Jurek, Anne, Env. Health

From: Ian Sutherland <isutherland@accenv.com>
Sent: Wednesday, March 15, 2017 11:17 AM
To: Jurek, Anne, Env. Health
Cc: amunoz@midpen-housing.org; aujimori@midpen-housing.org
Subject: Re: ACEH Correspondence RO3179
Attachments: Draft Subsurface Investigation Work Plan_1625 Chestnut Street, Livermore_3.15.17_ACC Environmental Consultants.pdf

Good afternoon Anne,

Attached please find the Draft Work Plan for 1625 Chestnut Street, Livermore in response to ACDEH correspondence dated October 24, 2016. It's been a while since we last corresponded, have you had a chance to review the email I sent last November (please see below)? At the discretion of ACDEH we'd like to adjust the attached Draft Work Plan in order to reflect the comments below. We appreciate your input on this matter, please let me know if you have any questions or would like to discuss.

Thanks

Ian Sutherland, PG
Project Manager
ACC Environmental Consultants
7977 Capwell Drive, Suite 100
Oakland, California 94621

Office: 510.638.8400 x110
Cell: 510.773.0752
Fax: 510.638.8404

On Tue, Nov 29, 2016 at 12:56 PM, Ian Sutherland <isutherland@accenv.com> wrote:

> Good afternoon Anne,
>
> Hope you had a nice Thanksgiving. I just have a couple questions regarding the draft work plan for 1625 Chestnut Street. The October 24, 2016 ACEH letter requesting a draft work plan notes that samples collected from 0-5 ft bgs were not analyzed for naphthalene. Please see the attached Table 4 indicating that URS samples between 0 and 5 ft bgs in the vicinity of the former gas station were analyzed for naphthalene and other PNAs. I additionally attached the updated Table 3, which has been revised to show the correct reporting limits for MBTEX. ACC's opinion is that the 0 to 5 ft bgs range in the vicinity of the former gasoline service station has been sufficiently characterized for TPH-g/-d/-mo, MBTEX and PNAs. Based on available data, URS did not use silica gel cleanup for TPH analyses, so we already have conservative TPH concentrations. In an effort to lessen analytical costs we respectfully request that ACEH consider whether additional characterization is required in the 0 to 5 ft bgs range in the area of the former gasoline service station.
>
> ACC agrees that additional sampling from 5 to 10 ft bgs at the location of the former gasoline service station is warranted. In an effort to minimize analytical costs, would it be acceptable to analyze all TPH samples (including other areas of the Site) without silica gel cleanup and half of those with silica gel cleanup (or vice versa)?

The ACEH letter requests that a soil vapor sample be collected at the base of the proposed elevator shaft as well as at locations where BTEX was detected in soil and groundwater. Although minor concentrations of BTEX were detected in soil vapor, BTEX has not been detected in soil or groundwater at the site. At this point it looks like we'd be collecting only one soil vapor sample at the base of the elevator shaft. Are any soil vapor sample duplicates warranted for one sample? Is that a location where we'd want to consider multiple depths?

Thank you for your assistance, we appreciate your feedback.

Ian Sutherland, PG
Project Manager
ACC Environmental Consultants
7977 Capwell Drive, Suite 100
Oakland, California 94621

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On Tue, Oct 25, 2016 at 8:28 AM, dehloptoxic, Env. Health <deh.loptoxic@acgov.org> wrote:

> Dear Interested Parties,
>
> Attached is Alameda County Environmental Health's (ACEH) correspondence for your case, RO0003179
>
> Please add our email address to your book to prevent future e-mails from being filtered as spam.
>
> Sincerely,
>
> ACEH

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DRAFT SUBSURFACE INVESTIGATION WORK PLAN

1625 CHESTNUT STREET
LIVERMORE, CALIFORNIA 94551
GEOTRACKER GLOBAL ID: T10000007202
ACC PROJECT NUMBER 6988-003.04

MARCH 15, 2017

SUBMITTED TO:

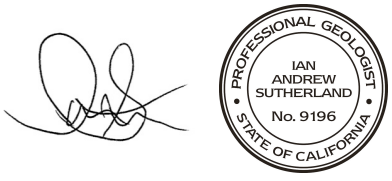
ALAMEDA COUNTY DEPARTMENT OF ENVIRONMENTAL HEALTH
1131 HARBOR BAY PARKWAY
ALAMEDA, CA 94502

PREPARED ON BEHALF OF:

MIDPEN HOUSING CORPORATION
1970 BROADWAY, SUITE 440
OAKLAND, CALIFORNIA 94612

PREPARED BY:

ACC ENVIRONMENTAL CONSULTANTS, INC



IAN SUTHERLAND, PG
PROJECT MANAGER

ACC PROJECT NUMBER 6988-003.03

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APPENDICIES

1.0 INTRODUCTION

On behalf of MidPen Housing Corporation (Client), ACC Environmental Consultants, Inc. (ACC) has prepared this Draft Subsurface Investigation Work Plan for 1625 Chestnut Street, Livermore, California (Site). The Site includes the addresses 1625 Chestnut Street (APN 98-290-11-1), 1635 Chestnut Street (APN 98-290-6-7), 1715 Chestnut Street (APN 98-249-1-3), 1763 Chestnut Street (APN 98-249-1-5) and 217 North Street (APN 98-249-1-4). APN boundaries are shown on the attached Appendix A. The purpose of this Work Plan is to describe the sampling procedures that will be conducted to further assess subsurface conditions at the Site with regard to proposed residential development. This Work Plan was prepared in response to Alameda County Department of Environmental Health (ACDEH) correspondence dated October 24, 2016 (Appendix B).

This Work Plan addresses the following:

- Additional soil and soil vapor sampling to further assess subsurface conditions at the location of the former gasoline service station at 1625 Chestnut Street;
- Assessment of soil conditions at proposed bioretention areas;
- Additional assessment of soil conditions at the eastern half of the Site with regard to proposed redevelopment, and at locations where total petroleum hydrocarbons (TPH) and polynuclear aromatic hydrocarbons (PAHs) were previously;
- Additional assessment of soil conditions at the southern property boundary near the south-adjacent railroad tracks; and
- Assessment of soil conditions adjacent to an existing hydraulic lift and transformer.

A California-licensed Professional Geologist (PG) will oversee activities described in this work plan.

2.0 BACKGROUND

The Site is situated along the southern portion of Chestnut Street between North N Street and North P Street in the City of Livermore and is currently developed with a vacant commercial building (constructed during 1978) and associated paved areas (Figures 1 & 2). Commercial structures formerly existing at the eastern half of the Site were demolished during 2006. The surrounding properties are mixed commercial and residential.

Proposed Site redevelopment includes construction of multi-family residential structures (Figure 3). Residential structures at the west portion of the Site will be constructed on subsurface parking structures extending up to approximately 10 feet below ground surface (ft bgs). The approximate locations of the proposed subsurface parking structures are included on the attached Figure 4. Residential structures at the east portion of the Site will be constructed at grade.

The Site was developed primarily as residential prior to the 1960s. A gasoline service station formerly existed at the northwest portion of the Site from the 1960's to the 1970's. The former gasoline service station layout is shown in the attached Appendix C and Figure 2. At this time there is no available documentation with regard to the removal of the former underground storage tanks (USTs) associated with the former gasoline service station, however subsurface investigations conducted up-to-date including a subsurface geophysical investigation indicate that the USTs associated with the former gasoline service station have been removed.

The southwestern portion of the Site appears to have been used as a cattle staging area during the 1940's and 1950's.

Analytical data from previous subsurface investigations is attached as Tables 1 through 4. Previous soil boring locations are shown on the attached Figures 2 and 3.

1989: Kleinfelder conducted a Phase II ESA consisting of three exploratory soil borings advanced at the approximate location of a former UST and at each of the two former pump island locations associated with the former gasoline service station (1625 Chestnut Street). Soil borings were advanced to approximately 25 ft bgs and seven soil samples were submitted for analysis of gasoline, diesel and motor oil-range total petroleum hydrocarbons (TPH-g, TPH-d and TPH-mo, respectively), benzene, toluene, ethylbenzene and xylenes (BTEX). TPH-mo was detected in one sample (soil boring B3 at 10 ft bgs) at a concentration of 20 milligrams per kilogram (mg/kg). TPH-mo was not detected in the remaining samples. TPH-g, TPH-d and BTEX were not detected during the investigation. The report noted that groundwater is anticipated at approximately 50 ft bgs.

2000: M.J. Kloberdanz & Associates conducted a Phase I ESA for 1625 and 1635 Chestnut Street. The Phase I ESA report recommended no additional investigations based on the results of the 1989 Kleinfelder Phase II ESA, but concluded that groundwater impacts associated with the former gasoline station or off-site sources could not be ruled out at that time.

2004: AEI performed a Phase I ESA Update for 1625 and 1635 Chestnut Street. The Phase I ESA report recommended no further investigation in connection with the former gasoline service station based on the results of the 1989 Kleinfelder Phase II ESA.

2007: Enercon Services, Inc. conducted a Phase I ESA for 1625 and 1635 Chestnut Street. The Enercon Services, Inc. Phase I ESA report identified the former gasoline service station as a recognized environmental condition (REC) and noted data gaps in the Kleinfelder 1989 Phase II ESA report.

2007: Fugro West Inc. conducted a Phase I ESA for 1715 Chestnut Street, 1763 Chestnut Street, 217 North N Street and other off-site parcels adjacent to the east of North N Street. No RECs were identified specifically at 1715 Chestnut Street, 1763 Chestnut Street or 217 North N Street, however the 2007 Fugro West Inc. Phase I ESA report noted the potential for subsurface contamination associated with the south-adjacent railroad tracks, and additionally noted an off-site, historic oil storage building.

2008: Fugro West, Inc. conducted a Phase II ESA that included the advancement of five 15-foot soil borings at 1715 Chestnut Street, 1763 Chestnut Street and 217 North N Street. No RECs were identified specifically at these properties and ACC's understanding is that the sampling at these properties was conducted to assess general site conditions with regard to proposed redevelopment. Soil samples from between 0 and 7.5 ft bgs were analyzed for VOCs, arsenic and lead. One soil sample was additionally analyzed for CAM-17 metals. VOCs were not detected in these soil borings and metals concentrations were consistent with naturally occurring background concentrations. Tetrachloroethene (PCE) was detected in groundwater off-site (approximately 50 ft bgs) at concentrations that reportedly do not pose a human health risk. PCE detected in groundwater was attributed to off-site sources.

2009: Enercon Services, Inc. performed a Phase I ESA for 1625 Chestnut Street. Three soil borings were advanced up to approximately 49 ft bgs in the vicinity of the former UST. Soil samples were collected at the base of each soil boring and at approximately 15 ft bgs (the presumed base of the former UST). TPH-g, TPH-d, TPH-mo and BTEX were not detected. Groundwater was not encountered during that investigation.

2011: URS conducted a subsurface investigation at 1625 and 1635 Chestnut Street. A total of 14 soil borings were advanced, five groundwater samples were collected from between approximately 45 and 50 ft bgs. In addition, five soil vapor samples were collected from approximately 5 ft bgs.

TPH-g, VOCs and OCPs were not detected in soil. TPH-d and TPH-mo were detected up to respective concentrations of 140 and 670 mg/kg, which does not exceed the current RWQCB human health risk screening levels for direct exposure at residential properties (published February 2016, Rev3). Additional sampling for TPH was recommended by URS at the location of soil borings C1, C3, C4, C5, C5, C7 and C8. Based on available data it appears to ACC that silica gel cleanup was not conducted by the laboratory for TPH-d and TPH-mo analyses during this investigation.

The PNA benzo(a)pyrene was detected at 2 ft bgs at soil boring B10 at a concentration of 0.021 mg/kg, which slightly exceeds the current RWQCB HHRSL of 0.016. Metals concentrations were consistent with naturally occurring background concentrations.

