Mr. Jeremy Harris
1919 Crew LLC
Pier 54 Suite 202
San Francisco, CA 94158

Ms. Dilan Roe
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: 1919 Market Street
Oakland, California 94805
ACEH Case# RO0003205
APNs 5-410-13-1, 5-410-14, 5-410-25

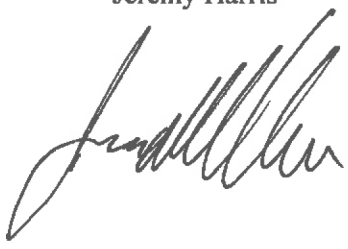
Dear Ms. Roe:

1919 Crew LLC has retained Pangea Environmental Services, Inc. (Pangea) as the environmental consultant for the project referenced above. Pangea is submitting the attached report on my behalf.

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached report is true and correct to the best of my knowledge.

Sincerely,

Jeremy Harris



October 25, 2016 *(Revised November 8, 2016)*

Mr. Danny Haber
1919 Crew LLC
Pier 54 Suite 202
San Francisco, CA 94607

Re: **Workplan for Site Assessment and Remediation Pilot Study**
1919 Market Street
Oakland, California 94805
ACEH Case# RO0003205
APNs 5-410-13-1, 5-410-14, 5-410-25

Dear Mr. Haber:

On behalf of 1919 Crew LLC, PANGEA Environmental Services, Inc. (PANGEA) has prepared this *Workplan for Site Assessment and Remediation Pilot Study* (Workplan) for the subject site. This Workplan was prepared in response to our agency meetings on September 30, October 11, and October 17, 2016. The objective of the proposed work is to further delineate the extent of known subsurface contaminants, to assess conditions near historic solvent storage areas, and to evaluate the feasibility of soil vapor extraction for site remediation.

If you have any questions or comments, please call me at (510) 435-8664.

Sincerely,
PANGEA Environmental Services, Inc.

Bob Clark-Riddell, P.E.
Principal Engineer

Attachment: *Workplan for Site Assessment and Remediation Pilot Study*

cc: Ms. Dilan Roe, ACDEH (via ACDEH FTP and Geotracker)
Ms. Kit Soo, ACDEH (via ACDEH FTP and Geotracker)

WORKPLAN FOR SITE ASSESSMENT AND REMEDIATION PILOT STUDY

1919 Market Street
Oakland, CA

October 25, 2016
(Revised November 8, 2016)

Prepared for:

1919 Crew LLC
Pier 54, Suite 202
San Francisco, CA 94607

Prepared by:

PANGEA Environmental Services, Inc.
1710 Franklin Street, Suite 200
Oakland, California 94612

Written by:

Ron Scheele, P.G.
Principal Geologist

Bob Clark-Riddell, P.E.
Principal Engineer

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

On behalf of 1919 Crew LLC, PANGEA Environmental Services, Inc. (PANGEA) has prepared this *Workplan for Site Assessment and Remediation Pilot Study* (Workplan) for the property at 1919 Market in Oakland, California (Figure 1) (Site). This Workplan was prepared in response to our agency meetings on September 30, October 11, and October 17, 2016. The objective of the proposed work is to further delineate the extent of known subsurface contaminants, to assess conditions near historic solvent storage areas, and to evaluate the feasibility of soil vapor extraction for Site remediation. The Site background, proposed Site assessment, and proposed remediation pilot study are presented below.

1.1 Regulatory Direction

On September 30, October 11, and October 17, 2016, property owner/developer representative Danny Haber and Mr. Clark-Riddell of PANGEA met with the Alameda County Department of Environmental Health (ACDEH). During the meetings, ACDEH requested additional Site assessment to further delineate the extent of known Site compounds and to investigate areas of historic chemical use (solvent and oil storage) identified in a Phase I environmental site assessment. This Workplan addresses these agency requirements.

During the meetings, soil vapor extraction (SVE) was proposed to remediate VOCs in soil gas in excess of applicable ESLs. SVE and excavation are appropriate remedial technologies for unsaturated soil per State guidance (CalEPA/DTSC, 2010). Soil excavation was not selected as a remedial approach due to the lack of an identified soil source area and the appropriateness of SVE. To facilitate testing of the SVE approach, this Workplan also describes proposed procedures for installation of SVE test wells and conveyance piping in conjunction with the building redevelopment.

