CORNERSTONE
EARTH GROUP

TYPE OF SERVICES	Preliminary Phase II Soil and Soil Vapor Quality Evaluation
LOCATION	160 El Camino Real San Bruno, California
CLIENT	David J. Powers & Associates
PROJECT NUMBER	118-123-1
DATE	January 25, 2021

CORNERSTONE EARTH GROUP

Type of Services	**Preliminary Phase II Soil and Soil Vapor Quality Evaluation**
Location	**160 El Camino Real San Bruno, California**
Client	**DAVID J. POWERS & ASSOCIATES**
Client Address	**1971 The Alameda, Suite 200 San Jose, California**
Project Number	**118-123-1**
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Type of Services	**Preliminary Phase II Soil and Soil Vapor Quality Evaluation**
Location	**160 El Camino Real San Bruno, California**

SECTION 1: INTRODUCTION

This report presents the results of the Preliminary Phase II Soil and Soil Vapor Quality Evaluation performed at 160 El Camino Real in San Bruno, California (Site) as shown on Figures 1 and 2. This work was performed for David J. Powers & Associates (DJPA) in accordance with the October 2, 2020 Agreement (Agreement).

1.1 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The Site is comprised of an approximately 0.22-acre vacant lot located at 160 El Camino Real in San Bruno, California. We understand that DJPA is assisting their client with evaluating the Site for development with a 3-story hotel with below-grade parking garage. Based on development plans provided by DJPA, the proposed excavations will extend to a depth of approximately 13 feet for construction of the parking garage.

1.2 PURPOSE

The purpose of this Preliminary Phase II Evaluation was to evaluate soil and soil vapor quality to help evaluate potential impacts from prior Site uses and appropriate mitigation measures for Site development.

1.3 SCOPE OF WORK

As presented in our Agreement, the scope of work performed for this investigation included the following:

- Drilling and logging of 14 exploratory borings at seven locations to depths ranging between approximately 5 feet up to 13 feet;
- Collection of 12 soil samples from four exploratory borings for laboratory analyses;
- Installation of 14 subsurface soil vapor probes at seven locations, with probes installed at depths of approximately 5 and 10 feet at each location.
- Collection of soil vapor samples from the probes for laboratory analyses; and
- Preparation of this report.

The limitations for this investigation are presented in Section 6.

SECTION 2: BACKGROUND

2.1 2015 PHASE I ENVIRONMENTAL SITE ASSESSMENT

Based on a 2015 Phase I Environmental Site Assessment (ESA) (AEI, 2015), the Site was occupied by a gas station in the northwestern corner of the Site from at least 1938 to 1999. A building used as an auto repair shop occupied the Site from 1949 to at least 1953. From 1976 to 1990, the same gas station and a ceramic store occupied the Site. From 1995 to 1999, a gas station and a carpet store occupied the Site. Ten underground storage tanks (USTs) believed to have stored gasoline, waste oil and diesel fuel were formerly installed at the Site. The USTs were removed and gas station buildings demolished between 1999 to 2000. The contents of the tanks reportedly were not documented during removal. The Site has remained vacant land since 2000.

2.2 PREVIOUS INVESTIGATIONS AND REGULATORY STATUS

The Site is listed on the State Water Resources Control Board GeoTracker database as a closed leaking underground storage tank (LUST) case under oversite of the San Mateo County Local Oversite Program (Case # 880048) and the San Francisco Bay Regional Water Quality Control Board (Water Board) (Case # 41-1228).

A number of soil, soil vapor and groundwater quality investigations have been performed at the Site from 1999 to 2014. These are briefly summarized below.

Soil borings advanced after removal of the USTs detected elevated concentrations of petroleum hydrocarbons up to depths of 30 feet in soil and in groundwater. In March 2000, 3,117 tons of soil reportedly were excavated to depths of approximately 18 to 20 feet below ground surface and the excavations were backfilled with imported soil.

Groundwater was monitored at the Site from 2001 to 2014. At the time of the last groundwater monitoring in April 2014, laboratory analyses detected up to 760 micrograms per liter (µg/L) gasoline range petroleum hydrocarbons (TPHg), 27,000 µg/L methyl tert-butyl ether (MTBE), and 220 µg/L tert-butyl alcohol (TBA). Benzene, toluene, ethylbenzene and xylene (BTEX) reportedly were not detected (TEC Environmental, 2014).

Based on the results of remediation and continued monitoring, the RWQCB concurred with the San Mateo County Department of Environmental Health (SMCDEH) recommendation that no further assessment or remediation related to the USTs was necessary at that time. Based on the August 13, 2014 case closure summary letter issued by the SMCDEH, an unknown amount of hydrocarbon impacted soil and groundwater remains in the subsurface at the Site that could pose an unacceptable risk under certain Site development activities. The case closure summary listed maximum concentrations of petroleum hydrocarbons detected in soil as 5,800 milligrams per kilogram (mg/kg) TPHg, 330 mg/kg toluene, 140 mg/kg ethylbenzene, 960 mg/kg xylene, and 26 mg/kg MTBE (San Mateo County Department of Environmental Health [SMCDEH], 2015). These detections appear to have been in soil samples collected from depths of approximately 10 to 15 feet in an exploratory boring drilled near the northwest edge of the former UST excavation (TEC Environmental, 2013).

SECTION 3: SUBSURFACE INVESTIGATION

3.1 PRE-FIELD ACTIVITIES

Cornerstone notified the regional utility notification center (Underground Service Alert [USA]) more than 48 hours before beginning drilling activities so that public and private utilities could be identified and marked at the ground surface. Where practical, we marked borings in white paint or stakes to designate our exploration locations, as requested by USA. Additionally, to reduce the risk of damaging unidentified underground utilities during drilling, we also contracted with a private utility locator. A boring permit was obtained from the SMCDEH. A copy of the boring permit is included in Appendix A. Additionally, Cornerstone coordinated with Penecore Drilling of Woodland, California, a licensed drilling contractor possessing a C-57 water well contractor's license issued by the State of California, to schedule the sampling activities.

3.2 EXPLORATORY BORINGS

On December 22 and 23, 2020 our field geologist, under oversight of a California Professional Geologist, directed a subsurface investigation, continuously logged in general accordance with the Unified Soil Classification System (ASTM D-2487) and sampled exploratory borings at seven locations (EB-1 through EB-7) to depths ranging from 5 feet up to 13 feet, with a total of 14 borings advanced. The borings were advanced using direct push technology. The locations of the exploratory borings advanced are provided in Figure 2.