PCE was detected in groundwater at concentrations of up to 15 ug/L and was detected in soil vapor samples at concentrations of up to 7.3 micrograms per cubic meter (ug/m^3), which does not exceed the current RWQCB HHRSL of 240 ug/m^3 for vapor intrusion concerns. Volatile gasoline constituents were additionally detected in soil vapor at concentrations less than corresponding RWQCB HHRSLs for vapor intrusion concerns.

Available data indicates that PCE detected in groundwater has migrated from an off-site source. As stated in the 2011 URS subsurface investigation report:

> Review of the groundwater investigation conducted by Treadwell and Rollo (Treadwell and Rollo, 2009) at the nearby LASC/MOSC sites indicates that the Chestnut Street site

is directly downgradient of the shallow groundwater PCE plumes associated with the LASC/MOSC sites. The April 2009 plume map in the Treadwell and Rollo report for shallow-zone PCE contamination (25 feet to 75 feet bgs) shows that the PCE plumes extend to the railroad tracks south of the Site. The highest concentration in the shallow PCE plumes identified by Treadwell and Rollo (2009), upgradient of the Site was 28 ug/L, which is higher than the onsite PCE concentrations found in groundwater. Additional migration of the contaminant plume would have occurred between April 2009 and the date of the current investigation (February 2011). It is likely that PCE concentrations detected in groundwater sampled during this TSI are attributable to an off-site, upgradient source.

A subsurface geophysical investigation was additionally conducted. Results of the geophysical investigation indicate that the USTs associated with the former gasoline service station were removed. No additional investigations were recommended with regard to the former gasoline service station.

2013: ACC advanced six soil borings to depths of between 20 and 48 feet bgs at the location of the former gasoline service station at 1625 Chestnut Street. TPH-g, TPH-mo and VOCs were not detected. TPH-d was detected up to concentrations of 4.8 mg/kg. Silica gel cleanup was conducted for TPH-d and TPH-mo analyses. Groundwater was not encountered. ACC recommended no further investigation with regard to the former gasoline service station.

2015: ACC conducted a Phase I ESA in 2015 for 1625, 1635, 1715 and 1763 Chestnut Street, and 217 North N Street. The Phase I ESA recommended that case closure be requested with regard to the former gasoline service station.

Based on available data the base of the UST pit is approximately 13 ft bgs. ACC soil boring B1 (2013) was advanced in the UST pit based on field observations. Kleinfelder soil borings B-1 and B-3 (1989) appear to have been advanced in the UST pit, however soil borings logs from that investigation are not currently available. Enercon soil boring B1 (2009) appears to have been advanced adjacent to or very near the UST pit. Soil data from these soil borings do not suggest significant subsurface impacts associated with the former USTs.

3.0 GEOLOGY & HYDROGEOLOGY

First groundwater at the Site is approximately 45 to 50 ft bgs. The nearest surface water is the Arroyo Mocho Creek located approximately 0.6 miles south of the Site. Soils encountered at the typically consist of silty-clays with varied amounts of sand and gravel, as well as gravel lenses with varied amounts of silt and sand. A comprehensive description of the local geology and subsurface at the Site is attached as Appendix D (REF).

4.0 PROPOSED SUBSURFACE SAMPLING

4.1 Soil Sampling Methodology

A project-specific Environmental Health & Safety Plan (EHASP) will be prepared and a soil boring permit will be obtained from the Zone 7 Water Agency prior to drilling. Filed conditions, observations and deviations from this work plan will be noted in the field.

Soil borings will be advanced via a hydraulic direct-push rig equipped with two-inch-diameter drill rods containing acetate liners designed to retrieve subsurface soils. Soil samples will be collected by isolating the desired soil interval within the acetate liner and subsequently capping the ends with plastic sheeting and tight-fitting plastic caps. Shallow soil borings (less than 4 ft bgs) may be sampled using a hand auger and a slide hammer equipped with stainless steel tubes that will subsequently be capped with plastic sheeting and tight-fitting plastic caps. When hand augering is conducted, the sample depth will consist of the approximate six inches of underlying soil from that depth (i.e. a sample collected at 2 ft bgs via hand augering would include soil from approximately 2.0 to 2.5 ft bgs). Subsequent to collection, samples will be stored on ice and transported to a California DPH-certified laboratory following chain-of-custody protocol.

Recovered soil cores will be logged in the field. Soil cores will be screened for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID). Soil cuttings will be containerized and stored on-site in a labeled 55-gallon drum pending waste characterization and off-haul by a licensed contractor. Waste characterization will be based on State and Federal hazardous waste criteria.

Exploratory soil borings will be backfilled to surface grade with neat cement slurry per applicable California Department of Water Resources (DWR) and Zone 7 Water Agency regulations.

4.2 Soil Vapor Sampling Methodology

Soil vapor sampling will be conducted based on the document *Advisory – Active Soil Gas Investigations* prepared by the Department of Toxic Substances Control (April 2012). Soil vapor borings will be advanced via a hydraulic direct-push rig. Dedicated sample probes and Teflon tubing will be installed to the desired depth using a PVC pipe. Six inches of kiln-dried sand will be placed both above and below the probe, followed by one foot of dry bentonite. The soil boring will subsequently be backfilled to ground surface with hydrated bentonite.

Soil vapor sampling will be conducted a minimum of two hours subsequent to installation of the soil vapor probe in order to allow subsurface conditions within the soil vapor boring to equilibrate. Dedicated one-liter SUMMA canisters and tubing will be used at each soil vapor sampling location. Shut-in tests will be conducted at each location prior to sampling in order to assess the integrity of the sample train. Approximately three volumes will be purged from the sample tubing and pore space prior to sampling. Sample flow rates will be approximately 200 millimeters per minute. Isopropyl alcohol will be utilized as a tracer gas.

Soil vapor soil borings will be backfilled to surface grade with neat cement slurry per applicable California Department of Water Resources (DWR) and Zone 7 Water Agency regulations.

4.3 Proposed Sample Locations and Analyses

Proposed sampling locations are shown on the attached Figure 4. ACC will make every attempt to advance the borings as shown on Figure 4 and relative to previous soil borings advanced at the Site based on available data, Site figures and visible markings at the Site including evidence of backfilled historical soil borings. The following table correlates with the attached Figure 4 and lists the proposed sample depths, analyses and rationale for each sample.

Boring Number	Rationale	Depth (ft bgs)	Analyeses	Additional Notes
ACC1 through ACC10	Further assess soils at the location of former gasoline service station; Assess PAHs at the 2011 URS location where PAHs where detected in soil (C2); Soil vapor sampling at ACC1 (proposed elevator pit within boundary of former gasoline service station).	4, 8 (Soil); 10 (Soil vapor at ACC1, area to be excavated to approximately 10 ft bgs).	• TPH-d & TPH-mo (8015 w/SGC & wo/SGC) • TPH-g & MBTEX (8015/8021) • PAHs (8270 SIM) • VOCs & methane (TO-15, soil vapor only)	Proposed locations address locations where TPH was detected in soil at 2011 URS locations (C1 through C5) and 2013 ACC locations (B1 and B4)
ACC11 through ACC19	Assess TPH concentrations detected in shallow soils at locations of proposed bioretention areas and general vicinity of 2011 URS soil boring locations where TPH was detected (C6 & C7)	2	• TPH-g, TPH-d & TPH-mo (8015 w/SGC & wo/SGC)	ACC11 at C6 (C6 TPH concentrations slightly higher than C7)
ACC20 through ACC26	Assess soil conditions at eastern half of Site and at 2011 URS soil boring locations where TPH was detected (C8); Assess PAHs at the 2011 URS location where PAHs where detected in soil (C10)	4, 8	• TPH-g, TPH-d & TPH-mo (8015 w/SGC & wo/SGC); • PAHs (8270 SIM) – ACC20 only	
ACC27 through ACC31	Assess soils at south Site boundary near adjacent railroad tracks & bioretention areas	2	• TPH-g, TPH-d & TPH-mo (8015 w/SGC & wo/SGC) • PAHs (8270 SIM) • PCBs (8082)	
Up to 8 locations	Assess soils at hydraulic lift & transformer	2, 8 feet at hydraulic lift; first encountered soil at transformer.	• TPH-dro (8015 w/SGC & wo/SGC); • PCBs (8082)	Samples IDs/locations to be identified in field; Locations & depths pending type of hydraulic lift and accessibility
ft bgs = feet below ground surface; w/SGC & wo/SGC = with silca gel cleanup and without silica gel cleanup; SIM = selected ion monitoring.				

5.0 QUALITY ASSURANCE/QUALITY CONTROL

5.1 Field

QA/QC procedures to be followed in the field are as follows:

- Field duplicates will be collected an analyzed for TPH analyses (with Silica Gel cleanup). 10% of the total soil samples submitted for TPH analysis (not including samples to be put on hold) will be analyzed. Sample IDs will not identify which samples correlate with the duplicate samples;
- One Equipment blank per day will be collected and submitted for analysis;
- Sampling equipment will be decontaminated prior to advancement at each soil boring location using an Alconox solution and double rinsed with potable water;
- Nitrile gloves will be worn and changed frequently (at a minimum of in between each sampling location) when handling samples in order to prevent cross-contamination of samples;
- Samples will be labeled in the field and stored on ice during transport to the laboratory. Every effort will be made to cool the samples to 4.0 degrees Celsius and chain-of-custody protocol will be followed during the sample collection and analysis;
- Pre-cleaned sample containers and preservatives will be provided by the laboratory.

5.2 Laboratory

McCampbell Analytical, Inc. (CDPH ELAP 1644, NELAP 12283CA) will be subcontracted for the proposed laboratory analyses. Laboratory QA/QC measures will include the reporting of analytical results for matrix spikes, surrogate recoveries and laboratory control samples. The most stringent of control procedures are used by the laboratory in cases where multiple controls are offered. Written procedures to monitor routine quality controls including acceptance criteria are located in the test method SOPs, and include such procedures as:

- Observing all holding times for sample preparation, extraction and analyses;
- Use of laboratory control samples and blanks to serve as positive and negative controls for chemistry methods;
- Use of laboratory control samples to monitor test variability of laboratory results;
- Use of calibrations, continuing calibrations, certified reference materials and/or PT samples to monitor accuracy of the test method;
- Measurements to monitor test method capability, such as limit of detection, limit of quantitation, and/or range of test applicability, such as linearity;
- Use of regression analysis, internal/external standards, or statistical analysis;
- Use of reagents and standards of appropriate quality;
- Procedures to ensure the selectivity of the test method;
- Measures to assure constant and consistent test conditions, such as temperature, humidity, rotation speed, etc., when required by test method; and
- Use of surrogate standards in organic methods, method specific requirements or lab

generated.

For QA/QC measures, ACC will review the laboratory reports with regard to dilutions factors, reporting limits, sample holding times, data qualifiers, matrix spikes, surrogate recoveries, laboratory control samples and duplicate sample results, and note pertinent information and/or discrepancies in the final report in the event that the data quality objectives are not met.

