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December 14, 2017

Mr. Mark Detterman
Alameda County Health Care Services Agency
Environmental Health Services
Local Oversight Program
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Subject: Submittal Acknowledgement regarding 811 Paramount Road, Oakland, CA. (Alameda County Fuel Leak Case No. RO0003143 and CA Geotracker Global ID T10000006106)

Dear Mr. Detterman:

We have read and acknowledge the content, recommendations and/or conclusions contained in the attached document or report submitted on our behalf to ACDEH's FTP server and the SWRCB's Geotracker website.

Sincerely,

Mark A. Jacobson
Property Owner-Responsible Party

Ilona Frieden
Property Owner-Responsible Party

cc: Mr. Amitai Schwartz – Property Owner-Responsible Party Counsel

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Mr. Mark Detterman
Alameda County Health Care Services Agency
Environmental Health Services
Local Oversight Program
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Subject: Interim Remedial Action Plan related to Mitigation of Vapor Intrusion associated with a Former Leaking Underground Heating Oil Tank located at 811 Paramount Road, Oakland, CA. (Alameda County Fuel Leak Case No. RO0003143 and CA GeoTracker Global ID T10000006106)

Dear Mr. Detterman:

INTRODUCTION AND CLEANUP OBJECTIVE

On behalf of the property owners (Mr. Mark A. Jacobson & Ms. Ilona J. Frieden) Stellar Environmental Solutions, Inc. (Stellar Environmental) is providing this Interim Remedial Action Plan (IRAP) as directed in the Alameda County Department of Environmental Health (ACDEH), letter, dated November 15, 2017 and discussed at the October 19, 2017 site meeting with you and Ms. Dilan Roe of the property owners and their counsel and Stellar Environmental. This IRAP is designed to evaluate and determine the appropriate remedial action to mitigate site source hydrocarbon soil contamination and associated vapor intrusion into the site residence related to the former 350-gallon residential underground heating fuel storage tank (UST) that was removed on December 16, 2013. The purpose of this IRAP is to mitigate residual hydrocarbon contamination documented in soil that is suspected to be the source of toxic vapor intrusion into the adjacent site residence.

ACDEH is the oversight agency for the UST site cleanups in Oakland and is applying the California Regional Water Quality Control Board (Water Board) Environmental Screening Levels (ESLs) as a preliminary guide in determining whether additional remediation and/or investigation may be warranted. The ESLs were established for evaluating the likelihood of environmental impact. ESLs are conservative screening-level criteria for soil and groundwater, designed to be generally protective of both drinking water resources and aquatic environments; they incorporate both environmental and human health risk considerations.

Different ESLs are published for commercial/industrial vs. residential land use, for sites where groundwater is a potential drinking water resource vs. is not a likely drinking water resource, and for the type of receiving water body. The applicable ESL criteria for the subject site are *residential land use* and *groundwater is a potential drinking water resource;* based on the following:

- Residential land use as zoned by the City of Oakland.
- Groundwater is a potential a drinking water resource based on the location of the site being within the Department of Water Resources (DWR) designated East Bay Plain Groundwater Sub-Basin (DWR 2003) and the designation of this area of Oakland as "Zone A – Significant Drinking Water Resource (Water Board, 1999).

Attached Figure 1 shows the site location and Figure 2 is a site plan showing the locations of historical sampling and location of the former UST. Figure 3 shows the area of the proposed IRAP soil excavation.

SITE DESCRIPTION

The subject property is located at 811 Paramount Road in Trestle Glen, a historical residential district in Oakland, California. The area has historically been a residential area since the turn of the 20th century. The property is situated on a ridgeline in the Oakland hills with an average elevation of approximately 210 feet above mean sea level (amsl) and a generally westward and southward topographic slope. Rainwater drains away from the residential front yard area of the former UST site to the street curb gutter where it is channeled into the storm drain system on Paramount Road.

Local Hydrogeology

The site is underlain by Late Pleistocene alluvium that generally consist of weakly consolidated slightly weathered poorly sorted irregularly interbedded clay, silt, sand, and gravel. Local heterogeneities in shallow lithology and groundwater levels are typical of the alluvial deposits in this area. Shallow site lithology was determined in this current March 2016 and the previous June 2015 investigations by the visual method of the Unified Soils Classification System (USCS) based on continuous core soil samples. The predominant soil types encountered consisted of clay from the ground surface to between 6 and 8 feet below ground surface (bgs). Silt predominated from approximately 6 feet bgs to 29 feet bgs with the exception of a predominance of clay to 20 feet bgs in bore SB1. Gravelly and sandy to silty clay were observed from approximately 24 to 30 feet bgs in bores SB2 and SB3. Clay was encountered at approximately 29 - 31 feet bgs in bores SB1 and SB2 and observed to persist to the maximum depth advanced of 36 feet bgs in bore SB2. Groundwater was not encountered during any of the site investigations.

Surface Water Bodies

The nearest surface water bodies are Sausal Creek located approximately 5,000 feet east of the site; Central Reservoir located 5,000 southeast and Lake Merritt Lake located about 5,000 feet west of the site. These water bodies ultimately drain to San Francisco Bay, located approximately 3.75 miles to the west of the site.

HISTORICAL ENVIRONMENTAL BACKGROUND AND DISCUSSION

The following section presents a brief narrative of historical site investigation activity conducted to date. Locations of investigation borings and analytical results of soil, soil-gas, and indoor air sampling are summarized on the attached Figures 2, 3 and 4.

December 2013: Former UST Removal and Verification Soil Sampling

The former UST was discovered during property renovations in 2013 at which time the subject property owners contracted Golden Gate Tank Removal, Inc. (GGT) to remove the UST. The underground storage tank (UST) removal report, dated January 14, 2014 that was prepared by GGT documents the December 2013 removal of one 350-gallon heating oil UST and 32.75 tons of associated fuel impacted soil from the subject site. The UST was found to be in poor condition with at least one visible hole. Soil discoloration and hydrocarbon odors were noted to be associated with overburden soil and soil underlying the UST.

The initial UST soil samples were collected at a depth of 7 feet on both the east end and west end beneath the UST after its removal on December 16, 2013. The analytical at 7 feet bgs on the east end (sample E7) was reported at 9,290 milligrams per kilogram (mg/kg) Total Petroleum Hydrocarbons in the carbon C10-C28 range, which includes the upper C8-C10 range of gasoline (TPHg), the full (C10-C23) range of diesel (TPHd) and into the motor oil (C18-C35) range (TPHmo). The 9,290 mg/kg detection exceeds the applicable Environmental Screening Limits (ESLs) for TPHg, TPHd and TPHmo, which are 100 mg/kg, 230 mg/kg and 5,100 mg/kg, respectively (GGT, 2013). Also reported in sample E7 was 1.1 mg/kg ethylbenzene, 1.37 mg/kg total xylenes and 47.3 mg/kg naphthalene, with naphthalene above the ESL. Benzene and toluene were below the laboratory detection limit. The west end sample (sample W7) concentrations at 7 feet bgs were detected at 1,390 mg/kg in the C10-C28 range. The benzene, toluene, ethylbenzene and xylenes (BTEX) concentrations were near to below Laboratory Reporting Limits (RLs) of 79 µg/kg or less, and naphthalene concentration was 7.72 mg/kg, above its ESL.

