term environmental monitoring of groundwater and landfill gas (Brown & Root, 1995c). Remedial measures for the Upper OU have not yet been implemented.

The results of the more recent hydrostratigraphic investigation (URS/Dames & Moore, 2000) confirmed that VOCs were locally present in the MBF B/C sands (Upper OU), but not in the underlying Gage aquifer of the Lower OU, which is separated from the MBF B/C sands by approximately 50 feet of comparatively fine grained and low-permeability sediments comprising the LBF aquitard. Figure 3, Summary of Groundwater Analytical Results, shows the Gage aquifer sampling locations with corresponding groundwater analytical results from the 2000 URS/Dames & Moore investigation. An up-gradient location (MWL01) was reported to have TCE, cis 1,2-DCE, and vinyl chloride in the upper portion of the MBF B/C sands at concentrations slightly in excess of their respective state and/or federal MCLs. Additionally, a groundwater grab sample from the lower portion of the MBF B/C sands at a down-gradient location (MWL02) was reported to contain 1,2-DCA slightly above its MCL. No VOCs were detected for grab samples collected within the LBF aquitard, which directly overlies the Gage aquifer. All VOCs detected in the groundwater grab samples have been previously reported, typically at higher concentrations, in shallower Upper OU monitoring wells at the Site. No VOCs were detected in groundwater samples collected from the three monitoring wells installed in the Gage aquifer.

Based upon available data, it appears that certain COCs have penetrated into portions of the MBF B/C sands but have not entered the underlying Gage aquifer (Dames & Moore, 1998 and URS/Dames & Moore, 2000). The 40- to 50-foot thick interval of fine-grained sediments comprising the LBF aquitard appears to form an effective buffer protecting the Gage aquifer from potential downward migration of contaminants from the overlying Upper OU. Based on the fate and mobility model used for the Site (Dames & Moore, 1998), any future vertical migration of VOCs into the Lower OU would result in VOC contamination at lower concentrations (less than MCLs) than the concentrations detected in the groundwater grab samples. This takes into account the degradation process through hydrodynamic dispersion, molecular diffusion, sorption/desorption, and biotic or abiotic transformation (biodegradation).

Additional remedial investigations of the Lower OU are not currently warranted since the environmental actions taken to date (1978 through 2000) have included a characterization of the hydrostratigraphy of the Lower OU and a one-time baseline assessment of its water quality. Results for the baseline sampling event from the Gage aquifer indicated no VOCs are present at detectable concentrations in the Lower OU and that metals were not present at concentrations in excess of MCLs.

Based upon the available groundwater monitoring and fate and mobility modeling data, in conjunction with remedial actions proposed for the Upper OU, the risk posed to the Lower OU is considered to be minimal. However in the interest of satisfying the CERCLA and NCP requirements under 40 CFR §300.415(b)(2), a removal action is merited given the potential for contamination of drinking water or sensitive ecosystems. Therefore, the selected removal action should be designed to protect human populations against the potential health risk, namely ingestion of the COCs exceeding the Federal and State drinking water standards. It is judged that the selected Lower OU removal action (groundwater monitoring), in association with Upper OU remedial actions (landfill capping, SVE, and groundwater P&T), will provide adequate protection to human health and the environment.

long-term effectiveness, as a future removal action may possibly be required to address potential future migration of contamination from the Upper OU into the Lower OU aquifers.

Implementability. The technical feasibility of Alternative 1 is high. No technical difficulties are anticipated for well abandonment of the existing Gage aquifer groundwater monitoring wells. The technology to be employed is widely available, and services and equipment are readily available from multiple vendors.

The technical feasibility of the No Action alternative is, of course, high. The administrative feasibility of Alternative 1 would depend on State and public acceptance. For the purpose of this analysis, Alternative 1 assumes that the one-time groundwater sampling event already performed is sufficient to determine the impacts that the COCs present in the Upper OU have had on the Lower OU and the environment. With respect to implementation, State and community acceptance of Alternative 1 is considered to be low, as any potential future contamination in the Lower OU would go unnoticed and potentially threaten drinking water aquifers.

Cost. The estimated present worth of Alternative 1 is approximately $30,000. Expenditures would be for the abandonment of the three existing Gage aquifer monitoring wells and the proper management and disposal of drill cuttings and removed well materials.

Alternative 2 – Groundwater Monitoring

This alternative includes the periodic collection and analysis of groundwater samples from the Gage aquifer over a four-year period. Groundwater conditions within the Gage aquifer would be monitored using the three wells that were installed in 2000. Monitoring activities would be conducted on a quarterly basis for a period of two years, followed by semi-annual monitoring for an additional two years, and annual monitoring every third year thereafter for up to 50 years. If any VOCs are detected in the lower Bellflower aquitard during that period, the monitoring events will be increased to quarterly for a period of two years. A groundwater monitoring plan for the Gage aquifer has already been prepared and approved by the DTSC (DTSC, 2002), and is presented in Appendix E.

Effectiveness. Alternative 2 would provide engineering controls to detect the potential vertical migration of the COCs into the Gage aquifer from the overlying Upper OU. This alternative allows for future decisions to be made on any actions deemed necessary to inhibit or reduce the exposure pathways of concern. Alternative 2 is considered to provide long-term effectiveness for ongoing evaluation of potential groundwater impacts from the Upper OU to the Lower OU. Moreover, remedial actions for the Upper OU, including landfill capping, SVE and groundwater P&T will jointly act to minimize or eliminate the potential for contaminants present in the Upper OU to enter and possibly impact the underlying Lower

OU. Continued groundwater monitoring in Gage aquifer may be used to assess the effectiveness and success of these Upper OU remedial measures.

Implementability. The technical feasibility of Alternative 2 is considered to be high. No technical difficulties are anticipated for groundwater monitoring and sampling. The technology to be employed is widely used, and services are readily available from multiple vendors.

State and public acceptance of this alternative is also expected to be high, as it meets the removal action objectives as a protective remedy. For the purpose of this analysis, the planned monitoring period is assumed to be sufficient time to identify any potential impacts that conditions in the Upper OU may have on the Lower OU. The ultimate length and frequency of monitoring will be determined by the analytical results obtained, regulatory agency requirements, and the effectiveness of remedial action for the Upper OU.

If at some future time, monitoring data, obtained through sampling and laboratory analysis of groundwater samples, were to document the presence of any site-related VOC(s) at concentrations in excess of MCL(s) in the Lower Bellflower aquitard, then additional monitoring activities, beyond those anticipated by Alternative 2 and including the possible installation of additional monitoring wells, may be necessary. The nature and extent of any such increased monitoring is outside the scope of the remedy set forth in Alternative 2, and would need to be defined in a new RAP or other appropriate planning document that takes into account the scope and type of future contamination affecting the Lower OU.

Cost.[1] The estimated present worth for Alternative 2 is approximately $135,000. This value is comprised of the following:

• Estimated Capital Cost:	None
• Estimated Annual Operation and Maintenance (O&M) Cost:	None
• Estimated Quarterly Monitoring Annual Cost:	$18,620 x 2 years
• Estimated Semi-Annual Monitoring Annual Cost	$9,310 x 2 years
• Estimated Annual Monitoring Cost (each third year thereafter for up to 50 years)	$4,655 x 17 events
	Total $134,995

This cost estimate assumes that groundwater samples collected from the 3 existing wells will be analyzed for VOCs and dissolved metals. Alternative 2, which assumes 8 quarterly monitoring events followed by 4 semi-annual monitoring events, and up to 17 annual

[1] Estimated costs were developed jointly by DTSC and BKK Corporation in accordance with the February 4, 2004 Consent Decree between these parties.

DTSC has determined that a Notice of Exemption is applicable as the remedy consists of extracting and sampling non-contaminated groundwater from the Gage aquifer. The CEQA documentation is included in Appendix C.

This RAP is being issued to the public pursuant to applicable Federal laws, the NCP, the Superfund Amendments and Reauthorization Act (SARA), and the Cal-EPA Public Participation Policy and Procedure Manual, which requires specific public participation activities to be carried out in concert with technical activities. For non-time critical actions, federal and state regulations require a 30-day public comment period on the RAP at the time the draft document is made available for public review. The comment period may be extended depending on the circumstances. Additional public participation elements include preparing and distributing a fact sheet, issuing a public notification and conducting a public meeting.

A summary of the comments received and the response to those comments is included in Appendix D (Responsiveness Summary) of this Final RAP.

The proposed schedule for implementing a groundwater monitoring program for the Lower OU is tentatively set to begin in the Winter of 2004 or Spring of 2005, which is based on the anticipated time-frame for the DTSC's approval of the Final RAP. The groundwater monitoring program for the Lower OU, under the current DTSC-approved plan, would extend possibly up to the winter or spring 2059. The actual duration of the groundwater monitoring program may vary depending on future findings and decisions.

Allwest Geoscience, Inc. 1999a. Report of Supplemental Site Assessment and First Quarter Groundwater Sampling for LA Metromall (Former Cal Compact Site), 20400 South Main Street, Carson, California. January 8.

Allwest Geoscience, Inc. 1999b. Report of Second Quarter Groundwater Performed for LA Metromall (Former Cal Compact Site), 20400 South Main Street, Carson, California. April 2.

Brown & Root. 1995a. Remedial Investigation for Cal Compact Landfill, Carson, California.

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Dames & Moore. 1998. Report "*Hydrostratigraphy, Groundwater Flow, and Contaminant Transport, Cal Compact and Vicinity*. December 22.

DTSC. See California Environmental Protection Agency.

EPA. See United States Environmental Protection Agency.

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URS/Dames & Moore. 2000. Report of Hydrostratigraphic Investigation, Cal Compact Landfill, Carson, California. August 10.

United States Code of Federal Regulations - 40 CFR Part 300. 1990. National Oil and Hazardous Substances Pollution Contingency Plan.

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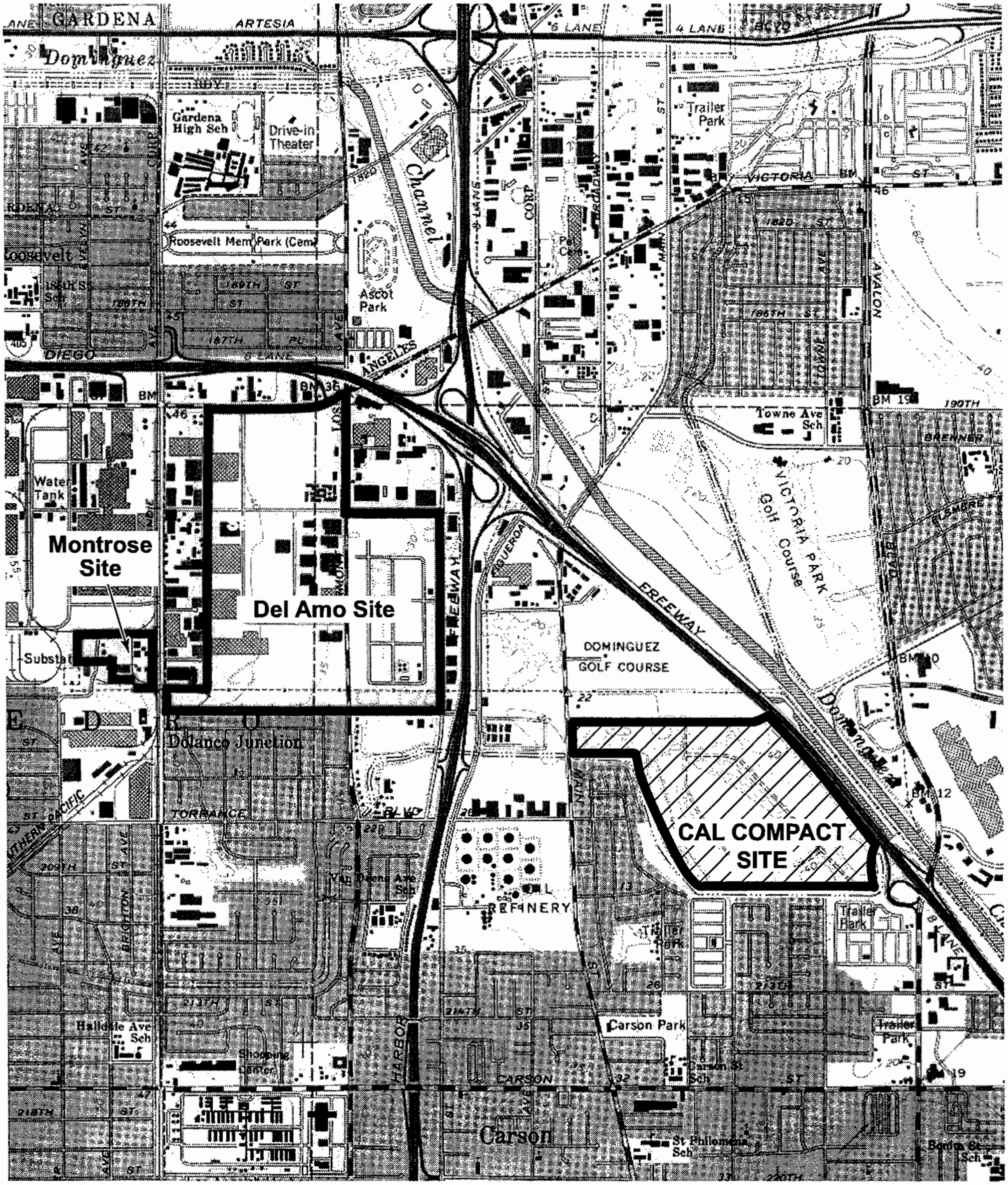
FIGURES

901/395



0 1/2 1

Scale in Miles

Base Map: *USGS 7.5' Topographic Quadrangle:* Torrance, CA 1964 (Photorevised 1981)

FIGURE 1

VICINITY MAP

Cal Compact Landfill

URS

901/396

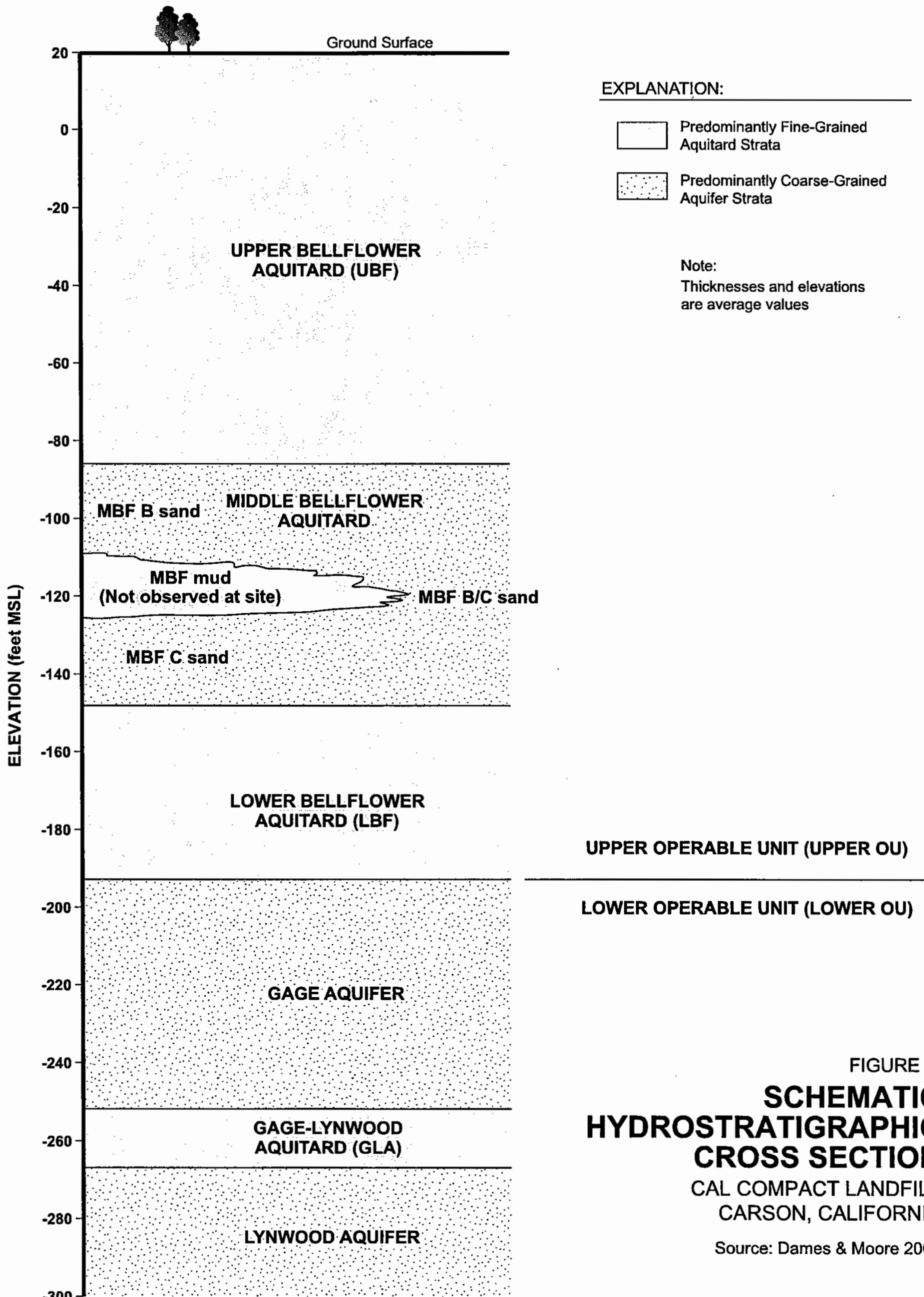


FIGURE 2

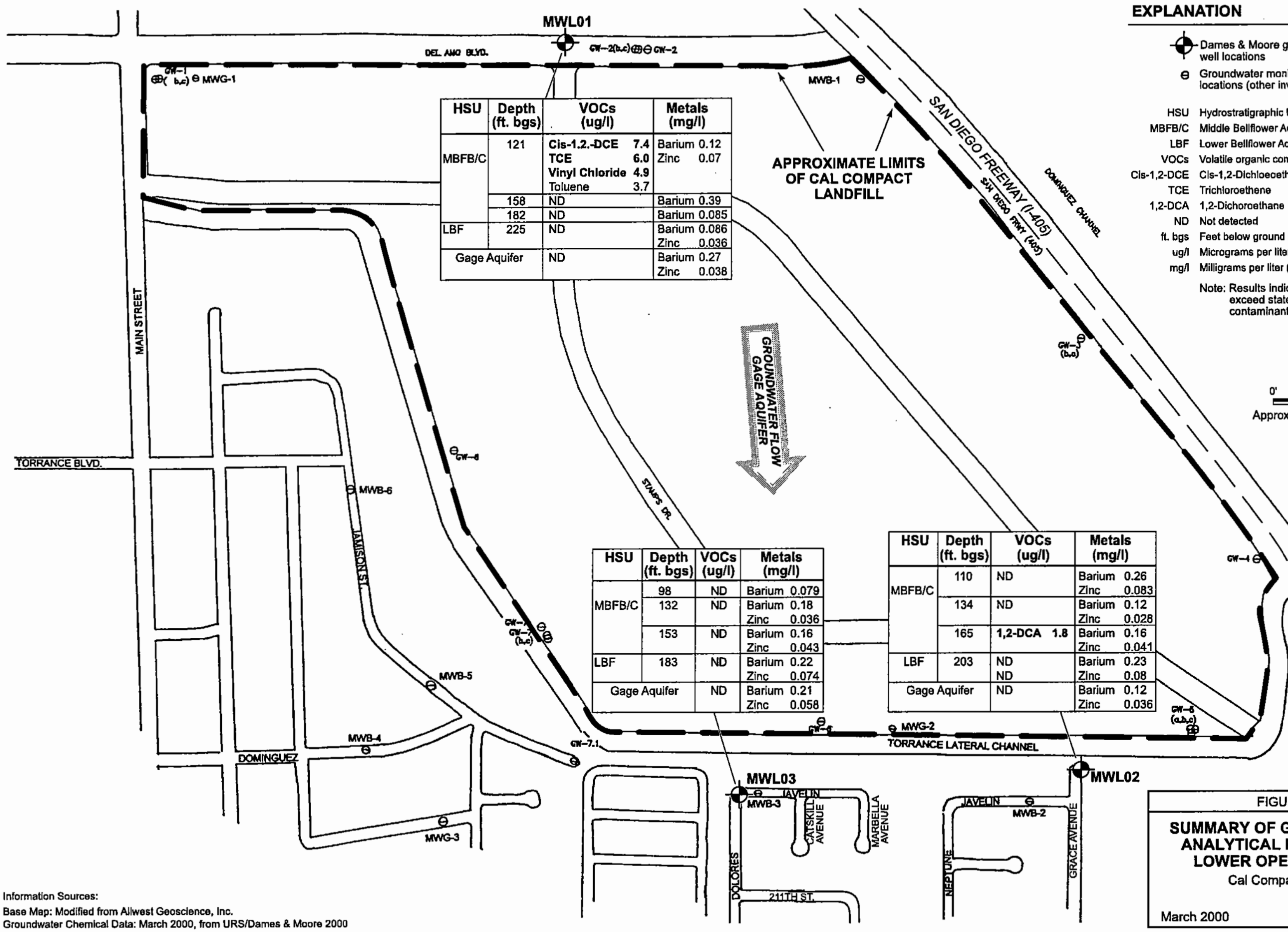
SCHEMATIC HYDROSTRATIGRAPHIC CROSS SECTION

CAL COMPACT LANDFILL
CARSON, CALIFORNIA

Source: Dames & Moore 2000

URS

901/398



MWL01

HSU	Depth (ft. bgs)	VOCs (ug/l)	Metals (mg/l)
MBFB/C	121	**Cis-1,2.-DCE 7.4** **TCE 6.0** **Vinyl Chloride 4.9** Toluene 3.7	Barium 0.12 Zinc 0.07
	158	ND	Barium 0.39
	182	ND	Barium 0.085
LBF	225	ND	Barium 0.086 Zinc 0.036
Gage Aquifer		ND	Barium 0.27 Zinc 0.038

MWL03

HSU	Depth (ft. bgs)	VOCs (ug/l)	Metals (mg/l)
MBFB/C	98	ND	Barium 0.079
	132	ND	Barium 0.18 Zinc 0.036
	153	ND	Barium 0.16 Zinc 0.043
LBF	183	ND	Barium 0.22 Zinc 0.074
Gage Aquifer		ND	Barium 0.21 Zinc 0.058

MWL02

HSU	Depth (ft. bgs)	VOCs (ug/l)	Metals (mg/l)
MBFB/C	110	ND	Barium 0.26 Zinc 0.083
	134	ND	Barium 0.12 Zinc 0.028
	165	**1,2-DCA 1.8**	Barium 0.16 Zinc 0.041
LBF	203	ND ND	Barium 0.23 Zinc 0.08
Gage Aquifer		ND	Barium 0.12 Zinc 0.036

EXPLANATION

- Dames & Moore groundwater monitoring well locations
- Groundwater monitor well or well cluster locations (other investigators)

HSU	Hydrostratigraphic Unit
MBFB/C	Middle Bellflower Aquitard B/C Sand
LBF	Lower Bellflower Aquitard
VOCs	Volatile organic compounds
Cis-1,2-DCE	Cis-1,2-Dichloethene
TCE	Trichloroethene
1,2-DCA	1,2-Dichoroethane
ND	Not detected
ft. bgs	Feet below ground surface
ug/l	Micrograms per liter (equivalent to parts-per-billion)
mg/l	Milligrams per liter (equivalent to parts-per-million)

Note: Results indicated in **Bold** type exceed state and/or federal maximum contaminant levels

Information Sources:
Base Map: Modified from Allwest Geoscience, Inc.
Groundwater Chemical Data: March 2000, from URS/Dames & Moore 2000

FIGURE 3

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS FOR LOWER OPERABLE UNIT

Cal Compact Landfill

March 2000

URS

APPENDIX A

ADMINISTRATIVE RECORD

Administrative Record for Lower Operable Unit
Cal Compact Landfill
Carson, California

California Environmental Protection Agency, Department of Toxic Substances Control, 1999. Comment Letter: *Draft Work Plan, Hydrostratigraphic Investigation, Cal Compact Landfill, Carson, California*. September 23, 1999.

California Environmental Protection Agency, Department of Toxic Substances Control, 2000. Consent Decree entered in *Department of Toxic Substances Control, et al., versus Commercial Realty Projects, Inc., et al., United States District Court, Central District (No. 95-8773 MRP (MANx))*.

California Environmental Protection Agency, Department of Toxic Substances Control, 2002. Comment Letter: *Lower Operable Unit (OU) Remedial Action Plan (RAP) for Cal Compact Landfill, Carson, California*. March 6, 2002.

California Environmental Protection Agency, Department of Toxic Substances Control, 2002. Comment Letter: *Lower Operable Unit (OU) Remedial Action Plan (RAP) for Cal Compact Landfill, Carson, California*. July 15, 2002.

California Environmental Protection Agency, Department of Toxic Substances Control, 2002. Comment Letter: *Lower Operable Unit Remedial Action Plan for Cal Compact Landfill, Carson, California*. October 16, 2002.

California Environmental Protection Agency, Department of Toxic Substances Control. 2002. *Groundwater Monitoring Program, Cal Compact Landfill, Carson. California*. December 2002.

Dames & Moore. 1998. Report "*Hydrostratigraphy, Groundwater Flow, and Contaminant Transport, Cal Compact and Vicinity*. December 22, 1998.

Dames & Moore. 1999. *Draft Work Plan, Hydrostratigraphic Investigation, Cal Compact Landfill, Carson, California*. July 21, 1999.

Dames & Moore. 1999. *Work Plan Addendum, Hydrostratigraphic Investigation, Cal Compact Landfill, Carson, California*. July 21, 1999

Dames & Moore, 2000. Letter: *Confirmation of Revised Soil Boring/Monitoring Well Locations and Notification of Schedule for Planned Field Activities, Hydrostratigraphic Investigation, Cal Compact Landfill, Carson, California*. January 4, 2000.

Dames & Moore, 2000. Letter: *Groundwater Grab Sampling Program, Hydrostratigraphic Investigation, Cal Compact Landfill, Carson, California*. February 18, 2000.

URS/Dames & Moore. 2000. *Report of Hydrostratigraphic Investigation, Cal Compact Landfill, Carson, California.* August 10, 2000.

URS. 2000. *Groundwater Monitoring Program Cal Compact Landfill; Carson, California.* December 11, 2000.

URS, 2002. Letter: *Response to Agency Comments on Draft Remedial Action Plan, Lower Operable Unit – Cal Compact Landfill, Carson, California.* April 23, 2002.

URS, 2002. Letter: Suggested Alternative Comment Response, DTSC Letter to URS Corporation, Dated July 15, 2002, *Draft Remedial Action Plan – Lower Operable Unit, Cal Compact Landfill Site, Carson, California.* August 5, 2002.

California Environmental Protection Agency, Department of Toxic Substances Control. 2004. *Feasibility Study Cal Compact Landfill Carson, California.* October 2004.

APPENDIX B

STATEMENT OF REASONS, NONBINDING ALLOCATION OF RESPONSIBILITY

(Prepared by DTSC)

Terry Tamminen
Agency Secretary
Cal/EPA

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Arnold Schwarzenegger
Governor

PRELIMINARY NONBINDING ALLOCATION OF RESPONSIBILITY

California Health and Safety Code (Health and Safety Code) section 25356.1(e) requires a remedial action plan to include a nonbinding preliminary allocation of responsibility (NBAR) among all identifiable potentially responsible parties (PRPs) at a particular site, including those parties which may have been released, or may otherwise be immune from liability. Health and Safety Code section 25356.3(a) allows PRPs with an aggregate allocation in excess of fifty percent to convene an arbitration proceeding by submitting to binding arbitration before an arbitration panel. If an arbitration panel is convened, any other PRP may elect to submit to binding arbitration by the panel.

The purpose of the NBAR is to establish which PRPs may convene an arbitration proceeding by agreeing to submit to binding arbitration by the panel. The NBAR, which is based on the evidence currently available to DTSC, is not binding on anyone, including PRPs, DTSC, or any arbitration panel. If a panel is convened, its proceeding is de novo and does not constitute a review of the NBAR allocations. The arbitration panel will apportion liability for the costs of removal and remedial actions among all identifiable PRPs, regardless of whether those parties are before the panel, pursuant to the criteria in section 25356.3(c) of the Health and Safety Code. Pursuant to Health and Safety Code section 25356.7, once an arbitration decision is issued the NBAR and the arbitration panel's apportionment of liability, among other things, are admissible in a court of law only to show the good faith of the parties who have discharged their obligations under an arbitration decision issued, or cleanup agreement entered into pursuant to Health and Safety Code section 25356.4.

The Cal Compact site (Site) operated as a landfill between 1959 and 1965. A thorough PRP analysis was performed, and the volume of waste sent to the site has been analyzed for all PRPs named in the NBAR. In addition, DTSC has reviewed the progress of recent litigation involving the Site. Liability has been allocated as follows: Generators (other than Generators of Municipal Solid Waste) have been assigned 25%. Municipal Solid Waste Generators have been assigned 20%. Current Site Owners have been assigned 30%. Prior Site Owners, Operators and Transporters have been assigned 25%.

The NBAR allocation is non-binding and preliminary and does not limit (i) strict joint and several liability under CERCLA and other laws, or (ii) the obligations of parties who have signed settlements with DTSC. This allocation does not take into account (i) the potentially responsible parties' financial condition or ability to pay or (ii) the degree of cooperation that the potentially responsible parties have exhibited in response to past orders issued by DTSC. DTSC sets forth the following identifiable potentially responsible parties:

Generators (other than municipal solid waste generators)

1. ConocoPhillips Company (via acquisitions/mergers with Signal Oil & Gas Company, Continental Oil Company and Douglas Oil Company)

2. Shell Chemical Company

3. ChevronTexaco Corporation (via acquisitions/mergers with Standard Oil Company of California, Gulf Oil Corporation, Texaco Inc. and Tidewater Oil Company)

4. Unocal Corporation (formerly Union Oil Company of California)

5. Shell Oil Company

6. Buttram Energies, Inc.

7. BP Amoco Corporation (via acquisitions/mergers with Richfield Oil Company)

8. Long Beach Oil Development Company

9. Exxon Mobil Corporation (via acquisitions/mergers with Mobil Oil Corporation and Humble Oil & Refining Company)

10. Atchison, Topeka & Santa Fe Railway Company

11. Santa Fe International Corporation (formerly Santa Fe Drilling Company)

12. Sunray Dx Oil Company

13. Southern California Gas Company

14. Prudential Overall Supply Company

15. Exploration Drilling Company

16. Grover Collins Company, Inc.

17. Atlantic Oil Company

18. PPG Industries, Inc. (formerly Pittsburgh Plate Glass Company)

19. Camay Energy Corporation (formerly Camay Drilling Company)

20. U. S. Borax, Incorporated

21. Lockheed Martin Corporation (formerly Harvey Aluminum Company)

22. Minnesota Mining and Manufacturing Company

In addition, DTSC estimates that approximately 200 smaller quantity or de minimis generators fall into this "Generator Category."

Municipal Solid Waste Generators

A. Municipalities

1. Bell
2. Bellflower
3. Buena Park
4. Commerce
5. Compton
6. Cudahy
7. Culver City
8. Downey
9. El Segundo
10. Gardena
11. Hawthorne
12. Hermosa Beach
13. Huntington Beach
14. Huntington Park

15. Inglewood
16. Lakewood
17. Lawndale
18. Lomita
19. Long Beach
20. Los Alamitos
21. Los Angeles
22. Lynwood
23. Manhattan Beach
24. Maywood
25. Norwalk
26. Palos Verdes Estates
27. Paramount
28. Redondo Beach
29. Rolling Hills
30. Santa Ana
31. Santa Monica
32. Seal Beach
33. Signal Hill
34. South Gate
35. Torrance
36. Vernon

B. County of Los Angeles

C. Garbage Disposal Districts

1. Athens-Woodcrest-Olivita Garbage Disposal District

2. Belvedere Garbage Disposal District

3. Firestone Garbage Disposal District

4. Malibu Garbage Disposal District

5. Walnut Park Garbage Disposal District

<u>Transporters</u>

1. BKK Corporation (via acquisition/merger with Chancellor & Ogden Company)

2. H&C Disposal Company

3. IT Transportation Corporation (via acquisitions/mergers with Routh Transportation, Kyle O. Mayes, Inc. and Fix & Brain)

4. The Arnold Group (via acquisition/merger with M. C. Nottingham Company)

5. Kalman Steel Products Company (via acquisition/merger with California Salvage Company, Inc.)

6. Western Waste Industries (formerly Western Refuse Hauling, Inc.)

7. Greenholm Metals, Inc.

8. Monarch Building Maintenance Company, Inc.

<u>Current Owners</u>

1. L.A. MetroMall, LLC, a California Limited Liability Company

2. Commercial Realty Projects, Inc.

Owners/Operators

1. BKK Corporation (via acquisition/merger with Cal Compact, Inc.)

2. The Deutsch Company

APPENDIX C

RESPONSIVENESS SUMMARY

(To be completed upon receipt of public comments)

Department of Toxic Substances Control

an C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

5796 Corporate Avenue
Cypress, California 90630

Arnold Schwarzenegger
Governor

Response to Comments

For
Draft Remedial Action Plan
And
Notice of Exemption

Former Cal Compact Landfill Site
20400 South Main Street, Carson, California 90745

1.0. Introduction

On November 23, 2004, the Department of Toxic Substances Control (DTSC) issued a public notice to accept public comments on a draft Remedial Action Plan (RAP) and Notice of Exemption outlining a plan to monitor groundwater at the former Cal Compact Landfill site, located at 20400 South Main Street, Carson, California, 90745, in Los Angeles County. The 30-day public comment period began November 23, 2004 and ended December 31, 2004. A public meeting was held December 7, 2004, at the Carson Community Center, 801 E. Carson Street, Room 107, Carson, California to present the groundwater monitoring proposal and receive public comments.