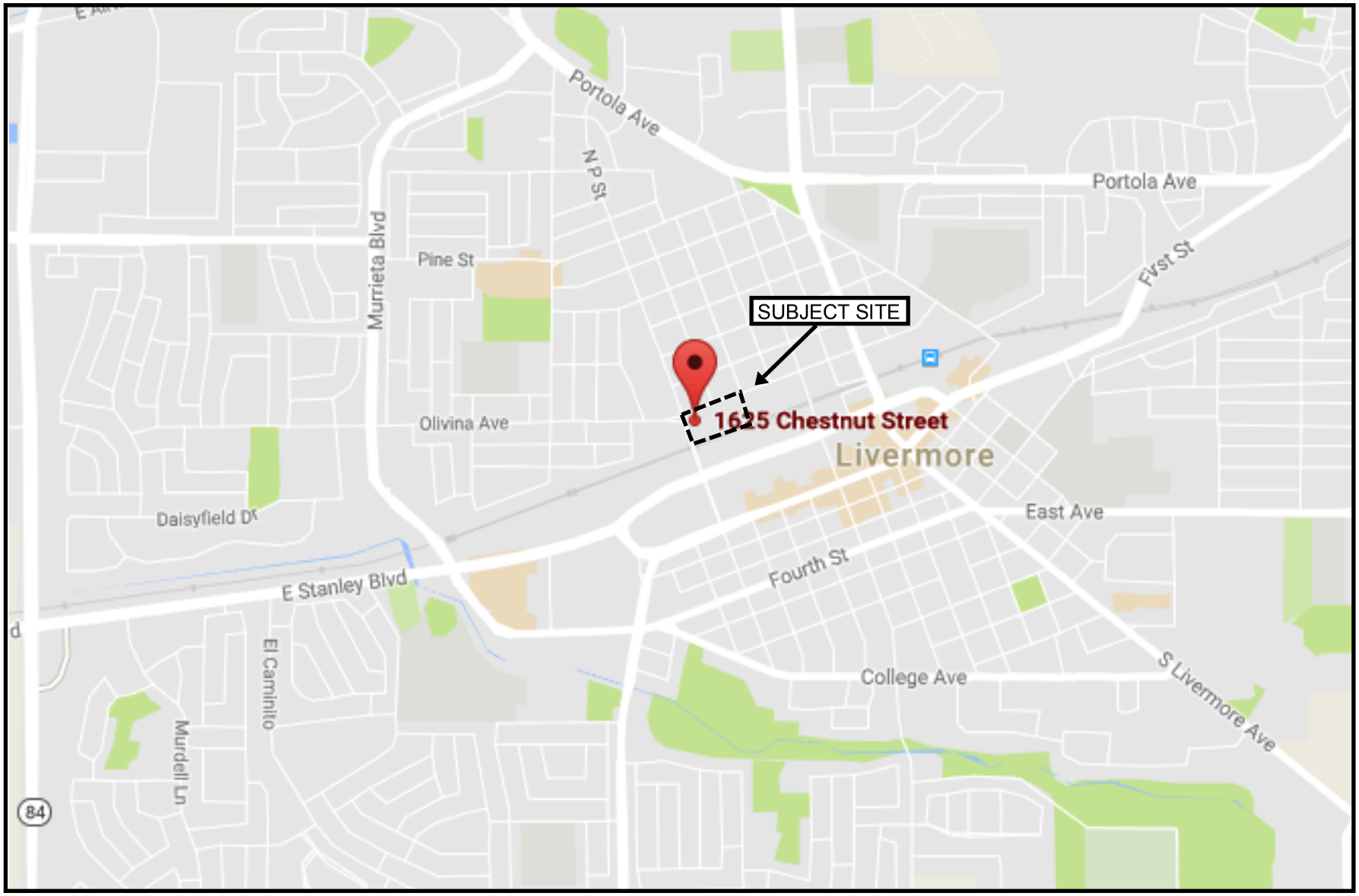
6.0 REPORTING

A digital report documenting sampling methodologies, sampling locations, analytical results, conclusions and recommendations will be prepared and submitted to the ACDEH via the GeoTracker database. The report will be reviewed and signed by a State of California-licensed Professional Geologist.

7.0 AGENCY NOTIFICATION

ACDEH will be notified of all scheduled fieldwork, as well as deviations from this work plan and unexpected or previously undocumented subsurface contamination observed by ACC.

FIGURES 1 - 4



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SITE VICINITY MAP
1625 CHESTNUT STREET
LIVERMORE, CALIFORNIA

N
W E
S

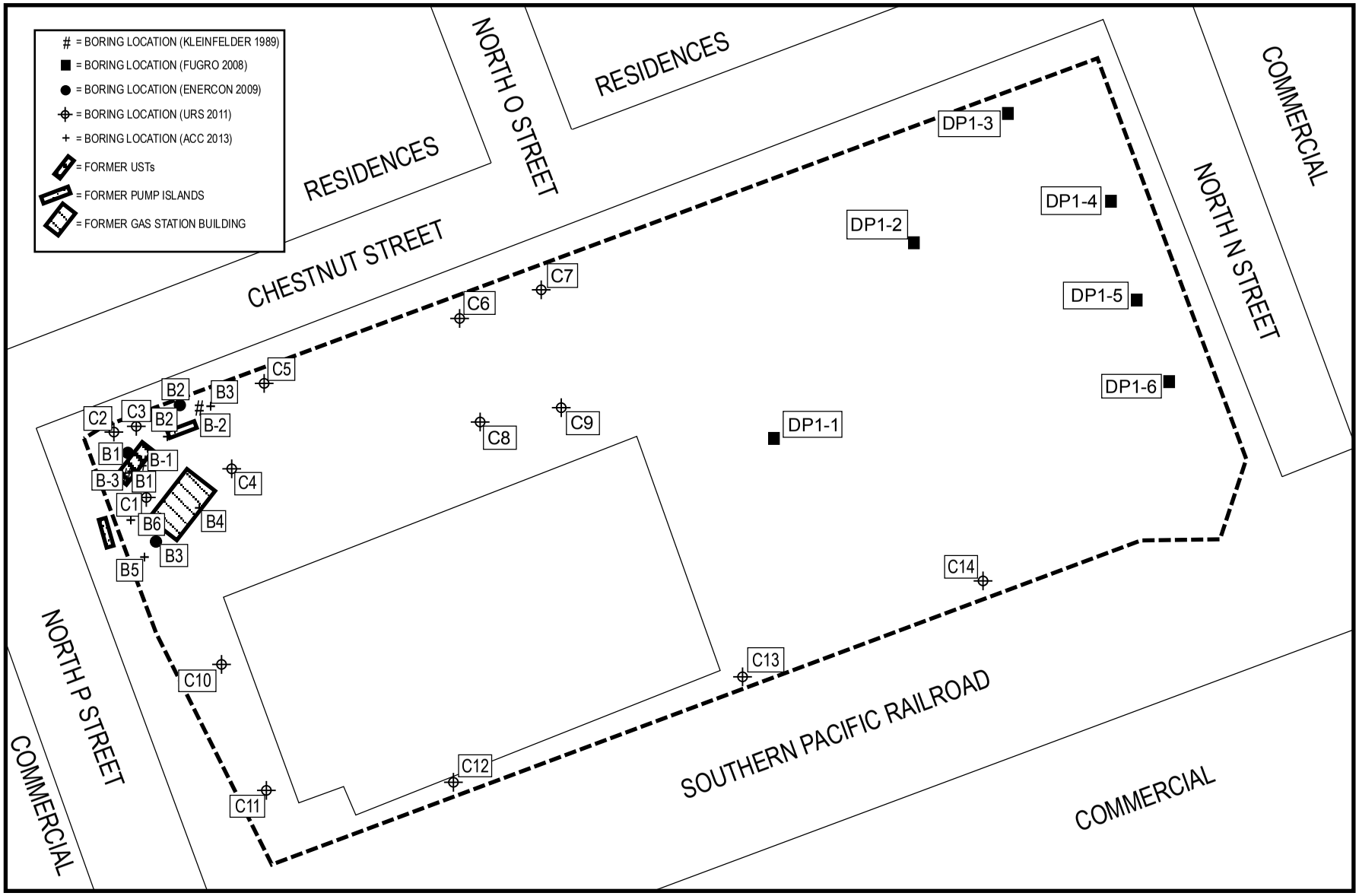
APPROXIMATE SCALE (FEET)
0 2000 4000

PROJECT: 6988-008.03

SUBJECT PROPERTY

FIGURE 1

ALL DIMENSIONS & LOCATIONS APPROXIMATED



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HISTORIC SAMPLING LOCATIONS
1625 CHESTNUT STREET
LIVERMORE, CALIFORNIA