All borings were advanced using a track-mounted drill rig equipped with Geoprobe® Direct Push Technology and a Dual Wall Sampling System. The Dual Wall Sampling System helps prevent cross contamination between sampling intervals. The Dual Wall Sampler is comprised of two main components: an exterior steel casing and an inner sample barrel. The outer casing has a 3.25-inch outer diameter (OD) and a 2.5-inch inner diameter (ID). The sample barrel is 5 feet in length with a 2.375-inch outside diameter (OD) and a 2-inch inner diameter (ID). The Dual Wall sample barrel is loaded with a 5-foot acetate liner and installed inside the outer casing. The outer drive casing and inner sample barrel are then hydraulically pushed to a depth of approximately 5 feet. As these tools are advanced, the inner sampling barrel collects the soil core sample. This sampler is then retrieved while the outer casing remains in place, protecting the integrity of the hole. A new sampler is lowered into place and advanced another 5 feet to collect the next soil sample. This process continues until a desired depth has been reached. The borings advanced for the collection of soil and groundwater samples were tremie grouted upon completion.

3.2.1 Subsurface Conditions

This section presents a summary of subsurface conditions encountered in soil borings advanced at the Site. For further detail, soil boring logs are attached in Appendix A.

Based on the exploratory borings advanced at the Site, the upper approximately ½ foot consisted of topsoil. Sandy clay with gravel fill was encountered beneath the surface materials in borings EB-1 through EB-5. Fill extended to depths ranging between approximately 10 to 13 feet (maximum depth explored of 13 feet). Native soils consisting of clayey sand with silt was encountered in borings EB-6 and EB-7 at depths up to 10 feet. A petroleum odor was observed in boring EB-3 at a depth of approximately 9½ feet. No apparent chemical odors or staining were observed in the other exploratory borings.

3.2.2 Organic Vapor Readings

Soil samples retrieved from the exploratory borings were monitored with a MiniRAE 3000 organic vapor meter (OVM) to record volatile organic vapors (VOCs). Low to moderate OVM readings ranging between 0 to 100 parts per million by volume (ppm_v) were observed in screened soil samples in borings EB-1, EB-2, EB-4, EB-5, EB-6 and EB-7. An elevated OVM reading of 161.2 ppm was observed in boring EB-3 at an approximate depth of 9 to 10 feet. OVM readings are shown on the boring logs included in Appendix A.

3.3 SOIL SAMPLE COLLECTION AND LABORATORY ANALYSES

Soil samples for laboratory analyses were collected in new (unused) acetate liners. Ends of the soil samples were covered in a Teflon film, fitted with plastic end caps, and labeled with a unique sample identification number. Samples for volatile analysis were collected in triplicate Core-N-One samplers in general accordance with EPA Method 5035. Soil samples were placed in an ice-chilled cooler and transported to a state-certified laboratory with chain of custody documentation.

To help evaluate re-use and disposal alternatives, soil samples were collected from four exploratory borings (EB-1, EB-3, EB-4, and EB-5) advanced within the approximate limits of the UST excavation backfill. Soil samples were collected from the upper approximately one foot of soil, and from depth intervals of 2 to 3 feet, 4 to 5 feet, 9 to 10 feet, and 12 to 13 feet. To help evaluate the quality of soil that will be excavated for the planned construction, twelve selected soil samples were analyzed for 17 California Assessment Manual Metals (CAM-17, EPA Test Method 6010B/7471A), organochlorine pesticides (OCPs, EPA Test Method 8081A), polychlorinated biphenyls (PCBs, EPA Test Method 8082), diesel (TPHo) and oil (TPHo) range petroleum hydrocarbons (EPA Test Method 8015), volatile organic compounds (VOCs) and TPHg (EPA Test Method 8260B). Four randomly selected soil samples were additionally analyzed for semi-volatile organic compounds (SVOCs, EPA Test Method 8270C).

3.4 SOIL VAPOR COLLECTION AND LABORATORY ANALYSES

Between December 22 through 23, 2020, our field geologist oversaw the drilling and installation of 14 temporary soil vapor probes at seven locations (two probes per location). At each location, a soil vapor probe was installed to a depth of 5 feet (SV-1-5 through SV-7-5) and an additional co-located soil vapor probe was installed to a depth of 10 feet (SV-1-10 through SV-7-10) within approximately 3 lateral feet of each other. The protocols presented follow the general requirements of the July 2015 document entitled, “Advisory – Active Soil Gas Investigations”, prepared by the Department of Toxic Substances and Control (DTSC), Los Angeles Regional Water Quality Control Board, and San Francisco Regional Water Quality Control Board.

3.4.1 Soil Vapor Probe Installation

The 14 temporary soil vapor probes consisted of a stainless steel expendable vapor tip and screen affixed to stainless steel tubing. The vapor sampling locations were constructed by first placing approximately 2 inches of coarse aquarium-type sand into the bottom of the borehole using a tremie pipe. The stainless steel tip and tubing were then lowered into the borehole via a tremie pipe. Additional sand was then placed in the borehole via tremie to create an approximately 1 foot sand pack interval around the vapor tip. Approximately 1 foot of granular bentonite (Benseal™) was placed on top of the sand pack via the tremie pipe. Bentonite “gel” was then mixed utilizing a power drill and paddle (creating the consistency of porridge, but to the viscosity that would allow for flow in a ¾ inch diameter PVC tremie pipe through a funnel). The bentonite gel was then placed via tremie pipe on top of the dry granular bentonite to the approximate ground surface.

3.4.2 Soil Vapor Sampling

Vapor sampling was performed at least 2 hours after completing well construction activities. Fourteen soil vapor samples were collected using the methods described below. Soil vapor sampling notes are included in Appendix A.

Soil vapor sampling was performed following the protocols presented in the July 2015 document entitled, "Advisory – Active Soil Gas Investigations", prepared by the Department of Toxic Substances and Control and the California Regional Water Quality Control Board, Los Angeles Region. The tubing emanating from the vapor points was affixed to a sample shut off valve in the "off" position. A 167 milliliters-per-minute flow regulator with attached particulate filter was fitted to the shut off valve and the other end to a "T" fitting. One end of the "T" was connected to the sampling summa canister. The other end of the "T" was affixed to a digital vacuum gauge and a 6-liter summa canister utilized for purging.