Over-excavation to 12 feet bgs was subsequently performed on December 24, 2013. East end sample (sample E12) concentrations decreased two to three orders of magnitude to 28.0 mg/kg of TPH C10-C28, while BTEX and naphthalene concentrations were near to below RLs. The west end sample (sample E12) concentrations increased with depth to 3,960 mg/kg TPHd, and naphthalene concentrations increased to 25.2 mg/kg, in excess of their respective ESLs; BTEX concentrations were near to below RLs. MTBE was not analyzed in any of the samples.

June 2015: Residual Soil-Gas and Indoor Air Investigation

ACHCS in their letter dated December 15, 2014, requested additional investigation of the residual soil contamination indicated by detections of TPHd and napththalene above applicable ESLs that was reported in the UST removal report (GGT 2013). Stellar Environmental was retained by the property owners to prepare an investigation Workplan which was approved with the incorporation of modifications by ACHCS in their review and approval letter, dated March 30, 2015. The Workplan was implemented by Stellar Environmental in June 2015 and showed no detectable TPHd, TPHmo or fuel related volatile organic compounds (VOCs) in site soils, indicating the potential residual soil contaminantion is neither laterally or vertically extensive. The location of soil bores with analytical results is shown on the attached Figure 2.

Groundwater was not encountered in any of the 3 bores that were advanced during the investigation, with the deepest bore extending to 36 feet bgs. The absence of residual soil contaminantion and relatively deep first groundwater occurance indicates no threat to groundwater by potential contaminants of concern (COCs).

However, soil-gas collected from soil-gas well SG5.5 feet bgs showed 880,000 $\mu g/m^3$ TPHg, which is in excess of the Water Board residential ESL of 300,000 $\mu g/m^3$ for potential risk of vapor intrusion into the adjacent residential building. The location of soil bore SG5.5 with historical analytical results of soil-gas sampling is shown on the attached Figure 3. Thus vapor inrusion risk is the focus of this current investigation. The detection of residual TPHg in soil-gas is anomalous for a residential heating oil UST, as gasoline grade hydrocarbons was not used in heating oil. However, the TPHg appears to rapidly attenuate with depth as there were no detections of any COCs at 13 feet bgs immediately below the target contaminant depth where elevated TPHd and naphthalene in soil were reported in the UST removal report (GGT 2013). In addition, the June 2015 investigation documented 3.0 to 3.4 % oxygen) in shallow soil adjacent to the residential building.

The June 2015 investigation sampling detected no residual soil contamination, showed no threat to groundwater and only limited residual soil-gas detection of 880,000 µg/m^3 total petroleum hydrocarbons as gasoline in excess of the regulatory threshold criteria of 300,000 µg/m^3. Thus, the only apparent potential exposure risk is soil vapor intrusion into the residential building.

September 2015: Residual Soil-Gas and Indoor Air Investigation

The analytical results from the June 2015 investigation qualified the site for closure under the strict criteria of the Water Board Low Threat Closure Policy (LTCP), however due to the exceedance of TPHg over the Water Board ESL, ACHCS requested in their letter dated August 19, 2015, re-sampling of soil-gas, an evaluation of the building crawl space and additional sampling of potential toxic vapor intrusion into the site residence be conducted in the event that the soil-gas sampling results exceeded the applicable ESLs. A Workplan, dated September 9, 2015 was prepared by Stellar Environmental and approved with modifications by ACHCS in their letter dated September 10, 2015. Historical analytical results of indoor air and soil-gas sampling is shown on the attached Figure 3.

The soil-gas well SG5.5 was resampled on September 23, 2015 as prescribed in the Workplan. The analytical results showed 240,000 µg/m^3 TPHd, 2,000,000 µg/m^3 TPHg and 600 µg/m^3 benzene, all in excess of their applicable residential ESLs of 68,000 µg/m^3, 300,000 µg/m^3, and 48 µg/m^3, respectively. The analyte TCA was incorrectly reported by the laboratory to be detected in that sampling event. The TCA was later confirmed as not detected and the amended analytical laboratory report was included in the March 2016 report. The analytical results of the September 23, 2015 soil-gas sampling were subsequently shared with the ACHCS regulator and as prescribed in the Workplan, sampling of the indoor air was completed. Benzene was the only site contaminant of concern that was detected in the indoor air, in the basement, at 0.20 µg/m^3, which is above its applicable ESL of 0.084 µg/m^3. However as the 0.20 µg/m^3 benzene concentration was less than the 1.0 µg/m^3 detected in the ambient outdoor air suggests the benzene in the residential indoor air could be attributed to outdoor ambient sources. The compounds, TPHg and TPHd, that were detected above their ESLs in the soil-gas, and were not detected in the indoor-air survey.

March 2016: Residual Soil, Soil-Gas and Indoor Air Investigation

The March 2016 investigation work was advanced to address ACHCS's concern that the two previous samplings of soil-gas well SG5.5 showed an increasing concentration trend in TPH-gasoline and benzene. ACHCS also requested additional soil bore sampling to investigate TPHd, TPHg, benzene and TCA that could possibly be related to the discolored green soil noted on the June 2015 investigation borings logs (SB2 and SG5.5) between 3.5 and 6 feet bgs; re-evaluation of oxygen that was previously measured below the LTCP bioattenuation zone criteria of 4%; and a second indoor air survey.

Following receipt of the March 2016 results, the laboratory determined that TCA had previously been reported in error and retracted the September 2015 detection. The erroneously reported TCA was determined to be an unidentified compound by the laboratory. Tetrachloroethene (PCE) and methylene chloride (MC) were detected in soil-gas well SG5.5 above their ESLs in the March 2016, and also confirmed by the laboratory to not have been detected in September 2015. However, considering that the lab retracted their September 2015 finding of TCA and neither MC nor PCE were previously detected in any of the previous samples or other media prior to this event, these detections are considered likely false positives or likely laboratory contaminants related to the batch-certified clean Summa™ canisters. In addition, the property history does not indicate any other reasonable chemical source for the chlorinated VOC compound detections in the soil gas. The household chemical inventory conducted on March 31, 2016 revealed no chemical products other than commercially available products in their original packaging, with no signs of spillage. In addition, the owners, who have lived in the house since 1987 and who were also acquainted with the previous owner, were interviewed and have no knowledge of any site activities that used chemicals other than those used in routine household and garden maintenance that could be attributed to the detection of solvents such as PCE or methylene chloride (MC).

The March 2016 indoor air from the central basement room (sample IA2) showed TPH-gasoline, naphthalene and 1,4-dichlorobenzene above their ESLs. Benzene and carbon tetrachloride were also above their ESLs but these can be discounted along with most of the naphthalene when compared to the outdoor air. The naphthalene concentration in outdoor air exceeded the indoor air in the Oct 2015 event but was equal to the crawl space air and less than the basement room air in the April 2016 event. Oxygen was measured during the March 2016 event at 1.2 % in soil-gas well SG5.5. This showed a lowering concentration trend compared to the last measurement in June 2015 that showed 3.0 % in soil-gas well SG5.5.

August 2016: Soil-Gas and Indoor Air Investigation

Analysis of basement room indoor air (sample IA2) during August 2016 event detected TPH-diesel at 180 $\mu g/m^3$ and naphthalene at 0.60 $\mu g/m^3$, both above their ESLs of 140 $\mu g/m^3$ and 0.083 $\mu g/m^3$, respectively, suggesting vapor intrusion into the basement room air quality that was likely created by the former UST related contamination. This is also supported when compared to the outdoor ambient air (sample OA1) that showed less (75 $\mu g/m^3$) TPH-diesel in this August 2016 event.