N
W E
S

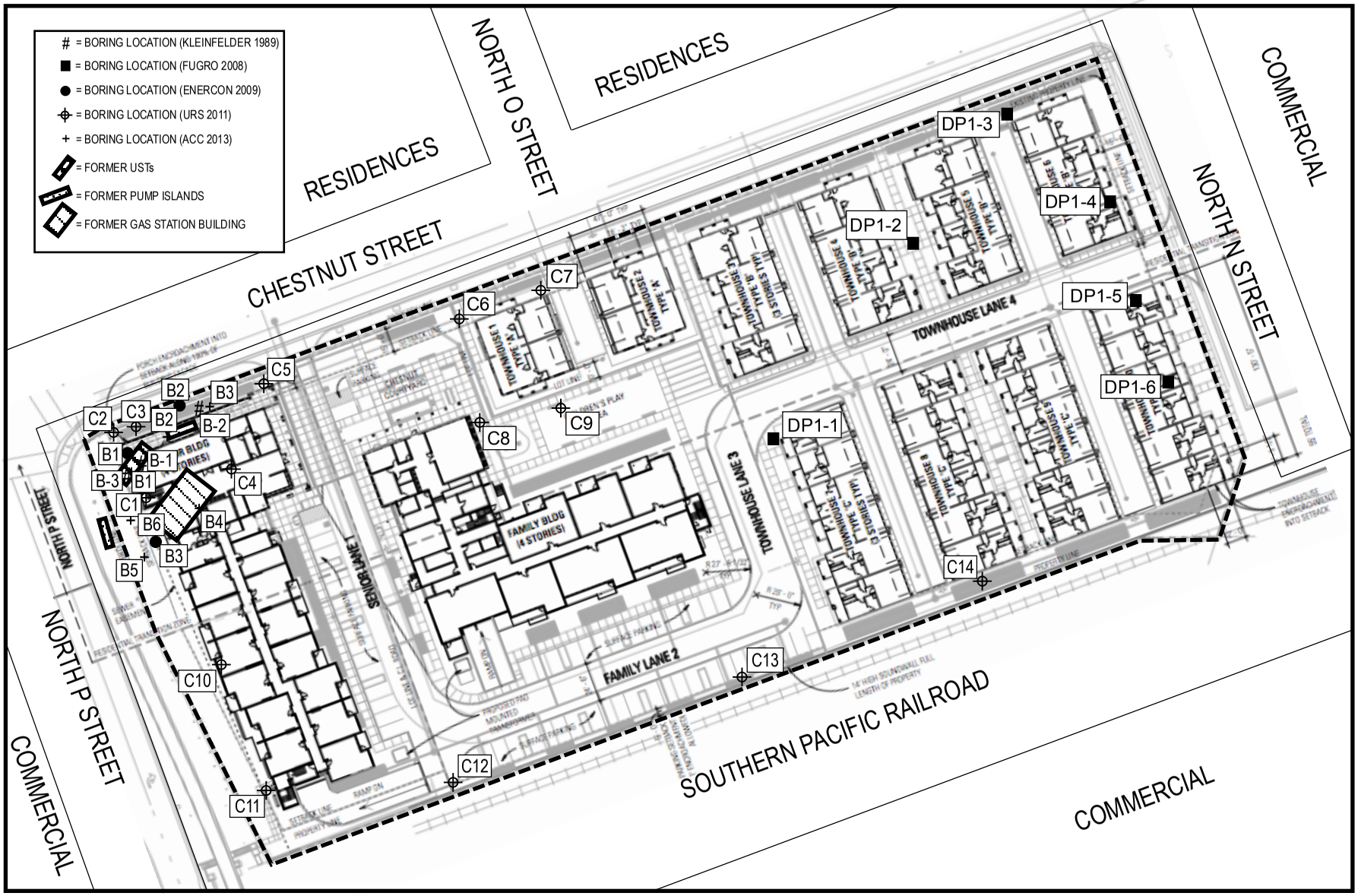
APPROXIMATE SCALE (FEET)
0 80 160

PROJECT: 6988-003.02

9.30.16

FIGURE 2

ALL DIMENSIONS & LOCATIONS APPROXIMATED



ACC ENVIRONMENTAL CONSULTANTS
An Employee Owned Company

PROPOSED BUILDING LAYOUT
(WITH HISTORIC SOIL BORING LOCATIONS)
1625 CHESTNUT STREET
LIVERMORE, CALIFORNIA

N
W E
S

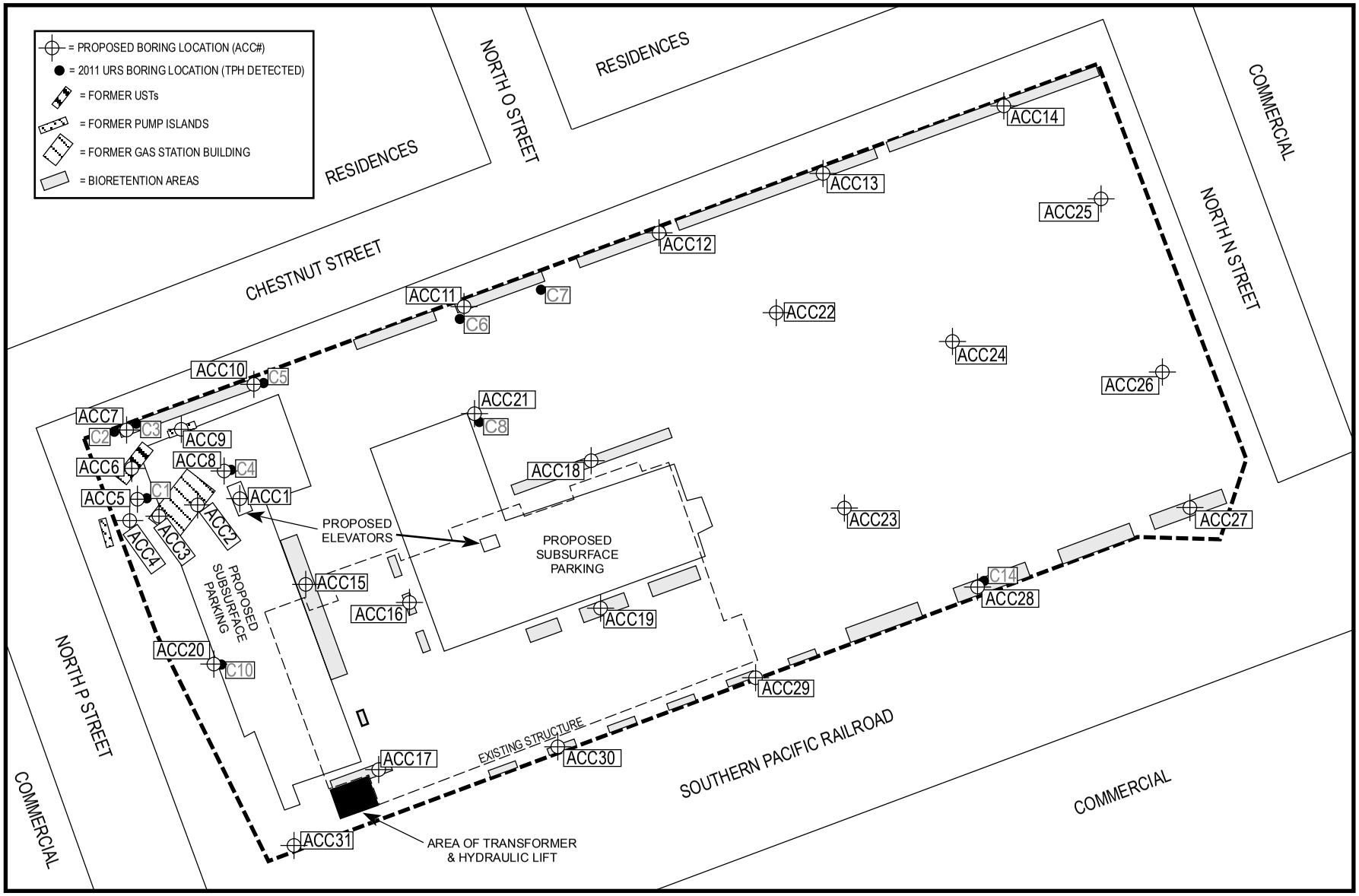
APPROXIMATE SCALE (FEET)
0 80 160

PROJECT: 6988-003.02

9.30.16

FIGURE 3

ALL DIMENSIONS & LOCATIONS APPROXIMATED



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PROPOSED SOIL BORING LOCATIONS
1625 CHESTNUT STREET
LIVERMORE, CALIFORNIA

N
W E
S

APPROXIMATE SCALE (FEET)
0 80 160

PROJECT: 6988-003.02

02.15.17

FIGURE 4

ALL DIMENSIONS & LOCATIONS APPROXIMATED

TABLES 1 - 4

TABLE 1
Groundwater Analytical Results Summary (TPHs, VOCs & Metals)
1625 Chestnut Street, Livermore, CA
ACC Project Number: 6988-003.02

Company	Sample Date	Sample ID	Chemical Compound & Concentrations (ug/L)																								
			TPH-g	TPH-d	TPH-mo	Benzene	Ethylbenzene	Toluene	Total Xylenes	MTBE	Naphthalene	tert-Butylbenzene	Tetrachloroethene	Trichloroethene	Vinyl Chloride	Other VOCs	Barium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Vanadium	Zinc	Mercury	Other Metals
Fugro West, Inc.	2007	**A1-1**	–	–	–	<1.0	<1.0	<1.0	<2.0	<0.5	<2.0	<2.0	**16**	<1.0	<1.0	ND	–	–	–	--	--	--	--	–	–	–	--
URS Corporation	2.17.11	**C1GW**	<50	<55	<110	<0.5	<0.5	<0.5	<1.0	<0.5	<1.0	<1.0	**13**	**0.71**	<0.5	ND	**0.43**	**0.015**	**0.011**	**<0.02**	**0.0051**	**0.01**	**0.081**	**0.011**	<0.02	<0.0002	ND
		C2GW	<50	**130**	**400**	<0.5	<0.5	<0.5	<1.0	<0.5	<1.0	<1.0	**14**	<0.50	<0.5	ND	**0.47**	**0.086**	**0.024**	**0.044**	**0.0059**	**0.015**	**0.27**	**0.035**	**0.042**	<0.0002	ND
		C9GW	<50	**72**	**190**	<0.5	<0.5	<0.5	<1.0	<0.5	<1.0	<1.0	**15**	**0.53**	<0.5	ND	**1.2**	**0.029**	**0.031**	**0.039**	**0.0094**	**0.016**	**0.15**	**0.022**	**0.029**	**0.0005**	ND
		C12GW	<50	<62	**120**	<0.5	<0.5	<0.5	<1.0	<0.5	<1.0	<1.0	**2.4**	<0.50	<0.5	ND	**0.35**	<0.01	**0.0023**	<0.02	<0.005	<0.01	**0.016**	<0.01	<0.02	<0.0002	ND
		C14GW	<50	**69**	**82**	<0.5	<0.5	<0.5	<1.0	<0.5	<1.0	<1.0	**13**	**0.98**	<0.5	ND	**0.30**	<0.01	**0.0087**	<0.02	<0.005	**0.034**	**0.055**	<0.01	<0.02	<0.0002	ND
MCL Priority (Table GW-1)			220	150	--	1.0	30	40	20	5.0	0.17	--	5.0	5.0	0.5	–	1000	50	6.0	1000	15	100	100	50	5000	2.0	--
Vapor Intrusion HHR SLs (GW-3, fine-coarse mix, residential)			--	--	--	30	370	1.00E+05	3.80E+04	100	180	--	100	170	2.0	–	--	--	--	--	--	--	–	--	--	--	--

TPH=Total Petroleum Hydrocarbons specified as gasoline-range (TPH-g), diesel-range (TPH-d) and motor oil-range (TPH-mo); VOCs = Volatile Organic Compounds; ug/L = micrograms per liter; MCL = US EPA Maximum Contaminant Levels; HHR SLs = Human Health Risk Screening Levels published by the San Francisco Bay Regional Water Quality Control Board (February 2016).

TABLE 2
Soil Vapor Analytical Results Summary
1625 Chestnut Street, Livermore, CA
ACC Project Number: 6988-003.02

Company	Sample Date	Sample ID	Chemical & Concentration (ug/m3)																
			Benze ne	Ethylbenzene	Toluene	Total Xylenes	Tetrachloroethene	Trichloroethene	Vinyl Chloride	Propylene	1,3-Butadiene	Acetone	Carbon Disulfide	n-Hexane	2-Butanone	Cyclohexane	n-Heptane	Bromoform	Other VOCs
URS Corporation	2.16.11	**C1-SG**	**2.8**	**1.5**	**4.8**	**5.6**	<0.89	<0.89	<0.89	**33**	**4.4**	**11**	<0.89	**1.1**	**2.1**	**5.0**	**1.0**	**0.96**	ND
		C2-SG	**1.7**	<0.92	**1.6**	<0.92	**0.94**	<0.92	<0.92	**48**	<0.92	**5.6**	<0.92	**31**	<0.92	**6.1**	**7.8**	**0.95**	ND
		C3-SG	<0.87	<0.87	<0.87	<0.87	**6.8**	<0.87	<0.87	**3.3**	<0.87	<3.5	<0.87	<0.0082	<0.87	<0.87	<0.87	<0.87	ND
		C3-SG (DUP)	<0.87	<0.87	<0.87	<0.87	**6.8**	<0.87	<0.87	<0.87	<0.0019	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	ND
		C4-SG	**4.4**	**1.3**	**4.2**	**3.3**	**7.3**	<0.94	<0.94	**96**	**6.5**	**8.3**	<0.94	**2.0**	**1.2**	**8.2**	**1.5**	**2.6**	ND
		C5-SG	**12**	**14**	**21**	**43**	**5.1**	<0.91	<0.91	**320**	**35**	**16**	**1.8**	**6.7**	**3.3**	**7.4**	**3.7**	**2.1**	ND
Soil Gas Vapor Intrusion HHR SLs (Table SG-1, residential)			48	560	1.60E+05	5.20E+04	240	240	4.7	–	--	1.60E+07	--	–	--	--	--	--	--

ug/m3 = micrograms per cubic meter; VOCs = Volatile Organic Compounds; HHR SLs = Human Health Risk Screening Levels published by the San Francisco Bay Regional Water Quality Control Board (February 2016); C3-SG DUP identified as C6-SG in URS report.