A minimum 10-minute vacuum tightness test was performed on the manifold and connections by opening and closing the 6-liter purge summa canister valve and applying and monitoring a vacuum on the vacuum gauge. The sample shut-off valve on the downhole side of the sampling manifold remained in the "off" position. When gauge vacuum was maintained for at least 10 minutes without any noticeable decrease (less than approximately 0.1 inches of mercury [Hg] for properly connected fittings), purging began. The downhole shut off valve was opened and at least three pore volumes were removed utilizing the purging summa canister. The volume of vapor removed was verified by the calculated pressure drop in the summa canister. The purge volume was calculated based on the length and inner diameter of the sampling probe, the connected sampling tubing and equipment, dry bentonite seal, and the borehole sand pack.

Following purging, sampling began by opening the 1-liter Summa canister valve allowing the soil gas sample to be collected. Sampling continued until the vacuum gauge indicated approximately 5 inches of Hg remaining. Upon completion of soil gas collection, the Summa canister was labeled with a sample ID, project number, and date and time of collection. The samples were then transported to a state-certified laboratory with chain-of-custody documentation.

The 14 subsurface soil vapor samples were analyzed for VOCs and TPHg by EPA Test Method TO-15 and the fixed gases carbon dioxide, methane, and oxygen by ASTM Method D-1946.

3.4.3 Soil Vapor Sample Integrity Evaluation

Immediately upon opening the valve to the 1-liter sample Summa canister, a shroud was placed over and enclosed the atmosphere of the borehole and entire sampling train including all connections for sample integrity evaluation purposes. Isopropyl alcohol (2-propanol, 91 percent) was utilized as a leak detection compound during sampling by applying between 7 and 10 drops to cotton gauze and placing the moistened gauze near the borehole beneath the shroud. Analysis of the fourteen soil vapor samples did not detect 2-propanol above the reporting limit (analytical laboratory reports are included in Appendix B).

To help confirm the sampling trains were sufficiently tight and the soil vapor data is representative of subsurface conditions, one confirmation sample (SV-7-5 [IPA]) of the shroud atmosphere was collected during sampling at location SV-7-5. The soil vapor sample was collected in a separate 250-milliliter (mL) Summa canister for analysis of the leak detection compound 2-propanol. Laboratory analysis of sample SV-2 IPA detected 2-propanol at a concentration of 170,000 micrograms per cubic meter (µg/m^3).

During the same sampling time period, a data logging photoionization detector (PID) was utilized to monitor the atmosphere inside the shroud through a bulkhead fitting. The logged data (at minimum thirty [30] second intervals) was corrected to parts per million by volume 2-propanol concentrations and utilized to evaluate the integrity of the sampling train. 2-propanol concentrations within the shroud atmosphere were measured by the PID between 42,960 and 92,703 µg/m^3 with an average of 87,535 µg/m^3. The PID appeared to underestimate 2-propanol concentrations in the shroud atmosphere.

Based on the non-detect 2-propanol concentrations in the soil vapor samples analyzed and the average concentration as measure by the PID, it appears that there is no apparent leakage. This data indicates that the sample trains were sufficiently tight, and no significant leakage occurred.

SECTION 4: DISCUSSION OF RESULTS

4.1 ENVIRONMENTAL SCREENING LEVELS

The soil analytical results were compared to the DTSC-recommended Residential Screening Levels (SLs) presented in the DTSC Office of Human and Ecological Risk (HERO) guidance document *Human Health Risk Assessment (HHRA) Note 3* dated June 2020 (DTSC, 2020). If a DTSC-SL has not been established, the soil results were compared to Residential Regional Screening Levels (RSLs) established by the USEPA Region 9 (USEPA, November 2020). For detected chemicals for which DTSC-SLs and RSLs have not been established, Tier 1 Environmental Screening Levels (ESLs) established by the Water Board (January 2019) were used for comparison[1].

Soil vapor analytical results were compared to Soil Gas Tier 1 ESLs established the Water Board (January 2019). If a soil vapor ESL has not been established, the soil vapor results were compared to Residential Ambient Air DTSC-SLs with an attenuation factor of 1/30 applied as recommended by Water Board guidance (January 2019). For detected chemicals for which Residential Ambient Air DTSC-SLs RSLs are not established, Residential Indoor Air RSLs were used for comparison with an attenuation factor of 1/30 applied.

4.2 SUMMARY OF ANALYTICAL DATA

Analytical results are presented in the Data Summary Tables section of this report. Laboratory analytical data reports and chain of custody documentation are included in Appendix B. Provided below is a summary of the analytical results.

[1] DTSC-SLs, RSLs and ESLs are used to screen properties for potential human health concerns where releases of chemicals to soil have occurred. Under most circumstances, the presence of a chemical in soil below the corresponding DTSC-SL, RSL or ESL can be assumed not to pose a significant risk to human health. A chemical exceeding its screening level does not indicate that adverse impacts to human health are occurring or will occur but suggests that further evaluation of potential health concerns is warranted.

4.2.1 Soil

- The VOC compounds ethylbenzene, xylenes, 1,2,4-trimethylbenzene, isopropylbenzene, naphthalene, n-butylbenzene, n-propylbenzene, and sec-butylbenzene were detected in one sample (EB-3) collected from a depth of 9 to 10 feet at concentrations that were below their respective residential screening criteria.

- The OCPs 4,4'-DDE, alpha-chlordane, gamma-chlordane, and dieldrin were detected at several samples analyzed at concentrations below their respective residential screening criteria.

- Chromium was detected in 12 of 12 soil samples analyzed at concentrations ranging from 5.5 to 110 mg/kg. The concentrations of chromium detected appear to be within the published background range (Scott, 1991; Bradford, 1996). A screening level has not been established to total chromium; however, disposal and reuse facilities typically require STLC analysis for samples where total chromium concentrations exceed 50 mg/kg. Selected samples were analyzed for STLC chromium. No soluble concentrations exceeded the STLC hazardous waste threshold.

- Cobalt was detected in 16 of 16 soil samples analyzed at concentrations ranging from 4.4 to 34 mg/kg. Five of these samples (EB-1 [0-1], EB-3 [2-3], EB-3 [4-5], EB-4 [2-3], and EB-5 [4-5]) exceeded the residential RSL of 23 mg/kg.

- Concentrations for other metals detected (arsenic, barium, beryllium, copper, lead, mercury, molybdenum, vanadium and zinc) were either below selected residential levels and/or appeared to be generally consistent with published background/ambient conditions (Duverge, 2011).

- TPHd and TPHo were detected in 16 of 16 samples at concentrations below their respective Tier 1 ESLs.