July 2017: Sub-Slab Soil-Gas and Soil Investigation

The objective of the investigation was to further investigate residual site soil contaminant source of indoor air vapor intrusion related to a former 350-gallon UST that was removed on December 16, 2013. This investigation sampling detected a zone of petroleum hydrocarbons in soil at bore location SB7 that contained 4,700 - 20,000 mg/kg TPH-diesel; 860 - 2,000 mg/kg TPH-gasoline; and up to 38 mg/kg naphthalene that was concentrated between 8-14 feet below ground surface and is likely the source of measured vapor intrusion degrading indoor air in the adjacent building. The sub-slab soil-gas sampling showed no contaminants above the regulatory environmental screening limits and 15-16 % oxygen concentration conducive to promote bioattenuation.

October 2017: Sump, Soil and Preferential Pathway Investigation

The boring and sampling investigation conducted on October 4, 2017 investigation was advanced to delineate vertical and horizontal extent of residual soil contamination at bore location SB7 that was reported in August 2017. Soil contamination documented at bore SB7 consisted of TPH that contained 4,700 - 20,000 mg/kg TPH-diesel; 860 - 2,000 mg/kg TPH-gasoline; and 38 mg/kg naphthalene that was concentrated between 8-14 feet bgs. The extent of soil contamination around bore SB7 is shown on Figure 2. The October 4, 2017 investigation delineated the residual hydrocarbon in soil to approximately 10-20 cubic yards of contaminated soil containing residual TPH in excess of regulatory ESLs that extends approximately 2 to 4 feet around bore SB7 at a depth of about 7 to 16 feet bgs.

A geophysical survey to identify utilities was also conducted to investigate subsurface utilities that could potentially act as preferential pathway for migration of contaminants. A sample of the water was collected from the ssite sump and analyzed to determine if surface water infiltrating through contaminated site soils was carrying contaminants into the building perimeter drain system, potentially distributing contaminants that could contribute to vapor intrusion into the adjacent residence. Analytical results of the sump water detected trace concentrations of TPH gasoline and toluene that are below applicable ESLs. The source of TPH in the sump likely originates from residual soil contaminants located a few feet away that are carried by meteoric water into the drainage system.

Attached Figure 1 shows the site location. The location of soil bores with analytical results and the approximate extent of contaminated soil around bore SB7 is shown on Figure 2. Historical analytical results of soil-gas and indoor air sampling is shown on attached Figure 3.

FEASIBILITY STUDY

Low detectable concentrations of petroleum hydrocarbons were documented in the sump water sample during the October 2017 investigation indicate a preferential pathway has been created with the installation of the French drain. When coupled with the documented naphthalene vapor intrusion into the basement, and the first floor living space, it is apparent that a vapor migration pathway was also created around the house, and thus ACDEH has determined that it is appropriate to proceed to Interim Remedial Actions as articulated in their letter dated November 15, 2017.

ACDEH has request a this IRAP be completed as part of the process but based on the long history of investigation and monitoring data, our understanding of the site conceptual model and physical characteristics, and our recent telephone conversations, the most cost effective and logical corrective action is easy to converge on. However, feasibility comparisons of no action and the three corrective actions to achieve cleanup objectives are presented below. The methods compared are:

1. No action
2. Monitoring Natural Attenuation (MNA) (the de-factor current remedy)
3. In-Situ Soil Vapor Extraction (SVE)
4. Active Remediation including excavation of soil contamination in the source area.

EVALUATION CRITERIA

One “No Action” and three active remedial technologies are compared, including the current passive remedy of monitoring natural attenuation (using the existing wells), which has been demonstrated to not be effective in source area contaminant reduction over the last ten years of monitoring. The technologies selected for review are: 1) No action; 2) MNA; 3) SVE; and 4) Soil Excavation.

This section will compare each of the technologies being reviewed to the following criteria:

- Technology effectiveness
- Overall protection of human health and the environment
- Compliance with ARARs
- Long-term feasibility and permanence

- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Technology cost
- State/support agency acceptance
- Community acceptance

Figure 4 presents the screening and more detailed criteria used to assess the appropriateness of the alternatives. The evaluation criteria have been divided into three groups based on the function of the criteria in remedy selection. The first two criteria are "threshold" criteria that relate to the statutory requirements that must be satisfied for each alternative to be eligible for selection. The primary balancing criteria are the next five technical criteria upon which the detailed analysis is primarily based. The last two criteria are assessed formally after the public comment period, although to the extent they are known, they are factored into the identification of the preferred alternative. Based on this formal consideration, the lead agency may modify aspects of the preferred alternative or decide that another alternative is more appropriate.

The question of long-term effectiveness addresses the magnitude of the risks resulting from the residuals left in place and the adequacy and reliability of controls. Other critical questions assessed are the likelihood of meeting performance specifications; type of long-term management; monitoring and necessary maintenance; difficulties and uncertainties of long-term operation and maintenance; confidence in the system's ability to handle potential problems; and land disposal of residuals and untreated wastes. Remediation methods should be evaluated for their effectiveness in reducing the toxicity, mobility, and/or volume of the contaminants. For short-term effectiveness, the selection process should also address protection of the community, protection of workers, environmental impacts, and time required to reach cleanup objectives. The implementability evaluation includes technology maturity, ease of implementation, and potential disruption of normal site activities during construction and operation. The selected technology should be the one that meets the effectiveness criteria at the lowest cost and gains regulatory and community acceptance as a long-term solution.

ALTERNATIVES EVALUATION

Technology Screening

The potential remedies of thermal desorption, dual-phase extraction, air sparging recovery and in-situ injection were screened out in an initial cursory phase based on predominately long chain (diesel grade) hydrocarbon contamination, low-permeability soil, and cost. Thus, at this stage, three removal action alternatives, other than no action, are considered for the site. In addition to Alternative 1, the passive remedy also known as "No Action."

These alternatives are:

- *Alternative 2:* Monitoring Natural Attenuation (MNA), or essentially what we have been doing at the site for the last 2.5 years, which has allowed for a better understanding of the chemical trend.
- *Alternative 3:* In-situ Soil Vapor Extraction (SVE) implemented in the hotspot "source area" around bore SB7.
- *Alternative 4:* A focused excavation of an estimated 20-30 tons of soil to remove in the vicinity of bore SB7.

Each of these alternatives is described and evaluated below. Table 1 summarizes the alternatives against the criteria outlined. Table 2 provides a "pass/fail" comparison of the alternatives to the feasibility criteria.

The following considerations were used to evaluate the removal action alternatives, along with the criteria identified in the previous section:

- Regulatory/permitting acceptance
- Site constraints and limitations to implementation
- Geochemical environment and design of the full-scale implementation project
- Responsible party and property owner (the same in this case) acceptance
- Permitting (if necessary)
- Subcontracts negotiation

Alternative 1: No Action

No Action is the appropriate selected alternative when there are no more regulatory concerns and the site can be move to regulatory closure. In this alternative soil-gas and indoor air monitoring for trend analyses and assessment is no longer necessary because there is no site COCs.