TABLE 3
Soil Analytical Results Summary (TPH, VOCs & OCPs)
1625 Chestnut Street, Livermore, CA
ACC Project Number: 6988-003.02

Company	Sample Date	Sample ID	Chemical Compound & Concentrations (mg/kg)												
			TPH-g	TPH-d	TPH-mo	MTBE	Benzene	Toluene	Ethylbenzene	Total Xylenes	Acetone	Naphthalene	Tetrachloroethene	Other VOCs	OCPs
Kleinfelder	1989	**B-1 (10.5')**	<0.1	<10	<20	--	<0.0005	<0.0005	<0.0005	<0.002	--	--	--	--	--
		B-1 (14.5')	<0.1	<10	<20	--	<0.0005	<0.0005	<0.0005	<0.002	--	--	--	--	--
		B-2 (2.5')	<0.1	<10	<20	--	<0.0005	<0.0005	<0.0005	<0.002	--	--	--	--	--
		B-2 (5.0')	<0.1	<10	<20	--	<0.0005	<0.0005	<0.0005	<0.002	--	--	--	--	--
		B-2 (15.0')	<0.1	<10	<20	--	<0.0005	<0.0005	<0.0005	<0.002	--	--	--	--	--
		B-3 (10.0')	<0.1	<10	<20	--	<0.0005	<0.0005	<0.0005	<0.002	--	--	--	--	--
		B-3 (15.0')	<0.1	<10	<20	--	<0.0005	<0.0005	<0.0005	<0.002	--	--	--	--	--
Fugro West, Inc.	12.4.07	**DP1-1 @ 0'**	--	--	--	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.049	<0.0098	<0.0049	ND	--
		DP1-1 @ 2'	--	--	--	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.50	<0.010	<0.0050	ND	--
		DP1-1 @ 7.5'	--	--	--	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<0.048	<0.0097	<0.0048	ND	--
		DP1-2 @ 0'	--	--	--	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<0.048	<0.0097	<0.0048	ND	--
		DP1-2 @ 2'	--	--	--	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.50	<0.010	<0.0050	ND	--
		DP1-2 @ 7.5'	--	--	--	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.049	<0.0098	<0.0049	ND	--
		DP1-3 @ 0'	--	--	--	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.50	<0.010	<0.0050	ND	--
		DP1-3 @ 2'	--	--	--	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<0.048	<0.0097	<0.0048	ND	--
		DP1-3 @ 7.5'	--	--	--	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.049	<0.0098	<0.0049	ND	--
		DP1-4 @ 0'	--	--	--	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.50	<0.010	<0.0050	ND	--
		DP1-4 @ 2'	--	--	--	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<0.048	<0.0097	<0.0048	ND	--
		DP1-4 @ 7.5'	--	--	--	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.049	<0.0098	<0.0049	ND	--
		DP1-5 @ 0'	--	--	--	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.049	<0.0098	<0.0049	ND	--
		DP1-5 @ 2'	--	--	--	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.049	<0.0098	<0.0049	ND	--
		DP1-5 @ 7.5'	--	--	--	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.50	<0.010	<0.0050	ND	--
		DP1-6 @ 0'	--	--	--	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.049	<0.0098	<0.0049	ND	--
		DP1-6 @ 2'	--	--	--	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<0.048	<0.0097	<0.0048	ND	--
		DP1-6 @ 7.5'	--	--	--	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.050	<0.010	<0.0050	ND	--
Enercon Services, Inc.	8.18.09	**B-1-15'**	<10	<10	<10	--	<0.0050	<0.0050	<0.0050	<0.010	--	--	--	--	--
		B-1-49'	<10	<10	<10	--	<0.0050	<0.0050	<0.0050	<0.010	--	--	--	--	--
		B-2-15'	<10	<10	<10	--	<0.0050	<0.0050	<0.0050	<0.010	--	--	--	--	--
		B-2-35'	<10	<10	<10	--	<0.0050	<0.0050	<0.0050	<0.010	--	--	--	--	--
		B-3-15'	<10	<10	<10	--	<0.0050	<0.0050	<0.0050	<0.010	--	--	--	--	--
		B-3-49.25'	<10	<10	<10	--	<0.0050	<0.0050	<0.0050	<0.010	--	--	--	--	--
URS Corporation	2.17.11	**C1-2**	<0.26	**7.9**	<49	--	<0.0051	<0.0051	<0.0051	<0.010	--	--	--	--	--
		C1-5	<0.23	**100**	**570**	--	<0.0046	<0.0046	<0.0046	<0.0091	--	--	--	--	--
		C2-2	<0.22	**27**	**150**	--	<0.0043	<0.0043	<0.0043	<0.0087	--	--	--	--	--
		C2-5	<0.20	<0.99	<49	--	<0.0041	<0.0041	<0.0041	<0.0082	--	--	--	--	--
		C2-5 DUP	<0.21	**32**	**210**	--	<0.0041	<0.0041	<0.0041	<0.0082	--	--	--	--	--
		C2-20	<0.24	<0.99	<50	--	<0.0049	<0.0049	<0.0049	<0.0097	--	--	--	--	--
		C2-30	<0.22	<1.0	<50	--	<0.0045	<0.0045	<0.0045	<0.0090	--	--	--	--	--
		C3-2	<0.23	**39**	**140**	--	<0.0046	<0.0046	<0.0046	<0.0091	--	--	--	--	--
		C3-5	<0.22	**110J**	**470 J**	--	<0.0044	<0.0044	<0.0044	<0.0088	--	--	--	--	--
		C3-5 DUP	<0.26	<0.99 UJ	<50 UJ	--	<0.0053	<0.0053	<0.0053	<0.011	--	--	--	--	--
		C3-20	<0.20	<1.0	<50	--	<0.0040	<0.0040	<0.0040	<0.0081	--	--	--	--	--
		C3-30	<0.32	<1.0	<50	--	<0.0063	<0.0063	<0.0063	<0.013	--	--	--	--	--
		C3-60	<0.26	<0.99 UJ	<50 UJ	--	<0.0053	<0.0053	<0.0053	<0.011	--	--	--	--	--
		C4-2	<0.21	<1.0	<50	--	<0.0042	<0.0042	<0.0042	<0.0084	--	--	--	--	--
		C4-2 DUP	<0.23	<0.99	<49	--	<0.0046	<0.0046	<0.0046	<0.0091	--	--	--	--	--
		C4-5	<0.22	**140**	**670**	--	<0.0043	<0.0043	<0.0043	<0.0087	--	--	--	--	--
		C5-2	<0.21	**2.1**	<50	--	<0.0043	<0.0043	<0.0043	<0.0085	--	--	--	--	--
		C5-5	<0.22	**10**	**130**	--	<0.0044	<0.0044	<0.0044	<0.0087	--	--	--	--	--
		C6-2	<0.24	**38**	**210**	--	<0.0047	<0.0047	<0.0047	<0.0095	--	--	--	--	<0.002
		C7-2	<0.25	**45J**	**280 J**	--	<0.0051	<0.0051	<0.0051	<0.010	--	--	--	--	<0.002
		C7-60	--	--	--	--	--	--	--	--	--	--	--	--	<0.002
		C8-2	<0.22	**12**	**53**	--	<0.0043	<0.0043	<0.0043	<0.0087	--	--	--	--	<0.002
		C9-2	<0.30	<0.99	<49	--	<0.0061	<0.0061	<0.0061	<0.012	--	--	--	--	<0.002
		C9-2 DUP	<0.26	<0.99	<50	--	<0.0051	<0.0051	<0.0051	<0.010	--	--	--	--	<0.002
		C10-2	<0.27	<0.99	<49	--	<0.0054	<0.0054	<0.0054	<0.011	--	--	--	--	<0.002
		C11-2	<0.21	<1.0	<50	--	<0.0043	<0.0043	<0.0043	<0.0085	--	--	--	--	<0.002
		C12-2	<0.22	<0.99	<50	--	<0.0044	<0.0044	<0.0044	<0.0088	--	--	--	--	<0.002
		C13-2	<0.22	<0.99	<49	--	<0.0043	<0.0043	<0.0043	<0.0086	--	--	--	--	<0.002
		C14-2	<0.22	**1.7**	<50	--	<0.0044	<0.0044	<0.0044	<0.0087	--	--	--	--	<0.002
ACC Environmental Consultants, Inc.	10.24.13	**B1-4'**	<0.230	**4.8**	<49	<0.0045	<0.0045	<0.0045	<0.0045	<0.0091	<45	<0.0091	<0.0045	ND	--
		B1-16'	<0.230	<0.99	<49	<0.0045	<0.0045	<0.0045	<0.0045	<0.0090	<45	<0.0090	<0.0045	ND	--
		B2-4'	<0.240	<0.99	<50	<0.0049	<0.0049	<0.0049	<0.0049	<0.0097	<45	<0.0097	<0.0049	ND	--
		B3-4'	<0.240	<0.99	<50	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<45	<0.0097	<0.0048	ND	--
		B4-4'	<0.240	**4.2**	<49	<0.0047	<0.0047	<0.0047	<0.0047	<0.0094	<45	<0.0094	<0.0047	ND	--
		B5-4'	<0.240	<1.0	<50	<0.0047	<0.0047	<0.0047	<0.0047	<0.0095	<45	<0.0095	<0.0047	ND	--
		B6-4'	<0.230	<1.0	<50	<0.0047	<0.0047	<0.0047	<0.0047	<0.0094	<45	<0.0094	<0.0047	ND	--
Direct Exposure HHR SLs (Residential, Table S-1)			740	230	1.10E+04	42	0.23	970	5.1	560	5.90E+04	3.3	0.60	--	--

TPH=Total Petroleum Hydrocarbons specified as gasoline-range (TPH-g), diesel-range (TPH-d) and motor oil-range (TPH-mo); VOCs = Volatile Organic Compounds; OCPs = Organochlorine Pesticides; mg/kg = milligrams per kilogram; HHR SLs = Human Health Risk Screening Levels published by the San Francisco Bay Regional Water Quality Control Board (February 2016); C2-5 DUP identified as C2-60 in lab report; C3-5 DUP identified as C3-60 in lab report; C4-2 DUP identified as C4-60 in lab report; C9-2 DUP identified as C9-60 in lab report.

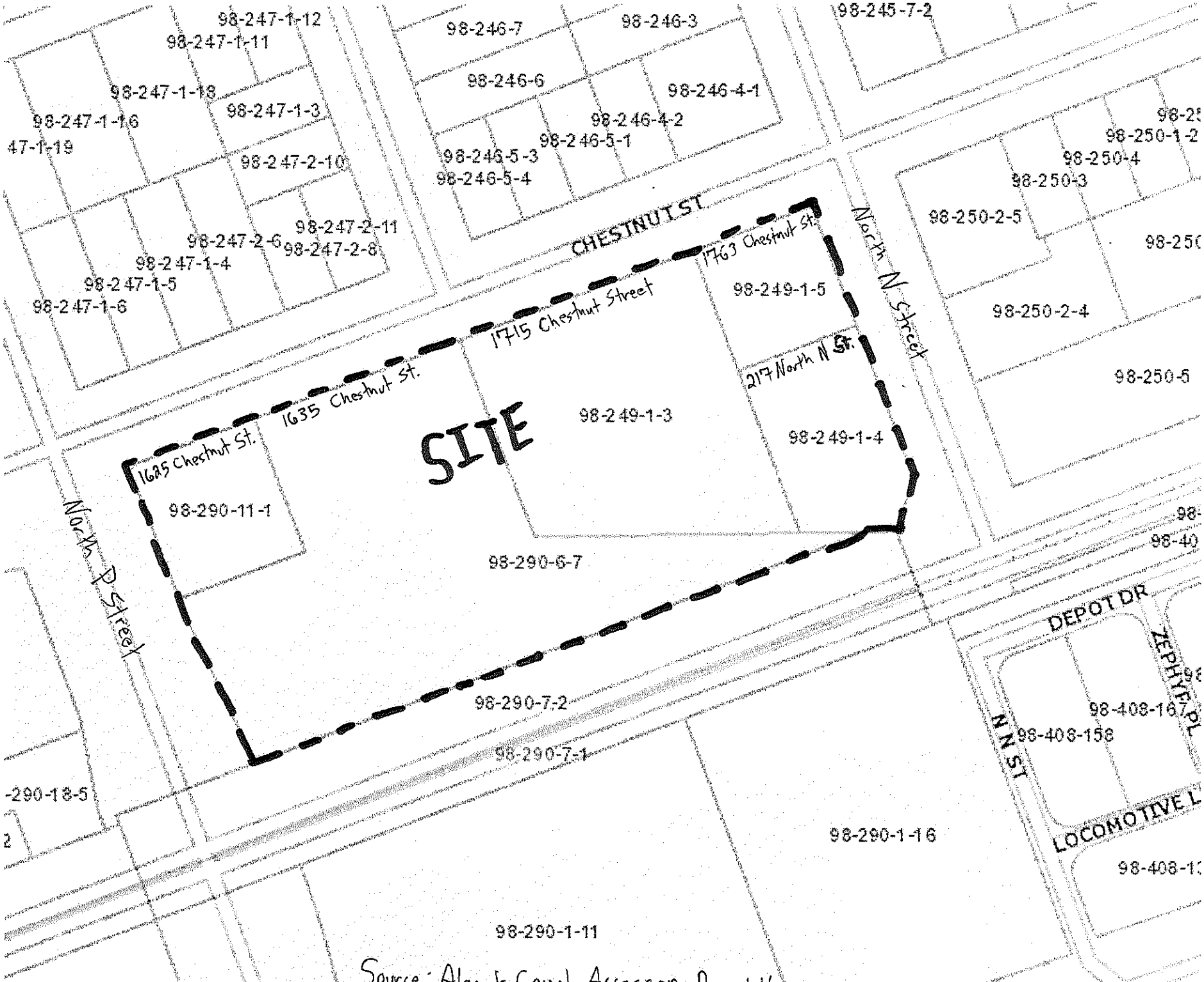
TABLE 4
Soil Analytical Results Summary (PAHs & Metals)
1625 Chestnut Street, Livermore, CA
ACC Project Number: 6988-003.02