- TPHg was detected in one sample EB-3 collected from a depth of 9 to 10 feet, at a concentration of 1.9 mg/kg, which is below the Tier 1 ESL of 100 mg/kg.

- PCBs and SVOCs were not detected in the soil samples analyzed.

4.2.2 Soil Vapor

- TPHg exceeded the Tier 1 ESL of 3,300 μg/m^3 in one sample (SV-3) collected from a depth of 10 feet.

- Benzene exceeded the Tier 1 ESL of 3.2 μg/m^3 in three soil vapor samples collected from a depth of 5 feet (SV-3-5, SV-4-5, and SV-5-5) and in three soil vapor samples collected from a depth of 10 feet (SV-4-10, SV-5-10, and SV-7-10).

- Ethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, hexane and o-xylene were detected at concentrations exceeding their respective residential or Tier 1 screening criteria in one sample (SV-3-10) collected from a depth of 10 feet.

- MTBE was detected exceeding the Tier 1 ESL of 360 µg/m^3 in one sample (SV-4-10) at a concentration of 460 µg/m^3.

- The VOC compounds benzene, toluene, tert-butyl alcohol, 1,2,4-trimethylbenzene, acetone, carbon disulfide, hexane, isopropanol, o-xylene, m,p-xylene, tetrachloroethene (PCE), and trichlorofluoromethane were detected above laboratory reporting limits in the soil vapor samples analyzed but at concentrations that were below their respective residential or Tier 1 screening criteria.

- Trichloroethene (TCE) was detected in 6 of 12 samples at concentrations ranging between 4.9 and 30 µg/m^3. Two of these samples had concentrations (20 µg/m^3 in SV-7-5 and 30 µg/m^3 in SV-7-10) that exceeded the Tier 1 ESL of 16 µg/m^3.

- Methane was detected in one sample (SV-3-10) at a concentration of 0.27%.

- Carbon dioxide was detected in 12 of 12 samples analyzed at concentrations ranging between 0.23 and 9.2 percent.

- Oxygen was detected in 12 of 12 samples analyzed at concentrations ranging between 0.85 and 15 percent. Oxygen concentrations equal to or above 4 percent are indicative of aerobic subsurface soil conditions which promote the bio-attenuation of hydrocarbon compounds.

SECTION 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 SOIL QUALITY

Laboratory analyses of soil samples collected in the vicinity of the UST excavation backfill area did not detect petroleum hydrocarbons, OCPs, PCBs, SVOCs, and/or VOCs above their respective residential screening criteria. The detected metal concentrations appear typical of natural background concentrations and/or less than their respective residential screening levels. The detected soluble (STLC) chromium concentrations were below the STLC hazardous waste threshold.

As noted in Section 5.2, the detection of gasoline range constituents in soil vapor indicates the presence of residual petroleum-impacted soil in the former UST pit area; redevelopment considerations associated with this soil are presented in Section 5.3.

5.2 SOIL VAPOR QUALITY

Laboratory analyses detected elevated concentrations of total petroleum hydrocarbons in the gasoline range and petroleum-related VOCs in the 10 foot deep sample at SV-3; significantly lower concentrations were detected at a depth of approximately 5 feet at this location. Generally low concentrations of benzene were detected soil vapor samples SV-1 (10 feet), SV-4 (5 and 10 feet), and SV-7 (10 feet), but exceeded the conservative residential screening level of 3.2 µg/m^3 in the 5 and 10 foot deep samples at SV-4 and SV-5, and the 10 foot deep sample at SV-7. Benzene was not detected in soil vapor samples collected in borings SV-2 and SV-6.

The TPHg detections in soil vapor are likely associated with residual TPHg impacts in groundwater and soil. As noted above, the 2014 case closure summary indicated the presence of TPHg in soil; the reported concentrations appear to have been in soil samples collected from depths of approximately 10 to 15 feet in an exploratory boring located in the northwest area of the Site, between the former remedial excavation and El Camino Real. The concentrations reported in soil may be the source of the elevated concentrations detected in soil vapor sample SV-3.

The property adjacent to the east is occupied by residences. Two of three soil vapor samples collected near the east property line (SV-2 and SV-6) did not exceed residential ESLs. Benzene was detected at a depth of 5 feet exceeding the residential ESL in sample SV-4. Sample SV-4 was located within the former tank pit excavation backfill, whereas SV-2 and SV-6 were located in native soil outside the former backfill. These results indicate significant attenuation with distance from the former excavation. As such, the vapor intrusion risk to nearby sensitive receptors, including the adjacent residential property, associated with the gasoline range constituents detected appears de minimis.

The chlorinated solvents TCE and PCE were detected in soil vapor samples, and TCE exceeded the residential screening levels in samples collected at SV-7 (maximum of 30 ug/m^3 detected). Based on the groundwater flow direction reported during the previous groundwater monitoring (northeast) as shown on Figure 2, the PCE and TCE concentrations detected may be associated with an off-site source.

Based on the soil vapor data, the planned structure likely will require a vapor intrusion mitigation system (VIMS). Redevelopment considerations are summarized in Section 5.3.

5.3 REDEVELOPMENT CONSIDERATIONS

Based on the data obtained to date, remedial and risk management measures may be required to manage impacted soil and to limit potential health risks to future Site occupants and/or construction workers. The need for remedial measures is typically determined based on an evaluation of potential human health risks, which can vary based on the type of planned development and the potential for exposure to identified contaminants. The following mitigation measures are recommended:

- The Site is currently a closed LUST case with SMCDEH and the Water Board. The 2015 case closure letter requires notification to SMCDEH of a change in land use or excavation. The Project Applicant shall inform SMCDEH of the planned change in land use and their redevelopment plans.

- A Site Management Plan (SMP) and Health and Safety Plan (HSP) shall be developed to establish appropriate management practices for handling and monitoring of impacted soil, soil vapor and ground water that potentially may be encountered during construction activities. The SMP shall be prepared by an Environmental Professional and be submitted to the overseeing regulatory agency (*e.g.*, Water Board, DTSC and/or SMCDEH) for review and approval prior to commencing construction activities. The SMP also shall be provided to the City.

  Prior to the start of any construction activity that involves below ground work (*e.g.*, mass grading, foundation construction, excavating or utility trenching), information regarding Site risk management procedures, including copies of the HSP and SMP, shall be provided to the Contractors for their review, and each Contractor should provide such information to its Subcontractors. The SMP measures shall be incorporated into the project design documents. The SMP shall include a discussion of the following:

- Site control procedures to control the flow of personnel, vehicles and materials in and out of the Site.