Alternative 2: Monitoring Natural Attenuation

Monitoring Natural Attenuation relies on the long-term geochemical environment and residual COC concentrations are amenable to natural attenuation of the hydrocarbons. This alternative assumes that conditions favor subsurface processes such as indigenous microorganisms utilizing the hydrocarbons as a food source to reduce it as well as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials, resulting in measureable long term reduction in the hydrocarbon contaminant concentrations of concern. The primary mechanism is the biological processes that naturally biodegrade the contaminants in soil. Naturally occurring microbes convert the contaminants to benign compounds through metabolic or co-metabolic processes. The primary contaminants at this site are hydrocarbons which are amenable to natural attenuation due to their ability to biodegrade, but only if the concentrations are in the less than 10,000 mg/kg total petroleum hydrocarbon (TPH) to allow for sufficient oxygen to support microbial utilization of the hydrocarbon as a food source. In other words the source area (TPH >10,000 mg/kg) removal needs to have been completed before MNA can be effective.

Alternative 3: In-situ Soil Vapor Extraction (SVE

This alternative includes the installation of a soil vapor extraction (SVE) system to capture subsurface hydrocarbons. The contaminant source at this site is limited to an area of 2 to 4 feet around bore SB7 at a depth of about 7 to 16 feet bgs making this remedy impractical to implement. Vacuum short-circuiting or preferential paths created both naturally and by the adjacent building or related structures such as the perimeter drain may render this remedy only marginally effective. Other factors such as noise, space requirements, extensive permitting, monitoring, operation, and maintenance and make this remedy impractical for treating a limited contaminant volumes.

Table 1
Evaluation of Removal Action Alternatives

SUMMARY OF TECHNOLOGIES—

Alternative 1 – No Action. No Action relies on long-term plume reduction to occur and site can be closed without further monitoring. MNA or site maintenance and monitoring could be implemented, and could result in slow reductions in residual TPH over time. Long-term monitoring would be required.	***Alternative 3** – **Monitoring Natural Attenuation.*** MNA or the status quo maintenance and monitoring would continue to be implemented, with chemical trends evaluated annually. Long-term monitoring would be required.
Alternative 3 – In-Situ SVE. Installation of an SVE system with a vapor extraction well installed at the location of bore SB7. The SVE would focus on contaminated soil in an area of 2 to 4 feet around bore SB7 at a depth of about 7 to 16 feet bgs	***Alternative 4 – Active Remediation.*** Excavation of contaminant soil source.

FEASIBILITY OF ALTERNATIVES—

ASSESSMENT CRITERIA	ALTERNATIVE 1 **No Action**	ALTERNATIVE 2 **Monitoring Natural Attenuation**	ALTERNATIVE 3 **Soil Vapor Extraction**	ALTERNATIVE 4 **Active Remediation**
1. Overall Protection of Human Health and the Environment				
Magnitude of Residual Risk On Site	Unlikely that the TPH in soil will diminish significantly over time without active remediation.	Negligible. The TPH could be reduced long term.	Potential Impact. A potential for TPH reduction, but effectiveness impacted by limited target focus	Negligible. Controls would reduce concentration in soil, the source of vapor intrusion.
Adequacy and Reliability of Controls	No engineering controls are required.	No engineering controls are required.	Adequate and reliable controls for SVE with site constraints.	Adequate and reliable to control to implement work proposed.

Table 1 (continued)

ASSESSMENT CRITERIA	ALTERNATIVE 1 No Action	ALTERNATIVE 2 Monitoring Natural Attenuation	ALTERNATIVE 3 Soil Vapor Extraction	ALTERNATIVE 4 Active Remediation
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)				
Ability to Meet ARARs	Not achievable on its own, even assuming meeting groundwater ESLs not required.	Unlikely to achieve ARARS due to high levels of residual hydrocarbon at source area not allowing for oxygen penetration.	Will not achieve ARARs unless the SVE makes contact with entrained TPH in soil which is unlikely due to numerous potential pathways	Most promising to remove source contamination in soil critical to meeting ARARs and removing source of vapor intrusion
3. Long-Term Effectiveness and Permanence				
Effectiveness	Not achievable on its own.	Not achievable on its own. The degree to which charge occur are tracked by MNA but after 2.5 years trend does not support MNA as viable	Would be somewhat effective in the lower concentration and higher permeable zones	Most Effective.
Permanence	Not likely to achieve permanence.	Not likely to achieve permanence.	Would require vapor extraction and Alternative 1 follow on.	<1 year timeframe to closure estimated
4. Reduction of Toxicity, Mobility, and Volume				
Effectiveness in Redu-cing Toxicity, Mobility, and Volume of TPH in soil	No significant change in toxicity. Mobility will vary by seasonal effects of pressure, temperature but still pose as source of vapor intrusion.	No significant change in toxicity. Mobility varies by seasonal effects of pressure, temperature but still pose as source of vapor intrusion.	Potential long term bioremediation depending on degree of source stripping achieved	Effective source removal of TPH mass in soil
5. Short-Term Effectiveness				
Time Until Removal Action Objectives are Achieved	Not effective.	Effective in the 10-20 year term however free product will persist.	Estimated 1.5 to 2 years	Estimated < 0.5 year
Protection of Community During Removal Action	Yes. There would be no impacts likely to the community given the current land use.	Yes. No impacts to the community likely given the current land use.	Yes. No impacts to the community likely given the current land use.	Yes. No impacts to the community likely given the current land use.
Protection of Workers During Removal Action	No Risk to workers.	No significant risk to personnel.	No significant risk to site workers in conducting in-situ work using PPE	No significant risk to site workers in conducting excavation using PPE.
Environmental Protection	TPH could continue to desorb from soil into building perimeter drain and be source of vapor intrusion. No significant change in TPH concentrations.	Same as Alternative 1 but with MNA an indication of any charge in chemical trends are monitored.	Degree of protection dependent on effectiveness of contact achieved between SVE and contaminated material.	Protection achieved through removal of remnant TPH source.

Table 1 (continued)

ASSESSMENT CRITERIA	ALTERNATIVE 1 No Action	ALTERNATIVE 2 Monitoring Natural Attenuation	ALTERNATIVE 3 Soil Vapor Extraction	ALTERNATIVE 4 Active Remediation
6. Implementability				
Technical Feasibility	Feasible but not compliant	Feasible but not compliant	Problematic.	Feasible.
Administrative Feasibility	Regulatory closure acceptance required	No permits necessary.	Would require significant additional cost	Excavation permitting, temporary sidewalk obstruction, traffic control
7. Technology Cost [a]				
Capital Cost	None	Possible if future installation of well(s) required	$120,000	$45,000
Annual Operation & Maintenance	None	$75,000 ($5,000/year for 15 years)	$30,000 ($15,000/year for 2 years)	none

Notes:

[a] Cost estimates for the in-situ treatment techniques are based on discussions with vendors of the technology.

ARARs = Applicable or Relevant and Appropriate Requirements
MNA = monitored natural attenuation

Table 2
Pass/Fail Comparison of Screening Technologies to Feasibility Criteria

Alternative	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction in Toxicity, Mobility, and Volume	Short-Term Effectiveness	Implementability	Estimated Life-Cycle Cost ($1,000)
1. No Action	P	F	F	F	F	P	10
2. MNA	P	F	F	F	F	P	75
3. SVE	P	F-P	F-P	F-P	F-P	P	200
4. Excavation	P	P	P	P	P	P	45

Notes:

P = Pass
F = Fail

Compliance with ARARs would take at least 15 years with the MNA alternative. Cost basis varies slightly for alternatives as described in the sections covering those alternatives.