The 157 acre site is divided into two Operable Units (OUs), an Upper OU and a Lower OU. This draft RAP is for the Lower OU only. Groundwater monitoring for the Lower OU will provide the necessary controls to detect if future chemical migration occurs to the Lower OU. The draft RAP involves monitoring the Lower OU groundwater on a quarterly basis for two years, followed by semi-annual (twice per year) monitoring for two more years, and one groundwater monitoring event every three years for the remaining forty-six years of the program.

DTSC is required to respond to all public comments received during the 30-day public comment period. As of December 31, 2004, DTSC received no written, oral, or e-mailed public comments on the draft RAP or Notice of Exemption. Questions about the draft RAP, Notice of Exemption or other site documents should be directed to Mr. Daniel Zogaib, Project Manager, Department of Toxic Substances Control, 5796 Corporate Avenue, Cypress, California, 90630,
(714) 484-5483.

The RAP is now final. The final RAP, Notice of Exemption and other site documents can be viewed at:

Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630
Contact Ms. Julie Johnson at
(714) 484-5337 for an appointment

Carson Public Library
151 E. Carson Street
Carson, CA 90745
(310) 830-0901

APPENDIX D

FINAL CEQA DOCUMENTS

(Prepared by DTSC)

Department of Toxic Substances Control

Terry Tamminen
Agency Secretary
Cal/EPA

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630-4732

Arnold Schwarzenegger
Governor

NOTICE OF EXEMPTION

To: Office of Planning and Research
1400 Tenth Street, Room 222
Sacramento, California 95814

From: Department of Toxic Substances Control
Southern California Cleanup Operations
Branch, Cypress Office

Project Title: Remedial Action Plan for the Lower Operable Unit of Cal Compact Landfill

Contact Person: Dan Zogaib **Telephone:** (714) 484-5483

Project Location: 20400 South Main Street, Carson, California
City: Carson **County:** Los Angeles

Project Description:

Site Description: The proposed project is a Remedial Action Plan (RAP) for the Lower Operable Unit of the Cal Compact Landfill. The Cal Compact Landfill (Site) is divided into two operable units (OUs), an upper operable unit (UOU) and a lower operable unit (LOU). The UOU is defined as the shallow soils extending down through the waste zone to the bottom of the Bellflower aquitard. The LOU is defined as the start of the Gage aquifer, directly underlying the Bellflower aquitard, through the Lynwood aquifer and extending down to the Silverado aquifer. The Gage aquifer lies approximately 220 feet below ground surface (bgs) at the Site (Dames & Moore, 2000).

Currently, monitoring data from the UOU shows that the contamination has not been detected deeper than 100 feet bgs. Furthermore, when the three Gage monitoring wells were installed into the LOU in 2000, they were sampled and found to be free of any contaminants of concern (COCs) from the Site. Since the LOU currently does not show any impact from the UOU of the Site, no active remedies or institutional controls are necessary other than the monitoring of the three Gage monitoring wells.

Project Activities: The LOU monitoring program consists of sampling the three Gage monitoring wells as follows:

1. Quarterly sampling and analysis for volatile organic compounds (VOCs), California Title 22 metals (dissolved), and semivolatile organic compounds (SVOCs) for a period of two years;

2. Semiannual sampling and analysis for VOCs for a period of two years; and,

3. Sampling and analysis for VOCs every third year for a period of up to forty-six years.

If contamination is detected in the lower Bellflower aquitard during the monitoring period, the monitoring events will be increased to quarterly for a period of two years.

The goal of the LOU monitoring program is to ensure against vertical migration of the COCs from the UOU to the Gage aquifer. The three Gage monitoring wells will be used for the monitoring of vertical migration of Site COCs, as well as the horizontal groundwater flow gradient. The Gage monitoring wells are located such that there is one well upgradient of the Site and two wells downgradient of the Site.

Background: The Cal Compact Landfill is an inactive Class II landfill located at 20400 South Main Street in Carson, County of Los Angeles, California. It is bounded to the north by the Dominguez Golf Course and vacant property, to the east by the San Diego Freeway (Interstate Highway 405), and to the south and west by single family residences and mobile home parks. The Harbor Freeway (Interstate Highway 110) is located approximately 0.25 to 0.50 mile west of the Site. The approximately 157-acre landfill was active between 1959 and 1965, during which time it accepted both municipal solid wastes and industrial liquid and semi-liquid wastes for disposal. The Site has been vacant and unused since the closure of the landfill in 1965. Previous investigations had indicated that the primary COCs threatening the LOU were VOCs, primarily trichloroethene, cis-1,2-dichloroethene, 1,2-dichloroethane, vinyl chloride, benzene, toluene, ethylbenzene, and xylenes. These VOCs had been detected in localized areas within the Bellflower aquitard of the UOU at concentrations above their maximum contaminant levels (MCLs) for drinking water. In addition, SVOCs and heavy metals had been detected above background levels in localized areas within the Bellflower aquitard. The results of a recent hydrostratigraphic investigation indicate that Site related COCs were present in the UOU but not in the LOU (URS/Dames & Moore, 2000).

Name of Public Agency Approving Project: Department of Toxic Substances Control (DTSC).

Name of Person or Agency Carrying Out Project: BKK Corporation, on behalf of DTSC, will be implementing the LOU monitoring program.

Exempt Status: Title 14, California Code of Regulation (CCR), Section 15061(b)(3)
With certainty, no possibility of a significant effect on the environment.

Reasons Why Project is Exempt:

1. Although the LOU is listed on the Cortese List, the only activity proposed for the Site is the monitoring of the three Gage monitoring wells which have been shown previously to be free from contamination. The UOU is currently undergoing quarterly monitoring of soil gas and groundwater and has been since 1995 with no adverse impacts to human health and the environment.

2. Groundwater monitoring activities proposed will not result in any discharges or runoff to surface waters. Furthermore, the surface soils at the Site have not been found to contain any COCs from the landfill. The closest surface water bodies to the Site are the Torrance Lateral Channel and the Dominguez Channel. Both of these features are man-made, concrete lined, drainage channels. Due to the nature of these flood control and

stormwater run-off facilities, and the lack of natural environments, no ecological receptors are present in these structures.

3. There are no available records of any active groundwater wells in the Gage aquifer within a two mile radius of the Site. Both drinking water supply wells within two miles of the Site, Dominguez Water Company (DWC) Wells 19A and 79, are in the deeper Silverado aquifer and are well separated from any sources of contaminated from the site by depth, horizontal distance and a clay aquitard.

4. If at some future time, monitoring data obtained through sampling and laboratory analysis of groundwater samples were to document the presence of any Site-related VOC(s) at concentrations in excess of MCL(s) in the Lower Bellflower aquitard, then a new remedy would need to be developed for the LOU. The Remedial Action Plan for The Lower Operable Unit of The Cal Compact Landfill contains a re-opener in the event that any VOC(s) are found in the Lower Bellflower aquitard. Under such circumstances, DTSC would look to members of the Defense Group (pursuant to Section XIV.G of the Defense Group Consent Decree), as well as other potentially responsible parties, to plan and implement that new remedy.

5. The monitoring wells are locked and secured thus alleviating the need for institutional controls to protect the wells during the LOU monitoring program.

Signature: ______________________________ **Date:** ________________

Thomas M. Cota, Chief
Southern California Cleanup Operations
Branch, Cypress Office

Date received for filing at OPR:

APPENDIX E

DTSC-APPROVED GROUNDWATER MONITORING PLAN FOR LOWER OPERABLE UNIT

GROUNDWATER MONITORING PROGRAM
CAL COMPACT LANDFILL
CARSON, CALIFORNIA
URS Corporation - December, 2000
Revised By The Department of Toxic Substances Control - December, 2002

1.0 INTRODUCTION

Presented in this document is the scope of the groundwater monitoring program to be conducted for the Gage aquifer at the Cal Compact Landfill in Carson, California (site). This plan is a revised version of the plan prepared by the URS Corporation (URS) on behalf of the Cal Compact Defense Group (Defense Group) submitted to the Department of Toxic Substances Control (DTSC) in December, 2000. The December, 2000 plan was prepared in response to the DTSC requirement that the Defense Group develop a program to monitor groundwater conditions in the three Gage aquifer monitoring wells recently installed at the site (DTSC letter to URS, dated October 2, 2000). The December, 2000 document was submitted to fulfill the requirement that the Defense Group prepare a Remedial Action Plan (RAP) for the Lower Operable Unit (OU) at the site set forth at Section 10.c of the Consent Decree lodged with the court in the action captioned "Department of Toxic Substances Control *et. al.* versus Commercial Reality Projects, Inc. *et. al.*", Case No. 95-8773 (MANx). The Defense Group is under no obligation to implement this plan.

The general scope of the December, 2000 monitoring plan was previously discussed with DTSC staff and described under response to Comment 4 in URS' November 3, 2000 letter (URS, 2000) responding to DTSC comments on the Report of Hydrostratigraphic Investigation, Cal Compact Landfill, Carson, California (URS/Dames & Moore, 2000). The December, 2000 document was intended to formalize the general program described by DTSC at the time.

In the two years since DTSC accepted the December, 2000 groundwater monitoring plan, as drafted by URS, DTSC has determined that the option of Low-Flow (minimal drawdown) groundwater sampling procedures would be beneficial as it reduces the quantity of wastewater and facilitates faster sampling.

2.0 PURPOSE AND OBJECTIVES

The goal of this monitoring program is to establish a history of time-series data for the Gage aquifer groundwater conditions at the site and to evaluate potential future impacts to the Gage aquifer from the site.

The groundwater monitoring program will be conducted with the following objectives:

- Assess the spatial and temporal variation in Gage aquifer groundwater levels and flow conditions at the site; and,

- Record the spatial and temporal variation of dissolved contaminant concentrations, if any, in Gage aquifer groundwater.

3.0 SCOPE AND PROCEDURES

Groundwater conditions within the gage aquifer will be monitored using the three wells recently installed into this hydrostratigraphic unit by URS during March and April 2000. Monitoring activities will be conducted on a quarterly basis for a period of two years, followed by semi-annual monitoring for an additional two years, and triennial monitoring thereafter for up to 50 years. If any VOC is detected and confirmed through retesting in the lower Bellflower aquitard during that period, the monitoring events will be increased to quarterly for a period of two years.

It is anticipated that the following tasks will be performed during each monitoring event:

- Measure static groundwater levels in each of the three Gage aquifer monitoring wells;

- Collect groundwater samples and record appropriate field parameters from each monitoring location;

- Perform laboratory chemical analysis on the collected samples; and,

- Prepare a brief report to DTSC summarizing the results of each individual groundwater monitoring event.

All groundwater monitoring activities will be conducted in accordance with *Low-Flow (Minimal Drawdown) Groundwater Procedures by Robert W. Puls and Michael J. Barcelona* or the standard operating procedures outlined in Appendix A of the Work Plan and Work Plan Addendum documents for the Hydrostatigraphic Investigation, Cal Compact Landfill, Carson, California (Dames & Moore, 1999a and 1999b). The following sections further describe these tasks.

3.1 Measurement of Static Groundwater Levels

Static groundwater level measurements will be recorded at each of the three Gage aquifer monitoring wells during each monitoring event. Static groundwater level measurements will be made to the nearest 0.01-inch using an electronic well sounder, and the results will be recorded on a groundwater sampling field record. Multiple measurements will be conducted at each well location to ascertain that the measured depth is accurate and reproducible.

3.2 Groundwater Sampling (Standard Method Option)

Groundwater samples will be collected from each of the three recently installed Gage aquifer monitoring wells, including wells MWL01, MWL02, and MWL03. Each well is equipped with dedicated sampling pump systems, consisting of a Grundfos Rediflo-2® sampling pump attached to an integrated Teflon®-lined sampling tube, wire assembly and well seal. The system is hung in the well from a seal with watertight electrical and tube fittings. The Rediflo-2® pump is a variable speed three phase pump that utilizes a motor control box to allow flow rates between 0.1 and 6 gallons per minute.

Prior to sampling, each well will be thoroughly purged using the dedicated pump. A minimum of three well casing volumes will be purged prior to sample collection. During well purging physical parameters of pH, specific conductivity, temperature and turbidity will be measured to assess whether they have stabilized prior to sampling. Purge rates, purge volumes and field monitoring parameters will be recorded on the appropriate field forms.

Groundwater samples will be collected using the dedicated pump system. Samples will be collected from the discharge port of the sampling system directly into laboratory supplied sample containers appropriate for the analysis to be conducted. Groundwater samples collected for metals analysis will be filtered in the field using an in-line filter apparatus.

Groundwater generated during well purging will be temporarily stored in appropriately labeled containers. Appropriate management and disposition of purge water will be based upon the analytical results obtained.

Field quality assurance/quality control (QA/QC) samples will be collected during each groundwater monitoring event. Field QA/QC samples to be collected include trip blanks and field duplicate samples. One trip blank and one field duplicate sample will be collected during each monitoring event. Because dedicated equipment is to be used for sampling of wells, collection of equipment blank samples will not be necessary.

3.3 Groundwater Sampling (Low-Flow Option)

Groundwater samples will be collected from each of the three recently installed Gage aquifer monitoring wells, including wells MWL01, MWL02, and MWL03. Each well is equipped with dedicated sampling pump systems, consisting of a Grundfos Rediflo-2® sampling pump attached to an integrated Teflon®-lined sampling tube, wire assembly and well seal. The system is hung in the well from a seal with watertight electrical and tube fittings. The Rediflo-2® pump is a variable speed three phase pump that utilizes a motor control box to allow flow rates between 0.1 and 6 gallons per minute.

The pump intake will be kept at least two (2) feet above the bottom of the well to prevent disturbance and resuspension of any sediment or NAPL present in the bottom of the well. The depth of the pump will be recorded. The water level will be measured with the pump in the well before starting the pump. The well will be pumped at 200 to 500 milliliters per minute (ml/min). The water level will be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates will, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. Care will be taken to maintain pump suction to avoid entrainment of air in the tubing. Each adjustment made to the pumping rate and the water level measured immediately after each adjustment will be recorded. During purging of the well, physical parameters of pH, turbidity, temperature, specific conductance, redox potential (Eh), and dissolved oxygen (DO) will be recorded every five minutes. When the indicator parameters have stabilized and show three consecutive readings as follows (Puls and Barcelona, 1996): +0.1 for pH, +3% for specific conductance, +10 mv for Eh, and +10% for DO and turbidity, the well will be considered stabilized and ready for sample collection.

Groundwater samples will be collected at a flow rate between 100 and 250 ml/min and such that the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. Volatile organic (VOC) samples will be collected first and directly into the appropriate sample containers. All sample containers will be filled with minimal turbulence by allowing the groundwater to flow gently down the inside of the container.

Groundwater generated during well purging will be temporarily stored in appropriately labeled containers. Appropriate management and disposition of purge water will be based upon the analytical results obtained.

Field quality assurance/quality control (QA/QC) samples will be collected during each groundwater monitoring event. Field QA/QC samples to be collected include trip blanks and field duplicate samples. One trip blank and one field duplicate sample will be collected during each monitoring event. Because dedicated equipment is to be used for sampling of wells, collection of equipment blank samples will not be necessary.

Whichever groundwater sampling method is chosen for use must be adhered to for the duration of the groundwater monitoring program to ensure consistency of the results.

3.4 Analytical Program

The analytical program for the first two years of groundwater monitoring will be consistent with that performed previously for these Gage aquifer wells. Analysis to be conducted for the samples collected from each well during each monitoring event during the first two years will include the following:

- VOCs by EPA Method 8260b;

- California Title 22 Metals (dissolved) by EPA Method 6010b/7470; and,

- Semivolatile organic compounds by EPA Method 8270.

For all monitoring events after the first two years, analysis to be conducted for the samples collected from each well during each monitoring event will be analyzed only for VOCs using EPA Method 8260b.

In the event that any VOCs are found in the lower Bellflower aquitard, two years of quarterly monitoring will be conducted. Analysis to be conducted for the samples collected from each well during each monitoring event will include the following:

- VOCs by EPA Method 8260b; and,

- California Title 22 Metals (dissolved) by EPA Method 6010b/7470.

These analyses will be conducted on all primary groundwater samples as well as all field QA/QC samples collected during each monitoring event.

3.5 Reporting

Following the completion of field sampling activities, receipt of all associated analytical measurements, and validation of results, a brief summary report will be prepared and submitted to DTSC. Monitoring reports will summarize the results of all laboratory tests conducted, including data for all prior monitoring events, and present groundwater level measurements and interpreted groundwater flow direction. Monitoring reports will also include copies of analytical laboratory reports and chain-of-custody documentation for the groundwater samples collected and analyzed.

4.0 REFERENCES

California Department of Toxic Substances Control, 2000. Letter to URS re: Cal Compact Landfill, 204500 South Main Street, Carson, California. October 2, 2000.

Dames & Moore, 1999a. Draft Work Plan, Hydrostratigraphic Investigation. Cal Compact Landfill, Carson, California. July 21, 1999.

Dames & Moore, 1999b. Work Plan Addendum, Hydrostratigraphic Investigation. Cal Compact Landfill, Carson, California. December 3, 1999.

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APPENDIX G2 CEQA DOCUMENTATION FOR LOWER OU RAP

Terry Tamminen
Agency Secretary
Cal/EPA

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630-4732

Arnold Schwarzenegger
Governor

NOTICE OF EXEMPTION

To: Office of Planning and Research
1400 Tenth Street, Room 222
Sacramento, California 95814

From: Department of Toxic Substances Control
Southern California Cleanup Operations
Branch, Cypress Office

Project Title: Remedial Action Plan for the Lower Operable Unit of Cal Compact Landfill

Contact Person: Dan Zogaib **Telephone:** (714) 484-5483

Project Location: 20400 South Main Street, Carson, California
City: Carson **County:** Los Angeles

Project Description:

Site Description: The proposed project is a Remedial Action Plan (RAP) for the Lower Operable Unit of the Cal Compact Landfill. The Cal Compact Landfill (Site) is divided into two operable units (OUs), an upper operable unit (UOU) and a lower operable unit (LOU). The UOU is defined as the shallow soils extending down through the waste zone to the bottom of the Bellflower aquitard. The LOU is defined as the start of the Gage aquifer, directly underlying the Bellflower aquitard, through the Lynwood aquifer and extending down to the Silverado aquifer. The Gage aquifer lies approximately 220 feet below ground surface (bgs) at the Site (Dames & Moore, 2000).

Currently, monitoring data from the UOU shows that the contamination has not been detected deeper than 100 feet bgs. Furthermore, when the three Gage monitoring wells were installed into the LOU in 2000, theywere sampled and found to be free of any contaminants of concern (COCs) from the Site. Since the LOU currently does not show any impact from the UOU of the Site, no active remedies or institutional controls are necessary other than the monitoring of the three Gage monitoring wells.

Project Activities: The LOU monitoring program consists of sampling the three Gage monitoring wells as follows:

1. Quarterly sampling and analysis for volatile organic compounds (VOCs), California Title 22 metals (dissolved), and semivolatile organic compounds (SVOCs) for a period of two years;

2. Semiannual sampling and analysis for VOCs for a period of two years; and,

3. Sampling and analysis for VOCs every third year for a period of up to forty-six years.

If contamination is detected in the lower Bellflower aquitard during the monitoring period, the monitoring events will be increased to quarterly for a period of two years.

The goal of the LOU monitoring program is to ensure against vertical migration of the COCs from the UOU to the Gage aquifer. The three Gage monitoring wells will be used for the monitoring of vertical migration of Site COCs, as well as the horizontal groundwater flow gradient. The Gage monitoring wells are located such that there is one well upgradient of the Site and two wells downgradient of the Site.

Background: The Cal Compact Landfill is an inactive Class II landfill located at 20400 South Main Street in Carson, County of Los Angeles, California. It is bounded to the north by the Dominguez Golf Course and vacant property, to the east by the San Diego Freeway (Interstate Highway 405), and to the south and west by single family residences and mobile home parks. The Harbor Freeway (Interstate Highway 110) is located approximately 0.25 to 0.50 mile west of the Site. The approximately 157-acre landfill was active between 1959 and 1965, during which time it accepted both municipal solid wastes and industrial liquid and semi-liquid wastes for disposal. The Site has been vacant and unused since the closure of the landfill in 1965. Previous investigations had indicated that the primary COCs threatening the LOU were VOCs, primarily trichloroethene, cis-1,2-dichloroethene, 1,2-dichloroethane, vinyl chloride, benzene, toluene, ethylbenzene, and xylenes. These VOCs had been detected in localized areas within the Bellflower aquitard of the UOU at concentrations above their maximum contaminant levels (MCLs) for drinking water. In addition, SVOCs and heavy metals had been detected above background levels in localized areas within the Bellflower aquitard. The results of a recent hydrostratigraphic investigation indicate that Site related COCs were present in the UOU but not in the LOU (URS/Dames & Moore, 2000).

Name of Public Agency Approving Project: Department of Toxic Substances Control (DTSC).

Name of Person or Agency Carrying Out Project: BKK Corporation, on behalf of DTSC, will be implementing the LOU monitoring program.

Exempt Status: Title 14, California Code of Regulation (CCR), Section 15061(b)(3)
With certainty, no possibility of a significant effect on the environment.

Reasons Why Project is Exempt:

1. Although the LOU is listed on the Cortese List, the only activity proposed for the Site is the monitoring of the three Gage monitoring wells which have been shown previously to be free from contamination. The UOU is currently undergoing quarterly monitoring of soil gas and groundwater and has been since 1995 with no adverse impacts to human health and the environment.

2. Groundwater monitoring activities proposed will not result in any discharges or runoff to surface waters. Furthermore, the surface soils at the Site have not been found to contain any COCs from the landfill. The closest surface water bodies to the Site are the Torrance Lateral Channel and the Dominguez Channel. Both of these features are man-made, concrete lined, drainage channels. Due to the nature of these flood control and

stormwater run-off facilities, and the lack of natural environments, no ecological receptors are present in these structures.

3. There are no available records of any active groundwater wells in the Gage aquifer within a two mile radius of the Site. Both drinking water supply wells within two miles of the Site, Dominguez Water Company (DWC) Wells 19A and 79, are in the deeper Silverado aquifer and are well separated from any sources of contaminated from the site by depth, horizontal distance and a clay aquitard.

4. If at some future time, monitoring data obtained through sampling and laboratory analysis of groundwater samples were to document the presence of any Site-related VOC(s) at concentrations in excess of MCL(s) in the Lower Bellflower aquitard, then a new remedy would need to be developed for the LOU. The Remedial Action Plan for The Lower Operable Unit of The Cal Compact Landfill contains a re-opener in the event that any VOC(s) are found in the Lower Bellflower aquitard. Under such circumstances, DTSC would look to members of the Defense Group (pursuant to Section XIV.G of the Defense Group Consent Decree), as well as other potentially responsible parties, to plan and implement that new remedy.

5. The monitoring wells are locked and secured thus alleviating the need for institutional controls to protect the wells during the LOU monitoring program.

Signature: [signature] **Date:** 1/24/05

Thomas M. Cota, Chief
Southern California Cleanup Operations
Branch, Cypress Office

Date received for filing at OPR:

APPENDIX G3 MANAGEMENT APPROACH TO PHASED OCCUPANCY (APRIL 2018)

SCS ENGINEERS







Management Approach to Phased Occupancy

Former Cal Compact Landfill

Carson, California

Presented to:

Department of Toxic Substances Control

5796 Corporate Avenue
Cypress, California 90630

Presented by:

CARSON RECLAMATION AUTHORITY
701 East Carson Street
Carson, California 90745

and

SCS ENGINEERS
3900 Kilroy Airport Way
Suite 100
Long Beach, California 90806

April 2018
File No. 01215078.02

Management Approach to Phased Occupancy Former Cal Compact Landfill Carson, California

Presented to:

Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

Presented by:

Carson Reclamation Authority
701 East Carson Street
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April 2018
File No. 01215078.04

Table of Contents

Section **Page**

List of Figures

No.

Appendices

1 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This Management Approach to Phased Occupancy (MAPO) applies to the remedial and development activities at the former Cal Compact Landfill (CCLF or Site) located at 20400 South Main Street, Carson, California (**Figure 1**). This document details the overall management approach, mitigation measures and other controls that will support phased construction and occupancy of the proposed vertical development of the Site (the Project). The proposed Project contemplates development of a variety of potential uses, including retail, commercial, hotel, entertainment and multi-family residential.

The Site currently consists of undeveloped land encompassing an area of approximately 157 acres. It is bordered by the I-405 Freeway to the east, the Torrance Lateral channel to the south and west, Main Street to the west, and East Del Amo Boulevard to the north (**Figure 2**). The Site was operated as a municipal solid waste Class II landfill from 1959 to 1964, with an approximate closing date of February 1965. Investigative data indicates the landfill waste thickness ranges up to 60 feet (McLaren/Hart, 1992). Landfill waste was disposed of by excavation, burial and subsequent covering. Soil cover over landfill materials across the Site ranges from 3 to 30 feet thick.

Most areas of the Site were excavated and filled with landfill waste except for the former haul roads and an area on the southern portion of the Site where waste was removed and backfilled with soil for installation of a new storm drain. The combination of the haul roads and excavated waste area at the Site created five distinct waste fill areas, or "Cells." The location of each of the Cells at the Site is summarized below and shown in **Figure 2**.

- Cell 1 is located on the northwest portion of the Property and bounded to the north by Del Amo Boulevard, to the west by Main Street, to the east by a former haul road and Cell 2, and to the south by a former haul road and a portion of Cell 3.

- Cell 2 is located along the eastern side of the Property and bounded to the north by Del Amo Boulevard, the west by a former haul road and Cell 1, to the east by the I-405 Freeway, and the south by a former haul road and a portion of Cell 5.

- Cell 3 is located along the western edge of the Property and bounded to the north and northeast by former haul roads, and to the west and south by the Torrance Lateral. Cell 5 abuts Cell 3 directly to the east, however the boundary between the two cells is somewhat arbitrary and may be adjusted in the future to accommodate Site development.

- Cell 4 is located in the middle of the Site and bounded on all sides by former haul roads and the other four waste fill Cells.

- Cell 5 is located on the south side of the Site and is bounded by former haul roads to the north and east, the Torrance Lateral to the south, and Cell 3 to the west.

Because of the size of the Site and the variety of uses contemplated, the various landfill Cells will be developed by different vertical developers in phases over time. Thus, there will be a need for phased occupancy of the Site – i.e., phased construction and occupancy of buildings on one or more landfill Cells while other Cells have yet to be closed and/or developed. However, there will be no intra-Cell phased occupancy; Remedial Systems for each Cell will be completed and their installation approved by DTSC for the entire Cell before occupancy of any portion of that Cell will be permitted.

The phased occupancy and use of the Site requires an evaluation of the human health risks, compliance requirements, and possible exposure to chemicals of concern for each developed Cell, while remediation and vertical construction may be ongoing or later undertaken on other Cells. Phased occupancy also requires a plan for mitigation measures and compliance monitoring to ensure the protection of occupied portions of the Site before remedial actions have been completed on all Cells. This document provides background information on the Site, the anticipated development process, and the management approach to Site controls that will allow for progressive occupancy of the Site.

1.2 LOT DESCRIPTION

Tentative Parcel Map (TPM) number 70372 was approved for the Site in May 2010. TPM70372 subdivided the property vertically into two lots, the "Subsurface Lot" and the "Surface Lot," as defined below. Definitions of these lots may change upon recordation of a final parcel map.

1.2.1 Subsurface Lot

The Subsurface Lot consists of the landfill waste, landfill cap and cover soils in which the Remedial Systems (as defined in Section 1.3.1 below) have been, or are being constructed. The Subsurface Lot will include:

1. all of the land up to one (1) foot above the linear low density polyethylene (LLDPE) geomembrane in all areas outside of building slabs;

2. all of the land below the bottom of the building slabs; and

3. all improvements now or in the future located below the depth specified in item (1) above or below the building slabs, including without limitation, the Remedial Systems and Building Protection Systems.

1.2.2 Surface Lot

The Surface Lot consists of all of the land and airspace above the Subsurface Lot. The Surface Lot is where all vertical development will occur and may be further subdivided into additional parcels to facilitate phased development and property transfer.

1.3 REGULATORY BACKGROUND

1.3.1 Development Approvals

The Site is planned for development as the District at South Bay, which permits mixed-use commercial, residential, and commercial recreation, and entertainment uses. The development approvals are under the land use and planning authority of the City of Carson, California. A Specific Plan Amendment was processed and recommended for approval by the City of Carson Planning Commission on January 23, 2018, and is scheduled to receive a final decision by the Carson City Council on February 20, 2018.

The City of Carson is the lead agency for California Environmental Quality Act (CEQA) review. A Supplemental Environmental Impact Report (SEIR) for the District at South Bay development Project was published for public comment on October 3, 2017. The SEIR supplements the Final Environmental Impact Report (FEIR) certified in 2006 for what was previously known as the Carson Marketplace Specific Plan and that was subsequently updated by Addendum. The SEIR was recommended for approval by the City of Carson Planning Commission on January 23, 2018, and will go before the Carson City Council along with the Specific Plan Amendment on February 20, 2018.

CEQA analysis for the implementation of remedial actions was previously assessed and completed in the FEIR, and an Addendum to the FEIR subsequently adopted in 2009 to address certain changes in the remediation activities. No further CEQA analysis of the remedy is required.

1.3.2 Environmental Approvals

The remedial activities are being completed under the oversight of the Department of Toxic Substances Control (DTSC), in coordination with the development planning process. In addition, Los Angeles County Environmental Programs Division will review and approve the design and installation of Building Protection Systems (BPS) for the planned development.

In 1988, DTSC issued a Remedial Action Order for the CCLF, which required investigation of the landfill and subsequent preparation of a Remedial Action Plan (RAP). In 1995, DTSC entered into a Consent Order and Remedial Action Order with the former landfill owner, BKK Corporation, successor to Cal Compact Inc., for preparation of a RAP, and a Consent Decree with L.A. Metro Mall, LLC and Commercial Realty Projects, Inc., among others, for implementation of the RAP. In the Consent Decree, DTSC divided the Site into two operable units (OUs): the Upper OU, defined as “Site soils, the waste zones above and within the Bellflower Aquitard, and the Bellflower Aquitard down to, but not including the Gage Aquifer”; and the Lower OU, which includes the deeper groundwater aquifers beneath the Upper OU.

1.3.2.1 Upper Operable Unit

Brown and Root Environmental (B&RE) developed the Upper OU RAP, which was approved in October 1995 (B&RE, 1995). The approved Upper OU RAP required the installation of the following Remedial Systems at the Site: a clay landfill cap, a landfill gas (LFG) extraction and treatment system, and a groundwater extraction and treatment system. The Upper OU RAP also provided for long-term operation and monitoring of these Remedial Systems. The Upper OU RAP was modified in 2009 by an Explanation of Significant Differences (ESD) that allowed the use of a geosynthetic membrane in the cap, as opposed to the clay specified in the 1995 RAP.

1.3.2.2 Lower Operable Unit

A separate Consent Decree was issued to a separate group of responsible parties ("the Defense Group") for the Lower OU in February 2004, following a Remedial Investigation (RI) conducted in 2001. The RI did not recommend a Feasibility Study (FS), but did recommend a RAP. The Lower OU RAP, which was prepared in January 2005, recommended sampling only in the Lower OU wells due to the absence of detectable concentrations of contaminants. Sampling has occurred sporadically since July 2005. The Lower OU wells were last sampled in 2011/12 with no detections of contaminants.

1.4 SITE REMEDIAL SYSTEMS

The Remedial Systems at the Site, which have been or will be constructed, include:

1. A groundwater extraction and treatment system (GETS), which has been completed and approved by DTSC;

2. A landfill cap comprised of an impermeable LLDPE geomembrane with a minimum of one foot of overlying protective cover soil, which has been completed in portions of the Site, and a clay cap that has been constructed along the perimeter slopes adjacent to the I-405 freeway and the Torrance Lateral channel; and

3. A landfill gas collection and control system (GCCS), which also has been completed in portions of the Site.

Completion of the remaining portions of the landfill cap and GCCS installation will be coordinated with vertical development. The Remedial Systems will meet all the requirements of the DTSC-approved RAP, and will include additional design refinements necessary to support development, such as: membrane integration into the structural pile caps; grading of landfill cap elevations to accommodate placement of utility trenches and Site drainage; and integration of development infrastructure, as needed. Additional detail on each Remedial System is provided below.