- Measures to minimize dust generation, storm water runoff and tracking of soil off-Site.

- Dewatering protocols, if dewatering is anticipated, including methods to evaluate water quality and discharge/disposal alternatives; the pumped water shall not be used for on-Site dust control or any other on-Site use.

- Protocols for conducting earthwork activities in areas where impacted soil, soil vapor and/or ground water are present or suspected. Worker training requirements, health and safety measures and material handling procedures shall be described.

- Perimeter air monitoring for dust during any activity that significantly disturbs impacted Site soil (*e.g.*, mass grading, foundation construction, excavating or utility trenching) to document the effectiveness of dust control measures.

- Protocols to be implemented if buried structures, wells, debris, or unidentified areas of impacted soil are encountered during Site development activities.

- Protocols to characterize/profile soil suspected of being contaminated so that appropriate mitigation, disposal or reuse alternatives, if necessary, can be implemented. Soil in contact with impacted ground water should be assumed contaminated. All soil excavated and transported from this Site should be appropriately disposed at a permitted facility.

- Stockpiling protocols for “clean” and “impacted” soil.

- Decontamination procedures to reduce the potential for construction equipment and vehicles to release contaminated soil onto public roadways or other off-Site transfer.

- Procedures to evaluate and document the quality of any soil imported to the Site. Soil containing chemicals exceeding residential (unrestricted use) screening levels or typical background concentrations of metals should not be accepted. The DTSC’s Clean Fill Advisory (October 2001 or latest version) provides useful guidance on evaluating imported fill.

- Methods to monitor excavations and trenches for the potential presence of VOC impacted vapors. Mitigation protocols shall be developed and implemented in the event elevated VOC vapors are released during excavation activities that may pose a risk to construction worker health and/or a risk to the health of occupants of neighboring properties.

- Protocols to evaluate if the residual contaminants will adversely impact the integrity of below ground utility lines and/or structures (*e.g.*, the potential for corrosion due to subsurface contamination).

- Measures to reduce soil vapor and ground water migration through trench backfill and utility conduits. Such measures shall include placement of low-permeability backfill "plugs" at specified intervals on-Site and at all locations where the utility trenches (within impacted soil or ground water) extend off-Site. In addition, utility conduits that are placed below ground water shall be installed with water-tight fittings to reduce the potential for ground water to migrate into the conduits.

- Measures to help reduce the potential for the downward migration of contaminated ground water if deep foundation systems are proposed. These measures shall be identified in the Geotechnical Investigation report and implemented as a part of the development plans.

The Project Applicant's Environmental Professional shall assist in the implementation of the SMP and shall, at a minimum, perform part-time observation services during demolition, excavation, grading and trenching activities. Upon completion of construction activities, the Environmental Professional shall prepare a report documenting compliance with the SMP; this report shall be submitted to the oversight regulatory agency and City.

- Deed Restriction or Land Use Covenant - Leaving contaminated soil (above residential screening levels and, for metals, above background concentrations) in-place or re-using contaminated soil shall require the oversight agency's written approval. At a minimum, if contaminated soil is left in-place, a deed restriction or land use covenant shall detail the location of the soil. This document shall include a surveyed map of the location of the impacted soil and shall restrict future excavation in the impacted area unless approved in writing by an oversight agency.

- Air Monitoring Plan – This plan shall assess the potential for exposure of construction workers and neighboring occupants adjoining the property to VOCs during construction activities; this plan shall specify measures to be implemented if VOC concentrations exceed threshold values. The air monitoring shall be submitted for agency review and approval prior to commencing excavation activities.

- Vapor Intrusion Mitigation Plan and Associated Documents – A Vapor Intrusion Mitigation Plan shall be prepared that describes the measures to be implemented to prevent exposure of property occupants to VOCs in indoor air as a result of vapor intrusion. The Vapor Intrusion Mitigation Plan will require the Project Applicant to design the proposed occupied spaces with appropriate structural and engineering features to reduce risk of vapor intrusion into buildings. At a minimum, this design shall include: 1) passive sub-slab ventilation with a spray applied seamless vapor barrier (and with the ability to convert the system from passive to active ventilation), 2) monitoring to ensure the long-term effectiveness of the remedy, and 3) the implementation of institutional controls. Other designs would be acceptable if approved in writing by the overseeing regulatory agency. The Vapor Intrusion Mitigation Plan shall be submitted for agency review and approval. DTSC's October 2011 *Vapor Intrusion Mitigation Advisory* provides useful guidance in selecting, designing, and implementing appropriate response actions for sites where a potential vapor intrusion risk has been identified.

A completion report shall be submitted to the overseeing regulatory agency upon completion of construction of the mitigation system. The report shall document installation of the vapor control measures identified in the Vapor Intrusion Mitigation Plan and present final as-built design drawings.

A Long-Term Operations, Maintenance, and Monitoring Plan (OMMP) also shall be submitted for agency approval that presents the actions to be taken following construction to maintain and monitor the vapor intrusion mitigation system, and a contingency plan should the vapor mitigation system fail.

A financial assurance mechanism shall additionally be established (*i.e.*, proof that adequate funds are available for long-term maintenance and monitoring of the vapor intrusion mitigation system) and described in the OMMP.

5.4 REGULATORY AGENCY SUBMITTAL

In accordance with the drilling permit application, this report will be submitted to the SMCDEH within 60 days of sample collection.

SECTION 6: LIMITATIONS

Cornerstone performed this investigation to support David J. Powers & Associates in evaluation of soil and soil vapor quality beneath the Site. David J. Powers & Associates understands that the extent of soil and soil vapor data obtained is based on the reasonable limits of time and budgetary constraints. In addition, the chemical information presented in this report can change over time and is only valid at the time of this investigation and for the locations sampled.

This report, an instrument of professional service, was prepared for the sole use of David J. Powers & Associates and may not be reproduced or distributed without written authorization from Cornerstone.

Cornerstone makes no warranty, expressed or implied, except that our services have been performed in accordance with the environmental principles generally accepted at this time and location.

SECTION 7: REFERENCES

Bradford, et. al. March 1996. Background Concentrations of Trace and Major Elements in California Soils.