Alternative 4: Source Excavation

Alternative 4 entails excavation of the contaminant source in the form of the removal of the soil with residual hydrocarbons that are still associated with the former UST area. The contamination was delineated in the October 2017 investigation with 4 borings (SB8, SB9, SB10 and SB11) that surrounded and defined the area around bore SB7. The depth of the contamination extends from 7 feet bgs to an estimated depth about 16 feet bgs based on the surrounding bores. This alternative is expected to entirely remove the primary contaminant source. Groundwater has not been encountered at the site within 36 feet bgs, the maximum depth of the site boring.

Recommended Alternative

Alternative 4 is selected as the preferred option based on it having prospects for the best contaminant mass recovery, and meeting the key regulatory criteria of source removal. Alternative 4 is also the least expensive alternative other than the no action granting of regulatory closure under the current conditions.

CORRECTIVE ACTION PLAN

The following tasks are proposed for the selected Alternative 4 corrective action:

Task 1 - Field Preparation

- Procure hazardous certified excavation contractor
- City of Oakland Sidewalk Obstruction Permit Fee
- City of Oakland Traffic Control Plan Preparation
- City of Oakland no parking signs
- Site visit to mark for underground utility clearance, as required
- Preparation of project health and safety plan

Task 2 – Contaminated Soil Excavation

The remedial excavation is designed to remove residual area contaminated soil source that was not removed in 2013 when the UST removal was completed.

Figure 2 shows the analytical results of historical soil sampling in the vicinity of bore SB7. Figure 3 shows the area of the proposed soil excavation. The proposed remedial excavation is approximately square, 8 by 8 feet to a depth of 16 feet bgs. The proposed excavation area is bound by soil bores having TPH contaminants below applicable regulatory ESLs. The excavation will center on bore SB7 and extend north toward bore SB11; south toward SB8; east toward SB10; and west to where it meets the former UST excavation. The excavation is anticipated to extent to a maximum of 16 -17 feet bgs, based on the depth of the surrounding bores that showed no significant contamination at 16 feet bgs and will extend below the depth of the former UST excavation which extended to 12 feet bgs.

Implementation of this IRAP will begin with saw-cutting of the concrete driveway surface and the concrete and base material removed to expose native soil. A backhoe and loader will then be used to remove the petroleum-impacted soils and directly load into trucks for transportation to an offsite disposal facility. Previous sample analytical results will be used to obtain pre-excavation soil profile acceptance from the landfill disposal facility.

Soil will be screened using a photoionization detector (PID) to verify removal of all contaminated soil and to segregate potentially clean overburden to re-use. Confirmation sampling of the excavation bottom will be conducted to confirm cleanup levels [Tier 1 Environmental Screening Levels (ESLs)] are met.

Confirmation samples from the excavation bottom will be submitted to an offsite analytical laboratory for analysis of total extractable hydrocarbons as diesel (TEHd); total extractable hydrocarbons as motor oil (TEHmo); total volatile hydrocarbons as gasoline (TVHg); naphthalene, benzene, toluene, ethyl benzene, and total xylenes (BTEX); and methyl tertiary butyl ether (MTBE).

Worker and Environmental Safety

In consideration for public safety with the close proximity to the sidewalk and to minimize potential collapse, the excavation will be backfilled the same day.

Typical best management practices (BMPs) when working with any potentially-contaminated soil or soils that exceed the Water Board worker exposure ESL risk will be employed and will include:

- During earthmoving activities, excavation and grading, open areas of dirt and soil stockpiles should be wetted or covered if fugitive dust emissions are observed.
- Particulate air sampling may be conducted during earth moving activities as part of health and safety monitoring to document usage of proper dust control measures.
- Soil stockpiles (though not anticipated) should be protected against the possibility of children or other non-construction persons contacting the soil. This can be achieved

by securing stockpiled soil beneath cover or within a protected work area. All stockpiles should be covered with heavy plastic sheeting (6.0-mil nominal) that is adequately weighted down, to prevent fugitive dust emission. Straw wattles will be utilized to prevent silt from levaing the proiject area via rainfall runoff.

- Construction vehicle wheels that might come in contact with the soils should be brushed/cleaned as necessary to ensure that soils are not incidentally tracked offsite.
- Barricades and caution tape will be utilized to keep unauthorized persons away from working areas.

Task 3– Reporting

The Sampling and Investigation report will contain the following elements:

- Project Introduction and Background;
- Investigation Scope and Objectives and Procedures;
- Description of the Fieldwork, Sampling Protocols, Analytical Methods;
- Tabulation of Data Compared to Relevant Regulatory Environmental Screening Criteria;
- Relevant figures showing site location, site plan showing location of former UST, current and historical investigation sampling points, delineation of the excavation and sample locations measured and drawn in the field in relation to geographic site features; and
- Technical Appendices (i.e.photographs, summary analytical tables, certified analytical reports and chain-of-custody records).
- The reports, including this IRAP and related data will be uploaded to the Water Board Geotracker and the ACDEHS's fileservers

PROPOSED SCHEDULE

We anticipate the following tasks during implementation of IRAP:

- Preparation of traffic plan and obtain City of Oakland sidewalk obstruction permit and 'no parking signs' during implementation of IRAP.
- Saw cutting of driveway, demolition and disposal of approximately 128 square feet of concrete (1day).
- Excavation and direct loading of contaminated soil, offsite transport, confirmation sampling, backfilling with aggregate silty base rock fill definition and removal (1 day)

- Restoration of concrete driveway, sprinklers, etc.; (1-2 days)
- Preparation of documentation report

Because this work is subject to reimbursement by the State of California Tank Fund, we request that the ACDEH provide to Stellar Environmental written approval of this IRAP to support the owner's Fund application and reimbursement process. Please contact us directly if you have any questions.

We trust that this submittal meets your agency's needs. We declare, under penalty of perjury, that the information and/or recommendations contained in this document or report is true and correct to the best of our knowledge.

We will proceed with implementation of this Workplan upon you review and concurrence. If you have any questions regarding this document or attachments, please contact us.