1.4.1 Groundwater Extraction and Treatment System

The depth to first groundwater beneath the Site ranges from approximately 15 to 40 feet below ground surface (bgs) within the Upper Bellflower Aquitard. Groundwater sampling results indicate that the Middle and Lower Bellflower Aquitard zones (MBF B/C and LBF units) are not impacted, with the exception of low levels of chlorinated volatile organic compounds (VOCs) in one Middle Bellflower well in the extreme northwest corner of the Site, which is most likely from off-Site upgradient sources.

It is assumed that during and after development is completed, groundwater would remain at approximately the same depth below the Site as currently measured (i.e., 15 to 40 feet bgs), and therefore would not be contacted during landfill cap construction or future cap or systems maintenance. In addition, future land use restrictions will prohibit construction of water wells and any use of groundwater beneath the Site not associated with remedial activities or monitoring.

The DTSC-approved RAP requires that groundwater remediation be completed in the Upper OU to minimize or prevent further off-Site migration of impacts, and to protect groundwater in the Lower OU. Based on numerous years of monitoring, it appears that impacts have not migrated off-Site, or vertically to the Lower OU.

In 2014, a groundwater extraction and treatment system (GETS) was installed to hydraulically contain impacted groundwater along the property boundary where contaminated groundwater is located and could migrate. The extraction well network is installed along the down-gradient property boundary. Extracted groundwater is treated by an aboveground treatment system that is co-located in the southern portion of the Site with the GCCS blower/flare station, and discharged off-Site to the sanitary sewer for transport to the local publicly-owned treatment works (POTW). In addition, the existing groundwater monitoring well network has been enhanced with additional groundwater monitoring wells to confirm that impacts in groundwater do not migrate beyond current areas of impact.

As of early 2017, over 3.9 million gallons of water had been treated by the GETS, which is currently comprised of 29 groundwater extraction wells and 71 groundwater monitoring wells. All groundwater Remedial Action Goals (RAGs) and treatment system discharge requirements have been met by the GETS. The locations of the wells associated with the GETS are presented in **Figure 3**.

1.4.2 Landfill Cap System

A landfill cap will be placed over the entire landfill area, excluding the former haul roads that are built on native soil. To accommodate the proposed Site development, the landfill cap design will be tailored to the following five types of surface features:

- Open outdoor areas that will be paved surface parking lots;
- Areas located above pile-supported structural concrete slabs within the building footprints, but which do not contain enclosed building spaces, such as driveway aprons and parking under open podium structures;
- Areas located above pile-supported structural concrete slabs outside the building footprints that do not contain enclosed building spaces, such as loading dock ramps;
- Areas where buildings containing enclosed, occupied spaces are located above pile-supported structural concrete slabs; and
- Landscaped areas outside of building footprints or slab foundations.

The landfill cap will be continuous across each Cell of the landfill. The landfill cap system will generally consist of a two-foot foundation layer of soil, graded and compacted to ensure proper drainage; an impermeable membrane; and a protective soil or gravel cover as described below. The landfill cap membrane being used is an impermeable 60-millimeter thick, LLDPE geomembrane. Prior to installation of the LLDPE geomembrane, the Site will be prepared and the foundation soil layer will be graded and compacted to ensure adequate drainage should water infiltrate down to the LLDPE geomembrane.

In areas under all pile-supported structural concrete slabs, gravel will serve as the protective cover for the landfill cap membrane. (This gravel will also serve as a component of the building protection system, where one is required; see Section 1.4.2.) In areas outside of pile-supported structural concrete slabs, such as outdoor parking and landscaped areas, a one-foot layer of soil will be placed above the LLDPE membrane as a protective cover, and a visible demarcation layer, such as orange plastic snow fencing, will be placed on top of the cover soil.

As noted above, the LLDPE geomembrane will be sloped to aid water drainage; several geonet drainage composite channels will be placed above the LLDPE geomembrane to further assist water draining. Additional soil will be placed above the protective soil cover and demarcation layer. The thickness of the additional soil will vary depending on development grades, but is estimated to range from at least 6 inches to approximately 6 feet in areas outside of building footprints.

Due to the potential for landfill settlement over time, buildings will be constructed on pile-supported structural foundations. Piles will be installed through the waste layer and into competent sediments. Each pile will be capped and the LLDPE geomembrane will be welded to and installed around each pile cap. Each pile cap will have a sealant, such as liquid boot, applied above the connection point of the membrane to pile cap to maintain the integrity and continuity of the membrane.

To date, approximately 40-acres of landfill cap have been installed around the perimeter of the Site, as well as in portions of Cells 3, 4, and 5 (**Figure 4**). The membrane extent in Cells 3 through 5 is based on estimated building footprints associated with a prior development plan, and may be modified to the extent the building footprint changes upon development of those Cells.

1.4.3 Landfill Gas Collection and Control System

The landfill GCCS consists of a combination of over 300 horizontal and vertical wells to be installed below the LLDPE geomembrane cap (discussed in **Section 1.4.2**) throughout the landfill. The purpose of the landfill GCCS is to collect and control landfill gases (LFG). LFG is conveyed to a central treatment unit that is operated in accordance with South Coast Air Quality Management District (SCAQMD) requirements. Therefore, LFG will be removed before it can pressurize below the LLDPE membrane and/or migrate through the landfill surface.

To date, 166 out of approximately 360 proposed LFG extraction wells have been installed across the Site. Of those 166 wells, 53 are actively routing gas to the LFG Control System; the remaining existing wells are inactive, either not yet connected to horizontal collectors or in areas where the cap is not yet installed. The LFG Control System consists of two blowers that collect the LFG and can route it to one of three control devices. The control devices consist of two combustion flares, each of which is equipped with a combustion air blower and a carbon absorption system, which consists of three carbon absorption vessels and a potassium permanganate vessel. The locations of the active wells are shown on **Figure 4**.

1.4.4 Building Protection System

In addition to the Remedial Systems described above, building protection systems (BPS) will be installed under all enclosed building areas. The BPS will be designed to prevent intrusion of LFG into the buildings in the event of a failure of or damage to the landfill cap and/or GCCS.

The intent of installation of a BPS is to further reduce the potential for landfill gas to migrate into the on-site buildings and impact future occupants. The BPS, together with the Landfill Cap System described in **Section 1.4.2** and the Landfill Gas Collection and Control System described in **Section 1.4.3,** will provide multiple layers of redundant protection, thus ensuring that landfill gases do not escape the waste zone and migrate into buildings.

The proposed BPS will consist of:

- A primary geomembrane that is part of the landfill cap and that will extend under the buildings and be sealed to the pile caps for the building slabs. Although the geomembrane is part of the Landfill Cap System, it also functions as part of the BPS under the building slabs.

- A sub-slab passive venting system capable of being converted to an active venting system. The venting system will consist of a network of perforated pipes embedded in a permeable gravel layer under any enclosed, occupied areas of each building slab.

- A full-time methane detection system capable of sensing the presence of methane in the sub-slab venting system, and automatically notifying an operator of the detection. Upon such notification, corrective action will be implemented, which could include modifications to the GCCS or BPS operations, including triggering active gas removal from the sub-slab system.

- Beneath enclosed portions of buildings, a secondary geomembrane system that would be attached to and seal the bottom of building slabs.

Some proposed developments will have areas of open-air, naturally ventilated space between the at-grade structural slab and the first occupied enclosed area (e.g., open-air parking garages beneath podium commercial uses). In these areas, the secondary geomembrane system will not be required and the sub-slab venting system may be modified pursuant to Section IV.B.2 and IV.B.3 of the City of Los Angeles Department of Building and Safety Methane Hazard Mitigation Standard Plan, which provides exceptions to the mitigation requirements discussed above for buildings with raised floor construction and buildings with natural ventilation.

2 PHASED DEVELOPMENT AND OCCUPANCY

The current plan for the Site is for mixed-use development, which will include retail; hospitality; entertainment; and possibly multi-family residential. The Carson Reclamation Authority (CRA) is in the process of negotiating with potential vertical developers, the first of which plans to develop an outlet shopping mall on Cell 2. The details of development on the other four Cells are still being determined, thus necessitating a flexible approach to remediation and Site management that allows for phased construction and occupancy.

2.1 KEY DEVELOPMENT CRITERIA

While complete development plans have not been finalized, the following development criteria have been established in order to allow for implementation of a phased development and occupancy program:

- Residential multi-family development, if any, will be restricted to Cell 1 and, by administrative permit, in the westernmost portion of Cell 2, in accordance with the Specific Plan Amendment and SEIR. Any residential development will be delayed until all Remedial Systems and any necessary piles and pile-supported structural slabs have been installed on all other Cells. This timing will ensure all other landfill Cells are closed and no future construction activities would penetrate the waste zone prior to any residential occupancy on the Site, thus further mitigating potential exposures.

- To the extent possible, the impact of any proposed development on both undeveloped and already developed or occupied Cells will be evaluated, specifically with respect to how the proposed development could impact adjacent Cells.

- There will be no intra-Cell phasing for purposes of Remedial System installation and occupancy. That is, once begun, the Remedial Systems must be installed across the entirety of each landfill Cell sufficient to obtain DTSC approval of a Remedial Action Completion Report for the Cell, and no occupancy will be permitted until the RACR and associated HRA are approved. Notwithstanding the foregoing, typical work staging and logistics during installation of structural piles and/or various Remedial Systems will be permitted regardless of the development plans on any particular Cell.

- Given the size of the Cells and the large building slabs to be installed, vertical construction may begin in one portion of a landfill Cell while Remedial Systems are being completed in another portion. This would only occur, however, under one of the following conditions: the construction is being performed by HAZWOPER-trained workers; or, DTSC has approved a plan to create an exclusion zone that would adequately separate and protect the area of vertical construction from the area where Remedial Systems are being installed.

- It is possible that more than one Cell could be developed at one time by one or more developers. In that case, Remedial Systems for these Cells would be planned, designed and implemented at the same time.

- Design of the Remedial Systems will be coordinated for the entire Site. The fundamental design of the Gas Collection and Control System, landfill cap and BPS will be consistent throughout the Site. Remedial Systems will be installed on a Cell-by-Cell basis, and engineering details (e.g., the specific locations of gas collection piping and location of piles) will necessarily be tailored to the specific development plans for that Cell. Nonetheless, the Remedial Systems' design will be substantially the same and will operate consistently across the entire Site.

- Similarly, a Site-wide grading plan will be created to accommodate roads, trunk infrastructure and development plans that are known at the time field work begins. Horizontal Site development will be coordinated and planned for the Site as a whole to the greatest extent possible.

2.2 PHASED OCCUPANCY OVERVIEW

Under a phased occupancy approach, each phase of development will be independently evaluated for health risks posed by not only that Cell's development activities, but also for the possible impacts to and from other Cells and the associated potential exposures and risks. Cell-specific mitigation measures will be designed to offset potential risks that are identified. Risks to the appropriate populations – construction workers, commercial workers/ users, general public, etc. – will be evaluated for both intra-Cell and Cell-to-Cell receptors at different points of the process, as detailed below.

The Roadmap to Occupancy (RtO) is presented in **Appendix B**. The RtO is a flow diagram of the process and management approach that will allow phased implementation of the remedy, phased Site development, and phased occupancy of the developed Cells. The management approach to phased occupancy is discussed in further detail below.

2.3 STEPS IN THE ROADMAP TO OCCUPANCY

The following management approach to phased occupancy provides further detail to the steps outlined in the Roadmap to Occupancy.

2.3.1 Pre-Development: Review of Development Plan

As part of implementation of a single-, or multi-Cell development, CRA will conduct a review of the proposed development plan to ensure that it meets the Key Development Criteria presented in **Section 2.1**. Once a determination is made that the key development criteria in **Section 2.1** have been met, the development will move forward to the next step.

2.3.2 Pre-Development: Planning and Design

The Cell(s) proposed for development must have a final grading plan, as well as designs for building foundations, utilities, Remedial Systems and proposed BPS components completed in order to accommodate the implementation of the RAP.

Since the conceptual designs have been completed, it is anticipated that no significant design changes will occur for either the Remedial Systems or the BPS.

During this step, mitigation measures will be identified and described in a Mitigation Measures Implementation Plan. While most mitigations likely will be based on programmatic, logistical needs (e.g., site security and traffic routing), some may also be based on potential risk to human health and the environment and compliance with mitigation measures specified in the SEIR.

The Mitigation Measures Implementation Plan will be incorporated into an overall Cell-Specific Development and Occupancy Plan. This will be a Cell-specific implementation plan based on the planned construction activities anticipated and will describe the sequence of installation of the Remedial Systems, infrastructure and foundation systems across the Cell, as well as the associated mitigations. It will also include a Pile Driving Workplan, which will be submitted to DTSC for review and approval prior to installing any structural piles.

2.3.3 Installation of Remedial Systems and BPS

Installation of the Remedial Systems (as defined in **Section 1.4**) for the proposed development Cell(s) will be completed in accordance with the DTSC-approved RAP. In addition, during this stage, any additional required work (installation of piles, utilities, grading, waste consolidation, etc.) will be conducted and coordinated with the installation of the Remedial Systems. The BPS will be installed above the landfill cap and below the slab under any occupied building area.

2.3.4 Preparation of FHRE and RACR

Following installation of the Remedial Systems, a Cell-specific Focused Health Risk Evaluation (FHRE) will be prepared. The FHRE will be focused solely on the risk to construction workers for the expected duration of vertical construction work, taking into account the remedies that have been installed on the subject Cell or portion of a Cell, the current remedial status of other Cell(s) at the Site at the time the FHRE is prepared, and the mitigation measures that have been implemented. The FHRE will be submitted to DTSC for review. The approval of a Cell-specific FHRE by DTSC will permit CRA (or its designated developer counterparty) to conduct vertical development without HAZWOPER-trained workers on that Cell.

Preparation of a Cell-specific Remedial Action Completion Report (RACR) will begin following installation of the Remedial Systems and BPS (where necessary). The RACR will include engineering details of the installation of the Remedial Systems on that Cell. DTSC may review and comment on a draft Cell-specific RACR prior to the preparation and submission of a Final Cell-specific RACR, which DTSC will review and approve. The Cell-specific RACR is DTSC's indication of the completion of active remedial work and implementation of the RAP on the applicable Cell.

2.3.5 Foundation Systems and Vertical Construction

Following DTSC approval of the FHRE, vertical construction may take place on the Cell(s) or portion of the Cell under development utilizing non-HAZWOPER workers. Prior to DTSC approval of the Cell-specific FHRE, and at CRA's (or it's designated developer counterparty's) discretion, vertical construction activities may commence utilizing HAZWOPER-trained workers, or in the event that DTSC has approved a plan to create an exclusion zone that would adequately separate and protect the area of vertical construction from the area where Remedial Systems are being installed, by non-HAZWOPER-trained workers.

2.3.6 Final HRA and No-Objection Letter

Following completion of vertical construction (i.e., core and shell), Los Angeles County approval of the installed BPS, and implementation of any post-construction Cell-specific mitigation measures (such as land use controls, covenants, conditions and restrictions, etc.), a Cell-specific Health Risk Assessment (HRA) will be prepared. The HRA will evaluate the risk to all potentially exposed populations. Depending on the planned development, this may include commercial workers, maintenance workers, residents, and the general public.

The HRA will be submitted to DTSC for review and approval. Upon DTSC approval of both the Final Cell-specific RACR and the Cell-specific HRA, DTSC shall issue a no-objection letter allowing the City of Carson and/or Los Angeles County to issue a Certificate of Occupancy (CO) for any buildings or structures constructed on the developed Cell.

The HRA process is discussed in more detail in **Section 3**, below.

3 IDENTIFICATION, MANAGEMENT, AND MITIGATION OF RISKS

3.1 RISKS POSED BY PHASED OCCUPANCY PLAN

This section describes the potential risks posed by implementation of a phased occupancy plan, and/or development over a landfill in general. The evaluation and mitigation of these risks will serve as the basis for any Cell-specific FHRE, RACR and/or HRA submitted to DTSC pursuant to this MAPO. Mitigation measures to address the risks described below are contained in Appendix A.

3.1.1 Human Health Risks

Health risks to the following receptors will be addressed in the Cell-specific HRA: on- and off-Site residents, construction workers, on-Site commercial/retail workers, and the general public. Health risks to on-Site construction workers will be addressed in the FHRE. Specific exposure scenarios for the risks described below will be selected as applicable to the health risk study being prepared, i.e., the HRA or the FHRE.

3.1.1.1 Exposure to Dust

Construction activities, vehicle and equipment operation, and periodic high wind conditions in areas with disturbed soil may cause soil particles to become suspended in the air causing elevated ambient dust levels. Elevated dust levels are a respiratory hazard and can cause respiratory distress, especially for the elderly, infants, and those with asthma or other respiratory ailments. These elevated dust levels can travel past the Cell work area perimeter to areas where the general public, including users/occupants of adjacent cells could be exposed to them.

Phased development will decrease the size of the buffer zones between the Site perimeter and areas where the general public and/or adjacent cell commercial/retail workers are located. This is partly because phased development will involve occupied development being adjacent to areas being constructed during later phases. Currently, the natural barriers of the Torrance Lateral, I-405 Freeway, and Del Amo Boulevard provide buffer zones between the Site perimeter and areas where residents, the general public, commercial/retail workers, and potentially sensitive receptors are located. Once construction activity begins, increased air monitoring will take place along the Site perimeter; during later phases of development, this increased level of air monitoring will occur between occupied cells and cells undergoing construction.

3.1.1.2 Exposure to Landfill Gas

There is a potential risk of exposure to LFG, which might be released during construction work, including pile driving, installation of the Remedial Systems, utility excavation, and waste relocation. LFG consists primarily of methane and carbon dioxide. LFG poses the following specific health risks:

1) asphyxiation by the displacement of air, or reduced oxygen, usually in a confined space; and

2) potential risk of exposure to the various VOCs that are in LFG at the Site. Various VOCs potentially present the risk of cancer, as well as acute and chronic toxicity from cumulative exposure to such VOCs.

Phased development could cause an increased risk of exposure to LFG to the general public, including commercial/retail workers, as areas of completed development could be located adjacent to areas still under construction.

3.1.2 Safety Risks

This section evaluates safety risks posed by Phased Development.

3.1.2.1 Traffic

Traffic safety is important for protecting both the public and construction workers. Allowing occupancy of certain Cells while other Cells are undergoing remediation and other construction work poses challenges with respect to traffic safety.

3.1.2.2 Security/Trespassers

Phased Development could potentially allow the public access to the Site prior to the completion of all remediation systems and vertical construction of some Cells. This could increase the risk of trespassers entering the secure construction area and causing safety risks to themselves, construction workers, and others.

3.1.2.3 Fire/Explosion

The presence of methane poses an additional risk to construction in and on a landfill, as methane has been documented as a principal cause of fires and explosions at other landfills in the United States. Landfill fires occur from a number of causes, including when waste is excavated, or when waste is exposed to air inadvertently drawn into a landfill by a landfill gas extraction system. During foundation and remediation construction, if air has been introduced into the waste, combustion can result from sparks caused by construction equipment igniting methane. In addition, spontaneous combustion can occur in waste material due to elevated temperatures from chemical oxidation or biological decomposition.

Also, explosions and fires may result from elevated levels of methane, usually in a confined space. Methane in the range of 5-15 percent by volume in air, often in subterranean voids such as meter boxes, vaults and trenches, can be explosive and has been known to migrate laterally in the subsurface hundreds of feet, and in some cases thousands of feet, without controls.

After the Remedial Systems on all Cells are completed on the Site, the potential for a landfill fire or explosion will greatly decrease because there will be no further pile driving, waste will no longer be excavated and relocated for grading purposes and no utility installation will occur below the landfill cap. The landfill cap and landfill gas control system will also be fully installed and operational, and subsurface landfill gas temperatures will be monitored at each wellhead to ensure that air is not being drawn into the waste from the extraction wells.

3.1.3 Compliance Risks

3.1.3.1 Waste Consolidation

Waste consolidation has been and will continue to be necessary as part of the grading and utility installation work at the Site to prepare it for development. The regulatory compliance framework for the Site has emphasized keeping waste on Site by reconsolidating it into areas that will be covered by the final landfill cap. As phased development advances, this will progressively restrict the options for reconsolidating waste removed during construction.

3.1.3.2 Air Quality Compliance

The SCAQMD Rule 1150.1 establishes specific restrictions on emissions from the surface of a landfill and Rule 403 restricts occurrences of odor detections. Under Rule 1150.1, any emissions detected at the landfill surface exceeding 200 parts per million by volume (ppmv) in air must be reported to SCAQMD in the periodic reports as required in the Rule, and any emissions above 500 ppmv must have actions taken to mitigate the emissions. In addition, Rule 1150.1 requires that "all landfill gas being generated must be collected."

Operation of the GCCS in a Cell with active pile driving or excavation work will pose a risk of pulling ambient air into the waste which could contribute to subsurface rapid oxidation ("landfill fire"). Reducing vacuum to wells in a Cell with active construction (pile driving, excavation work) to help prevent drawing in ambient air could result in instances of surface emissions violations (i.e., greater than 500 ppmv). Per Rule 1150.1, exceedances would require actions which might include one or more of the mitigation actions described in **Appendix A**. In addition, the LFG at the Site has demonstrated that it can produce a strong odor, and odor detection by occupants of adjacent Cells or properties can result in violations under Rule 403. Such violations also would require implementation of one or more of the mitigation measures described in **Appendix A**.

3.1.3.3 Storm Water Management

As part of the project storm water pollution prevention plan (SWPPP), all storm water from a storm event within an area still under construction must be retained on-Site until it can be tested before being released to the area storm drain system. Currently this is being accomplished through the construction of pre-development holding ponds in the former Site haul road locations. As the construction phases are completed the area available for these holding ponds will decrease, making retention of storm water more difficult. In later phases, storm water retention may not be possible due to the absence of adequate land area to locate the holding ponds. In this case other Best Management Practices (BMPs) may need to be implemented to manage storm water in compliance with regulatory requirements. The project SWPPP will be revised as construction phases are completed to account for the changes and to identify any different BMPs that may be needed.

3.2 METHODS FOR ASSESSING AND MANAGING RISKS

This section presents the methods for evaluating and managing the risks presented in Section 3.1 and has been adapted from a Draft Phased Development Plan prepared by a former consultant on the Site in 2013.

3.2.1 Human Health Risk Assessment

This section describes how human health risk assessment methods and a primary monitoring approach will determine and evaluate human health risks during implementation of the MAPO. Air monitoring will be the primary method for evaluating potential human health risks for receptors adjacent to or near the proposed phased development. Management of any identified risks may include applicable control or mitigation measures, as described in **Appendix A**.

Currently, air monitoring is conducted in accordance with the DTSC-approved Ambient Air Monitoring Program (Tetra Tech, 2008), implemented as part of previously-contemplated Site development activities. Air monitoring is conducted to document both on- and off-Site airborne exposures, based on perimeter air monitoring for dust, particulates, and constituents determined to be Chemicals of Concern (COCs). Monitoring of the ambient air during construction activities is required to ensure that the control measures taken are adequately controlling fugitive dust and COC emissions, and will continue during the period of phased occupancy.

The monitoring results are used to interpret ambient air quality within and surrounding the Site. In consultation with DTSC, a group of substances was identified as COCs and are currently evaluated on a regular basis by comparison to air screening levels. All of the screening levels were calculated to be protective of potential residential exposures using a combination of DTSC guidance and Site-specific factors, such as duration. If the monitoring data indicate that measured air pollutant concentrations exceed acceptable exposure levels, additional control or mitigation measures will be implemented to reduce emissions from the Site.

The sampling frequency and monitoring locations will be adjusted, as necessary, throughout the duration of the Site development activities. Additionally, at the beginning of each new major construction activity, including new phases of development, additional samples may be collected at various times or frequencies. Prior to any new development activities within a given Cell, the need for and location, if any, of additional air sampling locations will be determined and approved in consultation with DTSC.

As per the Ambient Air Monitoring Program (Tetra Tech 2008), the results of the monitoring samples will be reviewed immediately upon receipt to determine if Site conditions are in compliance with the air quality goals for the Site. If the results show that ambient air concentrations exceed the screening levels, then measures will be taken to determine the cause of the exceedance. Procedures and construction activities will be reviewed to see what modifications can be made to ensure that the screening levels will not continue to be exceeded. The changes will be documented to show that corrective actions have been implemented. The results of the comparisons to the screening levels would be used to identify locations and/or activities requiring implementation of mitigation measures.

3.2.2 Risk Management Plan

This section presents the measures that will be further developed and then implemented to help address the risk factors identified associated with phased development.

3.2.2.1 Mitigation Measures

One or more mitigation measures may be implemented to reduce the risks and impacts associated with phased occupancy. The mitigation measures will be selected based on the individualized risks and exposure scenarios identified in the Cell-specific FHRE, and are described in **Appendix A**. In addition to reducing risks, the mitigation measures are intended to help maintain regulatory compliance during the implementation of this MAPO. A Mitigation Measures Implementation Plan will be prepared during the Pre-Development Planning and Design process for any Cell and incorporated into any final HRA for the Cell approved by DTSC.

Because there is a narrow and somewhat artificial division between Cell 3 and Cell 5, particular care will be exercised during development of these Cells. Additional mitigation measures are likely to be implemented, which may include adjusting the dividing line between the Cells to more closely match development plans, installing Remedial Systems in an expanded buffer zone between Cell 3 and Cell 5, or completing the Remedial System installation on both Cells at once. Any such actions will be taken in consultation with DTSC to ensure adequate protection for users and activities on these two Cells and surrounding areas.

3.2.2.2 Monitoring Plan Revisions

Implementation of the MAPO may also require revisions to various monitoring plans (*e.g.*, Ambient Air Monitoring Program, Health and Safety Plan, etc.) previously approved by DTSC. These are described as part of the Mitigation Measures in **Appendix A**. The revisions include enhanced perimeter air monitoring, enhanced work area monitoring, enhanced landfill gas probe monitoring, enhanced surface monitoring and re-evaluation of the monitoring program action levels. The revision and implementation of any monitoring plans will need to be factored into the development schedule as the monitoring might impact the schedule of the foundation and remediation construction work.

3.2.2.3 Emergency Response and Preparedness Plan

An emergency response and preparedness plan for the entire Site will be developed prior to the implementation of phased occupancy. The emergency response plan will address a variety of potential emergencies that could occur at a large construction site, in addition to the particular types of emergencies that could apply to the partial occupancy of the developed phases while construction is ongoing on later phases. These particular types of emergencies relevant to the phased development will include plans and protocols for responding to a landfill fire and/or explosion, among other potential emergencies.

3.2.2.4 Buffer Zones

Phased occupancy implementation may result in some locations where a finished Cell is used by the public next to a Cell where foundation/Remedial System installation is still underway. It may also result in areas of a Cell where a finished slab is located near an area where foundation or Remedial System installation is still taking place. Areas where foundation or Remedial System installation will be in close proximity to vertical construction will require buffer zones in order to allow non-HAZWOPER-trained workers to operate in those finished slab areas. In addition, buffer zones are intended to mitigate both environmental and construction safety risks to occupants and users of completed phases by providing physical separation between developed and occupied areas and those areas still under remediation and construction. The buffer zones will also help reduce complaints from occupants about landfill gas odors during pile driving or waste consolidation.

The sizes of the buffer zones have not been determined and are anticipated to vary depending on the type of exposure or safety risk at each location. For example, the current Site Health and Safety Plan for pile driving requires a safety buffer zone of 150 feet for all people other than the crews performing pile driving or those workers implementing landfill gas control measures. The minimum distance between the pile driving and the existing houses across the Torrance Lateral channel is approximately 150 feet. These houses are rarely down-wind of the Site, based on the 2011 Site wind rose graph for wind speed, direction, and time, presented in **Figure 5** (Tetra Tech, 2013).

The wind rose graph shows that the prevailing wind direction at the Site is predominantly from the west to the east, with the second largest component from the west-southwest. It is rare for the wind direction to be from the north to the south, where the existing houses are located across the Torrance Lateral channel. Cell 2, which will be the first occupied cell, will be down-wind of foundation and remediation construction activities of later phases of any later developed Cells. With respect to exposure to dust and odors, wind direction will need to be considered in establishing the appropriate buffer zones.

In order to create a buffer zone, any foundation or Remedial System construction that is to be built in that buffer zone will be built as part of the earlier adjoining phase so that the occupants of the earlier adjoining phase are not exposed to the construction activities that would otherwise have occurred within that buffer zone. Accordingly, an approved buffer zone will be deemed to be a part of the occupied/developed Cell for purposes of Section 2.1 of this MAPO.

Once an adjoining Cell is occupied, no construction activity may take place in an established buffer zone. For example, foundation and Remedial Systems may need to be installed in the easternmost portions of Cell 4 and Cell 5 during the construction of Cell 2 for scenarios where Cell 2 is occupied prior to the completion of foundation and remediation construction in the adjoining portions of Cell 4 and Cell 5. The need for buffer zones as a mitigation measure will be evaluated within each Cell-specific FHRE and HRA, and will be implemented where necessary.

3.2.2.5 Traffic Control Plan Revision

The current traffic control plan for the Site allows no public access to the Site. The traffic control plan will be revised to accommodate public access as development phases are implemented so as to protect the public and maintain a safe work area. The traffic control plan will be further revised as the phases of development progress. The revised traffic control plan will attempt to avoid construction equipment crossing any roads that are opened to the public.

3.2.2.6 Land Use Controls

The enabling documents for the Site that were created in 2007 provided for deed restrictions; an Institutional Control Plan; Covenants, Conditions and Restrictions (CC&Rs); and other measures to help protect the Remedial Systems from damage by future occupants. They also provided for disclosures in sale and long-term lease agreements so that future owners and occupants are aware of the landfill and its Remedial Systems, as well as their restrictions and responsibilities. These documents will be updated and will apply to the entire Site prior to property transfer or building occupancy, whichever comes first.

4 ROADMAP TO OCCUPANCY

The objective of the Roadmap to Occupancy (RtO) is to establish a mechanism that will integrate the various approval and decision-making milestones allowing for the development of a particular Cell. The RtO included in this document incorporates all the elements necessary to implement phased occupancy. The key components of the process are:

(i) to establish a step-by-step process for evaluating management plans and mitigations to ensure a phased approach is protective of on- and off-site populations;

(ii) to establish a step-by-step process for evaluating health risk issues as the remedial system construction is completed in phases;

(iii) to minimize potential time gaps associated with completing, reviewing and approving documents that would be required for DTSC to issue a no-objection letter for Certificate(s) of Occupancy for each Cell; and

(iv) to standardize the documentation requirements for each Cell.

The RtO is a process flow diagram that shows the stepwise approach that will be utilized during each construction phase (see **Appendix B)**. The process flow diagram shows the documents that will be produced prior to implementing construction of each phase, during the various steps of completion of the phase, and then at the completion of each phase prior to occupancy. The flow diagram also illustrates the generalized permitting and review process that will be followed as the phase is completed. This document does not attempt to show all permitting and approvals, such as general construction and permitting and design review and approval.

5 REFERENCES

Brown & Root Environmental. *Final Remedial Action Plan, Cal Compact Landfill, Carson, California*. October 1995.

California Environmental Protection Agency, Department of Toxic Substances Control. *Explanation of Significant Differences from the Remedial Action Plan, dated 10/25/95, Cal Compact Landfill Site, Upper Operable Unit.* July 2009.

McLaren/Hart. *Revised Integrated Remedial Investigation of the Former Cal Compact Landfill in Carson, California*. August 1992.

Tetra Tech, Inc. *Ambient Air Monitoring Program*. 2008.