Company	Sample Date	Sample ID	Chemical Compound & Concentrations (mg/Kg)																								
			Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]f luoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Fluoranthene	Indeno[1,2,3-cd]pyrene	Naphthalene	Pyrene	Other PAHs	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Vanadium	Zinc	Mercury	Other Metals
Fugro West, Inc.	12.4.07	DP1-1 @ 0	--	--	--	--	--	--	--	--	--	--	--	3.5	--	--	--	--	--	4.8	--	--	--	--	--	--
		DP1-1 @ 2'	--	--	--	--	--	--	--	--	--	--	--	3.6	--	--	--	--	--	4.2	--	--	--	--	--	--
		DP1-1 @ 7.5'	--	--	--	--	--	--	--	--	--	--	--	2.6	--	--	--	--	--	2.9	--	--	--	--	--	--
		DP1-2 @ 0'	--	--	--	--	--	--	--	--	--	--	--	3.8	--	--	--	--	--	5.3	--	--	--	--	--	--
		DP1-2 @ 2'	--	--	--	--	--	--	--	--	--	--	--	4.0	--	--	--	--	--	5.3	--	--	--	--	--	--
		DP1-2 @ 7.5'	--	--	--	--	--	--	--	--	--	--	--	3.5	--	--	--	--	--	4.5	--	--	--	--	--	--
		DP1-3 @ 0'	--	--	--	--	--	--	--	--	--	--	--	3.9	--	--	--	--	--	5.2	--	--	--	--	--	--
		DP1-3 @ 2'	--	--	--	--	--	--	--	--	--	--	--	4.6	--	--	--	--	--	5.4	--	--	--	--	--	--
		DP1-3 @ 7.5'	--	--	--	--	--	--	--	--	--	--	--	3.4	--	--	--	--	--	2.9	--	--	--	--	--	--
		DP1-4 @ 0'	--	--	--	--	--	--	--	--	--	--	--	2.7	--	--	--	--	--	8.9	--	--	--	--	--	--
		DP1-4 @ 2'	--	--	--	--	--	--	--	--	--	--	--	3.6	--	--	--	--	--	4.9	--	--	--	--	--	--
		DP1-4 @ 7.5'	--	--	--	--	--	--	--	--	--	--	--	5.0	--	--	--	--	--	4.1	--	--	--	--	--	--
		DP1-5 @ 0'	--	--	--	--	--	--	--	--	--	--	--	5.4	--	--	--	--	--	44	--	--	--	--	--	--
		DP1-5 @ 2'	--	--	--	--	--	--	--	--	--	--	--	3.5	--	--	--	--	--	4.8	--	--	--	--	--	--
		DP1-5 @ 7.5'	--	--	--	--	--	--	--	--	--	--	--	3.2	--	--	--	--	--	3.3	--	--	--	--	--	--
		DP1-6 @ 0'	--	--	--	--	--	--	--	--	--	--	--	4.5	210	0.54	63	16	33	6.2	<1.0	120	29	42	<0.051	ND
		DP1-6 @ 2'	--	--	--	--	--	--	--	--	--	--	--	4.2	--	--	--	--	--	5.6	--	--	--	--	--	--
		DP1-6 @ 7.5'	--	--	--	--	--	--	--	--	--	--	--	4.4	--	--	--	--	--	5.5	--	--	--	--	--	--
URS Corporation	2.16.11	C1-2	<.099	<.099	<.099	<.099	<.099	<.099	<.099	<.099	<.099	<.099	ND	4.1 J	160 J	<0.41 UJ	52 J	14 J	28 J	8.5 J	<2.0 UJ	100 J	24 J	45 J	0.032 J	ND
		C1-5	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	ND	4.5 J	140 J	<0.41 UJ	60 J	15 J	30 J	7.2 J	<2.1 UJ	130 J	26 J	44 J	0.051 J	ND
		C2-2	0.087	0.011	0.014	0.009	0.0095	0.011	0.011	0.0061	<.005	0.016	ND	14 J	5.6 J	<0.38 UJ	41 J	11 J	32 J	18 J	<1.9 UJ	88 J	20 J	52 J	0.072 J	ND
		C2-2 DUP	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	ND	<4.1 UJ	110 J	<0.41 UJ	21 J	9.6 J	20 J	10 J	<2.0 UJ	38 J	18 J	30 J	0.27 J	ND
		C2-5	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	ND	5.6 J	130 J	<0.38 UJ	45 J	12 J	24 J	6.7 J	<1.9 UJ	96 J	20 J	39 J	0.049 J	ND
		C3-2	<.0099	<.0099	<.0099	<.0099	<.0099	<.0099	<.0099	<.0099	0.036	<.0099	ND	<4.1	110 J	<0.41	39	9.1	23	7.7	<2.0	67	24	38	0.031	ND
		C3-5	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	ND	<4.0	86	<0.40	34	8.3	20	6.0	<2.0	65	21	35	0.027	ND
		C3-5 DUP	--	--	--	--	--	--	--	--	--	--	--	<4.2	92	<0.40	46	8.3	23	5.1	<2.0	68	24	34	0.027	ND
		C3-60	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	ND	--	--	--	--	--	--	--	--	--	--	--	--	--
		C4-2	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	ND	4.5 J	200 J	<0.38 UJ	64 J	16 J	35 J	7.9 J	<1.9 UJ	120 J	27 J	50 J	0.029 J	ND
		C4-5	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	ND	<4.0 UJ	85 J	<0.40 UJ	33 J	6.6 J	15 J	4.1 J	<2.0 UJ	57 J	17 J	25 J	0.031 J	ND
		C5-2	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	ND	5.7 J	230 J	<0.38 UJ	120 J	19 J	37 J	8.3 J	<1.9 UJ	170 J	30 J	49 J	0.067 J	ND
		C5-5	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	ND	5.0 J	180 J	<0.38 UJ	63 J	18 J	33 J	8.9 J	<1.9 UJ	150 J	26 J	50 J	0.075 J	ND
		C6-2	<.050	<.050	<.050	<.050	<.050	<.050	<.050	<.050	<.050	<.050	ND	<4.1	120	<0.41	43	11	22	6.9	<2.0	110	21	37	0.04	ND
		C6-5	--	--	--	--	--	--	--	--	--	--	--	<4.2	140 J	<0.42	66	15	25	6.2	<2.1	160	26	44	0.061	ND
		C6-5 DUP	--	--	--	--	--	--	--	--	--	--	--	5.4	180 J	<0.41	69 J	11	30	6.1	<2.0	130	23	39	0.048	ND
		C7-2	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	<.025	ND	4.5	200 J	<0.39	61 J	15	30	12	<1.9	130	27	48	0.32	ND
		C7-5	--	--	--	--	--	--	--	--	--	--	--	5.1	190 J	<0.40	83	22	33	8.3	<2.0	250	30	48	0.056	ND
		C8-2	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	ND	5.8	230 J	<0.42	84 J	19	40	9.5	<2.1	160	37	53	0.041	ND
		C8-5	--	--	--	--	--	--	--	--	--	--	--	5.5	210 J	<0.40	86 J	19	36	8.9	<2.0	170	34	53	0.087	ND
		C9-2	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	ND	5.5	230	<0.41	82	20	37	8.4	<2.1	160	36	54	0.035	ND
		C9-2 DUP	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	ND	4.9	210	<0.40	71	17	34	7.5	<2.0	140	31	48	0.043	ND
		C9-5	--	--	--	--	--	--	--	--	--	--	--	5.2	190 J	<0.41	210 J	15	32	11	30	140	31	44	0.028	ND
		C10-2	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	ND	5.6	220 J	<0.40	76 J	17	33	12	<2.0	140	34	58	0.054	ND
		C10-2 DUP	0.016J	0.021J	0.031J	0.013	0.014	0.022J	0.020J	0.01	<.099	0.031J	ND	--	--	--	--	--	--	--	--	--	--	--	--	--
		C10-5	--	--	--	--	--	--	--	--	--	--	--	4.6	160 J	<0.40	71 J	14	28	8.0	<2.0	150	28	47	0.066	ND
		C11-2	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	ND	5.9	200 J	<0.41	88 J	19	41	9.7	<2.1	170	36	57	0.079	ND
		C11-5	--	--	--	--	--	--	--	--	--	--	--	4.7	120 J	<0.41	160 J	27	20	5.4	<2.0	360	22	42	0.034	ND
		C12-2	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	<.0049	ND	6.4	260 J	<0.41	94 J	31	40	9.3	<2.1	350	35	54	0.047	ND
		C12-5	--	--	--	--	--	--	--	--	--	--	--	<3.8	110 J	<0.38	49 J	12	21	4.9	<1.9	140	20	35	0.047	ND
		C13-2	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	ND	6.3	240 J	<0.40	90 J	20	38	9.5	<2.0	200	36	56	0.048	ND
		C13-5	--	--	--	--	--	--	--	--	--	--	--	4.7	170 J	<0.40	83 J	15	28	7.0	<2.0	170	28	51	0.058	ND
		C1-5 DUP	--	--	--	--	--	--	--	--	--	--	--	5.9	220 J	0.79	100 J	19	34	10	<2.1	180	37	53	0.052	ND
		C14-2	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	ND	6.4	240 J	1.0	100 J	18	35	10	<2.0	190	33	53	0.056	ND
		C14-5	--	--	--	--	--	--	--	--	--	--	--	<4.0	110 J	<0.40	52 J	17	20	5.0	2.5 UJ	160	19	34	0.098 J	ND
		C14-5 DUP	--	--	--	--	--	--	--	--	--	--	--	4.4	170 J	<0.41	64 J	14	30	10	2.0 UJ	120	27	47	0.037 J	ND
ACC Environmental Consultants, Inc.	10.24.13	B1-4'	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.2	--	--	--	--	--	--
		B1-16'	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.1	--	--	--	--	--	--
		B2-4'	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.9	--	--	--	--	--	--
		B3-4'	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.0	--	--	--	--	--	--
		B4-4'	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.5	--	--	--	--	--	--
		B5-4'	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6.0	--	--	--	--	--	--
		B6-4'	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6.8	--	--	--	--	--	--
Direct Exposure HHR SLs (Residential, Table S-1)			0.16	0.016	0.16	--	1.6	15	2400	0.16	3.3	1800	--	0.067	15000	150	120000	23	3100	80	390	820	390	23000	13	--

PAHs = Polyaromatic Hydrocarbons; mg/kg = milligrams per kilogram; HHR SLs = Human Health Risk Screening Levels published by the San Francisco Bay Regional Water Quality Control Board (February 2016); C6-5 DUP identified as C6-60 in lab report; C9-2 DUP identified as C9-60 in lab report; C13-5 DUP identified as C13-60 in lab report; C14-5 DUP identified as C14-60 in lab report; C2-2 DUP identified as C2-60 in lab repor; C3-5 DUP ientified as C3-60 in lab report (metals only?); C10-2 DUP idenitified C10-60 in lab report (PAHs only?).