Sincerely,

Mark A. Jacobson
Property Owner-Responsible Party

Ilona Frieden
Property Owner-Responsible Party

Henry Pietropaoli, P.G
Principal Geologist and Project Manager

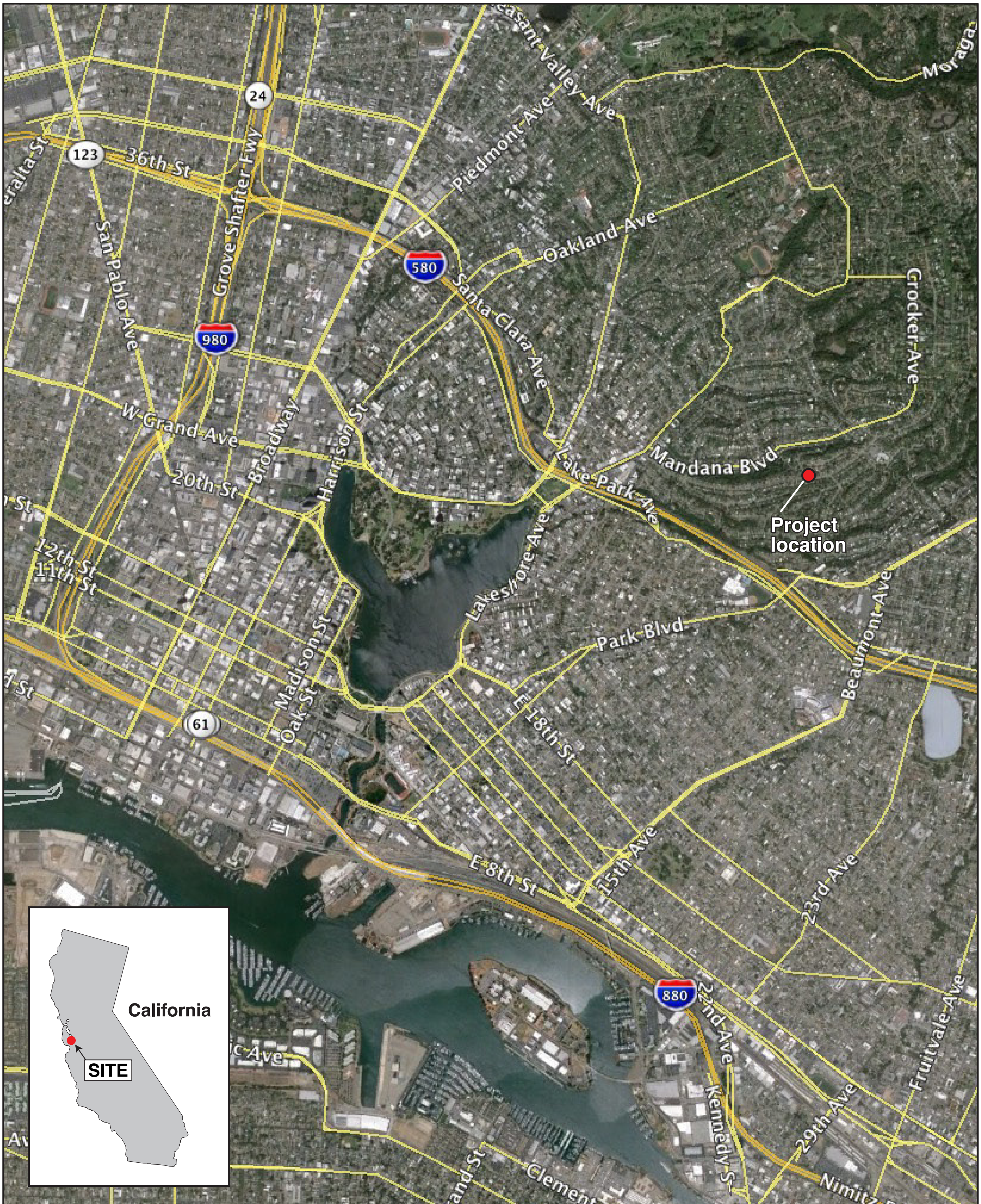
Richard S. Makdisi, P.G.
Principal Geochemist and President

Attachments: Figures 1, 2, 3. 4 and 5

cc: Mr. Amitai Schwartz – property owner counsel

REGISTERED GEOLOGIST
RICHARD S. MAKDISI
No. 4652
Exp. 4/2018
STATE OF CALIFORNIA

WORKPLAN FIGURES



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SITE LOCATION MAP

811 Paramount Avenue
Oakland, CA

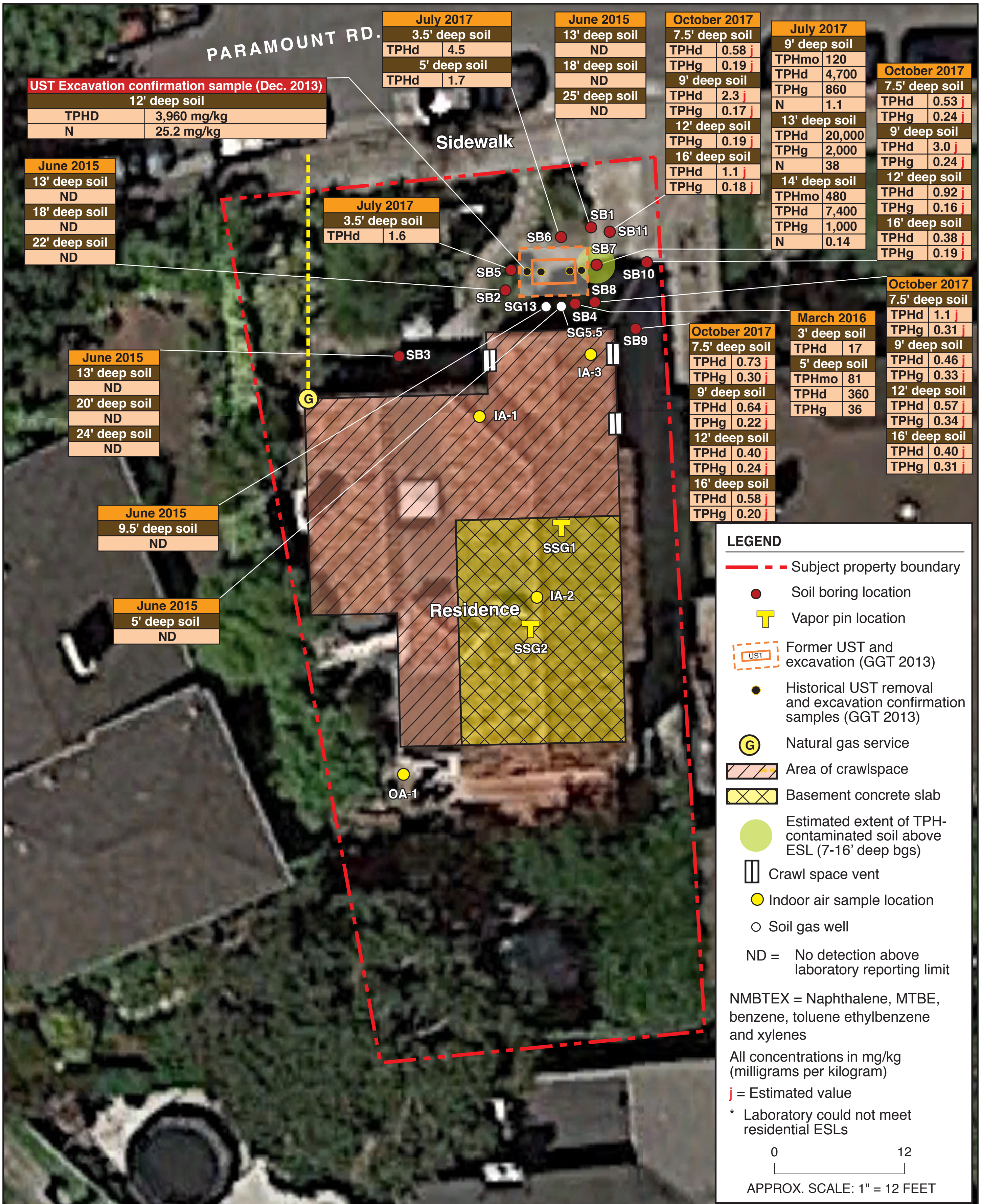
By: MJC

October 2017

Figure 1

STELLAR
ENVIRONMENTAL SOLUTIONS, INC
GEOSCIENCE & ENGINEERING CONSULTING

2015-16-01



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DISTRIBUTION OF ANALYTICAL RESULTS OF CONTAMINANTS OF CONCERN IN SOIL