ACDEH also required a Fact Sheet for public notification regarding planned Site activities. A Fact Sheet was approved by ACDEH and mailed to the public on October 21, 2016. The Fact Sheet included an invitation to a community meeting scheduled for October 26, 2016 to answer any questions about the Site project.

To facilitate building occupancy before completion of remediation and long-term, post-remediation confirmation testing, ACDEH requires installation of a vapor intrusion mitigation system (VIMS). This VIMS system will be in addition to the planned SVE remediation. To mitigate potential vapor intrusion within the planned residential building, the proposed VIMS will consist of a post-slab construction vapor barrier (e.g., RetroCoat^{TM}) and a sub-slab ventilation system (SSV), with contingency for active venting as a sub-slab depressurization system (SSD).

This mitigation approach is consistent with State regulatory guidance (CalEPA/DTSC, 2011). The VIMS design basis and designed will be submitted separately.

ACDEH requires a Site Management Plan (SMP) describing procedures for soil management and screening during planned subgrade work. As required, the SMP will include procedures for further characterizing apparent shallow fill material to identify any chemicals of potential concern (COPC). The SMP will include contingency measures to further delineate any identified chemicals of potential concern. Because the development plans include the excavation and removal of approximately 900 cubic yards of soil from the Site, the SMP will also include a sampling plan is designed to characterize soil for offsite disposal in general accordance with *DTSC Information Advisory: Clean Imported Fill Material* (Advisory) dated October 2001. The SMP will included procedures screening any imported materials to the Site.

A Corrective Action Plan (CAP) will also be required in advance of implementation of the final Site remediation plan. A Draft CAP will be prepared to incorporate results of additional Site assessment and the remediation pilot study. The Draft CAP will be provided to the public for a 30-day comment period prior to creation of a Final CAP.

2.0 SITE BACKGROUND

The Site background is described herein.

2.1 Site Use

The subject Site consists of three parcels of land comprising 1.457 acres located on the west side of Market Street and the east side of Myrtle Street within a mixed residential and commercial area of Alameda County, in Oakland, California (Figure 2). The Site's assessor parcel numbers (APN) are: 5-410-13-1, 5-410-14, and 5-410-25. The property is owned and being redeveloped by 1919 Crew LLC into 63 live-work residential apartment units. The Site is currently developed with one 70,000 square foot building, which was constructed in 1923 and is currently unoccupied with no onsite operations. In addition to the structure, the Site is improved with asphalt-paved parking, perimeter fencing, and associated drainage features. The subject property is bound by residential housing to the north, Market Street to the east beyond which is residential housing, St. John Missionary Baptist Church and residential housing to the south, and Myrtle Street to the west beyond which is residential housing. A site map showing Site features and surrounding properties is shown on Figure 2.

The Site has historically housed both residential and commercial tenants. The Site was formerly occupied by Greyhound Bus Lines and a plumbing contractor warehouse, which included onsite

operations such as motor repair and painting. The property was formerly equipped with two 10,000-gallon underground storage tanks (USTs), located within the sidewalk to the southwest side of the building, along Myrtle Street. The USTs were reportedly used by Greyhound Bus Lines to store diesel prior to the 1960s. The Site was occupied by Scott Company starting as early as 1957, who reportedly used the southwest UST to store gasoline. A former fuel dispenser was reportedly located on the southwest portion of the property, near the corner of the subject property building. The USTs and dispenser were removed in the early 1980s at a time when Myrtle Street was being repaved. On May 7, 1999, the Site received closure via Letter of No Further Action from the ACDEH for the Leaking UST case. According to a Phase I environmental site assessment (AEI, 2014), solvents were stored near the southwest and southeast corners of the Site and refrigerant oil was stored in the northeast corner of the Site.

2.2 Prior Site Investigation

The following summarizes previous environmental activities at the Site:

- **June 1992 to June 1993, Site Assessment Activities:** In June 1992, five soil borings (IB-1 through IB-5) were drilled inside and outside the building as part of a property transfer. In July 1992, five monitoring wells (MW-1 through MW-5) were installed at the Site. In November 1992, four soil boring (IB-1 through IB-4) were drilled near the former USTs in the southwest corner of the property. In June 1993, four additional soil boring (IB-5 through IB-8) were drilled near the former USTs in the southwest corner of the property. Monitoring wells were sampled until May 1998. Site closure was granted by ACEHD in summary letter dated January 22, 1999 from which the above data was obtained.