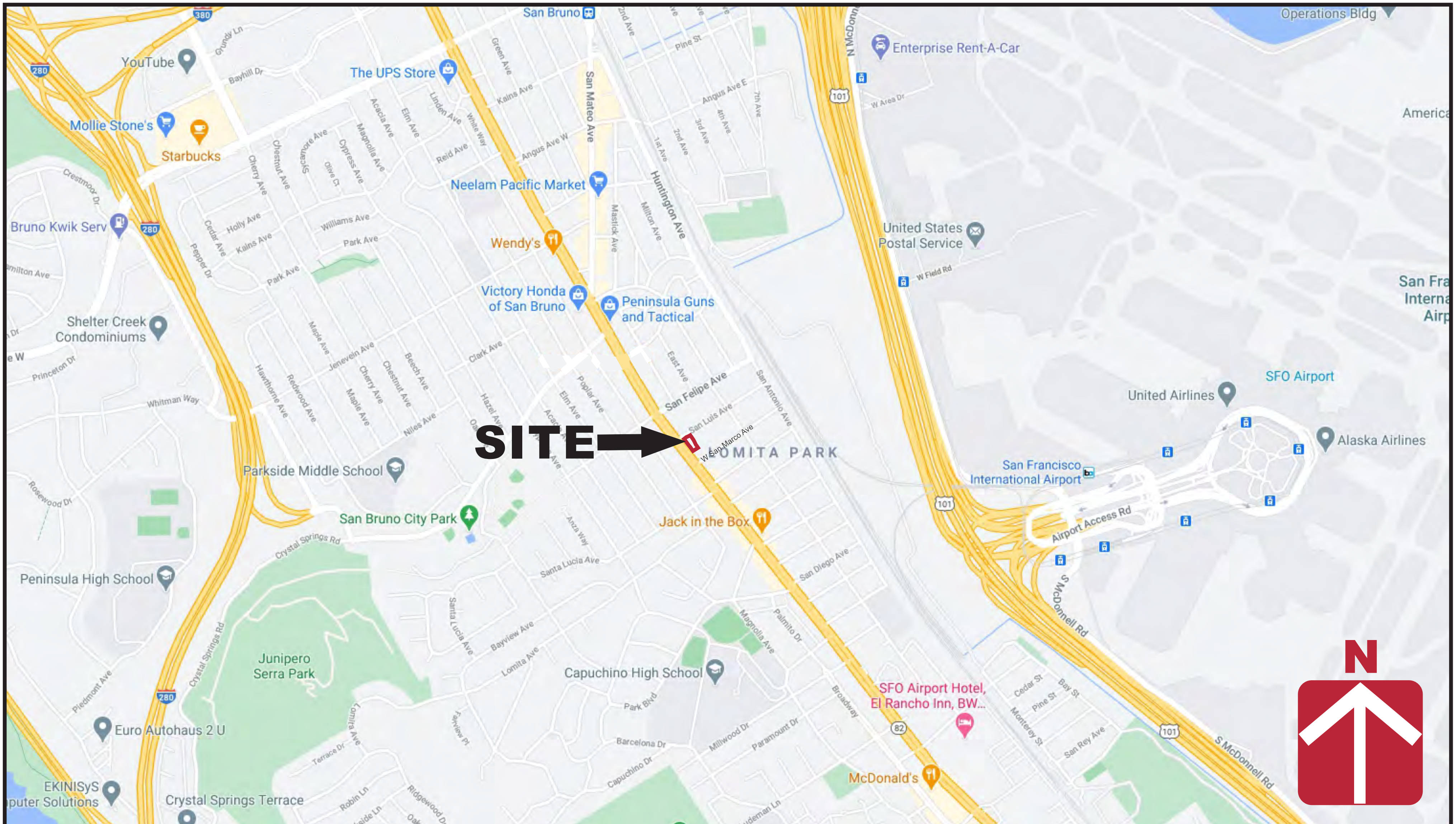
Scott, Christina. December 1991. Background Metal Concentrations in Soils in Northern Santa Clara County.

SMCDEH. Case Closure, Remedial Action Oversight, Former Al's Olympic, 160 (170) El Camino Real, San Bruno, California

TEC Environmental. December 18, 2013. Fate and Transport Model Support Investigation, Remediation Well Destruction, and First Quarter 2013 Groundwater Monitoring Report, Former Al's Olympic Service Station, 160 El Camino Real, San Bruno, California SMCo# 880848

TEC Environmental. May 5, 2014. First Semi-Annual Groundwater Monitoring Report, Former Al's Olympic Service Station, 160 El Camino Real, San Bruno, California SMCo# 880848

FIGURES



Vicinity Map

160 El Camino Real Hotel
San Bruno, CA

CORNERSTONE EARTH GROUP

Project Number	118-123-1
Figure Number	Figure 1
Date	January 2021
Drawn By	RRN

Legend

0.05 ft/ft — Groundwater flow direction and gradient (TEC Environmental, First Semi-Annual 2014 Groundwater Monitoring - May 2014)

Approximate location of exploratory boring for temporary soil vapor probe installation to a depth of 5 and 10 feet

Approximate location of exploratory boring for soil sample collection and temporary soil vapor probe installation to a depth of 5 and 10 feet

N

0 20 40
APPROXIMATE SCALE (FEET)

Base by Google Earth, dated 03/26/2018
Reference: TEC Accutite, Site Map - Figure 2, dated 10/04/2013

Project Number: 118-123-1
Figure Number: Figure 2
Drawn By: RRN
Date: January 2021

Site Plan

160 El Camino Real Hotel
San Bruno, CA

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DATA SUMMARY TABLES

Table 1. Analytical Results of Selected Soil Samples - Metals

(Concentrations in mg/kg)