811 Paramount Road
Oakland, CA

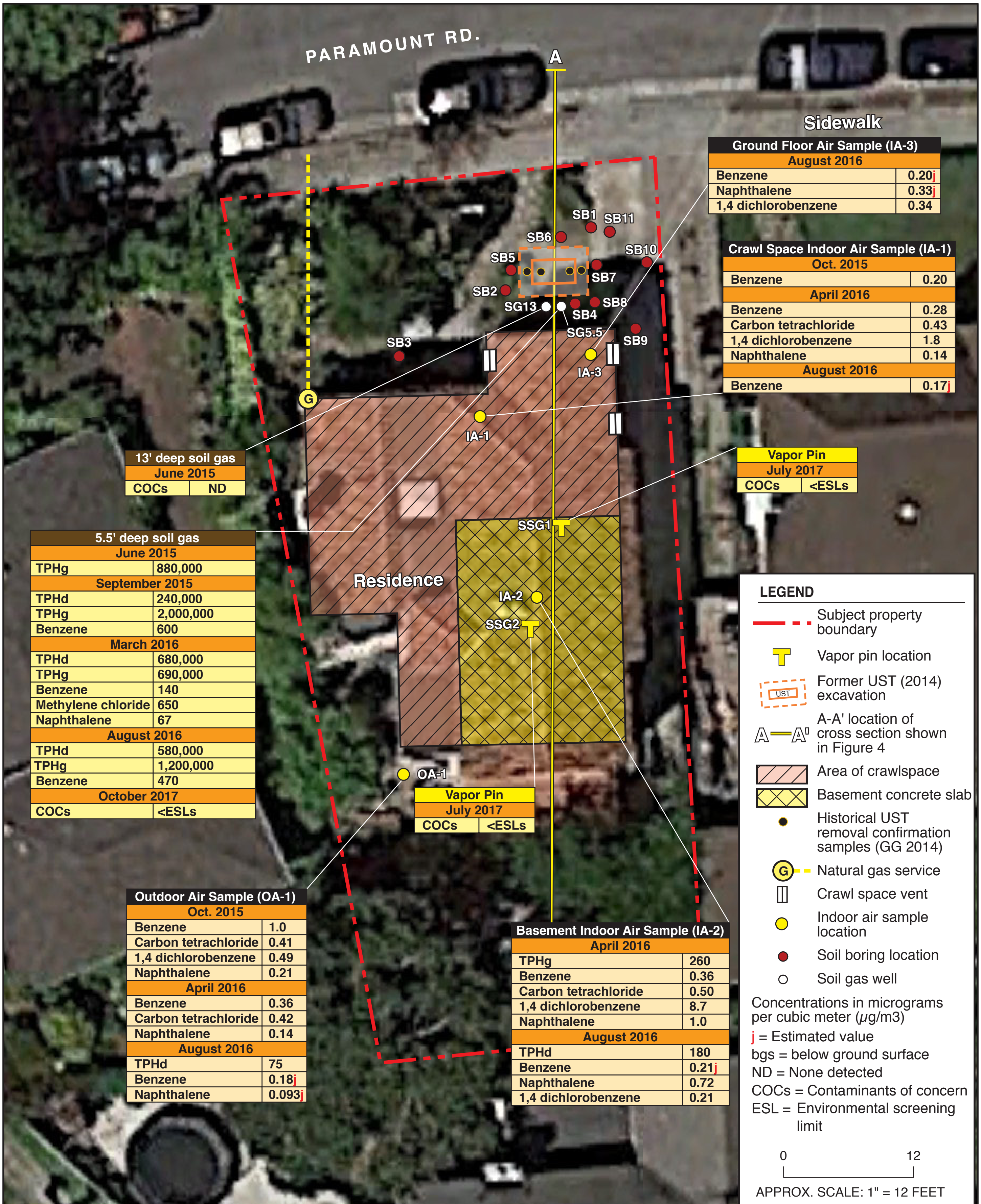
By: MJC

NOVEMBER 2017

Figure 2

STELLAR Environmental Solutions, Inc
Geoscience & Engineering Consulting

2015-16-26



Ground Floor Air Sample (IA-3)	
August 2016	
Benzene	0.20j
Naphthalene	0.33j
1,4 dichlorobenzene	0.34

Crawl Space Indoor Air Sample (IA-1)	
Oct. 2015	
Benzene	0.20
April 2016	
Benzene	0.28
Carbon tetrachloride	0.43
1,4 dichlorobenzene	1.8
Naphthalene	0.14
August 2016	
Benzene	0.17j

13' deep soil gas	
June 2015	
COCs	ND

Vapor Pin	
July 2017	
COCs	<ESLs

5.5' deep soil gas	
June 2015	
TPHg	880,000
September 2015	
TPHd	240,000
TPHg	2,000,000
Benzene	600
March 2016	
TPHd	680,000
TPHg	690,000
Benzene	140
Methylene chloride	650
Naphthalene	67
August 2016	
TPHd	580,000
TPHg	1,200,000
Benzene	470
October 2017	
COCs	<ESLs

Vapor Pin	
July 2017	
COCs	<ESLs

Outdoor Air Sample (OA-1)	
Oct. 2015	
Benzene	1.0
Carbon tetrachloride	0.41
1,4 dichlorobenzene	0.49
Naphthalene	0.21
April 2016	
Benzene	0.36
Carbon tetrachloride	0.42
Naphthalene	0.14
August 2016	
TPHd	75
Benzene	0.18j
Naphthalene	0.093j

Basement Indoor Air Sample (IA-2)	
April 2016	
TPHg	260
Benzene	0.36
Carbon tetrachloride	0.50
1,4 dichlorobenzene	8.7
Naphthalene	1.0
August 2016	
TPHd	180
Benzene	0.21j
Naphthalene	0.72
1,4 dichlorobenzene	0.21

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SITE PLAN SHOWING ANALYTICAL RESULTS OF COMPOUNDS IN SOIL-GAS, SUB-SLAB GAS, INDOOR AND OUTDOOR AIR ABOVE ESL