FIGURES

N:\ES\SW_JOBS\2015\01215078 – Carson CRA – Cal Compact\-03 – CCLF Site Management\CAD\CAL COMPACT\FIGURES.dwg Mar 01, 2018 – 9:3am By: 1103RHH

SCS ENGINEERS
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PROJ. NO. --	DWN. BY: V. CHEW	ACAD FILE: --
DSN. BY: --	CHK. BY: C. FONG	APP. BY: C. FONG

SHEET TITLE: SITE LOCATION MAP

PROJECT TITLE: CAL COMPACT LANDFILL CARSON RECLAMATION AUTHORITY

DATE: 01-19-2016

SCALE: SEE SHEET

DRAWING NO. FIGURE 1

N:\ES\SW\JOBS\2015\01215078 - Carson CRA - Cal Compact\-03 - CCLF Site Management\CAD\CAL COMPACT\FIGURES.dwg Mar 01, 2018 - 9:3am By: 1103RHH

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PROJ. NO. --	DWN. BY: V. CHEW	ACAD FILE: --
DSN. BY: --	CHK. BY: C. FONG	APP. BY: C. FONG

SHEET TITLE:
SITE DETAIL MAP

PROJECT TITLE:
CAL COMPACT LANDFILL
CARSON RECLAMATION AUTHORITY

DATE: 01-19-2016
SCALE: SEE SHEET
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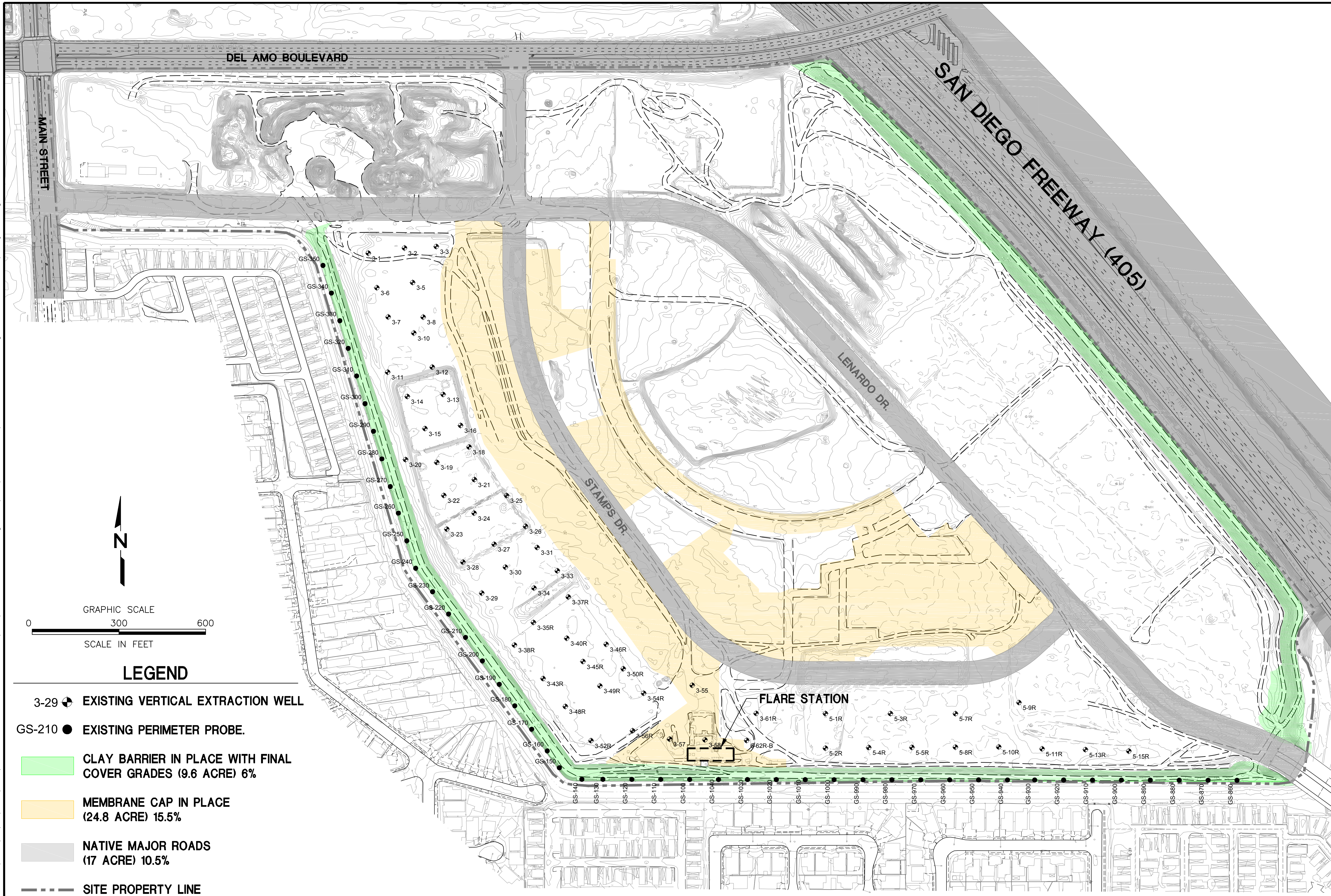

NO.	REVISION	DATE

SHEET TITLE: LANDFILL AREAS

PROJECT TITLE: CARSON RECLAMATION AUTHORITY CAL COMPACT LANDFILL 20400 MAIN ST. CARSON CA 90745

CLIENT: CARSON RECLAMATION AUTHORITY

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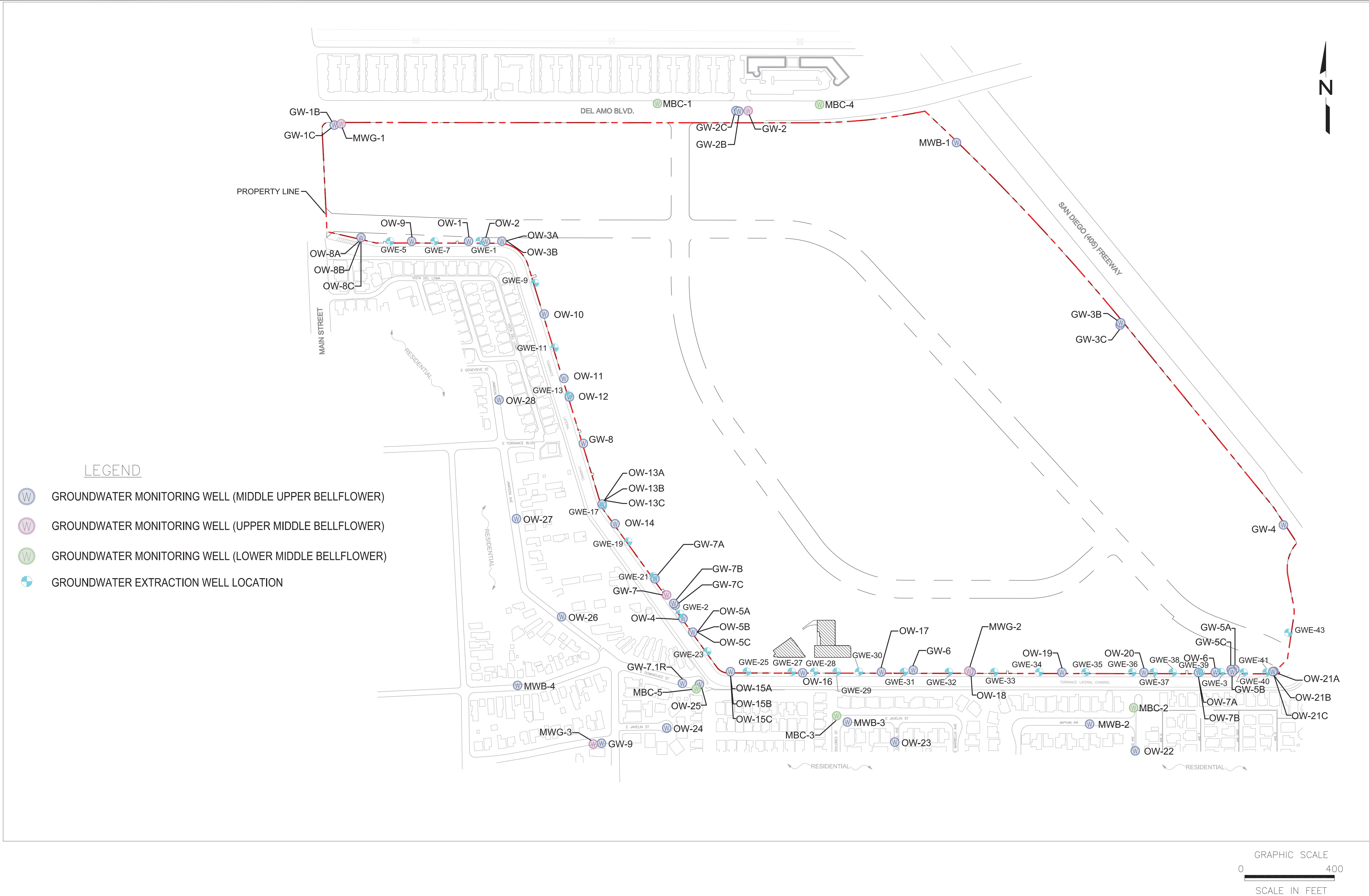
PROJ. NO. 01215078.03 | DWN. BY: VGC | CHK. BY: SS | APP. BY: RH

DATE: 03-10-2017

SCALE: SEE SHEET

DRAWING NO. FIGURE 4



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PROJ. NO.	01215078.03	DWN. BY:	J.SIEG	ACAD FILE:	J/HW/2015
DSN. BY:	SCS	CHK. BY:	K.GREEN	APP. BY:	R.HUFF

CLIENT:
CARSON RECLAMATION AUTHORITY
CITY OF CARSON
701 EAST CARSON STREET
CARSON, CALIFORNIA 90745

SHEET TITLE:
SITE MAP SHOWING GROUNDWATER EXTRACTION AND MONITORING WELL LOCATIONS

PROJECT TITLE:
FORMER CAL COMPACT LANDFILL
20400 MAIN STREET
CARSON, CALIFORNIA

NO.	REVISION	DATE
		-

DATE: JUNE 2016

SCALE: 1"=400'

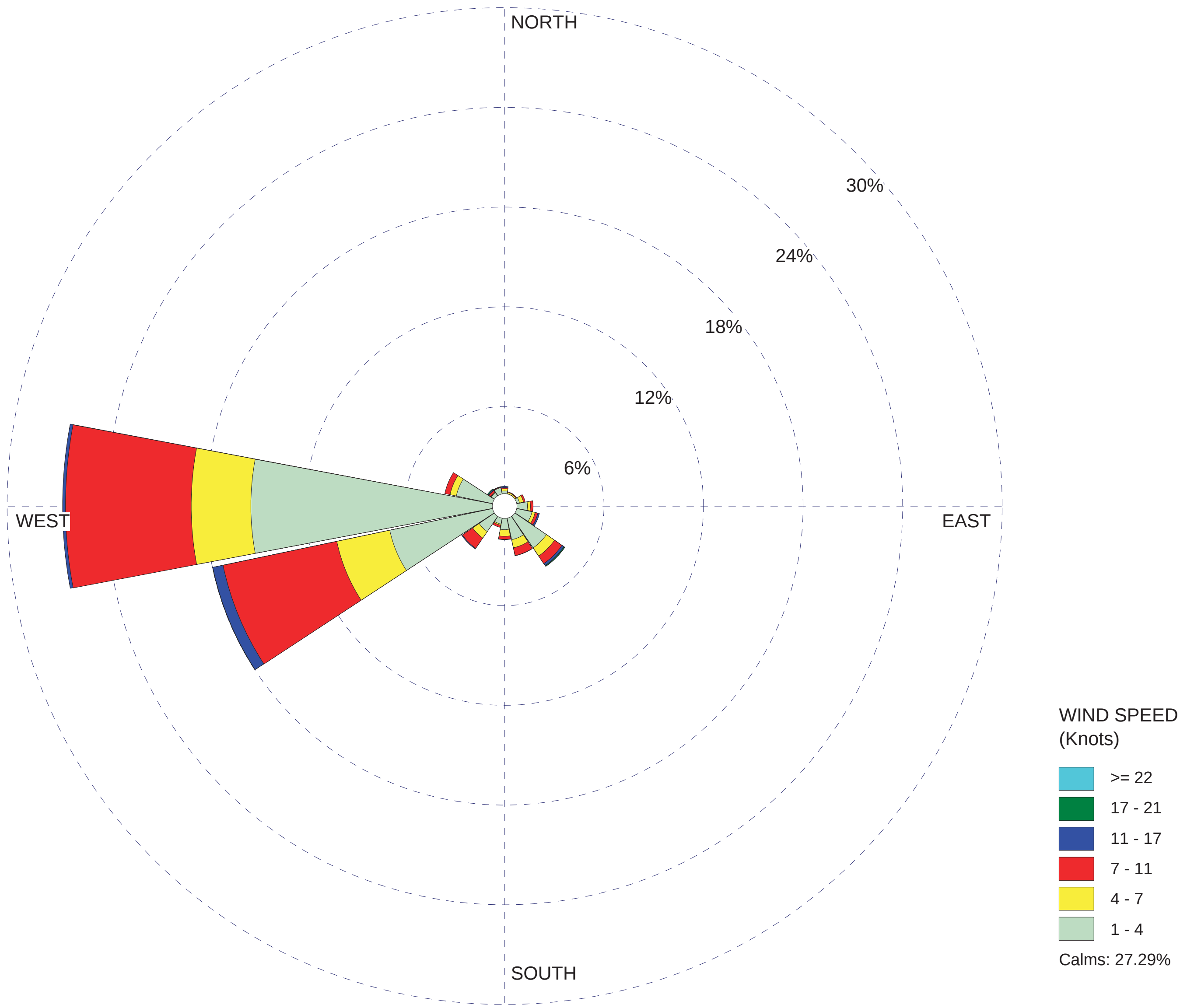
FIGURE NO.
FIGURE 4

WIND ROSE PLOT:

Cal Compact Landfill - On-Site Meteorological Station

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

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Jan 1 - Dec 31
00:00 - 23:00

TOTAL COUNT:

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CALM WINDS:

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AVG. WIND SPEED:

3.25 Knots

COMPANY NAME:

Tetra Tech

FIGURE 5

WRPLOT View - Lakes Environmental Software

APPENDIX A

POTENTIAL MITIGATION MEASURES FOR PHASED DEVELOPMENT

This Appendix describes potential mitigation measures that may be implemented as part of the phased development of the Site. As part of the Pre-Development Planning and Design process, a Cell-specific Mitigation Measures Implementation Plan will be developed, as discussed in Section 2.3.2.

Mitigation measures are presented in five general categories: Site Management; Environmental Monitoring; Dust Control; LFG / Odor Control (including enhanced subsurface oxidation control measures); and Storm Water Protection (using SWPPP control measures). Schedule development for the phased occupancy plan will factor in applicable mitigation measures, as some have the potential to significantly affect construction productivity, sequencing, scheduling, and duration of Site work.

SITE MANAGEMENT

Site Management tasks include activities that involve the day to day operations of the Site during construction activities. These issues involve Site security and control, personnel management, general health and safety, public and agency communications and coordination, and community relations. These issues are all currently being addressed at the Site; with a change to phased occupancy, however, there may be an increased need for these activities. These additional Site management measures are listed and described in the following subsections.

Enhanced Site Security, Fencing, and Control Measures

After the first Cell is occupied, the general public will have greater access to the Site boundaries and former haul roads. Once the former haul roads are opened to the public for access, it will increase the number of access points affording the general public access to the construction area. This will cause an increased risk of members of the public trespassing into the Site and a need for increased Site security, fencing, or other Site access and control measures.

Enhanced Traffic Control

After the first Cell is occupied, portions of the former haul roads will become public roadways. This will increase the traffic flow through the area and around the Site. Because of this, there may be a need for increased traffic control measures such as pre-development barriers, signals and signage, use of flagmen, barricades and delineators. Also, pre-development road closures or lane closures may become a necessity to accommodate construction activities and buffer zones. This would require permitting, lane or road closure traffic controls, and potentially the use of a flagman.

Increased Health and Safety Training and Monitoring

Because the change to phased occupancy will result in some areas undergoing vertical construction while remediation construction is still being completed in other areas, and also due to the increased project duration, there will be a need for greater health and safety training and monitoring at the Site. Prior to DTSC approval of a Cell-specific FHRE, all construction personnel who conduct work within the exclusion zones, while remediation construction activities are being conducted, are required to have HAZWOPER training and be in a formal medical supervision and monitoring program. The remediation contractor will keep records of the training and medical clearance and all records must be current before personnel are allowed to enter the exclusion area. The change to phased occupancy may increase the number of personnel required to undergo this training and medical monitoring and clearance and thus also increase the management needed for the increased personnel.

Increased Public Agency Communications and Coordination

Implementation of phased occupancy may result in the need for increased communications with public regulatory agencies after the first Cell is occupied as the public will be in closer proximity to the construction areas. Increased communication may be needed in an effort to minimize/reduce complaints and disruptions or interference with ongoing Site work or activities/work in the occupied areas.

Increased Community Relations

Implementation of phased occupancy will cause an increase in the need to conduct community relations after the first Cell is occupied and the general public is in closer proximity to the construction areas. These community relations activities may include such steps as providing public update meetings, responding to public complaints, investigating claims of damage to personal or public property by construction activities, and/or conducting repairs to public and personnel property damaged by construction activities.

ENVIRONMENTAL MONITORING

Environmental monitoring tasks include activities that record and document that established screening levels of dust and COCs are not exceeded to ensure that the exposed population are adequately protected during construction activities. An environmental monitoring program is currently being implemented at the Site and will continue until all construction activities are completed. Measures in addition to those being conducted in the current environmental monitoring program will be needed to amend or enhance the current program to account for changes as a result of the implementation of phased occupancy. These additional monitoring measures are listed and described in the following subsections.

Enhanced Perimeter Air Monitoring Using Fixed Location Monitoring Stations

Enhanced perimeter air monitoring includes the combination of real time monitoring instruments and single event sample collection with monitoring for dust, VOCs, metals, pesticides, and polychlorinated biphenyls (PCBs). Enhancements as a result of phased occupancy implementation will include the addition of monitoring stations and more frequent sample collections than currently conducted. The number of additional stations and sampling frequency may be able to be reduced over time as data is collected and reviewed (e.g., the original project perimeter monitoring program started with 8 stations around the Site perimeter but was reduced to 3 stations over the course of the project).

Enhanced Portable Perimeter Air Monitoring

Enhanced portable perimeter air monitoring involves monitoring personnel using portable monitoring instruments to measure real time ambient levels of VOCs, dust, and landfill gas at various locations around the Site perimeter while work is being conducted. Enhancements will include additional sampling locations as the perimeter around the remediation and construction areas changes as phases are completed and an increase in the frequency of the sampling. The number of additional stations and sampling frequency may be able to be reduced over time as data is collected and reviewed (e.g., the original project perimeter monitoring started with four circuits around the Site perimeter per work day, but was reduced to one circuit per day over the course of the project).

Enhanced Work Area Air Monitoring

Enhanced work area air monitoring will need to be conducted in and around active work areas where intrusive activities are being conducted after the first Cell is developed. Monitoring is done by monitoring personnel in real time while work is being conducted using portable monitoring instruments to measure levels of ambient VOCs and landfill gasses. Monitoring also includes collection of air samples to monitor for levels of VOCs over extended exposure durations utilizing SUMMA canister sample vessels with time release valves and sample submission and analysis at an analytical lab. Enhancement over the existing monitoring program will include additional monitoring locations requiring additional monitoring instruments and monitoring personnel or additional sample collection.

Enhanced LFG Probe Monitoring

The landfill gas collection and control system (GCCS) has been partially installed and is extracting LFG and treating it by thermal methods at the Landfill Operations Center (LOC). To gauge the effectiveness and optimize the LFG extraction, monitoring will be conducted at LFG probes installed around the perimeter of the Site that will monitor for levels of landfill gas, pressure, and temperature. The extraction rates at LFG extraction wells and horizontal collectors will need to be closely monitored and periodically adjusted based on the probe readings to ensure that the LFG is being extracted at optimal levels with as little air infiltration as possible.

Because the implementation of phased occupancy will involve completion of the GCCS, movement of the perimeters around the remediation and construction areas as phases are completed, and pile drilling/driving in areas with active LFG extraction, the monitoring of LFG probes will become critical. To accommodate these factors, the LFG probe monitoring program will need to be enhanced, including possibly installing additional monitoring probes within the interior of landfill cells, at the edges of the landfill cells and/or along the Site perimeter. This will permit better data collection to support enhanced control of the LFG extraction systems. These additional probes may be installed as temporary probes to be removed as the Cell construction is completed, or they may be retained and converted to use as permanent probes. Other enhancements to the probe monitoring program may include conducting additional monitoring. This may include the monitoring of the additional probes, as discussed previously, or may include increased monitoring frequency in order to properly control the LFG extraction. The increased frequency may include additional monitoring of the entire LFG probe system or increased monitoring in specific areas as determined by the development activities being conducted in that area.

Enhanced Surface Monitoring

Once the LFG extraction and treatment system has been activated in a given Cell, surface monitoring will be conducted around the surface of the developed areas (a standard measure under the Site's current Operations and Maintenance Plan) to detect any surface emissions. Monitoring personnel will sweep the ground surface across areas using a LFG detection instrument and record the location and gas levels of any areas with detectable LFG. Because implementation of phased occupancy will result in the LFG system being turned on while ongoing development of Cells continues, this will cause large areas of the Site to remain without paving and without the installation of the ultimate or final LLDPE membrane while the LFG extraction system is in operation. Because of this, enhanced surface monitoring will be required. This enhanced monitoring will include additional surface monitoring within both areas where the LLDPE membrane has been placed but surface paving or building slabs have not been installed and in areas where LLDPE membrane is yet to be installed. The monitoring of the areas where LLDPE membranes have been installed will be used to determine if there are any potential leaks in the installed membrane that need to be addressed before the surface completions are constructed. The monitoring results of the areas where no LLDPE membrane has been installed will be used to help with adjusting the extraction rates of the LFG wells and horizontal collectors in the area monitored and will serve as supplemental data to the LFG probe monitoring.

Re-evaluation of the Air Monitoring Program Screening Levels

The project currently has a set of air screening levels that were determined at the beginning of the project using the known Site and ambient area data. Now that the project has been operating for several years with the active monitoring program, the air screening levels should be re-evaluated as part of the MAPO implementation using a combination of the original data and the new monitoring data collected since field work began. The air screening level re-evaluation should also take into consideration the results of the Cell-specific HRAs and phased occupancy project schedule. Specifically, the results of the Cell-specific HRAs will be used to determine if air screening levels are needed for additional chemicals or if the current air screening levels need to be modified to account for any changes to exposure conditions/assumptions associated with phased occupancy. The resultant air screening levels will then be used during the implementation of phased occupancy.

DUST CONTROL

Construction activities disturb soil by their very nature and produce airborne dust. This dust can pose a health threat or nuisance condition to exposed populations. Dust control tasks include activities that will minimize the formation of dust that can migrate off the areas of construction or other undeveloped areas and impact the occupied Cells of the project or the surrounding area. The implementation of phased occupancy will generally decrease the separation distance between the construction areas and occupied areas as each Cell is completed and expose the occupants of down-wind Cell 2 to the foundation and remediation construction activities of up-wind later phases. Because of this, enhancements to the standard construction dust control methods may be required to ensure that dust levels remain below regulatory screening levels and do not affect occupants of developed areas. These additional dust control measures are listed and described in the following subsections.

Use of Additional Water Trucks or Fixed Watering Systems

The main construction dust control measure used is the application of water onto disturbed soil areas to keep the soil from becoming airborne. To decrease the dust produced during phased occupancy, additional water may need to be applied to better control dust levels. This may be accomplished by using additional water trucks. In areas that will only have limited equipment operation or other development activities, fixed position semi-permanent watering equipment such as sprinkler systems or misters may be installed to keep soil wet. This will only work in areas where the development activities would not disturb and potentially damage the watering system or supply piping.

Placement of Rock, Geomembrane, Plastic Sheeting, Tarps, or Liner over Unused Open Areas and Unpaved Roads

In areas of disturbed soil that will remain unused for long periods of time or on Site roads, the top surface may be stabilized by placing materials such as rock, geomembrane, plastic sheeting, tarps, or liner. This will stop the soil from becoming air-entrained producing dust. These cover materials may be moved and reused in other areas when the area is ready for development activities.

Placement of Wind Screens

The use of wind screens can stop or decrease the effect of wind on disturbed soil areas. Wind screens can be applied to Site perimeter fencing and can be placed around areas of active excavation or other soil disturbing activities.

Installation of Vegetation/Landscaping

Installation of vegetation or other landscaping materials can be used to stabilize disturbed soil areas and decrease the potential for dust production. However, vegetation requires the application of water to keep the plants alive and viable, and other landscaping such as mulch application must be removed before development activities can proceed. Also, these applications can only be used in areas that will remain undeveloped for a fairly long period of time due to the fairly long duration for vegetation to establish and the high level of activity required for removal of other landscaping materials.

Spraying of Soil with Specialty Dust Suppression Chemicals

Disturbed soil areas may be temporarily stabilized by applying specialty dust suppression chemicals (tackifiers/binders). These chemicals cause a crust to form on the top surface of the soil keeping the soil from becoming air entrained and decreasing the dust produced from wind effects. However, these chemicals must be periodically reapplied to address disturbance from construction traffic and to retain effectiveness.

Control Vehicle and Equipment Driving Speed.

As vehicles and equipment drive across disturbed soil areas or Site roads, dust is produced. By limiting the speed of these vehicles and equipment the level of dust produced is effectively reduced. The adherence to on-Site vehicle speed limits by all personnel will decrease dust production levels.

Limit Dust Producing Activities

Construction activities, by nature, produce dust. By limiting activities that produce higher levels of dust, the dust levels can be reduced or controlled. These limitations can involve reductions in time or quantity to reduce the dust production. Time limitations would include such things as limiting the time that an activity can be conducted per day. Quantity restrictions would include limiting the amount of soil area that is disturbed at any time or over a time period.

Suspension of Work Activities During Windy Periods

When wind levels increase the level of dust rises. By shutting down soil disturbing activities when wind levels rise, the dust production levels can be reduced. The Site currently has a wind limitation, per several Site SCAQMD permits, that states that operations must be halted if wind speeds exceed 15 miles per hour (mph) sustained over a 10-minute period or 25 mph at any time. However, certain Site activities or activities conducted close to Site perimeters may need to be halted at lower wind speeds to reduce dust levels.

Track-out Control for Site Vehicles and Equipment

Site vehicles traveling over disturbed soil will pick up soil on their tires and the vehicle undercarriage. When these vehicles or equipment leave the active construction area this soil can be dropped on the roads surrounding the Site causing soil track-out. Other vehicles operating on these roads can then drive over this deposited soil causing it to become air entrained producing dust as well as spreading the soil. The primary way of controlling track-out is to dedicate Site vehicles that do not leave the construction Site, however this may not always be possible. Vehicles such as those delivering construction materials or equipment cannot be dedicated to the Site. In these instances, the use of tire washing stations, rumble strips, placement of large aggregate, and stations to wash or decontaminate vehicles or equipment prior to their leaving the Site can be useful in decreasing the amount of track-out. When track-out still occurs despite these other control measures, a street sweeper can be used to clean the surrounding roads and other Site paved areas.

LFG/ODOR CONTROL

Because the Site is a former landfill, it is constantly producing LFG that comes up through the cover soil or is released by excavation activities. Additionally, when excavation activities expose waste, there is a high potential for strong odors to be produced. LFG must be controlled to minimize exposure to the exposed population and to minimize the nuisance effect of odors. These control measures include activities that will assist in minimizing any LFG emissions or odor from waste during construction that can migrate into adjacent developed Cells and the surrounding area. In addition, these measures would help control the migration of below surface LFG, as well as monitor for possible air/oxygen intrusion in the waste. These additional LFG and odor control measures are listed and described in the following subsections.

Operational LFG Extraction and Treatment System

To decrease the fugitive emissions of LFG, portions of the GCCS are currently operational as required by DTSC and SCAQMD. Once the system is fully installed, the pressure and quantity of LFG contained in the landfill cells will be reduced so that surface emissions should decrease.

Installation of LFG Monitoring Probes

The installation of landfill gas monitoring probes was discussed previously under the environmental monitoring section. The installation of these probes and their monitoring will allow the tuning of the LFG extraction system to reduce the levels of surface LFG emissions.

Installation of LFG Extraction Wells

LFG extraction wells (vertical or horizontal) will be installed in the LFG system, as previously discussed, to allow the LFG extraction and treatment system to be operational while phased occupancy is being implemented. The operation of the GCCS will help to control fugitive LFG emissions. The LFG extraction wells will consist of both vertical wells and horizontal collectors.

Placement of HDPE Liner/Soil

Placement of high-density polyethylene (HDPE) liner and interim soil cover will be used to prevent air intrusion, allow horizontal collectors to be effective, and control LFG emissions. As the phased occupancy proceeds, the ultimate LLDPE membrane and soil cover will be installed.

Use of Carbon Gas Treatment Systems in Focused Areas

As construction activities continue in areas of the Site, the use of a LFG extraction pump and activated carbon canister treatment system may be used in specific areas of the Site to conduct focused gas extraction and treatment to reduce LFG emissions. The use of this system will allow construction activities to continue in areas by reducing LFG emissions to safe levels in an area where the main extraction and treatment system may need to be turned down or off.

Enhanced Use of Foam, Water, Soil and Liner

While construction activities are conducted, the enhanced use of foam, water, soil cover, or liner may be used to temporarily control landfill gas emissions. The use of these control measures may also be used to prevent air intrusion while the waste is exposed during excavation or pierced during well or pile hole drilling. The use of foam, water, or liner will not be used for overnight cover.

Limitation of Construction Work

To control LFG emissions, noise, and odor, construction work may be limited either in area or time. These limitations may involve the amount of exposed waste material through limiting the area of excavation or the number of pile drilling/driving rigs operated at a single time. These limitations may also include the amount of time that excavation or other waste and odor causing activities may be conducted.

Establishment of Buffer Zones

For occupied areas that will be adjacent to active construction areas, buffer zones will need to be established between construction areas and occupied Cells. The appropriate buffer zone dimensions will be determined depending on the type of activity being conducted and the distance to the occupied areas, and the area where the buffer zone is needed. DTSC will be consulted in the buffer zone dimension determination process prior to implementation. The buffer zones may consist of one or more of the following: (1) areas that have both landfill cap and LFG control after piles have been installed, (2) areas that have at least LFG control and piles and pile caps in place, and/or (3) the solid soil cell divisions that exist at the Site.

Completion of Waste Reconsolidation before the First Cell is Occupied

Waste excavation has a heightened risk for LFG and odor exposure, and landfill fire. To establish appropriate buffer zone areas and to assure that there is enough space to complete waste reconsolidation, the activities involving waste excavation, removal, and reconsolidation need to be conducted, to the extent possible, on the entire Site prior to the occupation of the first Cell. As the Cells continue to be completed, there will be fewer areas available to place reconsolidated waste. Also, as the phases continue to be completed, additional waste will be generated that will require reconsolidation. By conducting as much of the waste reconsolidation activities while the first Cell is under construction, the available area for this activity is maximized. In addition, a planned location for future waste reconsolidation can be established that will provide capacity as waste removal is needed as Site development takes place.

Enhanced Tuning of LFG Wells

The enhanced tuning of LFG wells is partially described in the environmental monitoring section. The LFG wells will be tuned by increasing or decreasing the LFG extraction rate in response to the construction activities being conducted in the area. The adjustment of the extraction rate of LFG wells will help provide effective LFG extraction while minimizing air intrusion during pile driving or other construction activities. This will be especially important in areas where LFG wells are installed before installation of the ultimate landfill cap. These areas will likely require additional monitoring of LFG wells, gas probes, and additional installed wells and probes as discussed under the environmental monitoring section.

Apply Deodorizer, Water, Soil, or Foam to Exposed Waste to Control Odor

While construction activities are conducted, the enhanced use of foam, water, soil cover, or deodorizer may be used to temporarily control odor while waste is exposed during excavation or reconsolidation activities. The use of foam, water, or liner will not be used for overnight cover.

Use of Vacuum Box During Pile Driving

A vacuum box consists of a shroud through which pile driving and drilling are conducted. A blower creates a vacuum in the shroud such that LFG and air are drawn through activated carbon and/or other treatment media to reduce emissions of odors, vapors and gases from the pile driving location. The need to use a vacuum box will be evaluated based on such considerations as proximity to occupants, size of buffer zones, weather conditions, and extent to which other control measures are effective.

Conduct Excavation Inside of an Enclosure or Tent

If no other alternatives are available that are effective, excavation into waste may be conducted within an enclosure or tent with a gas treatment system to contain dust, landfill gas, and odor. This would be applied to specific excavation activities only as needed. Note that although this mitigation measure is listed as a potential option, it is considered an extreme measure to be implemented only as necessary if other mitigation measures are considered ineffective or infeasible.

Use of Tarp Covers and Closed Top Roll-off Bins for Moving Waste

While excavated waste is being transported around the Site in reconsolidation activities or prior to being reconsolidated, tarps or covers will be used to control the emissions of LFG and odor. Only those quantities of waste that can be reconsolidated during the same day's work activity will be excavated. Closed top roll-off bins may be used to temporarily contain removed waste prior to being reconsolidated; however, any such bins will be emptied at the end of a day's work activities. Waste will not be stored in the bins overnight. Any open trenches will be covered with one foot of soil before leaving the site each day. Other control measures to contain odor and LFG emissions will be used as appropriate.