- **November 19, 2014, Phase I Environmental Site Assessment, AEI:** A Phase I ESA revealed that the Site was formerly occupied by Greyhound Bus Lines and a plumbing contractor warehouse, which included onsite operations such as motor repair and painting. The property was formerly equipped with two 10,000-gallon USTs, located within the sidewalk to the southwest side of the building, along Myrtle Street. The Phase I documented prior use and storage of solvents and refrigerant oils at the Site.

- **March 28, 2016, Phase II Subsurface Investigation Report, Partner Engineering & Science (Partner):** Three subslab soil gas samples (SS-3, SS-4 and SS-5) were collected on March 11, 2016. One of the subslab soil gas samples (SS-4) contained a detectable concentration of benzene which exceeded the residential Environmental Screening Level (ESL) established by the San Francisco Bay Regional Water Quality Control Board.

There were no other volatile organic compounds (VOCs) were detected in excess of applicable ESLs. Based on the results of this investigation, the report concluded that there has been a release of VOCs to the subsurface in the vicinity of the former painting area.

- **May 2, 2016, Additional Subsurface Investigation Report, Partner:** Five soil borings (B-1 through B-5) were advanced to a depth of 15 to 20 feet below grade surface (ft bgs) inside the building. Soil, groundwater, and shallow soil gas at 5 ft bgs were sampled to identify potential concerns related to the aforementioned historic operations. No VOCs were detected in soil samples above the applicable laboratory reporting limits (RL). PCE was detected in one groundwater sample (B5-GW) at a concentration less than the applicable ESL. No other VOCs were detected in groundwater exceeding laboratory RLs and/or residential ESLs. One soil gas sample (B3-SG-5) contained PCE and TCE concentrations exceeding applicable ESLs. Two soil gas samples (B2-SG-5 and B4-SG-5) contained chloroform concentrations exceeding the applicable ESL.

- **October 6, 2016, Site Assessment Report, PANGEA:** Nineteen subslab gas probes and three soil gas wells were installed and sampled to delineate VOCs beneath the building. Two soil borings were also drilled and grab groundwater samples collected to assess groundwater conditions. The extent of PCE, TCE, benzene, carbon tetrachloride and chloroform were delineated in subslab gas/soil gas beneath the building. The extent of PCE in groundwater was also delineated.

2.3 Subsurface Conditions

Subsurface conditions are detailed in PANGEA's *Site Assessment Report* dated October 6, 2016. Site subsurface conditions are illustrated on Figures 4 through 12. Soil, groundwater, and soil gas data is summarized on Tables 1, 2 and 3, respectively. The following summary was provided in the Site Assessment Report:

- The Site has by 2 to 4 ft of fill (permeable silty sand) underlain by silt and clay to 21 ft bgs, sand from 21 to 24 ft bgs and clay to a total depth of 25 ft bgs. In the former loading area in the northwest corner of the building, less fill was encountered and a silty sand was observed from 15.5 to 21 ft bgs. Groundwater was encountered during drilling at approximately 21 feet bgs and based on previous drilling data, appears to be under semi-confined conditions.

- Based on recent and historical *soil* analytical data, Site soil has not been significantly impacted by VOCs, with no VOCs have been detected in soil above ESLs.

- Site *Groundwater* has not been significantly impacted by VOCs, with no VOCs detected in groundwater above ESLs. Historical well data from the former UST area located southwest of the Site showed trace levels of BTEX prior to the wells being destroyed in 1992.

- *Subslab gas* and *shallow soil gas* is impacted with concentrations of PCE, TCE, benzene, carbon tetrachloride and chloroform in excess respective residential ESLs for soil gas and/or subslab gas. This impact above ESLs is located in the northwest portion of the Site within the historical painting and bus repair areas. No VOCs were detected above ESLs in subslab gas and shallow soil gas adjacent the former UST area.