Boring ID	Sample ID	Date	Depth (feet)	Arsenic	Barium	Beryllium	Chromium	STLC Chromium (mg/L)	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Vanadium	Zinc
EB-1	EB-1 (0-1)	12/22/2020	0-1	5.7	280	0.62	42	---	**34**	52	76	<0.038	<1.8	60	80	86
	EB-1 (4-5)	12/22/2020	4-5	3.9	470	0.46	20	---	14	120	25	<0.038	3.6	19	40	32
	EB-1 (9-10)	12/22/2020	9-10	2.4	260	0.28	13	---	9.7	67	15	<0.040	<2.0	12	25	20
EB-3	EB-3 (2-3)	12/22/2020	2-3	4.2	210	0.47	35	---	**29**	79	8.8	0.065	<1.9	31	47	41
	EB-3 (4-5)	12/22/2020	4-5	5.6	190	0.63	50	---	**26**	57	39	0.098	<2.0	53	73	70
	EB-3 (9-10)	12/22/2020	9-10	3.7	65	0.52	57	0.32	6.7	7.7	10	<0.039	<2.1	33	39	26
EB-4	EB-4 (2-3)	12/22/2020	2-3	4	220	0.52	56	0.16	**25**	66	30	0.056	<2.1	80	86	71
	EB-4 (4-5)	12/22/2020	4-5	<2.1	160	0.38	110	0.12	20	55	9	0.039	<2.1	54	67	56
	EB-4 (9-10)	12/22/2020	9-10	5.7	350	0.5	42	---	20	61	12	0.063	<1.9	65	68	65
EB-5	EB-5 (0-1)	12/22/2020	0-1	<1.9	43	<0.19	5.5	---	4.4	13	3.8	0.076	<1.9	6.2	8.2	6.9
	EB-5 (2-3)	12/22/2020	2-3	3.2	200	0.45	37	---	23	68	18	0.041	<2.1	43	47	45
	EB-5 (4-5)	12/22/2020	4-5	5.3	210	0.54	51	0.14	**24**	55	53	0.061	<2.0	71	80	86
Residential Screening Criteria				11	15,000	160	NE	5	23	3,100	80	1	390	820	390	23,000
Screening Criteria Basis				Duverge[1]	RSL[2]	DTSC-SL[3]	NE	STLC[4]	RSL[2]	RSL[2]	DTSC-SL[3]	DTSC-SL[3]	RSL[2]	DTSC-SL[3]	RSL[2]	RSL[2]

1 Duverge, 2011. Establishing Backround Arsenic in Soil of the Urbanized San Francisco Bay Region.
2 Regional Screening Level (RSL), USEPA Region 9 - November 2020.
3 Recommended Screening Level (SL), HERO HHRA Note 3 - June 2020.
4 Soluble Threshold Limit Concentration - California Code of Regulations, Title 22, Chapter 11, Article 3.
< Not detected at or above laboratory reporting limit
NE Not Established
BOLD Concentration exceeds selected Environmental Screening Criteria

Table 2. Analytical Results of Selected Soil Samples - Petroleum Hydrocarbons, VOCs, OCPs, PCBs and SVOCs

(Concentrations in mg/kg)

Boring ID	Sample ID	Date	Depth (feet)	TPHd	TPHo	TPHg	Ethylbenzene	Xylenes	1,2,4-Trimethylbenzene	Isopropylbenzene	Naphthalene	n-Butylbenzene	n-Propylbenzene	sec-Butylbenzene	4,4´-DDE	alpha-Chlordane	gamma-Chlordane	Dieldrin	PCBs	SVOCs
EB-1	EB-1 (0-1)	12/22/2020	0-1	25	180	<1.1	<0.011	<0.011	<0.011	<0.011	<1.6	<0.011	<0.011	<0.011	<0.0017	<0.0017	<0.0017	<0.0017	ND	ND
	EB-1 (4-5)	12/22/2020	4-5	9.6	37	<0.86	<0.0086	<0.0086	<0.0086	<0.0086	<0.0086	<0.0086	<0.0086	<0.0086	<0.0016	0.004	0.0055	0.0032	ND	---
	EB-1 (9-10)	12/22/2020	9-10	5.9	17	<0.52	<0.0052	<0.0052	<0.0052	<0.0052	<0.0052	<0.0052	<0.0052	<0.0052	<0.0016	0.0029	0.0042	0.0057	ND	---
EB-3	EB-3 (2-3)	12/22/2020	2-3	9.1	24	<0.44	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0016	<0.0016	<0.0016	<0.0016	ND	---
	EB-3 (4-5)	12/22/2020	4-5	6.5	21	<0.73	<0.0073	<0.0073	<0.0073	<0.0073	<0.0073	<0.0073	<0.0073	<0.0073	<0.0017	<0.0017	<0.0017	0.0022	ND	---
	EB-3 (9-10)	12/22/2020	9-10	66	150	1.9	0.046	0.0082	0.057	0.0094	0.05	0.018	0.037	0.0052	<0.0081	<0.0081	<0.0081	<0.0081	ND	ND
EB-4	EB-4 (2-3)	12/22/2020	2-3	42	230	<0.77	<0.0077	<0.0077	<0.0077	<0.0077	<0.0077	<0.0077	<0.0077	<0.0077	<0.0084	<0.0084	<0.0084	<0.0084	ND	ND
	EB-4 (4-5)	12/22/2020	4-5	3.4	12	<0.48	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0017	<0.0017	<0.0017	<0.0017	ND	---
	EB-4 (9-10)	12/22/2020	9-10	7.1	21	<0.54	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	0.0023	0.011	0.0084	<0.0017	ND	---
EB-5	EB-5 (0-1)	12/22/2020	0-1	3.1	7.4	<0.59	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0017	<0.0017	<0.0017	<0.0017	ND	---
	EB-5 (2-3)	12/22/2020	2-3	7.2	42	<0.45	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0016	<0.0016	<0.0016	<0.0016	ND	---
	EB-5 (4-5)	12/22/2020	4-5	4.6	15	<0.44	<0.0044	<0.0044	<0.0044	<0.0044	<0.33	<0.0044	<0.0044	<0.0044	<0.0017	<0.0017	<0.0017	<0.0017	ND	ND
Residential Screening Crtieria				260	1,600	100	5.8	580	300	NE	2	2,400	3,800	2,200	2	NE	NE	0.034	Varies	Varies
Screening Criteria Basis				ESL[1]	ESL[1]	ESL[1]	RSL[2]	RSL[2]	RSL[2]	NE	DTSC-SL[3]	DTSC-SL[3]	RSL[2]	DTSC-SL[3]	DTSC-SL[3]	NE	NE	DTSC-SL[3]	Varies	Varies

1 Environmental Screening Level (ESL), RWQCB, San Francisco Bay Region - January 2019.
2 Regional Screening Level (RSL), USEPA Region 9 - November 2020.
3 Recommended Screening Level (SL), HERO HHRA Note 3 - June 2020.
< Not detected at or above laboratory reporting limit
--- Not Analyzed
ND Not detected
NE Not Established

Table 3. Analytical Results of Selected Soil Vapor Samples

(Concentrations in µg/m³, %)