Enhanced Subsurface Oxidation Control

Subsurface combustion control measures include activities that will assist in minimizing ambient air intrusion into the waste mass. In addition, these measures help control the migration of below surface LFG, as well as monitor for possible air/oxygen intrusion in the waste. The additional control measures to reduce the risk of subsurface oxidation and combustion are listed and described elsewhere in this document, and include effective operation and maintenance of the gas collection and control system, and wellhead gas temperature monitoring to detect oxidation taking place in the waste material.

Construction Scheduling

Construction scheduling and sequencing will be based on existing Cell boundaries to provide natural soil buffer zones between areas of operating LFG system and pile driving or subsurface excavation work or LFG system construction work to aid in reducing the potential for ambient air to be drawn into the waste mass. The scheduling and sequencing will need to be adjusted as construction continues and in concert with the LFG probe and surface monitoring results.

STORM WATER PROTECTION (SWPPP CONTROL MEASURES)

The Site is currently being developed using a construction SWPPP that uses common Best Management Practices (BMPs) to contain storm water that may accumulate at the Site until it has been cleared for release to area storm water conveyance systems, prevent contamination of storm water from Site activities, and control or reduce levels of silt and sediment in storm water before it is released. The implementation of phased occupancy will result in a reduction of storm water storage and treatment capacity as areas of the Site are constructed and Cells are occupied. Special measures will be required to ensure that storm water can continue to be contained and treated to ensure compliance with regulatory requirements throughout the construction of all Cells until the Site is completely developed. These additional SWPPP control measures are listed and described in the following subsections.

Storm Water Collection Pond Relocation

As phased occupancy proceeds, the areas currently available for storm water accumulation and holding ponds will decrease. At the same time, the amount of construction area requiring ponds will also decrease because the completed Cells will include permanent storm water collection and conveyance systems. The remaining available area for location of accumulation ponds and the size of the ponds will need to be optimized to ensure that the pond volume remains adequate.

Alternate Storm Water Collection/Holding System

As phased occupancy continues and the area for storm water accumulation pond location decreases, alternate storm water collection and holding systems may need to be used. These alternative collection and holding systems may use a system of aboveground storage tanks and a surface collection and pump system.

Erosion Control Measures

Additional erosion control measures may be necessary to ensure that soil erosion is kept at a minimum in the construction areas. This will become more critical as phased occupancy continues and the area for storm water accumulation and holding decreases. These erosion control measures may include the installation of straw waddles, silt fencing, sand bags, check dams, stabilized vditches, and plastic sheeting. These erosion controls would be continually modified to adapt to the continuing changes as phased occupancy continues.

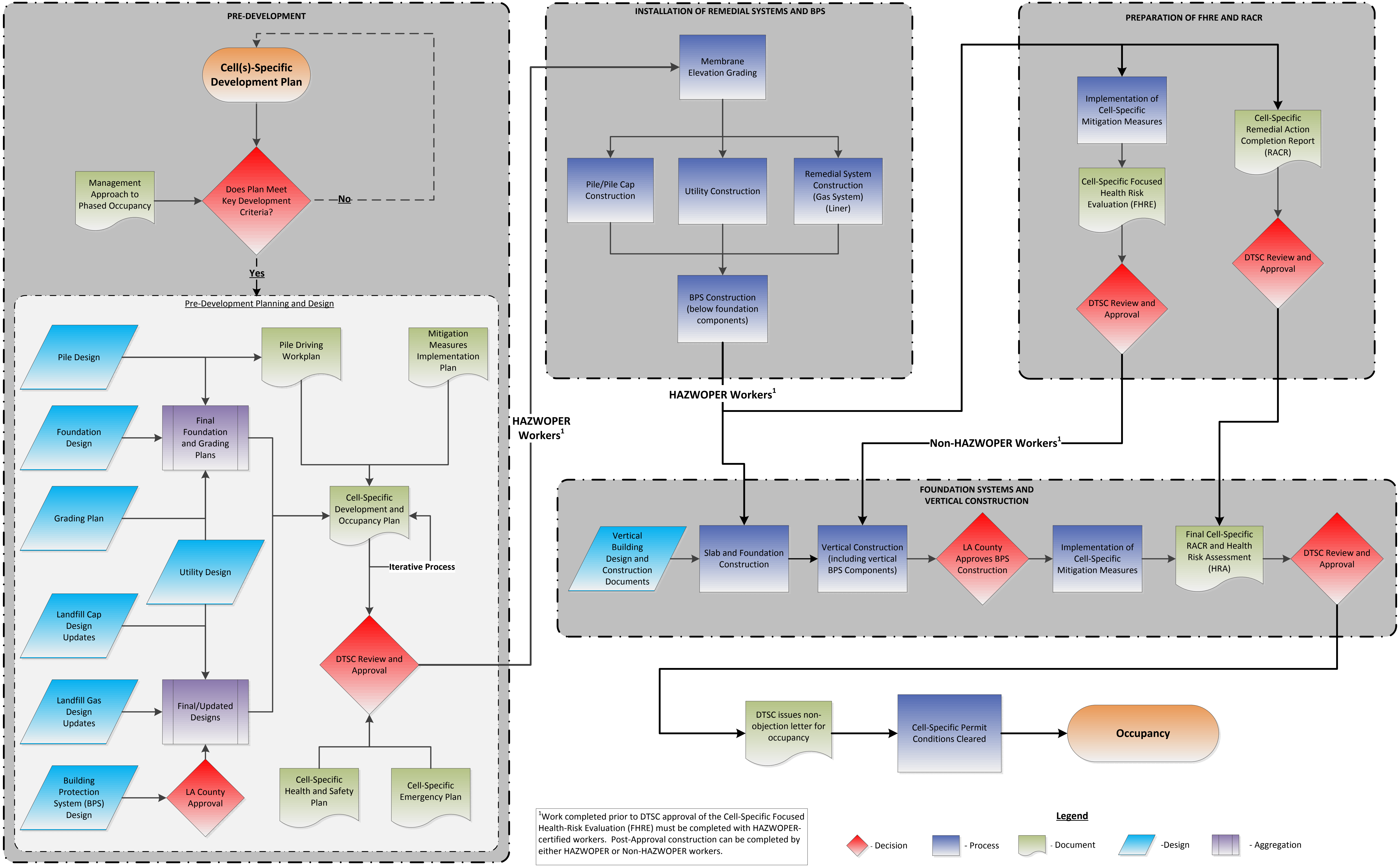
Application of Soil Binder

Soil binder chemicals may be applied to disturbed soil areas to stabilize the soil and prevent erosion from occurring. These chemicals would need to be periodically reapplied to maintain effectiveness. Driving over areas where these chemicals have been applied tends to decrease their effectiveness.

APPENDIX B

ROADMAP TO OCCUPANCY

Roadmap to Occupancy – Former Cal Compact Landfill



APPENDIX G4 LETTER OF PHASED DEVELOPMENT MATTERS (OCTOBER 2017)

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Barbara A. Lee, Director
5796 Corporate Avenue
Cypress, California 90630

Edmund G. Brown Jr.
Governor

October 17, 2017

Mr. John S. Raymond
Executive Director
Carson Reclamation Authority
701 E. Carson Street
Carson, California 90745

PHASED DEVELOPMENT MATTERS, CAL COMPACT LANDFILL SITE, 20400 MAIN STREET, CARSON, CALIFORNIA (SITE CODE: 401716) (the "Site").

Dear Mr. Raymond:

The Department of Toxic Substances Control (DTSC) understands that the Carson Reclamation Authority (CRA) plans to develop the subject site in phases. The following phased development matters have been raised by the CRA:

1. The ability of the CRA and RE | Solutions (RES), the CRA's remediation and development manager, to implement a phased remedial action in conjunction with the phased development and occupancy of the Site;

2. A revised "Roadmap to Occupancy" that outlines the process for obtaining DTSC input and approvals for phased occupancy of the Site; and

3. Clarification of the boundary of the limits of the "Upper Operable Unit" at the Site to allow CRA to establish a lot line that will divide the Site into a "Remediation Lot" and a "Development Lot." These definitions will be used in future documents such as the Covenants, Conditions and Restrictions.

Phased Development; Roadmap to Occupancy.

DTSC previously approved a phased remedial action implementation and development process for the Site dated September 28, 2009, and referred to as the Compliance Framework Agreement (CFA). DTSC has no objection, on a conceptual basis, to the proposed phased occupancy approach at the Site, as depicted in the attached revised Roadmap to Occupancy diagram (the "Roadmap to Occupancy"). This revised phased occupancy approach is consistent with the original phased development concept in the CFA, and is designed to be protective of human health and the environment. DTSC understands that a more detailed Phased Occupancy Plan (the "POP") will be submitted for its review and approval, and implemented prior to DTSC concurrence for phased occupancy at the Site. As indicated in the revised Roadmap to Occupancy, in addition to completion of the remedial action, appropriate mitigation measures will be implemented prior to occupancy of any cell to ensure that occupants within the developed areas are protected.

Boundary of Upper Operable Unit.

In October 1995, DTSC approved a Remedial Action Plan ("RAP") for the Upper Operable Unit ("Upper OU") at the Site (Brown & Root Environmental, 1995). The RAP defines the Upper OU as encompassing "site soils, the waste zones above and within the Bellflower Aquitard, and the Bellflower Aquitard down to, but not including the Gage Aquifer."

With respect to future site development, any breach of the final remedial surface of the Site would be prohibited without DTSC approval and monitoring. The remedial surface is defined as any component of the remedy/remedial design, and all soil that meets commercial/industrial or unrestricted land use standards. Under buildings or structures, the gravel layer associated with the required building protection systems will serve as the protective cover for the landfill cap membrane. Therefore, the upper boundary of the Upper OU at the Site shall be: (1) at the top of the protective soil cover above the landfill cap membrane in areas where no building foundation is present, which shall be delineated with a colored plastic or mesh marker; and (2) in areas where a building foundation is present, at the bottom of the structural slab. In addition, all remedial infrastructure both above and below the final remedial surface of the Site would be required to be protected, and DTSC would require its approval and oversight in the event development plans may affect the integrity of the remedy. Activities which DTSC concludes are located above the final remedial surface and do not affect the remedial systems, regardless of location, would not require DTSC oversight or involvement. DTSC looks forward to working with CRA to ensure that the phased development of the Site is implemented in a manner that is protective of human health and the environment and can be accomplished expeditiously.

If you have any questions or comments, please feel free to contact Mr. Dan Zogaib, Project Manager, via email at Daniel.Zogaib@dtsc.ca.gov or at (714) 484-5483.

Sincerely,

Peter Garcia
Branch Chief
Department of Toxic Substances Control

kl/dz/ey/pg

cc: See next page.

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APPENDIX G5 GROUNDWATER EXTRACTION AND TREATMENT SYSTEM (GETS) REMEDIAL ACTION COMPLETION REPORT (RACR) (MAY 2016)

FINAL

REMEDIAL ACTION COMPLETION REPORT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM FOR THE UPPER OPERABLE UNIT

FOR

THE BOULEVARDS AT SOUTH BAY
(FORMER CAL COMPACT LANDFILL)
20400 MAIN STREET
CARSON, CA

Prepared for:

Carson Marketplace, LLC
4350 Von Karman Avenue, Suite 200
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Prepared by:

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May 2016

Timothy P. Smith, P.E.
California Licensed Civil Engineer No. C62648

TABLE OF CONTENTS

Section **Page**

LIST OF TABLES

APPENDIX

ACRONYMS AND ABBREVIATIONS

B&RE	Brown and Root Environmental
bgs	Below ground surface
Blvds	Boulevards
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
COC	Contaminants of concern
CQA	Construction quality assurance
CQAP	Construction Quality Assurance Plan
DTSC	California Department of Toxic Substances Control
GETS	Groundwater extraction and treatment system
gpm	Gallons per minute
GWTS	Groundwater treatment system
HAZOP	Hazard and Operability
LACDPW	Los Angeles County Department of Public Works
LACSD	Los Angeles County Sanitation District
LA DEH	Los Angeles County Department of Environmental Health, Drinking Water Program
O&M	Operations and maintenance
QA/QC	Quality assurance and quality control
RACR	Remedial Action Completion Report
RAG	Remedial action goal
RAP	Remedial action plan
SCAQMD	South Coast Air Quality Management District
UBF	Upper Bellflower Aquitard
UOU	Upper Operable Unit
VOC	Volatile organic compounds

1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) prepared this remedial action completion report (RACR) on behalf of Carson Marketplace, LLC, to document completion of construction of a groundwater extraction and treatment system (GETS) in preparation for development of the former Cal Compact Landfill into a commercial and residential complex known as The Boulevards at South Bay. Carson Marketplace, LLC, was the Project Owner at the time this document was originally prepared, however, the site ownership has changed. The current site owner is the Carson Reclamation Authority.

The former Cal Compact Landfill is located at 20400 Main Street in the City of Carson, California. The site was used for agriculture before it became a Class II landfill. The landfill began operation in 1959 and ceased receiving waste in 1965. The site remained undeveloped until 2008, when earthmoving and deep dynamic compaction of the waste began in support of the proposed development. The project description, purpose, and scope are described in the construction quality assurance plan (CQAP) and have not changed (Tetra Tech 2011b).

1.1 OVERVIEW

This RACR documents completion of construction of a GETS associated with the Upper Operable Unit (UOU) remedial action at the former Cal Compact Landfill property (the Property). The Property is located at 20400 Main Street in Carson, California. This report addresses only the UOU, which includes "Site soils, the waste zone in and above the Bellflower Aquitard, and the Bellflower Aquitard down to, but not including, the Gage Aquifer" (California Environmental Protection Agency, Department of Toxic Substances and Control [DTSC] 1995). Throughout this document, the term "Property" refers to the legally defined boundary of the former Cal Compact landfill property itself, while the term "Site" refers to the area that includes the property plus any contaminated groundwater that originated from the property out to its leading edge, which may be located off the property.

1.2 PURPOSE

A remedial action plan (RAP) for the Site was developed in 1995 (Brown & Root Environmental [B&RE] 1995) and was approved by the DTSC. The remedial alternative for groundwater selected in the 1995 RAP is groundwater extraction and treatment. The GETS described in the RAP consisted of a line of pump-and-treat extraction wells along the downgradient (western and southern) Site boundaries to provide containment of contaminants of concern (COCs) that exceed their remedial action goals (RAGs), as established by the RAP. The GETS in the RAP also included treatment of extracted groundwater on Site, with discharge of the treated groundwater to surface water or to the sanitary sewer. This report describes the construction activities that were performed as part of the groundwater remedial action in accordance with the RAP.

Construction of the GETS included installation of the groundwater treatment system (GWTS), 26 new extractions wells and groundwater pumps, 21 new monitoring wells, and approximately 20,000 feet of conveyance piping. In addition, 10 existing groundwater wells, installed for a previous aquifer pump test, were incorporated as groundwater extraction wells (three) and groundwater monitoring wells (seven) for the GETS. The underground piping constructed for the GETS conveys extracted groundwater from the 29 groundwater extraction wells to the

GWTS at the Tetra Tech Operations Center. The GWTS also receives condensate from the Site landfill gas collection and control system. The GWTS consists of a surge tank, transfer pumps, particulate filters, a sequestering agent metering pump, an air stripper, liquid phase carbon vessels, a discharge tank, vapor phase carbon vessels, vapor phase potassium permanganate vessels, an air compressor and desiccant air dryer, and associated controls. Treated groundwater is pumped from the Tetra Tech Operations Center and is discharged to the Los Angeles County Sanitation District (LACSD) municipal sanitary sewer system in accordance with the LACSD flow and substance limits. Vapor phase emissions from the air stripper are discharged to the atmosphere in compliance with South Coast Air Quality Management District (SCAQMD) regulations.

Construction also included installation of condensate conveyance piping for the landfill gas treatment system, domestic water service, and fire protection water service, electrical service, instrumentation, and controls to provide continuous operation of the GETS. A canopy was also constructed over the GWTS to protect the treatment system components from the elements. Installation and operation of the GETS associated with the UOU remedial action at the Property conforms to the intent of the 1995 RAP.

2.0 REMEDIAL OBJECTIVES

After the RAP was approved by DTSC, a "Plans and Specifications for Groundwater Extraction and Treatment System" document was prepared (B&RE 1996) that described the GETS to be constructed at the Site. Initial extraction well spacing was estimated at 300 feet based on the 1995 pumping test results and aquifer parameters, resulting in a planned inclusion of 17 groundwater extraction wells along the downgradient property boundaries. Each well was to be 85 feet deep and 4 inches in diameter. The well screens would be at least 20 feet long and would target the main sand layer that is now referred to as the middle portion of the Upper Bellflower Aquitard (UBF), approximately 60 to 85 feet below ground surface (bgs). The average extraction rate was estimated at 1.5 gallons per minute (gpm) per well, for a total system flow rate of 25 gpm. The total maximum system design flow rate was 100 gpm. The GWTS process design consisted of particulate filtration and aqueous phase granular activated carbon adsorption with discharge of the treated groundwater to the sanitary sewer.

Tetra Tech conducted extensive additional testing (aquifer pump tests and treatability tests) and groundwater modeling in 2008 and 2009 to refine and improve the 1996 design of the GETS to meet the remedial objectives, namely, to maintain containment of COCs that exceed the RAGs along the southern boundary of the Site and to treat and discharge extracted groundwater in accordance with the LACSD wastewater limits. Based on these efforts, the groundwater extraction well network was redesigned with an initial 29 extraction wells, with the potential to add 14 more wells after start-up if the initial wells are not sufficient to ensure adequate containment of the COCs.

Based on the Groundwater Modeling Report, prepared by Tetra Tech in 2010, the design steady-state extraction rate for 20 of the proposed extraction wells is 0.5 gpm per well, with the remaining nine designed for 0.75 gpm per well, yielding a total system flow rate of approximately 17 gpm. The design extraction rate for the 14 additional potential extraction wells, if needed for future system modification, is 0.5 gpm per well. In the event that all potential extraction wells are deemed necessary and are installed and connected to the system, the total system flow rate is estimated to be 24 gpm. The total maximum GWTS design flow rate is 65 gpm, and is upgradeable to 100 gpm to accommodate increased flow conditions, if any.

Based on revised information from Tetra Tech's groundwater testing and modeling results, Tetra Tech designed a GETS consisting of downgradient extraction and monitoring wells, underground conveyance piping, and an aboveground GWTS. Tetra Tech proposed the design in the UOU design report (Tetra Tech 2011a). DTSC reviewed and approved the GETS design (DTSC 2011). In the design, extracted groundwater is pumped from the extraction wells through the underground conveyance piping to the GWTS. The GWTS process includes particulate filtration, sequestering chemical addition, air stripping, and aqueous phase granular activated carbon adsorption. Vapor phase contaminants generated from the air stripping process are treated with granular activated carbon and potassium permanganate alumina. In addition to the basic treatment process equipment, the treatment process includes surge and discharge tanks and associated transfer pumps and equipment. Treated groundwater is subsequently discharged to the LACSD municipal sanitary sewer via underground conveyance piping.

The primary COCs include chlorinated volatile organic compounds (VOCs); benzene, toluene, ethylbenzene, and xylene (BTEX), several semivolatile organic compounds including 1,4-dioxane; and metals. The RAP established RAGs for the COCs. The LACSD Industrial Wastewater Discharge permit program and the SCAQMD permit program establish acceptance criteria for industrial wastewater and vapor discharge. The RAGs, LACSD industrial wastewater discharge permit criteria, and SCAQMD discharge permit criteria are listed in Table 1 and will be used to evaluate whether the GWTS may be shut down or whether additional treatment is necessary.

Tetra Tech is responsible for operation and maintenance of the GETS and for performance monitoring. Performance monitoring is conducted as part of the remedial action to optimize the GETS performance and to evaluate the effectiveness of the remedy to meet the remedial objectives. Specific monitoring objectives include evaluating the extent of containment of the COCs, providing data to optimize system performance, and evaluating compliance with the RAGs and GETS regulatory permit criteria (Tetra Tech 2015).

3.0 REMEDIAL ACTION

This section summarizes the major remedial action construction activities associated with installation of the GETS as well as the GWTS shakedown and startup. Construction also included installation of condensate conveyance piping for the landfill gas treatment system, domestic water service, fire protection water service, and electrical service. The following activities were performed:

- Pre-construction planning and permitting activities.
- Construction quality control (QC) management.
- Extraction and monitoring well installation.
- Groundwater conveyance system installation.
- GWTS installation.
- System shakedown and startup.

3.1 PROJECT ORGANIZATION

The remedial action was conducted under a master contract between Carson Marketplace, LLC (Project Owner), and Tetra Tech (Prime Contractor), as described in the Tetra Tech Construction Quality Assurance Plan (CQAP), dated August 2011. The CQAP defines the responsible parties and outlines the organization of construction quality control authority for the remedial action. The primary responsible parties and project team involved in the remedial action include:

- Carson Marketplace, LLC: Project Owner.
- Tetra Tech, Inc.: Prime Contractor for remedial action completion.
  - Gregg Drilling and Testing: Groundwater well installation and development subcontractor.
  - Innovative Construction Solutions: Groundwater well head, pump, and conveyance system installation subcontractor.
  - American Integrated Services: GWTS installation subcontractor.
  - Frank's Industrial Services: GWTS electrical system installation subcontractor.
  - Tetra Tech BAS, Inc.: Excavation backfill monitoring and compaction testing subcontractor.
  - Psomas: Licensed survey subcontractor
- City of Carson/Los Angeles Department of Public Works (LACDPW): The City of Carson and LACDPW reviewed the project civil, structural, and electrical drawings to confirm compliance with building codes, electrical codes, and local ordinances and issued the applicable building, electrical, and sewer permits.
- DTSC: Reviewed documents associated with remedial action based on DTSC policies and procedures. Monitored program activities to confirm compliance, perform technical oversight, and provide final approval of the remedial design in conjunction with other regulatory agencies, as applicable.
- County of Los Angeles Department of Environmental Health, Drinking Water Program (LA DEH): Reviewed the Prime Contractor's permit application for installation of the groundwater well network for the GETS.
- South Coast Air Quality Management District: Reviewed the Prime Contractor's permit application for approval to construct the GETS and discharge the treated air to the atmosphere.

- Los Angeles County Sanitation Districts: Reviewed the Prime Contractor's industrial wastewater discharge permit application for approval to discharge treated groundwater to the sanitary sewer.

3.2 CONSTRUCTION PLANS AND DOCUMENTS

Before construction began for the remedial action, Tetra Tech planned and conducted various tests and models to evaluate and finalize the design of the GETS for the Site. Tetra Tech also obtained the necessary regulatory permits to construct and operate the GETS. Tetra Tech submitted the plans, reports, design drawings, and permits for review by the appropriate regulatory agency. During and after construction, Tetra Tech submitted additional plans and reports to prepare for subsequent phases of the project and to document completion.

3.2.1 Documents

Tetra Tech drafted, finalized, and submitted the following documents before remedial action construction began:

1. "Aquifer Pumping Test Work Plan for the UOU," October 6, 2008.

2. "Final Landfill Groundwater Investigation Technical Memorandum (Off-site)," March 5, 2009.

3. "Final Treatability Testing Report for Groundwater Treatment System Components," July 20, 2009.

4. "Groundwater Modeling Report for the UOU Groundwater Extraction System Design," February 19, 2010.

5. "Aquifer Pumping Test Report for the UOU Groundwater Extraction System Design," March 22, 2010.

6. "Final Extraction and Observation Well Design Document for the UOU," February 26, 2010.

7. "Final Groundwater Extraction and Observation Well Installation Report for the UOU," June 6, 2011.

8. "Final Construction Quality Assurance Plan for the Boulevards at South Bay," August 11, 2011.

9. "Final UOU Groundwater Extraction and Treatment System Conceptual Design Report," November 18, 2011. The draft version of this report is dated September 8, 2009, and was accepted by DTSC without further comments or objections. The final document is supplemented with a cover page stamped by the project engineer.

10. "Hazard and Operability (HAZOP) Final Report, Groundwater Extraction Treatment System," December 19, 2011.

11. "Final Addendum to the Final Groundwater Extraction and Observation Well Installation Report for the UOU," December 21, 2012.

Electronic copies of all public technical documents pertaining to the Site are posted on The Boulevards at South Bay public website: http://www.ttcollab.com/asb_pub/default.aspx

3.2.2 Drawings

Before construction of the GETS, Tetra Tech submitted the GETS Design Drawings, 95 percent DTSC submittal, on August 25, 2011. The 95 percent GETS design drawings were stamped and issued "For Construction" by Tetra Tech and DTSC.

GETS as-built drawings were finalized after construction was complete and are included in the construction quality assurance (CQA) report (Appendix A; Tetra Tech 2016).

3.2.3 Permits

Based on the GETS design documents and drawings, Tetra Tech obtained the necessary regulatory permits before the GETS was constructed and operated. Tetra Tech obtained regulatory permits from the LA DEH, City of Carson and LACDPW, LACSD, and SCQAQMD for groundwater well construction; building, electrical, and sewer construction; industrial wastewater discharge to the LACSD municipal sanitary sewer system; and construction and operation of a groundwater treatment system with vapor phase discharge to the atmosphere. The CQA report, included as Appendix A, describes the permits in further detail and includes copies of the corresponding drawings and permits.

3.3 Construction Quality Control

Tetra Tech finalized and submitted the final CQAP before construction of the GETS (Tetra Tech 2011b). The CQAP describes the quality assurance and quality control (QA/QC) procedures for construction of the GETS in a manner that complies with the conditions and requirements of the remedial design approved by DTSC. The CQAP specifies the types of CQA monitoring and the procedures for modifications to the GETS construction.

Tetra Tech has prepared a CQA report, included as Appendix A to this RACR, to document that the GETS was constructed in compliance with the CQAP and all other applicable regulatory requirements. The CQA report provides a detailed summary of the CQA program, procedures that were implemented, and the results. Please refer to the CQA report for further detail.

4.0 DEMONSTRATION OF COMPLETION

The GETS construction was observed, inspected, completed, and tested in accordance with the CQA plan. The CQA report (Appendix A) certifies that the GETS was constructed and tested in accordance with the CQAP and the regulatory requirements. Completion of construction activities associated with this remedial action was demonstrated by successful GETS startup and testing completion on May 27, 2014, and compliance with regulatory requirements for discharge during operational testing. The GETS was considered operational after this date.

5.0 ONGOING ACTIVITIES

Ongoing Site activities include GETS operation and maintenance and groundwater monitoring.

5.1 SYSTEM OPERATION AND MAINTENANCE

The GETS will be operated per the operations and maintenance (O&M) manual (Tetra Tech 2015). During operation, the GETS will be monitored on a daily basis and O&M sampling will be conducted in accordance with draft O&M manual requirements. The O&M manual will be revised from time to time based on updated GETS operational procedures that are a result of field conditions observed and GETS modifications during continuous operation.

5.2 GROUNDWATER MONITORING

The Site groundwater monitoring wells will be monitored as specified in the final groundwater monitoring plan (Tetra Tech 2014). The groundwater monitoring plan provides details on the combination of two groundwater monitoring programs required by the RAP, namely performance monitoring of the GETS and long-term groundwater quality monitoring. The GETS performance monitoring portion of the groundwater monitoring plan focuses on data collection and evaluation to demonstrate that the GETS prevents further off-property migration of contaminated groundwater. The groundwater monitoring plan also describes continuation of the existing long-term groundwater quality monitoring program for the Site as required by the RAP, and proposed amendments to this program based on historical data and combined monitoring efforts with the GETS performance monitoring. After 1 year of groundwater monitoring, the monitoring data will be evaluated in the annual groundwater monitoring report and the frequency and the analytical suite will be re-evaluated for modifications as appropriate.

6.0 REFERENCES

Brown & Root Environmental (B&RE). Final Remedial Action Plan, Cal Compact Landfill (Upper Operable Unit) Carson, California. October.

B&RE. 1996. Plans and Specifications for Groundwater Extraction and Treatment System, Cal Compact Landfill (Upper Operable Unit) Carson, California. October.

California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). 1995. Consent Decree, Civil Action No. 95-8773: DTSC; The California Hazardous Waste Control Account; and the California Hazardous Substance Account (Plaintiffs) v. Commercial Realty Projects, Inc.; and L.A. Metromall LLC (Defendants). May 25. (Court signed and entered on December 13, 1996.)

DTSC. 2011. Conditional Approval to the Landfill Groundwater Extraction and Treatment System Design, Cal Compact Landfill, Carson, California. October 21.

Tetra Tech Inc. 2010. Groundwater Modeling Report for the UOU Groundwater Extraction System Design. February 10.

Tetra Tech. 2011a. Final UOU Groundwater Extraction and Treatment System Conceptual Design Report, The Boulevards at South Bay. November 18.

Tetra Tech. 2011b. Final Construction Quality Assurance Plan, Groundwater Extraction and Treatment System for The Boulevards at South Bay. August 11.

Tetra Tech. 2014. Final Groundwater Monitoring Plan for the UOU. October 7.

Tetra Tech. 2015. Final Operations and Maintenance Manual, Groundwater Extraction and Treatment System for the UOU. May.

Tetra Tech. 2016. Final Construction Quality Assurance Report, Groundwater Extraction and Treatment System for The Boulevards at South Bay. May.

TABLE

Table 1. Remedial Action Goals and Treatment System Regulatory Discharge Criteria

Substance	RAG (aqueous)	LACSD Substance Maximum Limit (aqueous)	SCAQMD Substance Maximum Limit (vapor)
General Chemistry			
pH	NA	5.0 S.U. (min)	NA
Flash Point	NA	60 Deg. C (min)	NA
Temperature	NA	140 Deg. F	NA
Solids, Suspended	NA	NE	NA
Total Cyanide	NA	10 mg/L	NA
Sulfide, Soluble	NA	0.1 mg/L	NA
COD, Total	NA	NE	NA
Metals (mg/L)			
Antimony	0.006	NA	NA
Arsenic	0.05	3.0	NA
Barium	1.0	NA	NA
Beryllium	0.004	NA	NA
Cadmium	NA	15.0	NA
Chromium (total)	0.05	10.0	NA
Copper	NA	15.0	NA
Lead	NA	40.0	NA
Manganese	10.2	NA	NA
Mercury	NA	2.0	NA
Molybdenum	0.16	NA	NA
Nickel	0.3	12.0	NA
Selenium	0.11	NA	NA
Silver	NA	5.0	NA
Vanadium	0.03	NA	NA
Zinc	5.0	25.0	NA
Volatile and Semi-Volatile Organics (µg/L)			
Benzene	1.0	*	12.26 lbs/year
Bis (2-ethylhexyl)phthalate	5.2	*	**
1,1-Dichloroethane	5.0	*	**
1,2-Dichloroethane	0.5	*	**
1,1-Dichloroethylene	6.0	*	**
Ethylbenzene	680	*	**
Naphthalene	15.0	*	**
TNMOC	NA	NA	50 / 100 ppmv**
Tetrachloroethene	5.0	*	**
Toluene	1,000	*	**
Trichloroethylene	5.0	*	**
Vinyl Chloride	0.5	*	0.17 lbs/year

Table 1. Remedial Action Goals and Treatment System Discharge Criteria (continued)

Organochlorine Pesticides (µg/L)			
Total Detectable DDT	NA	0	NA
Aldrin	NA	0	NA
Dieldrin	NA	0	NA
Endrin	NA	0	NA
Toxaphene	NA	0	NA
Total HCH	NA	0	NA
Total Detected Chlordanes	NA	0	NA
Polychlorinated Biphenyls (µg/L)			
Total Detectable PCBs	NA	0	NA

Notes:

*	LACSD permit substance limit concentration is 1,000 µg/L for total toxic organics, volatile and semi-volatile.
**	SCAQMD permit substance limit concentration is 50 ppmv for TNMOC, as methane for the passive carbon canister associated with the GETS and 100 ppmv for TNMOC, as methane for the active treatment system.
C	Celsius
COD	Chemical Oxygen Demand
Deg	Degrees
DDT	Dichlorodiphenyltrichloroethane
HCH	Hexachlorocyclohexanes (alpha, beta, gamma, delta)
F	Fahrenheit
LACSD	Los Angeles County Sanitation District
lbs	pounds
µg/L	micrograms per liter
mg/L	milligrams per liter
min	minimum
NA	not applicable
NE	not established
PCB	Polychlorinated Biphenyls
RAG	Remedial Action Goal
S.U.	standard unit
SCAQMD	South Coast Air Quality Management District
TNMOC	Total non-methane organic compounds

Sources: Final Remedial Action Plan (B&RE 1995), LACSD Industrial Wastewater Discharge Permit No. 20895, SCAQMD Permit to Operate 156888

APPENDIX A – TETRA TECH CONSTRUCTION QUALITY ASSURANCE REPORT

FINAL

CONSTRUCTION QUALITY ASSURANCE REPORT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM FOR THE UPPER OPERABLE UNIT

FOR

THE BOULEVARDS AT SOUTH BAY
(FORMER CAL COMPACT LANDFILL)
20400 MAIN STREET
CARSON, CA

Prepared for:

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TABLE OF CONTENTS

Section **Page**

LIST OF TABLES

LIST OF TABLES (CONTINUED)

LIST OF FIGURES

LIST OF APPENDICES
(INCLUDED ON ELECTRONIC CD COPY)

LIST OF APPENDICES (CONTINUED)

ACRONYMS AND ABBREVIATIONS

AIS	American Integrated Services, Inc.
ASTM	American Society for Testing and Materials
Blvds	Boulevards
CQA	Construction quality assurance
CQAP	Construction Quality Assurance Plan
CQAR	Construction Quality Assurance Report
CCS83	California State Plane Coordinate System of 1983
DCN	Design change notice
DFW	Definable feature of work
DCR	Design clarification request
DTSC	California Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
EPP	Environmental Protection Plan
FCR	Field change request
FID	Flame ionization detector
FIS	Frank’s Industrial Services, Inc.
GAC	Granular activated carbon
GETS	Groundwater extraction and treatment system
gpm	Gallons per minute
GWTS	Groundwater treatment system
HASP	Health and Safety Plan
HDPE	High density polyethylene
hp	Horsepower
ICS	Innovative Construction Solutions, Inc.
I&CD	Instrument and Controls Description
LACDPW	Los Angeles County Department of Public Works
LACSD	Los Angeles County Sanitation District
NAVD88	North American Vertical Datum of 1988
NC	Non conformance
O&M	Operations and maintenance
PLC	Programmable logic controller
P&ID	Piping and instrumentation diagram
PPA	Potassium Permanganate-Impregnated Media
psi	Pounds per square inch

QA/QC	Quality assurance and quality control
SCAQMD	South Coast Air Quality Management District
scfm	Standard cubic feet per minute
SDR	Standard dimension ratio
SQCP	Subcontractor Quality Control Plan
TDH	Total discharge head
TNMOC	Total non-methane organic compounds
VOC	Volatile organic compounds

1.0 INTRODUCTION AND PROJECT REQUIREMENTS

This Construction Quality Assurance Report (CQAR) was prepared by Tetra Tech, Inc. (Tetra Tech), for Carson Marketplace, LLC, as part of the groundwater extraction and treatment system (GETS) design implementation for development of the former Cal Compact Landfill into a commercial and residential complex known as The Boulevards at South Bay. Carson Marketplace, LLC, was the Project Owner at the time this document was originally prepared, however, the site ownership has changed. The current site owner is the Carson Reclamation Authority. The CQAR documents GETS construction compliance with the Tetra Tech Final Construction Quality Assurance Plan, Groundwater Extraction and Treatment System (CQAP), dated August 2011.