- The *primary VOC impact* above ESLs is present in soil gas about 5 ft below the concrete slab in the former loading dock and auto painting area within northwestern corner of the Site. The slab is approximately 3.5 ft lower in this approximate 50 ft by 35 ft area than the slab across the rest of the Site.

2.4 Site Geology and Hydrogeology

The Site is situated within the Coast Range physiographic province of the State of California. The Coast Ranges are northwest-trending mountain ranges and narrow valleys, extending approximately 600 miles from the Oregon Border to the Santa Ynez River near Santa Barbara, sub-parallel to the Pacific coast and San Andreas Fault. Structural features including faults and synclinal folds largely control topography in the province and reflect both previous and existing regional tectonic regimes. The Coast Ranges are comprised of Mesozoic and Cenozoic aged sedimentary strata, dominated by the Franciscan Complex within the subject property vicinity.

The Site is located within the East Bay Plain subbasin, which is part of the larger Santa Clara Valley Groundwater Basin. The East Bay Plain subbasin is a northwest trending alluvial plain bounded to the north by San Pablo Bay, to the east by the contact with Franciscan Basement rock, and to the south by the Niles Cone Groundwater basin. The basin extends beneath San Francisco Bay to the west. Groundwater is generally found very near the surface throughout the basin. The East Bay Plain subbasin aquifer system consists of unconsolidated sediments of Quaternary age. The Early Holocene Temescal Formation is the most recently deposited and consists of primarily silts and clays with some gravel layers.

The relatively flat Site lies at an elevation of approximately 20 feet above mean sea level to the east of San Francisco Bay and to the north of the Oakland Inner Harbor. According to previous boring logs, soil beneath the Site consists of silty sand fill underlain by silty sand, clayey sand,

and sandy clay to a total depth of 20 ft bgs. During previous drilling, groundwater was encountered at approximately 15.5 to 19.5 ft bgs and rose to approximately 12.5 to 15 ft bgs. Groundwater appears to be under semi-confined conditions. Based on historical well monitoring data from for the Site and Site vicinity, groundwater flows to the northwest. Lithologic and groundwater data is shown on the geologic cross-section A-A' on Figure 3.

2.5 Planned Site Use

The planned redevelopment of the Site includes the conversion of a warehouse to 63 live/work units. The existing street side facades and portions of the building that are structurally adequate will remain, while rebuilding the middle portion of the building to current structural standards from the ground up. The entire building floor slab will be removed to allow for construction of new structural elements, infrastructure, and utilities.

3.0 PROPOSED SITE ASSESSMENT

The following proposed site assessment is designed to address agency requirements presented during our meetings on September 30, October 11, and October 17, 2016. Our proposed site assessment sampling locations are shown on Figures 13 and 14. The proposed sampling program is summarized on Table 4. The general objectives of the proposed site assessment are to:

- Further delineate the extent of known subsurface VOCs that pose a potential vapor intrusion risk for future residences and occupants of adjacent properties; and

- To assess conditions near historic solvent storage areas at the Site.

The above objectives will be achieved through the drilling/installation and sampling of several sub-slab gas probes and soil gas monitoring wells to evaluate subslab/soil gas conditions, and several soil borings to investigate soil and groundwater conditions. The soil gas sampling program includes the sampling of existing and new soil gas monitoring wells. Note that all sub-slab probes were destroyed during removal of the concrete slab at the Site, except those in the depressed former loading area.

The sampling program includes the following specific assessment objectives as summarized on Table 4:

- Vertical delineation of the highest VOC impact in the former loading and auto area via sampling of soil and deeper soil gas.

- Lateral delineation of known VOC impact in soil gas inside the building. Re-sampling existing northern soil gas wells will help evaluate potential risk to the adjacent northern residences along Myrtle Street.

- Lateral delineation of VOC impact in soil gas west and northwest of the former loading/auto area to evaluate potential risk to adjacent residences along Myrtle Street.

- Further assessment of conditions near former UST area.

- Assessment of fill material in the landscape areas.

- Investigation of former oil and solvent storage areas in the northeast, eastern and southwestern portions of the Site.

- Evaluation of conditions near adjacent buildings along the southern property boundary.

Soil gas data will be used to help determine if additional deeper SVE wells are merited to target VOC impact beneath the known subslab VOC impact.