APPENDIX A

APN BOUNDARIES



Source: Alameda County Assessor - Parcel Viewer

APPENDIX B

AGENCY CORRESPONDENCE (10/24/16)

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
REBECCA GEBHART, Interim Director

DEPARTMENT OF ENVIRONMENTAL HEALTH
LOCAL OVERSIGHT PROGRAM (LOP)
For Hazardous Materials Releases
1131 HARBOR BAY PARKWAY, SUITE 250
ALAMEDA, CA 94502
(510) 567-6700
FAX (510) 337-9335

October 24, 2016

Mr. Eric Uranga
City of Livermore Economic Development
1052 S. Livermore Avenue
Livermore, CA 94550
(Sent via email to: ejuranga@ci.livermore.ca.us)

Subject: Request for draft work plan for Case No. RO0003179 and GeoTracker Global ID T10000007202, Chestnut Square, 1625 Chestnut Street, Livermore, CA 94551

Dear Mr. Uranga:

Alameda County Department of Environmental Health (ACDEH) is sending this correspondence as a follow-up to the meeting that took place on October 3, 2016, between ACDEH, Polo Munoz and Allyson Ujimori from MidPen Housing Corporation, and Ian Sutherland and Kim Bunting from ACC Environmental Consultants, during which we discussed the above referenced case, including the site development plans in relation to historic borings and sampling locations.

Based on our review of the case and discussion at the meeting, ACDEH requests a draft work plan. Summarized below are ACDEH staff recommendations for the scope of work to be included in the draft work plan, which were also discussed during the meeting:

- ACDEH noted that in an investigation performed in the area of the historic gas station by URS and discussed in a report entitled, "Targeted Site Investigation Report," dated April 26,2011, benzene, ethylbenzene, toluene, and total xylenes (BTEX), although found to be below detection limits in both soil and groundwater, were detected in soil vapor samples. In addition, as noted by ACC Environmental Consultants, the soil vapor samples were collected on the date of a rainfall event, rather than collected at least five days without a significant rain event, as recommended by the Department of Toxic Substances Control's "*Advisory- Active Soil Gas Investigations*," dated April 2012. Therefore, we request that a soil gas sample be collected at the base of the planned elevator shaft nearest to the historic C-4 boring location. In addition, soil gas sampling should be collected in areas where BTEX was detected in soil and groundwater. In addition to BTEX, samples should be analyzed for methane.

- ACDEH noted that although soil samples were collected at 0 to 5 feet below ground surface (bgs) at the former gas station area, they were not collected at 5 to 10 feet bgs. In addition, the samples at 0 to 5 feet were analyzed for Total Petroleum Hydrocarbons and BTEX, but not for naphthalene. In order to characterize the soil at former gas station area for potential impacts to human health through direct contact and outdoor air exposure, sampling needs to be collected at both intervals of 0 to 5 feet bgs and 5 to 10 feet bgs and analyzed for the following: Total Petroleum Hydrocarbons as gasoline (TPH-g), diesel (TPH-d), and motor oil (TPH-mo) with and without silica gel cleanup; BTEX; and naphthalene. In addition, because motor oil has been detected in soil, the samples should be analyzed for polycyclic aromatic hydrocarbons (PAHs).

- ACDEH requests that shallow soil samples be collected in the proposed bioretention areas and analyzed for TPH-g, TPH-d, and TPH-mo with and without silica gel cleanup.

- According to figures and tables of historic sampling locations compiled and submitted to us by ACC Environmental Consultants, soil sampling was performed in the eastern portion of the site in 2007 or 2008 by Fugro, and the samples analyzed for volatile organic

compounds (VOCs) including BTEX, methyl *tert*-butyl ether (MTBE), tetrachloroethene (PCE), and naphthalene. Please propose in the draft work plan further shallow soil sampling at 0 to 5 feet bgs and 5 to 10 feet bgs in the eastern area and analyze for TPH-g TPH-d, and TPH-mo with and without silica gel cleanup.

- We request that shallow soil sampling at 2 feet bgs be performed at the southern portion of the site near the railroad tracks and spurs and at the location of the transformer and hydraulic lift in the western part of the site and the samples be analyzed for polycyclic aromatic hydrocarbons (PAHs) using EPA 8270C/D with Selective Ion Monitoring SIM as the analytical method, as well as analyze for polychlorinated biphenyls (PCBs)

Submit the draft work plan via email to me (anne.jurek@acgov.org) and copy to Dilan Roe (dilan.roe@acgov.org) by **November 30, 2016.**

GeoTracker Compliance

A review of the State Water Resources Control Board's (State Water Board) GeoTracker website indicates that several reports, including Phase I and Phase II Environmental Site Assessments, that have been uploaded onto ACDEH's ftp site have not been uploaded onto GeoTracker as required. Please upload to GeoTracker all historic reports that you have pertaining to site.

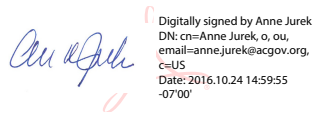
In addition, ACC Environmental Consultants on behalf of the Responsible Party (RP) submitted to ACDEH in September 2016 figures of historic locations of samples. Some of the sampling referenced a 2008 investigation performed by Fugro. However, this 2008 investigation report has not been uploaded to either ACDEH's ftp site or GeoTracker. Please upload this report to both sites.

Other required files, including electronic data files for laboratory analytical data, boring logs, and site maps for all investigative work performed for this site have not been uploaded onto GeoTracker. Because this is a state requirement, ACDEH requests that all the above requested reports and data be uploaded to GeoTracker by **November 4, 2016.**

Pursuant to California Code of Regulations, Title 23, Division 3, Chapter 16, Article 12, Sections 2729 and 2729.1, beginning September 1, 2001, all analytical data, including monitoring well samples, submitted in a report to a regulatory agency as part of the UST or LUST program, must be transmitted electronically to the State Water Board GeoTracker system via the internet. Also, beginning January 1, 2002, all permanent monitoring points utilized to collect groundwater samples (i.e. monitoring wells) and submitted in a report to a regulatory agency, must be surveyed (top of casing) to mean sea level and latitude and longitude to sub-meter accuracy using NAD 83. A California licensed surveyor may be required to perform this work. In September 2004, the SWRCB adopted regulations that require electronic submittal of information for all groundwater cleanup programs, including SCP programs. Additionally, pursuant to California Code of Regulations, Title 23, Division 3, Chapter 30, Articles 1 and 2, Sections 3893, 3894, and 3895, beginning July 1, 2005, the successful submittal of electronic information (i.e. report in PDF format) shall replace the requirement for the submittal of a paper copy. Please upload all required submittals to GeoTracker. Electronic reporting is described below on the attachments.

If you have any questions, please call me at (510) 567-6721 or send me an electronic mail message at anne.jurek@acgov.org. Online case files are available for review at the following website: http://www.acgov.org/aceh/index.htm. As your email address does not appear on the cover page of this notification ACEH is requesting you provide your email address so that we can correspond with you quickly and efficiently regarding your case.

Sincerely,



Anne Jurek, M.S.
Professional Technical Specialist II (Geology)

Enclosures: Attachment 1 – Responsible Party (ies) Legal Requirements/Obligations and Electronic Report Upload (ftp) Instructions

cc: Apolonio Munoz, MidPen Housing Corporation, 1970 Broadway Suite 440, Oakland, CA 94612 (Sent via email to: amunoz@midpen-housing.org)

Colleen Lopez, (Sent via email to: colleen.dblassociates@gmail.com)

Dilan Roe (sent via electronic mail to: dilan.roe@acgov.org)

Allyson Ujimori, MidPen Housing Corporation, 1970 Broadway Suite 440, Oakland, CA 94612 (Sent via email to: aujimori@midpen-housing.org)

Ian Sutherland, ACC Environmental Consultants, 7977 Capwell Drive, Suite 100, Oakland, California 94621 (Sent via email to: isutherland@accenv.com)

Attachment 1

Responsible Party(ies) Legal Requirements/Obligations

REPORT/DATA REQUESTS

These reports/data are being requested pursuant to Division 7 of the California Water Code (Water Quality), Chapter 6.7 of Division 20 of the California Health and Safety Code (Underground Storage of Hazardous Substances), and Chapter 16 of Division 3 of Title 23 of the California Code of Regulations (Underground Storage Tank Regulations).

ELECTRONIC SUBMITTAL OF REPORTS

ACEH's Environmental Cleanup Oversight Programs (Local Oversight Program [LOP] for unauthorized releases from petroleum Underground Storage Tanks [USTs], and Site Cleanup Program [SCP] for unauthorized releases of non-petroleum hazardous substances) require submission of reports in electronic format pursuant to Chapter 3 of Division 7, Sections 13195 and 13197.5 of the California Water Code, and Chapter 30, Articles 1 and 2, Sections 3890 to 3895 of Division 3 of Title 23 of the California Code of Regulations (23 CCR). Instructions for submission of electronic documents to the ACEH FTP site are provided on the attached "Electronic Report Upload Instructions."

Submission of reports to the ACEH FTP site is in addition to requirements for electronic submittal of information (ESI) to the State Water Resources Control Board's (SWRCB) Geotracker website. In April 2001, the SWRCB adopted 23 CCR, Division 3, Chapter 16, Article 12, Sections 2729 and 2729.1 (Electronic Submission of Laboratory Data for UST Reports). Article 12 required electronic submittal of analytical laboratory data submitted in a report to a regulatory agency (effective September 1, 2001), and surveyed locations (latitude, longitude and elevation) of groundwater monitoring wells (effective January 1, 2002) in Electronic Deliverable Format (EDF) to Geotracker. Article 12 was subsequently repealed in 2004 and replaced with Article 30 (Electronic Submittal of Information) which expanded the ESI requirements to include electronic submittal of any report or data required by a regulatory agency from a cleanup site. The expanded ESI submittal requirements for petroleum UST sites subject to the requirements of 23 CCR, Division, 3, Chapter 16, Article 11, became effective December 16, 2004. All other electronic submittals required pursuant to Chapter 30 became effective January 1, 2005. Please visit the SWRCB website for more information on these requirements. (http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/)

PERJURY STATEMENT

All work plans, technical reports, or technical documents submitted to ACEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge." This letter must be signed by an officer or legally authorized representative of your company. Please include a cover letter satisfying these requirements with all future reports and technical documents submitted for this fuel leak case.

PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6735, 7835, and 7835.1) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately registered or certified professional. For your submittal to be considered a valid technical report, you are to present site specific data, data interpretations, and recommendations prepared by an appropriately licensed professional and include the professional registration stamp, signature, and statement of professional certification. Please ensure all that all technical reports submitted for this fuel leak case meet this requirement.

UNDERGROUND STORAGE TANK CLEANUP FUND

Please note that delays in investigation, late reports, or enforcement actions may result in your becoming ineligible to receive grant money from the state's Underground Storage Tank Cleanup Fund (Senate Bill 2004) to reimburse you for the cost of cleanup.

AGENCY OVERSIGHT

If it appears as though significant delays are occurring or reports are not submitted as requested, we will consider referring your case to the Regional Board or other appropriate agency, including the County District Attorney, for possible enforcement actions. California Health and Safety Code, Section 25299.76 authorizes enforcement including administrative action or monetary penalties of up to $10,000 per day for each day of violation.

Alameda County Environmental Cleanup Oversight Programs (LOP and SCP)	**REVISION DATE:** July 25, 2012
	ISSUE DATE: July 5, 2005
	PREVIOUS REVISIONS: October 31, 2005; December 16, 2005; March 27, 2009; July 8, 2010
SECTION: Miscellaneous Administrative Topics & Procedures	**SUBJECT:** Electronic Report Upload (ftp) Instructions

The Alameda County Environmental Cleanup Oversight Programs (petroleum UST and SCP) require submission of all reports in electronic form to the county's FTP site. Paper copies of reports will no longer be accepted. The electronic copy replaces the paper copy and will be used for all public information requests, regulatory review, and compliance/enforcement activities.