1.1 PURPOSE

The CQAR summarizes how Carson Marketplace, LLC, Tetra Tech, and the selected construction subcontractors constructed the GETS in compliance with the conditions and requirements of the remedial design presented in the CQAP and approved by the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC). This CQAR documents the quality assurance and quality control (QA/QC) procedures that were completed during construction management.

The CQAR summarizes the type of monitoring that was performed and how modifications to the construction procedures were documented. A summary of the required inspections, tests, surveys, monitoring actions, verification samples, reporting mechanisms, and documentation is provided along with the completed construction quality assurance (CQA) documentation, which appears in the appendices of the CQAR. This CQAR also documents that the CQAP was executed in conjunction with the project Drawings, Specifications, and other supporting CQA plans and documents (DTSC 1995).

1.2 DISTRIBUTION

The distribution of key deliverables is shown in the distribution matrix (Table 1). The distribution matrix includes the names of the project team involved in the GETS construction, their contact information, and the number of document copies to be distributed.

1.3 CQAR FORMAT

The remaining sections of this document summarize the elements of the CQAR that confirm that quality remediation practices were used and appropriate documentation was prepared as required. These sections are as follows:

- Section 2.0 – defines the responsible parties that were involved in the construction of the GETS.
- Section 3.0 – describes the role of the CQA manager and monitors and the document control system.
- Section 4.0 – presents a summary of the pre-construction, weekly progress, and other progress meetings that were conducted throughout the construction of the GETS.

- Section 5.0 – describes the project organization, staff responsibilities and qualifications, delegation of authority, and project meetings.

- Section 6.0 — summarizes the construction quality control inspection and reporting that was completed for the construction of the groundwater extraction and observation well heads, groundwater conveyance piping, and treatment system.

- Section 7.0 – summarizes the system shakedown and startup procedures, equipment and alarm testing, safety shutdown procedures, and discharge documentation procedures that were conducted.

- Section 8.0 – summarizes incidents of non-compliance and corrective actions throughout the construction of the GETS.

- Section 9.0 – summarizes the documentation requirements that were completed: daily reports, construction submittals, observation and test data reports, construction problem and corrective action reports, design and specification revisions, photographs, as-built plans, and final certification report and inspection.

- Section 10.0 – provides a list of references.

2.0 RESPONSIBLE PARTIES AND DEFINITIONS

The organization and relationship of the parties involved with the GETS for The Boulevards at South Bay project for this CQAR are the same as were described in the CQAP, with minor personnel revisions shown in Figure 1 (Tetra Tech 2011a). Table 2 summarizes the revised roles and responsibilities of the project team. This project was conducted under a master contract between Carson Marketplace, LLC (Project Owner), and Tetra Tech (Prime Contractor). The Prime Contractor's personnel included the Program Manager, Project Manager, Site Superintendent, Engineer, CQA Officer, and CQA Monitors. The Prime Contractor engaged multiple subcontractors to fabricate, install, and test the GETS.

The GETS consists of three main components: the groundwater extraction wells and well heads, the groundwater conveyance piping system, and the groundwater treatment system (GWTS). The groundwater extraction and observation wells were installed and developed in accordance with the Final Groundwater Extraction and Observation Well Design Document for the Upper Operable Unit prepared by Tetra Tech in February 2010 (Tetra Tech 2010a). The groundwater extraction and observation well heads, groundwater conveyance piping, and the GWTS were constructed in accordance with the Tetra Tech 2011 CQAP and all other applicable Drawings, Specifications, and finalized construction submittals, design clarification requests (DCRs), field change requests (FCRs), and design change notices (DCNs). The Prime Contractor, with continuous monitoring and inspection by DTSC, confirmed GETS construction and testing complied with the CQAP and all other applicable Drawings and Specifications, construction submittals, DCRs, FCRs, and DCNs. Project CQA construction and testing documents finalized after the CQAP was submitted (construction submittals, drawings, DCRs, FCRs, and DCNs) will be referred to in this document as "CQA articles." DCRs, FCRs, and DCNs are described in further detail in Section 9. Definitions of the responsible parties and delegation of QC authority for the GETS project at The Boulevards at South Bay are presented below.

2.1 PROJECT OWNER

The Project Owner, Carson Marketplace, LLC, evaluated the project during construction and startup. The Project Owner's Representative communicated directly with the Prime Contractor for any meeting needs, requests for information, and for issuing change notices. The Project Owner's Representative participated in the QA program as appropriate.

2.2 PRIME CONTRACTOR

Tetra Tech served as the Prime Contractor. The Prime Contractor's personnel included the Program Manager, Project Manager, Site Superintendent, Engineer, CQA Officer, and CQA Monitors. The Program Manager's primary responsibility was to confirm that the subcontractor constructed the GETS in accordance with the CQAP and associated CQA articles. The Project Manager was responsible for technical management of the project, personnel, subcontractors, and managing financial aspects of the project and presenting meeting needs, requests for information, and change notices to the Program Manager. The Site Superintendent was responsible for coordinating site construction activities. The Engineer was responsible for the design of the groundwater extraction and observation well heads, conveyance piping, and treatment system and for confirming that construction by the subcontractor was in accordance with the CQAP and CQA articles. The roles and responsibilities of the CQA Officer and CQA Monitors are summarized in Table 2 and further described in Sections 3.0 and 6.0.

The subcontractors were responsible for performing work in accordance with the Prime Contractor's CQAP and CQA articles. The subcontractors worked in accordance with the Prime Contractor's Excavation Management Plan, which describes site-specific excavation procedures and methods, air monitoring requirements, analytical data requirements, mitigation measures, and contingency plans (Tetra Tech 2008). Subcontractors were responsible for the quality of their work, protection of the environment, and the health and safety of their personnel in accordance with the subcontractor-prepared Subcontractor Quality Control Plan (SQCP), Environmental Protection Plan (EPP), and Health and Safety Plan (HASP). The subcontractor-prepared HASP was reviewed by Tetra Tech to confirm compliance with the Prime Contractor's site-specific HASP at all times (Tetra Tech 2010b). The subcontractor-prepared SQCP, EPP, and HASP documents are included as construction submittals in Appendix A, submittal series 01450, 01570, and 01410.

2.3 CITY OF CARSON

The City of Carson consulted with the Los Angeles County Department of Public Works (LACDPW) Building and Safety/Land Development Division to review the GETS sanitary sewer, structural, and electrical drawings to confirm that they complied with building codes, electrical codes, and local rules and ordinances.

On August 31, 2011, the City of Carson and LACDPW approved and stamped the Prime Contractor GETS Private Sewer Drawings set. On September 14, 2011, the City of Carson and LACDPW issued Sewer Permit number SE 1205 110421009 to the Prime Contractor for approval to construct an industrial waste pipeline and connect to the municipal sanitary sewer system. In association with the City of Carson and LACDPW Sewer Permit, the City of Carson Building and Safety Division Inspector conducted on-site inspections of the GETS treated groundwater discharge pipelines after they were installed and before the trenches were backfilled (for underground pipeline areas). A copy of the City of Carson and LACDPW sewer permit and the stamped GETS Private Sewer drawing set are included in Appendix B. Copies of the City of Carson Building and Safety Division inspection records of the treated groundwater discharge pipeline are included in Appendix A, submittal 15235-8.

On May 17, 2011, the City of Carson and LACDPW approved and stamped the Prime Contractor GWTS structural drawing set. On December 7, 2011, the City of Carson and LACDPW issued Building Permit number BL 1205 1012210049 to the Prime Contractor for approval of construction of the GWTS enclosure structure. A copy of the City of Carson and LACDPW building permit and the stamped GWTS structural drawing set for equipment anchoring is included in Appendix B.

On August 21, 2012, the City of Carson and LACDPW approved and stamped the Prime Contractor GWTS electrical drawing set. On August 27, 2012, the City of Carson and LACDPW issued Electrical Permit number EL 1205 1201300011 to the Prime Contractor for approval of construction and installation of electrical equipment for the GWTS. A copy of the City of Carson and LACDPW electrical permit and stamped GWTS electrical drawings is included in Appendix B.

2.4 THE DEPARTMENT OF TOXIC SUBSTANCES CONTROL

DTSC reviewed the CQA articles throughout the project to ensure compliance with the CQAP and DTSC policies and procedures. DTSC continuously monitored and inspected program activities to confirm compliance, perform technical oversight, and provide final approval of the GETS construction in conjunction with other regulatory agencies, as applicable throughout the duration of the CQAP implementation.

2.5 OTHER REGULATORY AGENCIES

The South Coast Air Quality Management District (SCAQMD) reviewed the Prime Contractor's permit application for approval to construct the GETS and discharge the treated vapor to the atmosphere. On January 1, 2010, the SCAQMD issued a "Permit to Construct" the GETS to Tetra Tech for The Boulevards at South Bay Project (SCAQMD Facility ID 156888). On December 14, 2010; December 7, 2012; and January 4, 2013, the SCAQMD issued consecutive annual extensions of the "Permit to Construct" for Facility ID 156888 through January 1, 2012, 2013, and 2014. On February 13, 2014, the SCAQMD issued a "Permit to Operate" the GETS to Tetra Tech. The SCAQMD permits are included in Appendix B.

The Los Angeles County Sanitation District (LACSD) reviewed the Prime Contractor's industrial wastewater discharge permit application for approval to discharge treated groundwater to the sanitary sewer. On December 16, 2009, the LACSD issued Industrial Wastewater Discharge Permit No. 20574 to Tetra Tech for The Boulevards at South Bay Project (LACSD Facility ID 9244396).

Tetra Tech submitted a revised industrial wastewater discharge permit application to the LACSD in May 2011 as a result of additional GWTS water source inputs (impounded rain water, landfill gas condensate, and fire protection system testing water). On August 16, 2011, the LACSD issued Industrial Wastewater Discharge Permit No. 20895 to Tetra Tech for The Boulevards at South Bay Project (LACSD Facility ID 9244396). The revised LACSD Industrial Wastewater Discharge Permit No. 20895 is included in Appendix B.

3.0 CONSTRUCTION DOCUMENTATION ORGANIZATION

The CQA Officer had overall responsibility for the CQA program as defined in the CQAP and for supervising all CQA personnel. The CQA Officer was responsible for the day-to-day on-site administration of the CQA program. The CQA Monitors reported to the CQA Officer and were responsible for observing and documenting construction activities in accordance with the CQAP.

3.1 CONSTRUCTION DOCUMENTATION MANAGER

The CQA Officer served as the construction documentation manager and maintained a list of finalized CQA articles in the project files. Throughout construction of the GETS, the subcontractor was required to submit construction submittals in accordance with the Specifications for approval by the CQA Officer. The construction submittal process was conducted in accordance with CQAP Specification 01340 (Tetra Tech 2011a). CQAP specifications are included in Appendix C. The CQA Officer managed and maintained all construction submittal documents and all other CQA articles described in the CQAP. Construction submittals were categorized by the corresponding CQAP Specification number. A submittal log index and copies of all finalized submittals are presented in Appendix A.

Throughout the duration of remedial construction, the CQA Officer prepared a weekly CQA report for submittal to DTSC. The weekly CQA report submittal provided a chronological record of CQA documentation that included a weekly activity summary, completed daily documentation forms, finalized material and construction submittals, material delivery logs, non-conformance notices, design clarification requests, design change and field change notices, inspection and testing forms, survey records, and photographic documentation. Specific components of the weekly CQA report submittal are described in further detail in the relevant sections below. The weekly activity summary and photographic documentation portions of the weekly CQA report submittal are included chronologically in Appendix D. Copies of the other documents and forms included in the weekly CQA report submittals have been organized chronologically and compiled separately in the appendices of this report.

3.2 CONSTRUCTION DOCUMENTATION MONITORS

The CQA Monitors served as the daily construction documentation monitors in accordance with the CQAP. CQA Monitors completed daily documentation and additional documentation as needed and maintained complete construction documentation project files. Additional responsibilities of the CQA Monitors are described in the CQAP. The project files maintained by the CQA Officer and CQA Monitor contain all completed project submittals, FCRs, DCNs, forms, photos, documentation, meeting topics, meeting minutes, and other relevant materials.

4.0 MEETINGS

Pre-construction meetings, weekly progress meetings, special meetings, and daily progress meetings, if necessary, were held as described below.

4.1 PRE-CONSTRUCTION MEETING

Tetra Tech selected three construction subcontractors for installation of the GETS (Figure 1). Innovative Construction Solutions, Inc. (ICS), was contracted to install the conveyance piping and install the groundwater extraction and observation well heads, vaults, and pumps. American Integrated Services, Inc. (AIS) was contracted to install the GWTS equipment and aboveground piping for the GWTS. Frank's Industrial Services, Inc. (FIS) was contracted to install the GWTS electrical equipment. Tetra Tech conducted a pre-construction meeting with ICS on June 29, 2011. Tetra Tech conducted a pre-construction meeting with AIS and FIS on June 27, 2012. Pre-construction meetings were attended by representatives of the responsible parties and were conducted in accordance with the CQAP. Pre-construction meeting attendance forms and meeting minutes are included in Appendix E.

4.2 WEEKLY PROGRESS MEETINGS

Weekly scheduled progress meetings were held throughout the construction phases of the GETS. Meetings were attended by the Engineer and CQA Officer, CQA Monitor, subcontractor representative, and DTSC. Weekly progress meetings were conducted in accordance with the CQAP. A chronological record of meeting attendance forms and meeting minutes is included as Appendix F.

4.3 SPECIAL MEETINGS AND DAILY PROGRESS MEETINGS

As described in the CQAP, special or *ad hoc* informal meetings were held to plan work items, to discuss problems or non-conformance, to reinforce quality issues, to facilitate construction, and to quickly identify and resolve problems. Additionally, informal daily coordination meetings were held on an as-needed basis to discuss work completed on the previous day, planned work for the current day, questions, and field work logistics. Meetings were documented on the CQA Monitor daily reports and daily logs.

5.0 PROJECT ORGANIZATION

The organization and relationship of the parties involved with the GETS for The Boulevards at South Bay project are shown in Figure 1. Table 2 summarizes the delegation of QC authority and the roles and responsibilities of the project team. The roles and responsibilities of the CQA Officer and the CQA Monitors are described in Section 3.0. Throughout the project duration and construction of the GETS, the CQA Officer and CQA Monitors carried out their roles and responsibilities in accordance with the CQAP.

6.0 CONSTRUCTION QUALITY CONTROL INSPECTION AND REPORTING

This section summarizes the inspections and reviews conducted to verify that work products met the requirements of the CQAP and CQA Articles. The CQA Officer and Monitors had the principal responsibility to inspect and report whether subcontractors performed the work in accordance with the CQAP and CQA articles. In accordance with the CQAP, subcontractors were required to develop and submit a SQCP. The SQCP was reviewed for approval by the Prime Contractor. SQCPs are included in the construction submittal documents in Appendix A, submittal series 01450. CQA and SQC were performed on the following definable features of work (DFWs):

- Installation of groundwater extraction wells and observation wells, including the groundwater extraction and observation well heads and vaults;
- Installation of groundwater conveyance piping;
- Installation of the GWTS, including the down-hole extraction pumps; and
- GWTS startup and shakedown testing and operation and maintenance of the system.

The CQAP and CQA articles identify key parts of the GETS that require inspection and monitoring during construction and system testing and startup (Tetra Tech 2011a).

6.1 INSPECTION PROGRAM

The CQA inspection program was implemented by the CQA Officer and CQA Monitors. The CQA Monitors observed the subcontractors' work during construction to confirm that the subcontractor followed the finalized SQCP, the CQAP, and CQA articles.

As described in the CQAP, the CQA inspection program covered document submittals, material inspections, inspections of definable features of work, sampling and testing, and surveying. A summary of implementation of the CQA Inspection Program is described in further detail in the relevant sections below.

6.1.1 Inspection Frequency

The frequency of inspections and tests varied for materials and DFWs. To ensure adequate frequency, inspections were conducted when enough work had been performed to assess quality, yet not so late that the item observed was no longer viewable or accessible as work progressed.

6.1.1.1 Materials

The CQAP and CQA articles describe the construction materials for the project. Manufacturer's certifications, warranties, and design drawings for the materials were reviewed as part of the construction submittal process before the material was procured. Once the documentation had been reviewed, the materials were procured and physically inspected and approved when they were delivered to the site. The physical inspection of the material included assessing the condition of the material and conformance with the relevant submittals and specifications in the

CQAP and CQA articles. The CQA Officer and Monitor completed the inspection and received the material on the site. The inspection was documented on the "Material Delivery Log" inspection form. Completed Material Delivery Log forms are included in Appendix G.

6.1.1.2 Definable Feature of Work

Daily inspections of Subcontractor activity on DFWs were conducted by the CQA Monitors to confirm the work was completed in compliance with the CQAP and CQA articles and that the quality of workmanship was maintained until the project was completed. Inspection frequency of specific DFWs is further described in the relevant sections below.

6.1.2 Inspection Documentation

Inspections were documented by the CQA Monitors on a daily basis with daily log notes and the associated daily log forms (Daily CQA Report, CQA Production Log, and Photographic Log) and relevant inspection forms, as described in the CQAP. The Daily CQA Report form was used to document work performed that day, the subcontractors involved in the work, any tests or inspections that were performed and the results, material or submittals received, safety issues, and deficiencies or field design changes. The CQA Production Log was used on a daily basis to document work performed, health and safety actions taken, CQA action items, and the equipment or material received and used that day. CQA Monitors documented activities with photographs during inspections or routine work. A Photographic Log Form was used each time photographs were taken to document construction activity. The daily reports, photographic log, and other CQA documentation procedures and forms are further discussed in Section 9.0.

6.1.3 Sampling and Testing Requirements

The sampling and testing methods are described in this section and Appendix B-1 of the CQAP (Tetra Tech 2011a). Sampling and testing consisted primarily of GETS pipe bedding and backfill material sampling and testing for engineering purposes. Sampling and testing were conducted in accordance with the CQAP and are described in further detail in Section 6.3.1.

6.2 GROUNDWATER WELLS

Extraction and observation wells were installed and developed in accordance with the Groundwater Extraction and Observation Well Design Document prepared by Tetra Tech in February 2010 (Tetra Tech 2010a). The Final Groundwater Extraction and Observation Well Installation Report for the Upper Operable Unit, dated June 6, 2011, and the December 2012 final addendum to the well installation report document completion of well installation and development (Tetra Tech 2011b, 2012). The well installation reports contain well completion specifications and a well location map.

Groundwater extraction and observation well casing locations and elevations were surveyed by Psomas, a California-licensed surveyor, between January 17 and 27, 2012, and between March 4 and 6, 2013. Well locations were surveyed on the north side of the well casing after wellheads and vaults were installed. Each well was surveyed to provide horizontal coordinates to the nearest 0.01 foot relative to the California State Plane Coordinate System of 1983 (CCS83) and vertical coordinates to the nearest 0.01 foot relative to the North American Vertical Datum of 1988 (NAVD88). The well survey data are included in submittal 02520-3.

6.2.1 Groundwater Extraction Wells

CQA Monitors monitored and inspected the groundwater extraction well head installation and confirmed the subcontractor installed the extraction well heads in accordance with the CQAP and CQA articles. Construction submittal 02520-3 (extraction and observation well head as-built information) was finalized after the groundwater extraction well heads had been installed. Leak testing was conducted on the well head piping and appurtenances up to the air and groundwater manifold ball valves. Leak testing inspection and reporting are described in detail in Section 6.3. Approved construction submittals for groundwater extraction well heads, vaults, and lids are included in Appendix A, submittal series 02520.

6.2.2 Groundwater Observation Wells

CQA Monitors monitored and inspected the groundwater observation well head and vault installation and confirmed the subcontractor installed the observation well heads and vaults in accordance with the CQAP and CQA articles. No testing requirements were associated with installation of the groundwater observation wellhead. Approved construction submittals for observation well vaults and lids are included in Appendix A, submittal series 02520.

6.3 Groundwater System Pipelines

The groundwater system pipelines were installed in accordance with the CQAP and CQA articles. The CQAP and CQA articles provided the information for the approved equipment required to install the groundwater system pipelines; a description of the approved materials; the approved vendor or supplier; the approved inspecting and testing description, sequence, and frequency; and the desired result. Finalized construction submittals for the groundwater system pipelines are included in Appendix A, submittal series 15230 and 15235.

6.3.1 Groundwater Collection Pipelines

The subcontractor installed a double-walled collection pipeline conveying extracted groundwater from the extraction wells to the treatment system at the Tetra Tech Operations Center in accordance with the CQAP and CQA articles. Depending on the distance from the GWTS, the inner carrier pipe is either a 2-inch-diameter or a 4-inch-diameter standard dimension ratio (SDR) 11 high density polyethylene (HDPE), and the outer containment pipe is either a 4-inch-diameter or 6-inch-diameter SDR 17 HDPE. The CQAP and CQA articles for the groundwater collection pipelines provided the CQA Monitor with the approved quality assurance monitoring and inspection requirements during the following major phases of work:

- Excavation.
- Pipe Bedding.
- Pipe Installation.
- Leak Testing.
- Backfilling.

The CQA Monitors monitored the excavation and leak testing. Testing requirements were applied to the pipe bedding material, pipe installation, and backfilling. Before the pipe was laid in the trench and the excavation backfilled, the subcontractor conducted the following tests and confirmed the imported pipe bedding material met the CQA specification requirements:

- American Society for Testing and Materials (ASTM) D 422 – Standard Test Method for Particle-Size Analysis, and
- ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes.

Results of the pipe bedding material tests are included in Appendix A, submittal series 02300. Imported pipe bedding material consisted of poorly sorted, well rounded, 3/8-inch-diameter pea gravel. The subcontractor used the imported pipe bedding material to backfill the bottom of the trench, including 3 inches below the bottom of pipe to approximately 6 inches above the top pipe in the trench. Throughout the duration of the project, HDPE heat fusion (weld) samples were produced on a daily basis to ensure that HDPE heat fusion was performed properly. Weld samples were inspected for quality assurance by the CQA Monitors and a DTSC representative. Weld samples consisted of scrap sections of single containment or double containment HDPE pipe welded together to demonstrate adequate welder proficiency and material and equipment performance for HDPE heat fusion applications (butt, saddle, and socket fusion). HDPE weld samples were conducted as the first task in the morning and the first task after lunch break on all HDPE pipeline construction days. Groundwater conveyance pipe for production and installation was not welded until adequate weld samples that met CQA specifications were achieved. HDPE weld sample results were documented on weld sample logs, and HDPE weld samples were labeled, collected, and stored on site in an archive collection. HDPE weld sample logs are included in Appendix H.

The stacked pipeline orientation design on the west header was based on trench width restrictions associated with offset requirements from adjacent utilities. Pipeline orientation design on the east header was based on offset requirements from a landfill gas header. HDPE piping was installed using plastic spacers to ensure piping was aligned within the trench and that separation conformed to the CQAP requirement. Once HDPE piping was installed in the trench, pipelines were surveyed at the top of the pipe every 10 linear feet (horizontally) for CQA verification of alignment and for generating as-built drawings. CQA survey verification events were monitored by both a CQA Monitor and a DTSC representative. CQA survey verification confirmed GETS piping conformed to vertical and horizontal alignment (within 0.1 ft) in accordance with CQA Specifications. Final CQA survey verification reports are included in Appendix A, submittal series 01720.

The groundwater collection piping was leak tested by the subcontractor according to the requirements in Specification 15235 — Double-Walled Containment Pipe, and the applicable CQA articles. Leak testing events were monitored by both a CQA Monitor and a DTSC representative. All leak testing records are included in Appendix I. Final leak testing reports demonstrating CQA specification compliance for completed groundwater conveyance pipelines are included in Appendix A, submittal series 15230 and 15235.

After leak testing, the trench was backfilled with pipe bedding material to 6 inches above the top of the pipe. Orange plastic textile material (temporary construction "snow" fence) was installed on top of the pipe bedding material to act as a marker for future excavation, and the subcontractor backfilled the remainder of the trench with primary backfill material (on-site soil that was removed from the trench during excavation) in 6-inch lifts.

The Prime Contractor conducted testing of the primary backfill material in accordance with the CQAP and CQA articles. The Prime Contractor conducted moisture and density tests to confirm the primary backfill material used (1,000 cubic yards) had an in-place moisture content of at least the optimum moisture content and the minimum in-place density of at least 90 percent of the maximum dry density. The Prime Contractor conducted in-place moisture and density (Nuclear Gauge) tests at a minimum frequency of once per lift per 100 linear feet during primary backfill operations. In addition, the Prime Contractor conducted in-place moisture and density (Sand Cone) tests at a minimum frequency of once per 25 Nuclear Gauge tests during the primary backfill operations. The Prime Contractor also conducted continuous visual inspection of backfill and compaction. Primary backfill material testing and visual inspection complied with CQA specifications. Prime Contractor moisture density test results and visual inspection records are included in Appendix A, submittal series 02300.

6.3.2 Compressed Air Pipelines

The subcontractor installed a single-walled compressed air pipeline for conveying compressed air from the treatment system to the extraction well heads. The single-walled pipe conveying compressed air is either a 2-inch or 4-inch-diameter SDR 7 HDPE depending on the distance from the GWTS. The single-walled pipe was installed and tested in accordance with the CQAP and CQA articles. The CQA monitors and subcontractor followed the same quality control monitoring, inspection, and testing procedures described in Section 6.3.1 for the excavation, pipe bedding, weld samples, pipe installation, surveying, and backfilling. Leak testing by the subcontractor was conducted according to the requirements in Specification 15230 — Single-Walled Containment Pipe and the applicable CQA articles. CQA documentation of compliance with specifications for pipe bedding material, weld samples, leak testing, surveying, and backfill are included in the finalized construction submittals and appendices, as described in Section 6.3.1.

In addition to the compressed air pipeline, a spare 4-inch-diameter SDR 7 HDPE pipeline was installed in the trench adjacent to the compressed air pipeline. The CQA monitors and subcontractor followed the same quality control monitoring, inspection, and testing procedures described in Section 6.3.1 for the excavation, pipe bedding, weld samples, pipe installation, leak testing, surveying, and backfilling. CQA documentation of compliance with specifications for pipe bedding material, weld samples, leak testing, surveying, and backfill are included in the appendices and the finalized construction submittals, as described in Section 6.3.1. Spare pipeline installation and testing complied with CQA specifications.

6.3.3 Treated Groundwater Discharge Pipelines

The subcontractor installed a double-walled discharge pipeline for conveying treated groundwater from the treatment system to the sanitary sewer connection. The inner carrier pipe is 4-inch-diameter SDR 11 HDPE, and the outer containment pipe is 6-inch-diameter SDR 17 HDPE.

The double-walled pipe was installed and tested in accordance with the CQAP and CQA articles. The CQA monitors and subcontractor followed the same quality control monitoring, inspection, and testing procedures described in Section 6.3.1 for the excavation, pipe bedding, weld samples, pipe installation, leak testing, surveying, and backfilling. CQA documentation of compliance with specifications for pipe bedding material, weld samples, leak testing, surveying, and backfill are included in the appendices and the finalized construction submittals, as described in Section 6.3.1.

In accordance with the City of Carson and LACDPW Sewer Permit number SE 1205 110421009, the City of Carson Building and Safety Division Inspector conducted on-site inspections of the treated groundwater discharge pipelines after they were installed and prior to backfill (for underground pipelines). The City of Carson inspector issued his approval for the treated groundwater piping construction and connection to the sanitary sewer. No notices of corrective action were issued by the City of Carson inspector. City of Carson treated groundwater discharge pipeline inspection records are included in Appendix A, submittal 15235-8.

6.4 Groundwater Treatment System

The GWTS was installed to control the migration of contaminated Upper Operable Unit groundwater from the site. The extracted groundwater will be treated by removing volatile organic compounds (VOC) before it is discharged to the sanitary sewer. Table 3 provides the DTSC-approved design criteria for the major components of the treatment system. The CQAP Specifications describe performance and installation requirements for the components of the treatment system and the Instrument and Controls Description (I&CD) in the CQAP describes the treatment system process controls (Tetra Tech 2011a). The CQAP illustrates the process flow and instrumentation of the treatment system and provides equipment identification (Tetra Tech 2011a). The treatment system consists of the following liquid-phase components to extract and treat groundwater:

- Air compressor – rotary screw compressor, 50 horsepower (hp), 236 cubic feet per minute (scfm) at 175 pounds per square inch (psi), and includes a 240-gallon vertical tank, desiccant dryer, and compressor condensate oil/water filtering system.
- Down-hole extraction pumps – 29 top-loading, reinforced fiberglass housing with stainless steel ends, 4-inch-diameter pneumatic pumps, maximum flow for each pump is 6 gallons per minute (gpm) at 135 feet of total discharge head (TDH).
- Surge tank – 8,925-gallon (14-foot-diameter by 10 feet tall) vertical steel tank.
- Influent transfer pumps – 50 gpm at 50-foot TDH centrifugal, maximum flow 160 gpm (three pumps – two pumps operating [primary and secondary], one standby).
- Particulate filters – 8.25-inch-diameter by 48-inch-long filter housing, maximum flow 600 gpm (two sets of three filters in parallel).

- Air stripper – maximum process water flow of 65 gpm, rated air flow of 320 scfm at 35 inches water column, low-profile tray stripper system. Transfer pumps — 50 gpm at 50 feet TDH (two transfer pumps – one operating, one standby).
- Aqueous-phase granular activated carbon (GAC) vessels – 48-inch-diameter by 8 feet 8 inches tall, 2,000-pound GAC capacity steel units, maximum flow 100 gpm (two vessels).
- Discharge tank – 7,000-gallon (12-foot-diameter by 10 feet tall) vertical cross-linked polyethylene.
- Discharge transfer pumps – 50 gpm at 50 feet TDH centrifugal, maximum flow 160 gpm (two pumps – one operating, one standby).

In addition, the treatment system consists of the following vapor-phase components to address off-gas from the air stripper:

- Vapor-phase GAC Vessels – 96-inch-diameter by 131 inches tall, 8,000-pound GAC capacity steel units, maximum vapor flow 3,750 scfm (two sets of two vessels in parallel — two in use, two standby); and
- Vapor-phase Potassium Permanganate-Impregnated Media (PPA) Vessels– 60-inch-diameter by 112 inches tall, 6,000-pound PPA capacity steel units, maximum vapor flow 1,500 scfm (three vessels - one in use, two standby).