811 Paramount Road
Oakland, CA

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Figure 3

STELLAR Environmental Solutions, Inc
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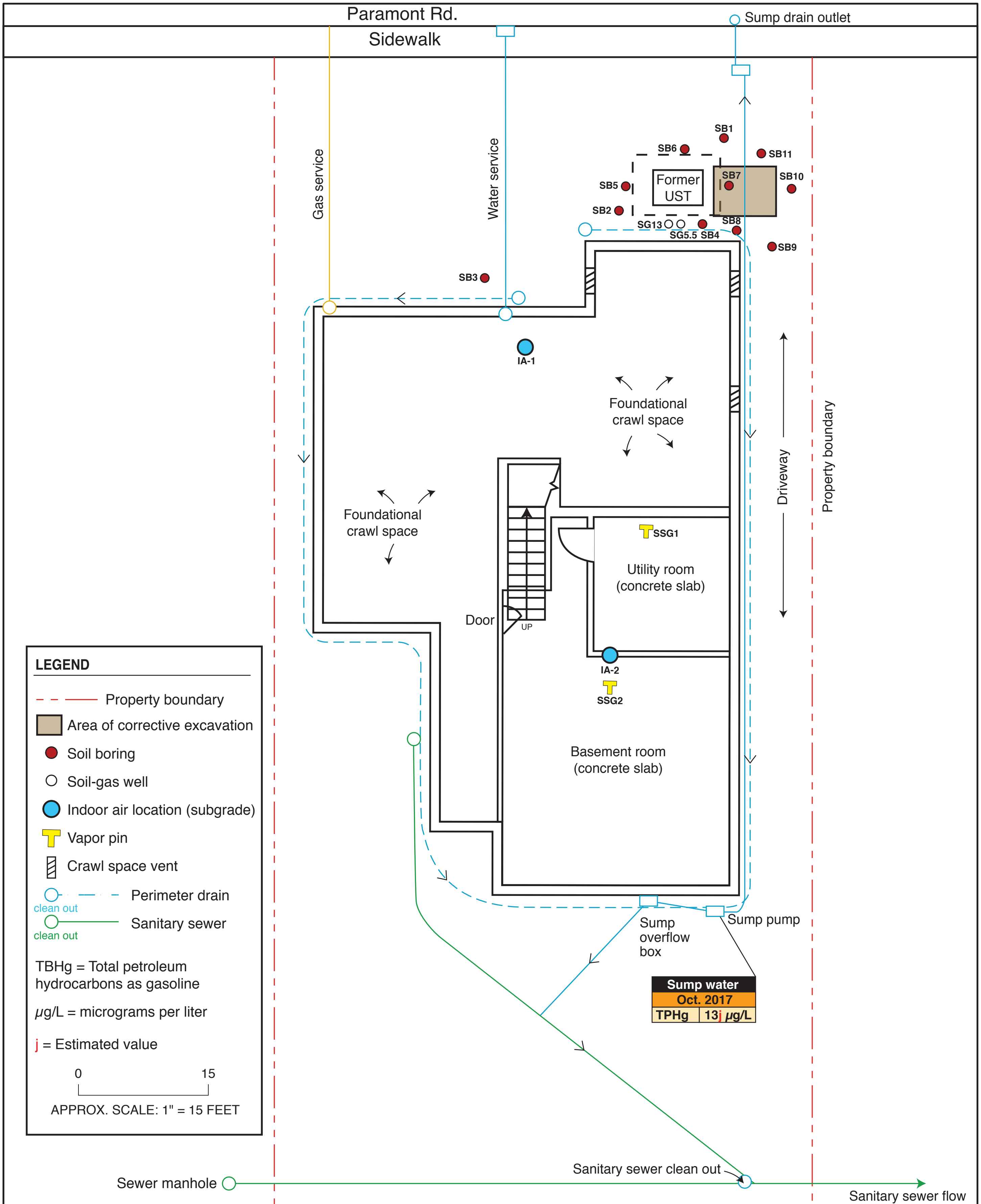
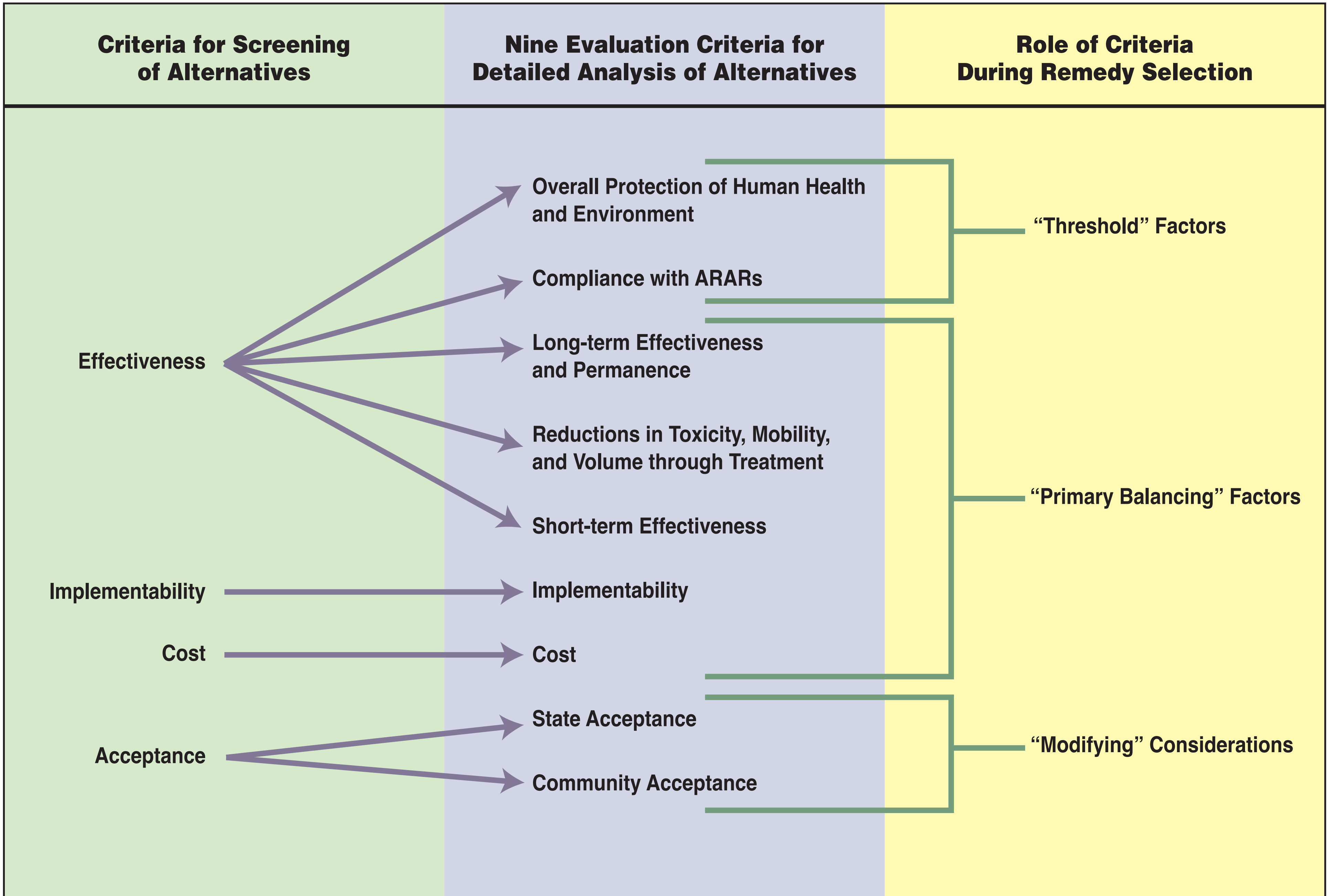


PLAN VIEW OF BUILDING SUBGRADE AND LOCATION OF UTILITIES

811 Paramount Road Oakland, CA	**By: MJC**	**DECEMBER 2017**
	Figure 4	

STELLAR ENVIRONMENTAL SOLUTIONS, INC
GEOSCIENCE & ENGINEERING CONSULTING

2015-16-32



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SITE REMEDY EVALUATION CRITERIA
811 Paramount Road, Oakland

Figure 5

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