REQUIREMENTS

- **Please do not submit reports as attachments to electronic mail.**
- Entire report including cover letter must be submitted to the ftp site as **a single Portable Document Format (PDF) with no password protection**.
- It is **preferable** that reports be converted to PDF format from their original format, (e.g., Microsoft Word) rather than scanned.
- **Signature pages and perjury statements must be included and have either original or electronic signature.**
- **Do not password protect the document**. Once indexed and inserted into the correct electronic case file, the document will be secured in compliance with the County's current security standards and a password. **Documents with password protection will not be accepted**.
- Each page in the PDF document should be rotated in the direction that will make it easiest to read on a computer monitor.
- Reports must be named and saved using the following naming convention:

  RO#_Report Name_Year-Month-Date (e.g., RO#5555_WorkPlan_2005-06-14)

Submission Instructions

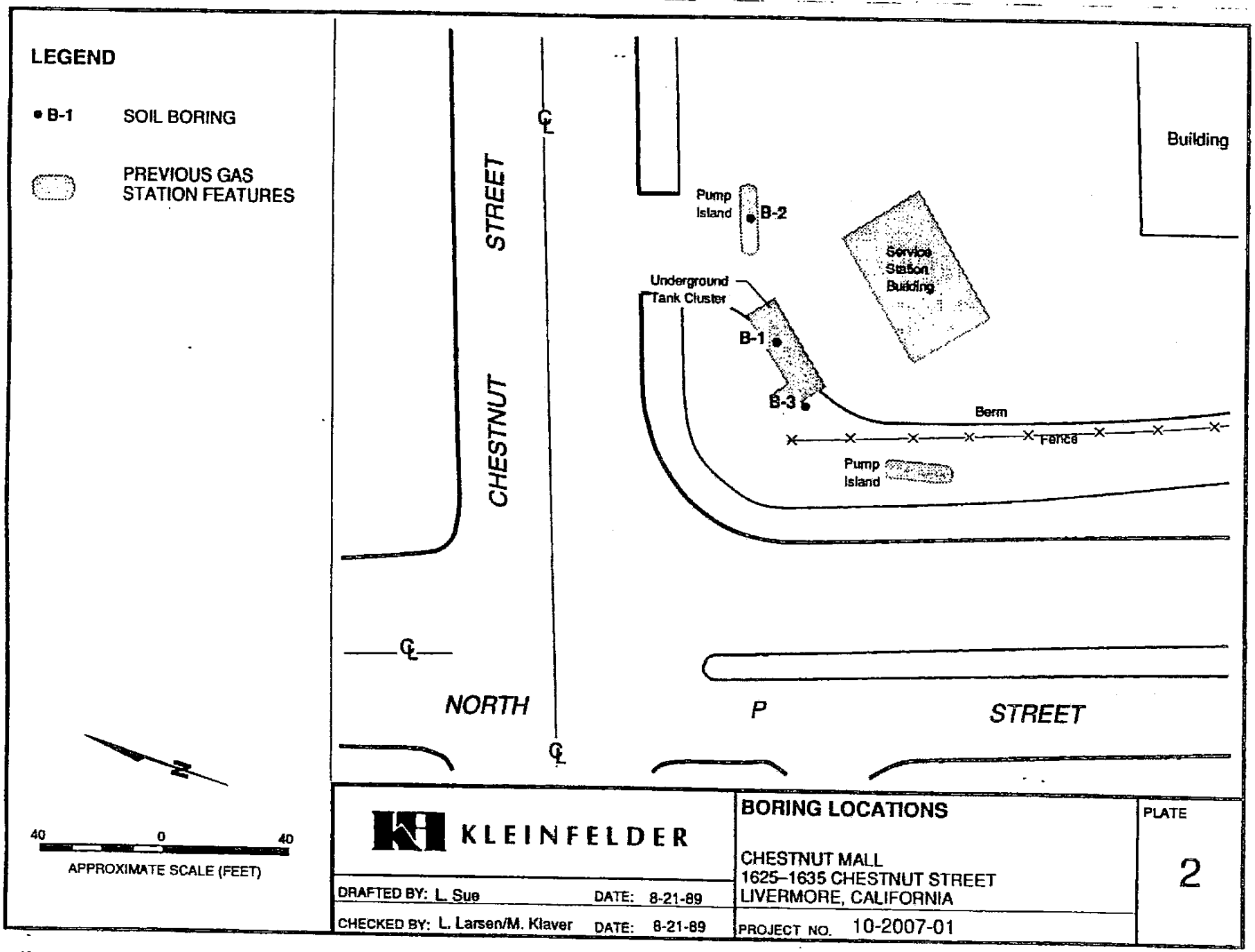
1) Obtain User Name and Password
   a) Contact the Alameda County Environmental Health Department to obtain a User Name and Password to upload files to the ftp site.
      i) Send an e-mail to deh.loptoxic@acgov.org
   b) In the subject line of your request, be sure to include **"ftp PASSWORD REQUEST"** and in the body of your request, include the **Contact Information, Site Addresses**, and the **Case Numbers (RO# available in Geotracker) you will be posting for**.

2) Upload Files to the ftp Site
   a) Using Internet Explorer (IE4+), go to ftp://alcoftp1.acgov.org
      (i) Note: Netscape, Safari, and Firefox browsers will not open the FTP site as they are NOT being supported at this time.
   b) Click on Page located on the Command bar on upper right side of window, and then scroll down to Open FTP Site in Windows Explorer.
   c) Enter your User Name and Password. (Note: Both are Case Sensitive.)
   d) Open "My Computer" on your computer and navigate to the file(s) you wish to upload to the ftp site.
   e) With both "My Computer" and the ftp site open in separate windows, drag and drop the file(s) from "My Computer" to the ftp window.

3) Send E-mail Notifications to the Environmental Cleanup Oversight Programs
   a) Send email to deh.loptoxic@acgov.org notify us that you have placed a report on our ftp site.
   b) Copy your Caseworker on the e-mail. Your Caseworker's e-mail address is the entire first name then a period and entire last name @acgov.org. (e.g., firstname.lastname@acgov.org)
   c) The subject line of the e-mail must start with the RO# followed by **Report Upload**. (e.g., Subject: RO1234 Report Upload) If site is a new case without an RO#, use the street address instead.
   d) If your document meets the above requirements and you follow the submission instructions, you will receive a notification by email indicating that your document was successfully uploaded to the ftp site.

APPENDIX C

FORMER GASOLINE SERVICE STATION LAYOUT


LEGEND
• B-1 SOIL BORING
PREVIOUS GAS STATION FEATURES
CHESTNUT STREET
NORTH
P STREET
Building
Pump Island
B-2
Service Station Building
Underground Tank Cluster
B-1
B-3
Berm
Fence
Pump Island
40 0 40
APPROXIMATE SCALE (FEET)
KLEINFELDER
DRAFTED BY: L. Sue DATE: 8-21-89
CHECKED BY: L. Larsen/M. Klaver DATE: 8-21-89
BORING LOCATIONS
CHESTNUT MALL
1625–1635 CHESTNUT STREET
LIVERMORE, CALIFORNIA
PROJECT NO. 10-2007-01
PLATE
2

APPENDIX D

GEOLOGIC SETTING (REF)

2.0 SITE GEOLOGY/HYDROLOGY

The Site lies within the Livermore Valley, which is comprised of continental deposits derived from alluvial fans, outwash plains, and lakes. Valley fill materials range in thickness from a few tens of feet to nearly 400 feet. Lithologies at the Site consist of Quaternary Alluvium overlying Franciscan bedrock (CDMG, 1980).

The aquifer system for the area is a multi-layered system with an unconfined upper aquifer overlying a sequence of semi-confined aquifers. Faults located to the north, east, and west, and variations in lateral continuity, thickness, and permeability of water-bearing formations cause local restrictions in the movement of groundwater within the groundwater basin.

The following geology and hydrogeology information was obtained from the Treadwell and Rollo Groundwater Investigation Report for the Livermore Arcade Shopping Center/Millers Outpost Shopping Center (LASC/MOSC) 2008 Trust Site, which is under the oversight of the San Francisco RWQCB (Treadwell and Rollo, 2009). This Site is within one-quarter mile of the Chestnut Site.

The Livermore Valley is bounded by the Calaveras Fault on the west, by the Greenville Fault on the east, and by the Mount Diablo Complex on the north. The Calaveras and Greenville faults are active strike-slip faults related to the San Andreas Fault system. The Livermore Valley includes down-dropped blocks and subsidiary northwest-trending faults. These blocks form sub-basins, and the Site lies in the Mocho Sub-basin, which is bounded on the southwest by the Mocho and Livermore faults, and on the northeast by the Tesla Fault. The Site lies in the southwestern portion of the sub-basin.

Previous investigations conducted in 1989 indicated the soils beneath the shopping center site are a heterogeneous mix of clayey silt, sandy gravel, and coarse gravels belonging to the Livermore Formation. These soils have moderate infiltration rates, high hydraulic conductivity, and low water-holding capacity. Soils encountered during previous investigations were primarily clays with varying percentages of silt, sand, and gravel.

The Livermore Formation is generally composed of unconsolidated to semi-consolidated beds of gravel, sand, silt, and clay (DWR, 2007). A lower member in the eastern portion of the valley is composed of gray silt and clay, with lenses of sand and gravel. The Livermore Formation is estimated to be at least 500 feet thick in the vicinity of the Site, and ranges up to 4,000 feet thick in the Livermore Valley. The Quaternary alluvial fan deposits make up the valley floor and are composed of semi-consolidated sand and gravel in a matrix of clayey sand. These deposits are on the order of 100 feet thick in the vicinity of the Site, and lie on an erosional unconformity on

top of the Livermore Formation. The axis of the erosional surface is northeast of the Site, where the Quaternary deposits may range in thickness up to between 300 and 400 feet.

The Mocho Sub-basin is one of the groundwater sub-basins in Livermore Valley, where faulting and variations in the thickness of permeable sediments restrict horizontal and vertical groundwater flow. Groundwater in the Mocho Sub-basin occurs in Shallow and Deep Zones. In the vicinity of the Site, the Shallow Zone is unconfined and ranges from about 30 to as much as 85 feet bgs (or an elevation of 440 to 385 feet above mean sea level) (Alameda County Zone 7, 2007). The groundwater surface in the Livermore Valley slopes generally westward, but in the Mocho Sub-basin it is predominantly to the northwest. The Deep Zone ranges from about 100 to at least 500 feet bgs, and flows generally towards the northwest.

The Site and its immediate vicinity to the north and northwest are underlain by the following hydrostratigraphic units, listed in order of increasing depth bgs (Treadwell and Rollo, 2009):

- Vadose Zone – The vadose zone comprises the unsaturated strata above the water table. Its thickness varies as the water table elevation fluctuates from approximately 25 to 40 feet depth bgs. The lithology of the vadose zone generally resembles that of the Shallow Groundwater Zone.

- Shallow Groundwater Zone – The Shallow Groundwater Zone (Shallow Zone) is the uppermost, unconfined saturated zone, and consists of variably interbedded gravel, sand, silt, and clay layers. Groundwater is typically encountered between 25 and 75 feet bgs. Coarser-grained units are generally more transmissive, except those with more poorly sorted layers whose matrices are comprised of silt and clay materials (fine-grained units). Vertical and horizontal transmissivity in silty and clayey layers is low.

- Clay Aquitard – Underlying the Shallow Zone is an aquitard unit dominated by silty clay lithology. This includes well-sorted plastic clay layers, occasionally interbedded with discontinuous sandy lenses, and poorly sorted strata containing cobbles and gravel in a fine-grained matrix. Taken together, the unit is termed the "clay aquitard" in recognition of its function as a barrier to significant vertical hydrologic communication.

- Deep Groundwater Zone – The Deep Groundwater Zone (Deep Zone) consists of interbedded gravel, sand, and fine-grained strata. The main difference between this unit and the Shallow Zone, which exhibits similar lithologies, is that the gravel and sand layers in the Deep Zone are better sorted, thicker, and more continuous.