The CQAP and CQA articles are resources that provide a list of the materials that were required to install the treatment system; a description of the materials; the inspecting and testing description, sequence, and frequency; the desired result; and dependent approvals required. Throughout the duration of the project, the CQA Monitor and the DTSC continuously monitored and inspected installation and testing of the GWTS equipment in accordance with the CQAP and CQA articles. Construction submittals for the GWTS are included in Appendix A. Refer to the construction submittal log index for the relevant GWTS equipment submittal series.

6.4.1 Downhole Extraction Pumps

Before the downhole groundwater extraction pumps were installed, the Prime Contractor engaged a subcontractor to remove any sediment that had accumulated in the sumps at the bottom of the wells since they were last developed between June 2010 and July 2012, before the GETS and GWTS began operation.

The subcontractor installed and tested a total of 29 pneumatic pumps in the extraction wells located along the perimeter of the site in accordance with the pump manufacturer's instructions, CQAP, and CQA articles, specifically Specification 15132 — Submersible Well Pumps (Appendix C). The Prime Contractor procured and furnished the pumps, tubing, hoses, and fittings. The CQAP and CQA articles provided the quality assurance monitoring and inspection requirements of the CQA Monitor during the pump installation.

CQA Monitors confirmed that the subcontractor tested each pump to demonstrate that the pump and ancillary equipment (fittings, tubing, and hose) functioned properly at the specified operating ranges of the GETS design.

6.4.2 Treatment Equipment

The CQAP and CQA articles provided the quality assurance monitoring and inspection requirements of the CQA Monitors during installation and testing of the treatment equipment. During anchoring of the equipment, 50 percent of the anchor bolts were pull-out tested by a certified third-party structural steel inspector in accordance with the CQAP and CQA articles. Anchor bolt pull-out testing results complied with CQA specifications. The quality assurance monitoring and inspection requirements for the carbon adsorption vessels, particulate filtration unit, and other equipment are described in the following sections.

6.4.2.1 Carbon Adsorption Vessels

The subcontractor installed the liquid and vapor phase carbon adsorption vessels and vapor phase PPA vessels in accordance with the CQAP and CQA articles, specifically Specification 11500 — Treatment Vessels (Appendix C). During installation, the CQA Monitor confirmed that the subcontractor leveled, plumbed, and aligned the vessels into position and that each piece of equipment was installed as recommended by the equipment manufacturer and in accordance with the CQAP and CQA articles. The CQA Monitor also confirmed that the materials and equipment were prepared for service as recommended by the manufacturer. Before system startup, the CQA Officer and Monitor confirmed that the GAC and PPA material were certified by the manufacturer and met the Prime Contractor's requirements. The CQA Officer and Monitor also confirmed that startup of the GAC and PPA vessels was conducted in accordance with the equipment manufacturer's recommendations and according to the CQAP. Construction submittals for the carbon adsorption vessels are included in Appendix A, submittal series 11500.

6.4.2.2 Particulate Filtration Unit

The subcontractor installed the particulate filter unit in accordance with the CQAP and CQA articles, specifically Specification 11510 – Particulate Filters (Appendix C). During installation, the CQA Monitor confirmed that the subcontractor installed the particulate filter unit in accordance with the manufacturer's technical data and printed instructions and the CQAP and CQA articles. After the particulate filter unit had been installed, the CQA Monitor confirmed that the subcontractor tested the unit in accordance with the manufacturer's instructions, CQAP and CQA articles, and to the satisfaction of the Prime Contractor. Construction submittals for the particulate filtration unit are included in Appendix A, submittal series 11510.

6.4.2.3 Other Equipment

Other treatment system equipment includes the surge and discharge tanks, air compressor, air stripper, transfer pumps, sump pump, control panels and consoles, programmable logic controller (PLC), level switches, magnetic flow meters, thermocouples, and the eye wash and shower. The subcontractor installed the treatment system equipment in accordance with the CQAP and CQA articles and the relevant specifications for each piece of equipment. During installation, the CQA Monitor confirmed that the subcontractor installed the treatment system equipment in accordance with the manufacturer's technical data and printed instructions and the CQAP and CQA articles. After installation, the CQA Monitor confirmed that the subcontractor tested the unit in accordance with the manufacturer's instructions, CQAP and CQA articles, and to the satisfaction of the Prime Contractor.

Other equipment also includes the above ground piping, valves, and appurtenances (polyvinyl chloride pipe, galvanized steel pipe, fittings, and pipe supports) associated with the groundwater treatment equipment. The subcontractor installed the aboveground piping, valves, and appurtenances in accordance with the CQAP and CQA articles, specifically Specification 15120 – Piping, Valves, and Appurtenances (Appendix C). During installation, the CQA Monitor confirmed that the subcontractor installed the piping, valves, and appurtenances in accordance with the manufacturer's technical data and printed instructions and the CQAP and CQA articles. After the equipment had been installed, the CQA Monitor confirmed that the subcontractor tested the piping, valves, and appurtenances in accordance with the manufacturer's instructions, CQAP and CQA articles, and to the satisfaction of the Prime Contractor. Leak testing of the above ground piping by the subcontractor was conducted according to the requirements in Specification 15120 — Piping, Valves, and Appurtenances and the applicable CQA articles. Leak testing events were monitored by both a CQA Monitor and a DTSC representative. All leak testing records are included in Appendix I. Construction submittals for the additional treatment system equipment components are included in Appendix A. Please refer to the construction submittal log index in Appendix A for the relevant equipment submittal series.

6.4.3 Safety Control/Alarm System

The GETS design incorporates a number of safety features, including safe materials, proper assembly, and automated safety controls and alarms. Section 6.0 and Section 6.1 describe the construction submittals and inspection process for ensuring safe materials were procured and properly installed for the GETS. Automated safety controls and alarm features of the GETS are shown in the as-built piping and instrumentation diagrams, included as Appendix W, and described in detail in the Final Operations and Maintenance Manual (Tetra Tech 2015). CQA functional testing of GETS automated safety and alarm features is described further in Section 7.2.

7.0 SYSTEM START-UP AND SHAKEDOWN

System startup testing was not conducted until the Prime Contractor confirmed that all required permits had been issued; leak testing of piping, fittings, and tanks had been completed; and all electrical tests had been completed in accordance with the CQAP and CQA articles.

This system startup for the GETS consisted of four phases of testing: (1) shakedown testing, (2) functional testing, (3) performance testing, and (4) operational testing. The shakedown testing was an initial test of the equipment and electrical components to confirm that each piece of equipment operates properly. The purpose of the functionality test was to evaluate all instrumentation, controls, and equipment to confirm that they were wired and programmed to function as required by the P&ID, the I&CD, and all other applicable CQA articles. The functional test was also conducted to confirm that all fail-safe interlocks, safety shutdowns, and alarms function correctly. The purpose of the performance test was to confirm that the system meets the groundwater and vapor phase removal requirements of the CQAP, the SCAQMD permit to construct, and the LACSD industrial wastewater discharge permit. The purpose of the operational test was to confirm that all system equipment runs properly on a long-term basis. Section 7.1 describes the specific procedures implemented for the shakedown testing, Section 7.2

describes the functional testing procedures that were implemented, and Section 7.3 describes how the performance test and the operational test were conducted.

7.1 Equipment Testing

Equipment was tested on December 3, 2013, and December 4, 2013, by the subcontractors with Prime Contractor CQA personnel and DTSC representatives present. Equipment testing was conducted as an initial shakedown to confirm all equipment and electrical components would operate as designed. Equipment testing was conducted in accordance with the CQAP, CQA articles, and specific vendor and manufacturer equipment requirements, including warranty requirements, as described in the CQAP.

During equipment testing, instrumentation, controls, and equipment were adjusted by the subcontractors with the Prime Contractor present for inspection and approval. Adjustments were documented by the CQA Officer on the project drawings as necessary. CQA documentation was incorporated in the final as-built drawings accordingly.

7.2 Safety Shutdown/Alarm Testing

Safety shutdown and alarm testing was conducted in accordance with the CQAP as part of a functional test by the Prime Contractor with the subcontractors and DTSC present. Safety shutdown and alarm testing was conducted to confirm the treatment system shut down and the appropriate alarms were triggered during possible operating scenarios. The CQA Monitors used the functional test checklist to monitor and document the performance of all treatment system instrumentation, controls, and equipment. The completed functional test checklist is included in Appendix J.

7.2.1 Functional Testing

Once equipment shakedown testing was complete and successful, functional testing was conducted to demonstrate that all instrumentation, controls, and equipment function properly and are wired such that all system interlocks operate correctly. The functional test was conducted between December 4, 2013, and December 5, 2013, by the Prime Contractor, with the subcontractors and DTSC present in accordance with the CQAP and CQA articles.

The Prime Contractor, with the subcontractors and DTSC present, initially completed a trial run of the functional test to revise test procedures and the functional test CQA checklist, as necessary. The functional test was conducted using City of Carson water from the fire main supply line. The water used during the functional test was temporarily stored in the GWTS discharge tank at the Tetra Tech Operations Center.

During functional testing, instrumentation, controls, and equipment were adjusted by the subcontractors with the Prime Contractor present for inspection and approval. Adjustments were documented by the CQA Officer on the project drawings as necessary. CQA documentation was incorporated in the final as-built drawings accordingly.

The water used during the functional test was subsequently used to start the performance test until groundwater was pumped to the GWTS. The functional and performance test water was stored in the discharge tank and was not discharged to the sanitary sewer during the testing. The completed functional test checklist is included in Appendix J.

7.3 Compliance with Discharge Requirements

After the successful completion of shakedown and functional testing, performance and operational testing were conducted in accordance with the CQAP and CQA articles to confirm the GWTS operates as designed and complies with the SCAQMD and LACSD discharge requirements. The Prime Contractor CQA Monitors, subcontractor, and DTSC observed and monitored the performance test and operational test.

7.3.1 Performance Testing

Performance testing was conducted on February 5, 2014, using a blend of extracted groundwater and the remaining City of Carson water in the GETS left over from the functional testing. Performance testing focused on the air stripper (AS-100), the aqueous-phase GAC vessels (AP-100 and AP-101), the vapor-phase GAC vessels (VP-200 and VP-201), and the vapor-phase PPA vessels (PPA-100 and PPA-101).

The Prime Contractor, with the subcontractor and DTSC present, operated the system at or below the LACSD-permitted design groundwater extraction rate (30 gpm) during performance testing for approximately 2 hours. Extracted groundwater and the functional test water were treated by the GWTS and temporarily stored in the 7,000-gallon-capacity discharge tank. The system effluent air was discharged to the atmosphere approximately 25 feet above grade via the 6-inch discharge pipe after it passed through the last PPA vessel, PPA-101.

During the 2-hour performance test, air and water samples were collected at appropriate sample points after 1 hour and 1 hour and 50 minutes of system operation. All samples were collected by the Prime Contractor and analyzed in accordance with the SCAQMD and LACSD permits (Appendix B). Table 4 displays the air and water sample locations, sample types, sample containers, analytical suite, method detection limits, and test frequency for the 2-hour test. An additional 45-minute performance test was conducted to simulate a shutdown of the air stripper blower. The extracted water bypassed the air stripper and was treated only by the aqueous-phase GAC vessels (AP-100 and AP-101). The system was shut off immediately after sampling was completed.

Performance of the air stripper and aqueous-phase GAC vessels was quantified by collecting and analyzing water samples from the influent sample port on the air stripper and from the influent, middle, and effluent sample ports on the aqueous-phase GAC vessels. All water samples were sent to CalScience Laboratory, an approved California-certified laboratory, for analysis for the required constituents listed on the LACSD permit (Appendix B). The analytical results of the performance test sampling and the required constituent concentrations in the effluent water are shown in Tables 5 through 10. Analytical reports for water samples are included in Appendix K.

Performance of the vapor-phase GAC and PPA vessels was quantified by collecting and analyzing vapor samples using Tedlar bags to collect vapor from the influent, middle, and effluent sample ports on the vapor-phase GAC vessels and from the middle and effluent sample ports on the vapor-phase PPA vessels. All vapor-phase samples were analyzed with a flame ionization detector (FID), calibrated with hexane, for total non-methane organic compounds (TNMOCs) in the field. Vapor samples were also sent to CalScience Laboratories for additional TNMOC analysis by U.S. Environmental Protection Agency (EPA) Method 25C. Additional field vapor samples were collected after 10 minutes and 30 minutes of system operation in Tedlar bags and analyzed for TNMOCs with a FID. FID sample results and laboratory analytical results for vapor samples are listed in Table 11. Analytical reports for vapor samples are included in Appendix L.

Analytical results were reviewed by the Prime Contractor and DTSC to confirm that the GETS operation complied with regulatory requirements for water and vapor discharge. Operational results were also reviewed by the Prime Contractor and DTSC to ensure the GWTS testing was within regulatory requirements for groundwater and vapor flow. The treated water was subsequently discharged to the municipal sanitary sewer.

7.3.2 Operational Testing

After successful completion of performance testing, operational testing was conducted in accordance with the CQAP and CQA articles to confirm that all system equipment operates properly and can operate as designed for an extended period. The Prime Contractor, CQA Monitors, subcontractor, and DTSC observed and monitored the operational test. The operational test was 6 hours in duration. During operational testing, GWTS effluent water was discharged to the sanitary sewer and system effluent air was discharged to the atmosphere.

The 6-hour operational test was conducted on February 10, 2014, and consisted of operating the system at or below the LACSD permitted design groundwater extraction rate (30 gpm) for 6 hours. During this time, the Prime Contractor, subcontractor, and DTSC inspected the system for problems, such as leaks, excessive equipment noise, or vibration. No Instrument or equipment issues were observed during the initial 6-hour period.

After the initial 6-hour operational test was completed, the Prime Contractor conducted a 2-week (336-hour) operational test between February 17, 2014, and May 27, 2014. The system was operated during regular business hours for a cumulative total of 336 hours in accordance with the Draft Tetra Tech Operations and Maintenance (O&M) Plan (Tetra Tech 2015). GETS operational data collected during the 336-hour operational test is included in Appendix M. During the operational testing period, Tetra Tech and the subcontractors remedied GETS deficiencies and worked to optimize the GETS operation. A summary of the GETS remedies and improvements is included in the GETS completion final inspection punch lists (Appendix N).

On March 11, 2014, Tetra Tech collected additional air and water samples from the GWTS to confirm the performance test results. Air and water samples were collected in accordance with Table 4, and the analytical and field sampling results are listed in Tables 12 through 17. Analytical reports are included in Appendix K and Appendix L. Tetra Tech reviewed the analytical results to confirm that the GETS operation complied with regulatory requirements for water and vapor discharge.

8.0 NON-CONFORMANCE AND CORRECTIVE MEASURES

The CQAP outlined a formal process to address non-conforming items to enhance management and tracking of non-conformance with the CQAP (Tetra Tech 2011a). During construction of the GETS, non-conformance incidents were identified, documented, and resolved in accordance with the CQAP.

Non-Conformance Notices were prepared by the CQA Officer and issued to the responsible party for corrective action. The CQA Officer verified corrective actions and completion and documented the corrective measures on the appropriate CQA daily reports and logs. Once the corrective action was complete, the corrective measure was inspected and documented on the Non-Conformance Notice form, and the completed Non-Conformance Notice form was signed by the Engineer, CQA Officer, Project Manager, Site Superintendent, and regulatory agency representative and filed in the CQA records. Completed Non-Conformance Notices are included as Appendix O.

The corrective action for one non-conformance notice (NC #016) has been closed based on the Project Memorandum in Appendix P. NC #016 was issued when the project owner's utility contractor inadvertently shifted two GETS related concrete vaults, located in the Torrance Lateral road, out of vertical alignment during underground utility installation. Currently, the vaults are fully functional and located above the existing road grade, but the vaults will be re-installed by Tetra Tech at the final road elevation during final construction of the Torrance Lateral road. Tetra Tech will notify DTSC, as described in the Project Memorandum, when the vertical alignment of the GETS related concrete vaults has been corrected.

9.0 DOCUMENTATION

As described in Section 3.0, CQA depends on thorough monitoring, documentation of the observations, and diligent records maintenance. CQA documentation procedures conducted by the CQA personnel in accordance with the CQAP are further described in the following sections.

9.1 DAILY REPORTS

All CQA personnel, as appropriate, completed Daily CQA Reports using the Daily CQA Report form from the CQAP. Copies of completed Daily CQA Reports are included in Appendix Q. Additionally, Tetra Tech completed internal Tetra Tech daily activity log forms and documented daily work activity in the daily log forms. Tetra Tech daily logs are included in Appendix R.

CQA personnel, as appropriate, also completed CQA Production Logs on a daily basis to summarize the work performed, health and safety actions taken, CQA action items, and the equipment or material received and used that day. Copies of completed CQA Production Logs are included in Appendix S.

9.2 CONSTRUCTION SUBMITTALS

A Submittal Log for construction submittals was maintained and individual Submittal Forms were completed to document each submittal (materials, cut sheets, shop drawings, material samples, equipment warranties, testing procedures, and equipment O&M manuals) and approval by the Prime Contractor and DTSC. Construction submittals were categorized by the CQAP Specification number. The construction submittal log is included in Appendix A, along with copies of all finalized construction submittals.

9.3 OBSERVATION AND TEST DATA REPORTS

Field tests and observations were conducted in accordance with the CQAP and CQA articles and were documented in the Daily Reports and test and observation forms, as described in the sections above.

9.4 CONSTRUCTION PROBLEMS AND CORRECTIVE ACTION REPORTS

Deficient or nonconforming items are defined as material or workmanship that does not meet the requirements of the CQAP and CQA articles. When deficient or nonconforming items were identified during initial or follow-up testing and inspection, the CQA Officer followed the Non-Conformance Notice protocol for documentation and resolution, as described in Section 8.0 of the CQAP.

9.5 DESIGN AND SPECIFICATION REVISIONS

During construction, any request for information made by the subcontractor to the Prime Contractor to clarify the design was documented on the DCR form in accordance with the CQAP (Tetra Tech 2011a). Finalized DCRs became CQA articles that supplemented the CQAP. Copies of all finalized DCRs are provided in Appendix T.

During construction, minor GETS field changes were documented on the FCR form in accordance with the CQAP (Tetra Tech 2011a). Finalized FCRs became CQA articles that supplemented the CQAP. Copies of all finalized FCRs are provided in Appendix U.

Significant GETS design changes that affected the intent of the approved design were documented on a DCN form in accordance with the CQAP (Tetra Tech 2011a). Finalized DCNs became CQA articles that supplemented the CQAP. Copies of all finalized DCNs are provided in Appendix V.

9.6 PHOTOGRAPHS

Construction, installation, and fabrication were photographed frequently enough to provide a photographic trail of the progress of the project. Photographs included routine work, significant problems, and corrective actions. Photos were digital and were electronically filed in a way that preserved the electronic time, date, and photographer. Sample photos of project progress were included in the photographic logs of the weekly CQA report submittal. Photographic logs are provided along with the weekly CQA summaries in Appendix D.

9.7 AS-BUILT PLANS

As the GETS construction and testing work were completed, any deviations from the CQAP and CQA articles were marked on the CQA Drawings by the CQA Monitors in accordance with the CQAP. As-built Drawings were prepared by the Engineer based on the marked-up Drawings, CQA survey records, DCRs, FCRs, DCNs, and other applicable CQA articles. The as-built drawings are included in the CQAR as Appendix W.

9.8 FINAL CERTIFICATION REPORT AND INSPECTION

The GETS subcontractors furnished Final Certification Reports to the Prime Contractor after conducting completion inspections with the Prime Contractor and DTSC and completing punch list items generated by the completion inspections of DFWs in accordance with the CQAP. On August 28, 2014, DTSC conducted the final inspection of the GETS and approved the construction completion with one minor punch list item remaining to be completed (repair of a differential pressure switch on the particle filtration unit). Final inspection punch lists for the GETS are included in the CQAR as Appendix N. Subcontractor Final Certification Reports are included in the CQAR as Appendix X.

10.0 REFERENCES

California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). 1995. Consent Decree, Civil Action No. 95-8773: DTSC; The California Hazardous Waste Control Account; and the California Hazardous Substance Account (Plaintiffs) v. Commercial Realty Projects, Inc.; and L.A. Metromall LLC (Defendants). May 25. (Court signed and entered on December 13, 1996.)

Tetra Tech EM Inc. (Tetra Tech). 2008. Rule 1150 Excavation Management Plan, for The Boulevards at South Bay. January 16.

Tetra Tech. 2010a. Final Groundwater Extraction and Observation Well Design Document for the Upper Operable Unit, for The Boulevards at South Bay. February 26.

Tetra Tech. 2010b. Site Health and Safety Plan, for The Boulevards at South Bay. Revision 3, July.

Tetra Tech. 2011a. Final Construction Quality Assurance Plan Groundwater Extraction and Treatment System, for The Boulevards at South Bay. August 11.

Tetra Tech. 2011b. Final Groundwater Extraction and Observation Well Installation Report for the Upper Operable Unit. June 6.

Tetra Tech. 2012. Final Addendum to the Final Groundwater Extraction and Observation Well Installation Report for the Upper Operable Unit. December.

Tetra Tech. 2015. Final Operations and Maintenance Manual, Groundwater Extraction and Treatment System for the UOU. May.

TABLES

TABLE 1 — DISTRIBUTION MATRIX

Name of Recipients	Title/Role	Organization and Address	Number of Copies for Distribution	Telephone Number
Nicole MacAulay	Project Owner Representative	Carson Marketplace, LLC 4350 Von Karman Ave, Suite 200 Newport Beach, CA 92660	1	(949) 885-8235
John Gebhardt	Project Owner Representative	SEG Advisors 21255 Burbank Blvd, Suite 140 Woodland Hills, CA 91367	1	(310) 422-4644
Gary Hann	Project Owner Representative	URS Corporation 2020 East First Street – Suite 400 Santa Ana, CA 92705	1	(714) 433-7625
Javier Weckmann, P.E.	Project Director and Construction Manager	Tetra Tech, Inc. 20400 Main Street Carson, CA 90745	2	(310) 965-0137
Kathy Vandenheuvel, P.E.	Project Manager	Tetra Tech, Inc. 1230 Columbia Street, Suite 1000 San Diego, CA 92101	2	(619) 525-7188
Tim Smith, P.E.	Engineer and CQA Officer	Tetra Tech, Inc. 20400 Main Street Carson, CA 90745	1	(714) 862-9622
Ning-Wu Chang, P.E.	Regulatory Agency	California Department of Toxic Substances Control 5796 Corporate Avenue Cypress, CA 90630	1	(714) 484-5300
Daniel Zogaib	Regulatory Agency	California Department of Toxic Substances Control 5796 Corporate Avenue Cypress, CA 90630	1	(714) 484-5300

TABLE 2 – ROLES AND RESPONSIBILITIES MATRIX

Name	Title/Role	Organizational Affiliation	Responsibilities
John Gebhardt, Nicole MacAulay	Project Owner Representatives	Starwood CPG Corporation, LLC / Carson Marketplace, LLC	Responsible for evaluating the project during construction and startup. Responsible for communicating directly with the Prime Contractor for any meeting needs, requests for information, and to issue change notices.
Javier Weckmann, P.E.	Program Manager	Tetra Tech, Inc.	Primary responsibility to confirm that the subcontractors construct the GETS in accordance with Drawings and Specifications approved by the regulatory agencies. Responsible for presenting meeting needs, requests for information, and issue change notices to the Project Owner's Representative.
Kathy Vandenheuvel, P.E.	Project Manager	Tetra Tech, Inc.	Responsible for managing financial aspects of the project and presenting meeting needs, requests for information, and issue change notices to the Program Manager.
Bernard Dobine	Site Superintendent	Tetra Tech, Inc.	Responsible for coordination of site activities and approval of Submittals, Field Change Requests, Design Change Notices, and Non-Conformance Notices.
Tim Smith, P.E.	Engineer	Tetra Tech, Inc.	Responsible for the design of the conveyance piping and the groundwater extraction and treatment system and confirming that these items are constructed in conformance with the Drawings, Specifications, the construction quality assurance plan (CQAP), and approved by the regulatory agencies. Responsible for sealing the design Drawings. Responsible for resolving corrective actions and translating change notices into Drawings and Specifications. Responsible for observing tests during construction in accordance with this CQAP.
Tim Smith, P.E.	CQA Officer	Tetra Tech, Inc.	Responsible for implementing and managing the CQAP. Responsible for coordinating with parties shown on the Project Organization Chart shown in Figure 1. Responsible for reviewing CQA issues that arise and revising CQAP as appropriate. Responsible for reviewing design changes for CQA implications. Responsible for reviewing CQA documentation. Responsible for reviewing and resolving deficiencies and issuing approvals. Responsible for preparing final CQA documentation as part of Remedial Action Completion Report. Responsible for assigning construction quality assurance (CQA) monitors to construction and installation activities on a daily basis and daily supervision of CQA Monitors. Responsible for clarifying CQA requirements and identifying deficiencies and appropriate corrective actions. Responsible for conducting CQA meetings issuing meeting minutes after CQA meetings.

TABLE 2 – ROLES AND RESPONSIBILITIES MATRIX

Name	Title/Role	Organizational Affiliation	Responsibilities
Ralph DeLaparra, James Brady P.E., Nick Shih, Brian Malone, Jeff Eddo, and Nic Macario	CQA Monitors	Tetra Tech, Inc.	Responsible for observing and documenting construction activities in accordance with this CQAP.
Various[1]	Subcontractors	Various[1]	Responsible for performing work in accordance with the approved CQAP and Drawings and Specifications. Responsible for reporting to the Engineer, CQA Officer, and CQA Monitors for the quality of their work, protection of the environment, and the health and safety of their personnel in accordance with the subcontractor construction quality control plan, subcontractor environmental protection plan, and health and safety plan.
Various[2]	Manufacturers	Various[2]	Responsible for supplying materials in accordance with the approved Drawings and Specifications. Responsible to the Engineer for the quality of the work.

Notes:

1 The names and organizations of the various subcontractors are: Richard Ko, P.E. with American Integrated Services, Inc., John Heiser, P.E. with Innovative Construction Solutions, Inc. and Joanna McKeehan with Gregg Drilling & Testing, Inc.

2 The names and organizations of the various manufacturers are: Rich Whelan with Kaeser Compressors, Inc., Dave Corder with QED Environmental Systems, Patricia Tinnerino with Siemens Water Technologies Corp., Curt Dansby with JB Systems, Roger Burns with Tiger Tanks, Doug Roughen with Core-Rosion Products, Orange County Pump Corporation, Brian Fune with Ryan Herco Flow Solutions, Roseanna Shea with J.L. Wingert Co., Karina Peyman with MCR Technologies, Inc.

TABLE 3 — TREATMENT SYSTEM DESIGN CRITERIA

Treatment System	Design Criteria	Quantity	General Specifications	Equipment Maximum Rated Flow	Rated Pressure (PSI)	Motor (Hp)
Flow Rate	Avg - 30 to 50 gpm Max - 100 gpm					
Treatment Efficiency	Influent VOC = 5.4 mg/l Effluent TTO < 1 mg/l for sanitary sewer discharge					
Aqueous Phase Equipment						
Down-Hole Groundwater Pumps	Maximum flow range = 5 - 6 gpm @ 135 ft/ea 29 extraction wells with 14 potential future wells	29 + 2 spares	Top loading, reinforced fiberglass body with stainless steel ends, 4" diameter pneumatic pump	10 gpm	120 (Air Pressure)	-
Surge Tank	Typical Operational Detention Time = 120 min @ 50 gpm Maximum Detention Time = 180 min @ 50 gpm maximum Chemical resistant	1	9,000 gal. vertical steel tank (custom steel tank approximately 14 ft in diameter and 10 ft tall)	-	-	-
Sequestering Agent Metering Pump	4 gpd antiscalant at 50 gpm system flow, line injection pressure of 75 psi or greater	1	Positive displacement pump with PVC head and fittings 4-20 mA direct pacing	14 gpd	250	-
Inlet Pumps	50 gpm/ea @ 50 ft TDH	2 + 1 (Lead, Lag, and Standby)	Centrifugal pump with stainless steel head	100 gpm	50	1.5
Particulate Filter Skid	10, 5, 1 micron multiple layer bag filter @ 100 gpm	1 + 1 (Lead, Standby)	Stainless steel bag filter housings with pneumatic valve auto-switchover. Two sets of three stainless steel filter housings duplexed in parallel	600 gpm	100	-
Air Stripper	Removal efficiency > 90% for all VOCs, except 1,4-Dioxane A/W > 40 Design flow rate = 50 gpm	1	Stainless steel, low profile, shallow tray air stripper (4-trays, centrifugal sump pumps with stainless steel head)	65 gpm (320 SCFM for vapor phase)	50 (0.7 for vapor phase)	1.5 (5 for vapor phase))
Carbon Vessels (Liquid Phase)	EBCT = 10 min/ea Design flow rate = 50 gpm Carbon change-out rate > monthly	2 (Lead + Lag)	Steel vessels with 2,000 lb. carbon capacity	100 gpm	75	-
Discharge Tank	Typical Operational Detention Time = 90 min @ 50 gpm Maximum Detention Time = 140 min @ 50 gpm Chemical resistant	1	7,000 gal. vertical standard XLPE tank approximately 10'3" tall	-	-	-
Discharge Pumps	50 gpm/ea @ 50 ft TDH	1 + 1 (Lead, Standby)	Centrifugal pump with stainless steel head	100 gpm	50	1.5

TABLE 3 — TREATMENT SYSTEM DESIGN CRITERIA

Treatment System	Design Criteria	Quantity	General Specifications	Equipment Maximum Rated Flow	Rated Pressure (PSI)	Motor hp
Vapor/Gas Phase Equipment						
Carbon Vessels (Vapor Phase)	EBCT > 3 sec/ea Design flow rate = 640 cfm (two air strippers) Carbon change-out rate > monthly	4 2 parallel train (Lead + Lag)	Steel vessels with 8,000 lb. carbon capacity	3750 scfm	5	-
Potassium Permanganate Alumina (PPA) Vessels	EBCT > 8 sec/ea Design flow rate = 640 cfm (two air strippers) Carbon change-out rate > monthly	3 (Lead + Lag + Standby)	Steel vessels with 6,000 lb. PPA capacity	1500 scfm	5	-
Air Compressor	Design flow rate = 150 SCFM Design pressure = 120 psi	1	Rotary screw compressor (Includes 240 gal vertical tank, desiccant dryer, and compressor condensate oil/water filtering system)	190 scfm	150	50

Notes:

Avg	Average
A/W	Air/water ratio
cfm	cubic feet per minute
ea	each
EBCT	empty bed contact time
ft	feet
gpm	gallons per minute
Hp	horse power
gal	gallon(s)
gpd	gallons per day
lb	pound
mA	milliamps
min	minutes
PPA	potassium permanganate alumina
psi	pounds per square inch
PVC	polyvinyl chloride
SCFM	standard cubic feet per minute
sec	seconds
TDH	total dynamic head
XLPE	crosslinked polyethylene

TABLE 4

PERFORMANCE TEST – AIR AND WATER SAMPLING LOCATIONS AND ANALYSES

Sample Location	Sample Type	Sample Container	Analysis (method number)	Method Detection Limits	Test Frequency
Influent (Air Stripper Outlet / GAC Vessels Inlet) GAC Vessels Midpoint GAC Vessels Outlet/ PPA Vessels Inlet PPA Vessels Midpoint Effluent (PPA Vessels Outlet)	Air	Tedlar Bag (field) And Summa Canisters (laboratory)	TNMOCs (FID - field method) and TNMOCs (EPA 25C)	0.1 ppmv TNMOCs by FID - field method and 10 ppmv TNMOCs by EPA 25C	10 min, 30 min, 1 hour, and 1 hour and 50 min by FID - field method and 1 hour and 1 hour and 50 min by EPA 25C
Influent Pre Air Stripper (Post Filter Skid) Air Stripper Outlet / GAC Vessels Inlet[1] GAC Vessels Midpoint[1] Effluent (GAC Vessels Outlet)	Water	3 - 40-mL vials preserved with HCL to pH < 2 (VOCs) 1-liter amber $Na_2S_2O_3$ (SVOCs) 250ml poly HNO_3 (Metals) 1-liter amber $Na_2S_2O_3$ (Organochlorine Pesticides including Total HCH) 1-liter amber $Na_2S_2O_3$ (PCBs) 250ml clear glass H_2SO_4 (COD) 1-liter poly unpreserved (Suspended Solids) 125-ml poly unpreserved (Soluble Sulfide) 500-ml poly NaOH (Total Cyanide)	VOCs (EPA 8260B) SVOCs (EPA 8270C) Metals (EPA 200.7/245.1) Organochlorine Pesticides including Total HCH (EPA 8081A) PCBs (EPA 8082) COD (EPA 410.4) Suspended Solids (EPA 160.2) Soluble Sulfide (EPA 376.2) Total Cyanide (EPA 335.2) Temperature (field method) pH (field method)	0.5 – 50 µg/L (EPA 8260B) 10 – 50 µg/L (EPA 8270C) 5 – 500 µg/L (EPA 200.7/245.1) 0.1 – 2 µg/L (EPA 8081A) 1 µg/L (EPA 8082) 20 mg/L (EPA 410.4) 1 mg/L (EPA 160.2) 50 µg/L (EPA 376.2) 50 µg/L (EPA 335.2)	1 hour and 1 hour and 50 min

TABLE 4

PERFORMANCE TEST – AIR AND WATER SAMPLING LOCATIONS AND ANALYSES

Notes:

1. The GAC Vessel Inlet and Midpoint samples will be analyzed only for VOCs by EPA Method 8260B.

Acronyms:

µg/L	Micrograms per liter
COD	Chemical Oxygen Demand
EPA	U.S. Environmental Protection Agency
FID	Flame Ionization Detector
GAC	Granular Activated Carbon
HCH	Hexachlorocyclohexane
HCL	Hydrochloric Acid
HNO_3	Nitric Acid
H_2SO_4	Sulfuric Acid
mg/L	Milligrams per liter
min	Minute
mL	Milliliter
NaOH	Sodium Hydroxide
$Na_2S_2O_3$	Sodium Thiosulphate
PCB	Polychlorinated biphenyls
ppbv	Parts per billion by volume
ppmv	Parts per million by volume
SVOC	Semivolatile Organic Compound
TNMOC	Total Non-Methane Organic Compounds
VOC	Volatile Organic Compound

TABLE 5

PERFORMANCE TEST ANALYTICAL RESULTS - SUMMARY OF DETECTED VOLATILE ORGANIC COMPOUNDS (AQUEOUS PHASE) - 2-HOUR OPERATION

GETS Operation Duration (Hours:Minutes)		1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50
		EPA 8260B (µg/L)																																							
Sample ID	Sample Location	Acetone		Benzene		Bromo-dichloro-methane		Bromoform		2-Butanone		Chloroform		Chloro-benzene		1,2-Dichloro-ethane		cis-1,2 Dichloro-ethene		Dibromo-chloro-methane		Ethyl-benzene		Naphthalane		n-Propyl-benzene		Toluene		Trichloro-ethene		1,2,4-Trimethyl-benzene		1,3,5-Trimethyl-benzene		Vinyl Chloride		p/m-xylene		o-xylene	
Influent – gw	Influent	14	<10	**450**	**500**	<1	<1	<0.5	<0.5	<5	<5	<0.5	<0.5	1.8	<0.5	**49**	**56**	14	<0.5	<0.5	<0.5	6.1	<0.5	1.9	<1	0.53	<0.5	6.6	<0.5	2.2	<0.5	2.8	<0.5	0.54	<0.5	**1.1**	<0.5	6.7	<0.5	4.1	<0.5
Pre AS-gw	Pre Air Stripper (Post Filter Skid)	25	<10	**100**	**180**	3.4	4.8	1.2	<0.5	13	<5	4.8	<0.5	1.1	<0.5	**7.8**	**14**	2.3	<0.5	4.0	<0.5	3.7	5.2	<1	<1	<0.5	<0.5	7.5	12	0.72	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	3.9	5.6	2.2	<0.5
Post AS-gw	Air Stripper Outlet / GAC Vessels Inlet	20	20	0.92	**1.1**	1.2	0.94	<0.5	<0.5	11	11	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Effluent-gw	Effluent (GAC Vessels Outlet)	<10	<10	<0.5	<0.5	1.2	0.94	<0.5	<0.5	<0.5	<5	1.7	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	1.0	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LACSD (µg/L)		*		*		*		*		*		*		*		*		*		*		*		*		*		*		*		*		*		*		*		*	
RAG (µg/L)		NE		1.0		NE		NE		NE		NE		NE		0.5		NE		NE		680		15.0		NE		1000		5.0		NE		NE		0.5		NE		NE	

Notes:
Only analytes positively detected in samples are presented in this table. For a complete list of constituents analyzed, refer to laboratory data package.
VOCs were not detected above the laboratory reporting limit and method detection limit concentrations in the GACmid-gw sample collected between the two GAC vessels at 1 hour and 1 hour and 50 minutes.
Performance testing was initiated with approximately 5,000 gallons of site fire hydrant supply water in the GETS surge (4,000 gallons) and discharge (1,000 gallons) tanks remaining from the functionality testing, resulting in diluted process water samples downstream of the influent sample location.