Boring ID	Sample ID	Date	Depth (feet)	TPHg	Benzene	Toluene	Ethylbenzene	MTBE	TBA	TAME	1,1,2-TCA	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Butanone (MEK)	4-Ethyl Toluene	Acetone	Carbon Disulfide	Chloroethane	Chloroform	Dichlorodifluoromethane	Freon 113	Hexane	o-xylene	PCE	TCE	Trichlorofluoromethane	Carbon Dioxide (%)	Methane (%)	Oxygen (%)
SV-1	SV-1-5	12/23/2020	5	181	<1.6	6.2	<2.2	<1.8	2.8	<2.1	<2.7	<2.5	<2.5	2.9	<2.5	12	<1.6	<1.3	2.6	<2.5	<3.8	2.1	<2.2	4.5	<2.7	<2.8	1.8	<0.030	9.9
	SV-1-10	12/22/2020	10	192	1.8	5.7	<2.2	<1.8	3.2	<2.1	<2.7	<2.5	<2.5	3.7	<2.5	14	1.8	<1.3	2.5	<2.5	<3.8	4.8	<2.2	<3.4	<2.7	<2.8	5	<0.017	3.3
SV-2	SV-2-5	12/23/2020	5	<180	<1.6	4.8	<2.2	<1.8	1.8	<2.1	<2.7	<2.5	<2.5	1.7	<2.5	<12	<1.6	<1.3	<2.4	<2.5	<3.8	2.7	<2.2	4.4	<2.7	7.5	0.34	<0.023	12
	SV-2-10	12/23/2020	10	228	<1.6	5.1	<2.2	<1.8	3.8	<2.1	<2.7	<2.5	<2.5	6.5	<2.5	16	<1.6	<1.3	<2.4	<2.5	<3.8	2.1	<2.2	4.7	<2.7	7.1	5.5	<0.029	9.4
SV-3	SV-3-5	12/23/2020	5	654	**7.7**	11	3.6	90	3.9	<2.1	3.3	<2.5	<2.5	4.6	4.8	20	11	<1.3	<2.4	<2.5	5.8	58	2.5	4.6	13	<2.8	1.2	<0.030	11
	SV-3-10	12/22/2020	10	**1,740,000**	<1900	3,300	**25,000**	<2200	<1800	<2500	<3300	**13,000**	**3,600**	8,600	9,100	30,000	<1900	<1600	<2900	<3000	<4600	**35,000**	**4,300**	<4100	<3200	<3400	9.2	0.27	0.85
SV-4	SV-4-5	12/23/2020	5	517	**8.8**	11	<2.2	4.8	3.9	<2.1	<2.7	<2.5	<2.5	4	<2.5	20	<1.6	<1.3	<2.4	<2.5	<3.8	11	<2.2	6	4.9	<2.8	1.2	<0.035	11
	SV-4-10	12/22/2020	10	2,260	**13**	16	<6.5	**460**	31	9.7	<8.2	<7.4	<7.4	21	<7.4	110	11	<4.0	**8.1**	<7.4	<11	160	<6.5	<10	11	<8.4	4.5	<0.022	2.6
SV-5	SV-5-5	12/23/2020	5	560	**5.8**	8.6	<2.2	<1.8	6.5	<2.1	<2.7	<2.5	<2.5	8	<2.5	27	8.1	1.3	<2.4	<2.5	<3.8	6.2	<2.2	5.1	13	<2.8	1.2	<0.030	12
	SV-5-10	12/22/2020	10	578	**4.9**	7.2	<2.2	26	3.2	<2.1	4.6	<2.5	<2.5	7.2	<2.5	29	3.6	<1.3	<2.4	<2.5	<3.8	13	<2.2	<3.4	<2.7	<2.8	3.1	<0.017	4.7
SV-6	SV-6-5	12/23/2020	5	209	<1.6	6	<2.2	<1.8	2.2	<2.1	<2.7	<2.5	<2.5	3.9	<2.5	26	<1.6	<1.3	<2.4	<2.5	<3.8	2.3	<2.2	3.7	<2.7	<2.8	0.52	<0.023	15
	SV-6-10	12/23/2020	10	<180	<1.6	2.7	<2.2	<1.8	<1.5	<2.1	<2.7	<2.5	<2.5	2	<2.5	14	<1.6	<1.3	<2.4	3	<3.8	<1.8	<2.2	<3.4	<2.7	<2.8	0.94	<0.011	13
SV-7	SV-7-5	12/23/2020	5	658	2.7	12	<2.2	<1.8	2.7	<2.1	<2.7	<2.5	<2.5	4	<2.5	15	<1.6	<1.3	<2.4	<2.5	<3.8	2.6	<2.2	4.2	**20**	<2.8	0.23	<0.023	14
	SV-7-10	12/23/2020	10	385	**13**	17	2.9	<1.8	<1.5	<2.1	<2.7	<2.5	<2.5	9.1	<2.5	56	13	<1.3	<2.4	<2.5	<3.8	17	2.4	4.2	**30**	<2.8	0.45	<0.028	11
Residential Screening Criteria				3,300	3.2	10,000	37	360	NE	NE	5.8	1,890	1,890	170,000	NE	1,100,000	21,900	350,000	4.1	3,000	156,000	21,900	3,500	15	16	39,000	NE	5	NE
Screening Criteria Basis				ESL[1]	ESL[1]	ESL[1]	ESL[1]	ESL[1]	NE	NE	ESL[1]	RSL[2]	RSL[2]	ESL[1]	NE	ESL[1]	RSL[2]	ESL[1]	ESL[1]	RSL[2]	RSL[2]	RSL[2]	ESL[1]	ESL[1]	ESL[1]	DTSC-SL[3]	NE	LEL[4]	NE

1 Environmental Screening Level (ESL), RWQCB, San Francisco Bay Region - January 2019.
2 Soil Vapor Screening Level calculated by applying an attenuation factor of 30 for future buildings to the indoor air Regional Screening Level (RSL), USEPA Region 9 - May 2020.
3 Soil Vapor Screening Level calculated by applying an attenuation factor of 30 for future buildings (DTSC, 2011) to the DTSC-modified screening levels (DTSC-SL) California Department of Toxic Substance Control, Human and Ecological Risk Office (HERO) Note Number 3, June 2020.
4 Lower Explosive Limit for methane
< Not detected at or above laboratory reporting limit
NE Not Established
BOLD Concentration exceeds selected Environmental Screening Criteria
Note: Red font indicates the laboratory reporting limit exceeds one or more of the selected screening levels.

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APPENDIX A – BORING LOGS, SOIL VAPOR WELL CONSTRUCTION DETAILS AND SOIL VAPOR SAMPLING NOTES

APPENDIX B – LABORATORY ANALYTICAL REPORTS