All samples were collected on 2/5/2014.
All samples were collected at 1 hour and 1 hour 50 minutes after initiation of groundwater treatment system operation and performance test.

Bold — Meets or exceeds RAG.

<# — Analyte not detected, laboratory reporting limit concentration is shown.
* — LACSD permit substance limit concentration is 1,000 µg/L for total toxic organics, volatile.
EPA — U.S. Environmental Protection Agency
GAC — Granular activated carbon
GETS — Groundwater Extraction and Treatment System
ID — Identification
LACSD — Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration
NE — Not established
RAG — Remedial action goal (Brown and Root 1995)
µg/L — Micrograms per liter
VOC — Volatile organic compounds

TABLE 6

PERFORMANCE TEST ANALYTICAL RESULTS – SUMMARY OF DETECTED VOLATILE ORGANIC COMPOUNDS (AQUEOUS PHASE) - 45-MINUTE OPERATION BLOWER SHUT-DOWN SIMULATION

Sample ID	Sample Location	EPA 8260B Analytical Results (µg/L)									
		Acetone	Benzene	Bromodichloro-methane	Bromoform	2-Butanone	Carbon Disulfide	Chloroform	Dibromochloro-methane	Cis-1,2-Dichloroethene	Toluene
preGAC-gw	Air Stripper Outlet / GAC Vessel #1 Inlet	16.0	**7.0**	4.2	1.6	9.0	<1	5.8	5.1	1.2	0.64
GACmid-gw	Between GAC Vessel #1 and GAC Vessel #2	<10	<0.5	<1	<0.5	<5	<1	<0.5	<0.5	<0.5	<0.5
postGAC-gw	GAC Vessels Outlet	<10	<0.5	<1	<0.5	<5	1.3	<0.5	<0.5	<0.5	<0.5
LACSD (µg/L)		*	*	*	*	*	*	*	*	*	*
RAG (µg/L)		NE	1.0	NE	NE	NE	NE	NE	NE	NE	1,000

Notes:
Only analytes positively detected in samples are presented in this table. For a complete list of constituents analyzed, refer to laboratory data package.

All samples were collected on 2/5/2014
Samples were collected after 45-minutes of groundwater treatment system operation when the air stripper was by-passed, simulating a shut-down of the air stripper blower.

Performance testing was initiated with approximately 5,000 gallons of site fire hydrant supply water in the GETS surge (4,000 gallons) and discharge (1,000 gallons) tanks remaining from the functionality testing, resulting in diluted process water samples downstream of the influent sample location.

Bold	Meets or exceeds RAG.
<#	Analyte not detected, laboratory reporting limit concentration is shown.
*	LACSD permit substance limit concentration is 1,000 µg/L for total toxic organics, volatile.
EPA	U.S. Environmental Protection Agency
GAC	Granular activate carbon
ID	Identification
LACSD	Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration
NE	Not established
RAG	Remedial action goal (Brown and Root 1995)
µg/L	Micrograms per liter
VOC	Volatile organic compounds

TABLE 7

PERFORMANCE TEST ANALYTICAL RESULTS – SUMMARY OF DETECTED SEMI-VOLATILE ORGANIC COMPOUNDS (AQUEOUS PHASE)

GETS Operation Duration (Hours:Minutes)		1:00	1:50
Sample ID	Sample Location	EPA 8270C (µg/L)	
		SVOCs	SVOCs
Influent – gw	Influent	ND	ND
Pre AS-gw	Pre Air Stripper (Post Filter Skid)	ND	ND
Post AS-gw	Air Stripper Outlet / GAC Vessels Inlet	ND	ND
GACmid-gw	GAC Vessel mid point	ND	ND
Effluent-gw	Effluent (GAC Vessels Outlet)	ND	ND
	LACSD (µg/L)	*	*
	RAG (µg/L)	**	**

Notes:
SVOCs were not detected above the laboratory reporting limit and method detection limit concentrations in any of the samples collected.

All samples were collected on 2/5/2014.
All samples were collected at 1 hour and 1 hour 50 minutes after initiation of groundwater treatment system operation and performance test.
Performance testing was initiated with approximately 5,000 gallons of site fire hydrant supply water in the GETS surge (4,000 gallons) and discharge (1,000 gallons) tanks remaining from the functionality testing, resulting in diluted process water samples downstream of the influent sample location.

*	LACSD substance limit concentration is 1,000 µg/L for total toxic organics, semi-volatile.
**	RAGs for SVOCs vary by compound.
EPA	U.S. Environmental Protection Agency
GAC	Granular activated carbon
GETS	Groundwater Extraction and Treatment System
ID	Identification
LACSD	Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration.
NA	Not applicable
ND	Not detected at or above laboratory reporting limit or method detection limit concentration. Refer to laboratory analytical report for reporting limit and method detection limit concentrations.
RAG	Remedial action goal (Brown and Root 1995)
µg/L	Micrograms per liter
SVOC	Semivolatile organic compounds

TABLE 8

PERFORMANCE TEST ANALYTICAL RESULTS – SUMMARY OF DETECTED INORGANIC ANALYTES (AQUEOUS PHASE)

GETS Operation Duration (Hours:Minutes)		1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50
Sample ID	Sample Location	EPA 200.7/245.1 (mg/L)							
		Arsenic		Nickel		Silver		Zinc	
Influent – gw	Influent	.0834	.0902	.0366	.0234	0.00583	<0.005	.0623	<0.01
Effluent-gw	Effluent (GAC Vessels Outlet)	<0.015	<0.015	<0.01	<0.01	<0.005	<0.005	0.0285	<0.01
LACSD (mg/L)		3	3	12	12	5	5	25	25
RAG (mg/L)		0.05	0.05	0.3	0.3	NE	NE	5.0	5.0

Notes:
Only analytes positively detected in samples are presented in this table. For a complete list of constituents analyzed, refer to laboratory data package.

All samples were collected on 2/5/2014
All samples were collected at 1 hour and 1 hour 50 minutes after initiation of groundwater treatment system operation and performance test.
Performance testing was initiated with approximately 5,000 gallons of site fire hydrant supply water in the GETS surge (4,000 gallons) and discharge (1,000 gallons) tanks remaining from the functionality testing, resulting in diluted process water samples downstream of the influent sample location.

<#	Analyte not detected, laboratory reporting limit concentration is shown.
EPA	U.S. Environmental Protection Agency
GAC	Granular activated carbon
GETS	Groundwater Extraction and Treatment System
ID	Identification
LACSD	Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration.
NE	Not established
RAG	Remedial action goal (Brown and Root, 1995)
mg/L	Miligrams per liter

TABLE 9

PERFORMANCE TEST ANALYTICAL RESULTS – SUMMARY OF GENERAL CHEMISTRY ANALYTES (AQUEOUS PHASE)

GETS Operation Duration (Hours:Minutes)		1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50	1:00	1:50
Sample ID	Sample Location	EPA 410.4 (mg/L)		EPA 160.2 (mg/L)		EPA 376.2 (mg/L)		EPA 335.2 (µg/L)		EPA 1010A (degrees C)		Field Water Quality Instrument* (pH S.U.)		Field Water Quality Instrument* (degrees C)	
		COD		Suspended Solids		Soluble Sulfides		Total Cyanide		Ignitability		pH		Temperature	
Influent – gw	Influent	120	120	18	16	<0.050	<0.050	<0.020	<0.020	>212	>212	6.78	6.78	18.2	19.3
Pre AS-gw	Pre Air Stripper (Post Filter Skid)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.00	6.96	18.2	18.0
Post AS-gw	Air Stripper Outlet / GAC Vessels Inlet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.17	8.13	18.1	18.4
GACmid-gw	GAC Vessel mid point	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.87	8.82	17.9	18.1
Effluent-gw	Effluent (GAC Vessels Outlet)	22	<5.0	2	1.1	<0.050	<0.050	<0.020	<0.020	>212	>212	8.85	8.84	16. 2	16.4
	LACSD	NE	NE	NE	NE	0.1	0.1	10	10	>60	>60	>6	>6	<60	<60
	RAG	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
All samples were collected on 2/5/2014
All samples were collected at 1 hour and 1 hour 50 minutes after initiation of groundwater treatment system operation and performance test.
Performance testing was initiated with approximately 5,000 gallons of site fire hydrant supply water in the GETS surge (4,000 gallons) and discharge (1,000 gallons) tanks remaining from the functionality testing, resulting in diluted process water samples downstream of the influent sample location.

*	Myron 6P Ultrameter II water quality meter
C	Celsius
EPA	U.S. States Environmental Protection Agency
GAC	Granular activated carbon
GETS	Groundwater Extraction and Treatment System
LACSD	Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration.
NA	Not analyzed
NE	Not established
mg/L	Milligrams per liter
µg/L	Micrograms per liter
RAG	Remedial action goal (Brown and Root 1995)
S.U.	Standard units

TABLE 10

PERFORMANCE TEST ANALYTICAL RESULTS – SUMMARY OF DETECTED ORGANOCHLORINE PESTICIDES AND POLYCHLORINATED BIPHENYLS (AQUEOUS PHASE)

GETS Operation Duration (Hours:Minutes)		1:00	1:50	1:00	1:50
Sample ID	Sample Location	EPA 8081A (µg/L)		EPA 8082 (µg/L)	
		Organochlorine Pesticides		Polychlorinated Biphenyls	
Influent – gw	Influent	ND	ND	ND	ND
Effluent-gw	Effluent (GAC Vessels Outlet)	ND	ND	ND	ND
LACSD (µg/L)		0*	0*	0**	0**
RAG (µg/L)		NE	NE	NE	NE

Notes:
Organochlorine pesticides and polychlorinated biphenyls were not detected above the laboratory reporting limit or method detection limit concentrations in any of the samples collected.

All samples were collected on 2/5/2014
All samples were collected at 1 hour and 1 hour 50 minutes after initiation of groundwater treatment system operation and performance test.
Performance testing was initiated with approximately 5,000 gallons of site fire hydrant supply water in the GETS surge (4,000 gallons) and discharge (1,000 gallons) tanks remaining from the functionality testing, resulting in diluted process water samples downstream of the influent sample location.

*	LACSD substance limit concentration for each organochlorine pesticide is 0 µg/L
**	LACSD substance limit concentration for total detectable polychlorinated biphenyls is 0.0 µg/L.
EPA	U.S. Environmental Protection Agency
GAC	Granular activated carbon
GETS	Groundwater Extraction and Treatment System
ID	Identification
LACSD-	Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration.
ND	Not detected above laboratory reporting limit or method detection limit concentrations. Refer to laboratory analytical report for reporting limit and method detection limit concentrations.
NE	Not established
RAG	Remedial action goal (Brown and Root, 1995)
µg/L	Micrograms per liter

TABLE 11

PERFORMANCE TEST FIELD SAMPLING RESULTS – SUMMARY OF DETECTED TOTAL NON-METHANE ORGANIC COMPOUNDS (VAPOR PHASE)

GETS Operation Duration		10 Minutes			30 Minutes			1 Hour			1 Hour and 50 Minutes		
Sample ID	Sample Location	FID (without carbon filter) TNMOCs & Methane	FID (with carbon filter)[1] Methane	FID TNMOC[2]	FID (without carbon filter) TNMOCs & Methane	FID (with carbon filter)[1] Methane	FID TNMOC[2]	FID (without carbon filter) TNMOCs & Methane	FID (with carbon filter)[1] Methane	FID TNMOC[2]	FID (without carbon filter) TNMOCs & Methane	FID (with carbon filter)[1] Methane	FID TNMOC[2]
PostAS-v	Influent (Air Stripper Outlet / GAC Vessels Inlet)	0.0	0.0	0.0	1.1	0.5	0.6	1.8	0.7	1.1	4.2	1.0	3.3
GACmid-v	GAC Vessels Midpoint	0.0	0.0	0.0	0.2	0.3	0.0[3]	0.0	0.0	0.0	1.4	1.5	0.0[3]
prePPA-v	GAC Vessels Outlet/ PPA Vessels Inlet	0.0	0.3	0.0[3]	0.0	0.1	0.0[3]	0.0	0.0	0.0	1.4	1.3	0.1
PPAmid-v	PPA Vessels Midpoint	0.0	0.0	0.0	0.0	0.1	0.0[3]	0.0	0.0	0.0	1.3	1.4	0.0[3]
Effluent-v	Effluent (PPA Vessels Outlet)	0.0	0.0	0.0	0.0	0.2	0.0[3]	0.0	0.0	0.0	1.5	1.3	0.2
SCAQMD (ppm)				100	NA	NA	100	NA	NA	100	NA	NA	100

Notes:
All results are reported in parts per million
Samples were collected at 10 minutes, 30 minutes, 1 hour, and 1 hour and 50 minutes after performance test initiation at 12:05 p.m. on 2/5/14.
Performance testing was initiated with approximately 5,000 gallons of site fire hydrant supply water in the GETS surge (4,000 gallons) and discharge (1,000 gallons) tanks remaining from the functionality testing, resulting in diluted process samples downstream of the influent process water sample location.
.

1. FID concentration readings through the carbon filter for methane have been adjusted by 0.5 ppm because ambient FID concentration readings through the carbon filter were 0.5 ppm.
2. Field FID TNMOC concentrations were calculated by subtracting the adjusted FID carbon filter reading (Methane only) from the FID concentration reading without the carbon filter (TNMOCs and Methane).
3. If the FID carbon filter concentration reading for methane was greater than the FID concentration reading without the carbon filter for TNMOCs and methane, then the TNMOC concentration value was assumed to be 0.0 ppm instead of a negative value.

FID — Flame ionization detector (Thermo TVA1000B calibrated with Hexane 50 pm in air)
GAC — Granular activated carbon
NA — Not applicable
SCAQMD — South Coast Air Quality Management District permit to operate substance limit concentration
PPA — Potassium permanganate
ppm — Parts per million
TNMOC — Total non-methane organic compounds

TABLE 12
OPERATIONAL TEST ANALYTICAL RESULTS - SUMMARY OF DETECTED VOLATILE ORGANIC COMPOUNDS (AQUEOUS PHASE) 3/11/2014

			EPA 8260B (µg/L)							
Sample ID	Sample Location	Sample Time	Benzene	1,2-Dichloroethane	Ethylbenzene	Naphthalane	Toluene	1,2,4-Trimethylbenzene	p/m-xylene	o-xylene
Influent – gw	Influent	0935	**990**[1]	**85**	52	<25	56	16	35	16
Pre AS-gw	Pre Air Stripper (Post Filter Skid)	1000	**820**	**83**	14	<25	46	27	58	32
Post AS-gw	Air Stripper Outlet / GAC Vessels Inlet	1005	0.58	1.3	<0.50	3.8	<0.50	<0.50	<0.50	<0.50
Effluent-gw	Effluent (Discharge Tank)	0953	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
LACSD (µg/L)			*	*	*	*	*	*	*	*
RAG (µg/L)			1.0	0.5	680	15.0	1,000	NE	NE	NE

Notes:
Only analytes positively detected in samples are presented in this table. For a complete list of constituents analyzed, refer to laboratory data package.
All samples were collected on 3/11/2014 approximately 2 hours after initiation of groundwater treatment system daily operation.

Bold — Meets or exceeds RAG or LACSD.

[1] — Benzene concentration exceeded the initial calibration range based on a dilution factor of 25. Result reported based on a dilution factor of 50.
<# — Analyte not detected, laboratory reporting limit concentration is shown.
* — LACSD permit substance limit concentration is 1,000 µg/L for total toxic organics, volatile.
AS — Air stripper
EPA — U.S. Environmental Protection Agency
ID — Identification
LACSD — Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration
NE — Not established
RAG — Remedial action goal (Brown and Root, 1995)
µg/L — Micrograms per liter
VOC — Volatile organic compounds

TABLE 13
OPERATIONAL TEST ANALYTICAL RESULTS – SUMMARY OF DETECTED SEMI-VOLATILE ORGANIC COMPOUNDS (AQUEOUS PHASE) 3/11/2014

Sample ID	Sample Time	Sample Location	EPA 8270C (µg/L)	
			Bis(2-Ethylhexyl) Phthalate	Naphthalene
Influent – gw	0935	Influent	**130**	12
Effluent-gw	0953	Effluent (Discharge Tank)	<9.6	<9.6
		LACSD (µg/L)	*	*
		RAG (µg/L)	5.2	15

Notes:
Only analytes positively detected in samples are presented in this table. For a complete list of constituents analyzed, refer to laboratory data package.

All samples were collected on 3/11/2014 approximately 2 hours after initiation of groundwater treatment system daily operation.

Bold	Meets or exceeds RAG.
*	LACSD substance limit concentration is 1,000 µg/L for total toxic organics, semi-volatile.
AS	Air stripper
EPA	U.S. Environmental Protection Agency
ID	Identification
LACSD	Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration.
NA	Not analyzed
RAG-	Remedial action goal (Brown and Root, 1995)
µg/L	Micrograms per liter
SVOC	Semivolatile organic compounds

TABLE 14
OPERATIONAL TEST ANALYTICAL RESULTS – SUMMARY OF DETECTED INORGANIC ANALYTES (AQUEOUS PHASE) 3/11/2014

			EPA 200.7/245.1 (mg/L)					
Sample ID	Sample Time	Sample Location	Antimony	Arsenic	Barium	Molybdenum	Nickel	Silver	Zinc
Influent – gw	0935	Influent	<0.0150	**0.0539**	0.0757	0.0816	0.0142	<0.005	0.010
Effluent-gw	0953	Effluent (Discharge Tank)	**0.0182**	0.0389	0.0713	0.0826	0.010	0.00796	0.0648
		LACSD (mg/L)	NE	3	NE	NE	12	5	25
		RAG (mg/L)	0.006	0.05	1.0	0.16	0.3	NE	5.0

Notes:
Only analytes positively detected in samples are presented in this table. For a complete list of constituents analyzed, refer to laboratory data package.

All samples were collected on 3/11/2014 approximately 2 hours after initiation of groundwater treatment system daily operation.

Bold Exceeds RAG
<# Analyte not detected, laboratory reporting limit concentration is shown.
EPA U.S. Environmental Protection Agency
gw Groundwater
ID Identification
LACSD Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration.
NE Not established
RAG Remedial action goal (Brown and Root, 1995)
mg/L Miligrams per liter

TABLE 15
OPERATIONAL TEST ANALYTICAL RESULTS – SUMMARY OF GENERAL CHEMISTRY ANALYTES (AQUEOUS PHASE) 3/11/2014

Sample ID	Sample Time	Sample Location	EPA 410.4 (mg/L)	EPA 160.2 (mg/L)	EPA 376.2 (mg/L)	EPA 335.2 (mg/L)	Field Water Quality Instrument* S.U.)	Field Water Quality Instrument* (degrees C)
			COD	Suspended Solids	Soluble Sulfides	Total Cyanide	pH	Temperature
Influent – gw	0935	Influent	110	8.8	<0.050	<0.020	6.84	16.9
Effluent-gw	0953	Effluent (Discharge Tank)	110	<1.0	<0.050	<0.020	8.07	19.1
		LACSD	NE	NE	0.1	10	>6	<60
		RAG	NE	NE	NE	NE	NE	NE

Notes:
All samples were collected on 3/11/2014 approximately 2 hours after initiation of groundwater treatment system daily operation.

*	Myron 6P Ultrameter II water quality meter
C	Celsius
EPA	U.S. Environmental Protection Agency
LACSD	Los Angeles County Sanitation District Industrial Wastewater Discharge Permit # 20574 substance limit concentration.
NE	Not established
mg/L	Milligrams per liter
µg/L	Micrograms per liter
RAG	Remedial action goal (Brown and Root, 1995)
S.U.	Standard Units

TABLE 16
OPERATIONAL TEST ANALYTICAL RESULTS – SUMMARY OF DETECTED ORGANOCHLORINE PESTICIDES AND POLYCHLORINATED BIPHENYLS (AQUEOUS PHASE) 3/11/2014

Sample ID	Sample Time	Sample Location	EPA 8081A (µg/L)	EPA 8082 (µg/L)
			Organochlorine Pesticides	Polychlorinated Biphenyls
Influent – gw	0935	Influent	ND	ND
Effluent-gw	0953	Effluent (Discharge Tank)	ND	ND
		LACSD (µg/L)	0*	0**
		RAG (µg/L)	NE	NE

Notes:
Organochlorine pesticides and polychlorinated biphenyls were not detected above the laboratory reporting limit or method detection limit concentrations in any of the samples collected.

All samples were collected on 3/11/2014 approximately 2 hours after initiation of groundwater treatment system daily operation.

*	LACSD substance limit concentration for each organochlorine pesticide is 0 µg/L
**	LACSD substance limit concentration for total detectable polychlorinated biphenyls is 0.0 µg/L.
EPA	U.S. Environmental Protection Agency
ID	Identification
LACSD	Los Angeles County Sanitation District Industrial Wastewater Discharge Permit substance limit concentration.
ND	Not detected above laboratory reporting limit or method detection limit concentrations. Refer to laboratory analytical report for reporting limit and method detection limit concentrations.
NE	Not established
RAG	Remedial action goal (Brown and Root, 1995)
µg/L	Micrograms per liter

TABLE 17
OPERATIONAL TEST FIELD SAMPLING RESULTS – SUMMARY OF DETECTED TOTAL NON-METHANE ORGANIC COMPOUNDS (VAPOR PHASE) 3/11/2014

		FID			RKI Eagle 2			
Sample Location	Time	FID (without carbon filter) TNMOCs & Methane	FID (with carbon filter) Methane	FID TNMOC[1]	VOC	Methane	Hydrogen Sulfide	Oxygen
Influent (Air Stripper Outlet / GAC Vessels Inlet)	1058	10.3	1.1	9.2	9	370	0	20.9
GAC Vessels Midpoint	1100	0.3	0	0.3	0	210	0	20.9
GAC Vessels Outlet/ PPA Vessels Inlet	1105	0.3	0	0.3	0	85	0	20.9
PPA Vessels Midpoint	1107	0.8	0	0.8	0	55	0	20.9
Effluent (PPA Vessels Outlet)	1110	1.2	0	1.2	0	65	0	20.9
Surge tank passive vent pre GAC drum	1030	>2847*	>2847*	>2847*	209	5700	0	16.2
Surge tank passive vent post GAC passive drum	1035	634.1	770.9	0[2]	0	380	0	18.3
SCAQMD (ppm)				50 / 100**	***	NA	NA	NA

Notes:
All results are reported in parts per million
All samples were collected on 3/11/2014 approximately 3 hours after initiation of groundwater treatment system daily operation.

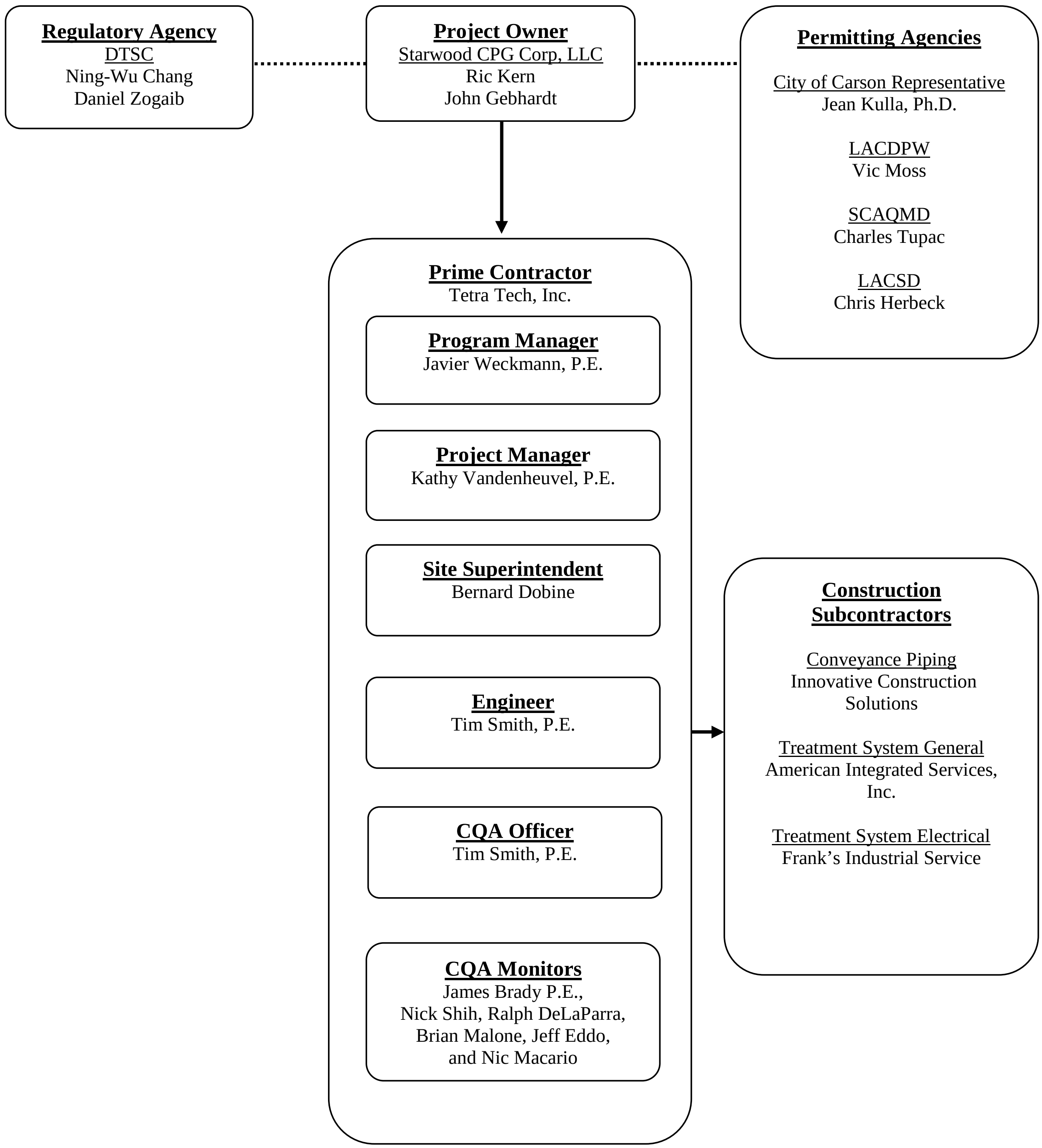
[1] Field FID TNMOC concentrations were calculated by subtracting the adjusted FID carbon filter reading (methane only) from the FID concentration reading without the carbon filter (TNMOCs and Methane).
[2] If the FID carbon filter concentration reading for methane was greater than the FID concentration reading without the carbon filter for TNMOCs and methane, then the TNMOC concentration value was assumed to be 0.0 ppm instead of a negative value.
* Result greater than the instrument detection range.
** SCAQMD limit concentration for benzene is 12.26 pounds per year and for vinyl chloride is 0.17 pounds per year.
*** SCAQMD permit substance limit concentration is 50 ppmv for TNMOC, as methane for the passive carbon canister associated with the GETS and 100 ppmv for TNMOC, as methane for the active treatment system.
FID Flame ionization detector (Thermo TVA1000B calibrated with Hexane 50 ppm in air)

TABLE 17
OPERATIONAL TEST FIELD SAMPLING RESULTS – SUMMARY OF DETECTED TOTAL NON-METHANE ORGANIC COMPOUNDS (VAPOR PHASE) 3/11/2014

GAC	Granular activated carbon
NA	Not applicable
PPA	Potassium permanganate
ppm	Parts per million
ppmv	Parts per million by volume
RKI Eagle 2	4 Gas Detector Instrument
SCAQMD	South Coast Air Quality Management District permit to operate substance limit concentration
TNMOC	Total non-methane organic compounds

FIGURES

FIGURE 1 - ORGANIZATION CHART



Notes:

Lines of Authority

Lines of Communication

APPENDIX G6 DTSC APPROVAL LETTER OF GETS RACR (JUNE 2016)

Matthew Rodriquez
Secretary for
Environmental Protection

Department of Toxic Substances Control

Barbara A. Lee, Director
5796 Corporate Avenue
Cypress, California 90630

Edmund G. Brown Jr.
Governor

June 27, 2016

Mr. Javier Weckmann, P.E.
Vice President
Tetra Tech, Incorporated
20400 Main Street
Carson, California 90745

REMEDIAL ACTION COMPLETION REPORT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM FOR THE UPPER OPERABLE UNIT, CAL COMPACT LANDFILL, 20400 MAIN STREET, CARSON, CALIFORNIA (Site Code: 401716)

Dear Mr. Weckmann:

The Department of Toxic Substances Control (DTSC) has reviewed the revised *Remedial Action Completion Report Groundwater Extraction and Treatment System for the Upper Operable Unit* (RACR) and has found it to be acceptable.

Should you have any questions or comments, please feel free to contact me at Daniel.Zogaib@dtsc.ca.gov or at (714) 484-5483.

Sincerely,

Daniel K. Zogaib
Project Manager
Brownfields and Environmental Restoration Program