3.1 Pre-Drilling Preparation

Prior to initiating field activities, the following tasks will be conducted:

- Obtain drilling permit from the Alameda County Public Works Agency;
- Obtain encroachment permit City of Oakland, if necessary;
- Pre-mark the excavation area with white paint and notify Underground Service Alert (USA) of the excavation activities at least 48 hours before work begins;
- Prepare a Site-specific health and safety plan (HASP) to educate personnel and minimize their exposure to potential hazards related to Site activities; and
- Coordinate with excavation and laboratory contractors and with involved parties

3.2 Sensitive Receptor Survey

PANGEA will conduct a door-to-door survey for adjacent properties to evaluate subgrade structures and possible water well use.

3.3 Soil and Groundwater Sampling

Soil samples will be collected as specified in the sampling program on Table 4 and on Figures 13 and 14. To facilitate soil sampling, soil borings will be conducted using hand auger or direct-push drilling techniques. The direct-push sampling rig will be equipped with a hydraulic hammer and steel drive rods to advance the borings to the total depth. With hydraulic-push drilling, continuous soil collection is conducted using acetate liners. Soil samples will be obtained by cutting 6-inch acetate subsections, trimming the excess soil from the ends, and capping the ends with Teflon® tape and plastic caps.

The soil samples will be classified according to the Unified Soil Classification System (USCS) and screened for field indications of petroleum hydrocarbons using visual and olfactory observations and a photo-ionization detector (PID). Additional soil samples may be collected near the water table and/or at lithologic changes. A groundwater sample will be collected for laboratory analysis from each boring that encounters groundwater. The grab groundwater samples will be collected using either temporary PVC casing or a discrete-depth sampler. The samples will be placed into a cooler filled with ice and delivered under chain-of-custody procedures to a State-certified laboratory. Completed borings will be tremie-grouted from the bottom of the hole to the surface. Soil and groundwater samples will be analyzed for the compounds specified on Table 4.

All Site investigation activities will be performed under the supervision of a California Registered Civil Professional Engineer (P.E.) or a California Registered Professional Geologist (P.G.), and in general accordance with the Standard Operating Procedures (SOPs) provided in Appendix A.

3.4 Sub-slab Gas Sampling

Soil gas samples will be collected as specified in the sampling program on Table 4. Several sub-slab gas probes will be installed where shown on Figures 13 and 14. The subslab gas probes will be installed and sampled following Department of Toxic Substances Control's (DTSC) July 2015 *Advisory – Active Soil Gas Investigation* guidance. At least 2 hours will be allowed to pass after installation before probes are sampled to allow subslab gases to equilibrate. Three casing volumes will be purged from the soil gas probe prior to sampling at rate of 100-200 milliliters per minute (ml/min). The probe will be connected to a certified 1-Liter summa canister with a flow control manifold and placed in a sampling shroud. A quantitate leak check compound such as isopropanol will be introduced into the shroud at the time sampling begins. Isopropanol concentrations will be monitored by a photo ionization detector (PID) and maintained at a concentration of 10-20 parts per million (ppm).

Subslab gas samples will be transported under chain-of-custody to a California-certified laboratory for analysis of volatile organic compounds (VOCs) by EPA Method TO-15.

3.5 Soil Gas Sampling

Soil gas samples will be collected as specified in the sampling program on Table 4 and on Figures 13 and 14. The new soil vapor probes/monitoring wells will be installed and sampled according to the State *Advisory – Active Soil Gas Investigations* (CalEPA/DTSC, 2015). The soil vapor wells will be constructed to a depth of 5.5 ft bgs. The wells will be constructed by setting a vapor implant attached to ¼-inch Teflon™ tubing at 5 feet bgs with six-inches of sand pack above and below it. A ½ foot of dry bentonite crumbles will be poured on top of the sand and the remaining annular space will be backfilled with hydrated bentonite. The Teflon™ tubing will be set in a 2-inch PVC riser and capped to prevent moisture from entering.

This is the same procedure used for prior sampling as documented in our *Site Assessment Report* dated October 6, 2016. If a tight formation limits well purging, soil gas wells may be purged between 24 and 48 hours prior to sampling to allow collection of representative samples in this tight soil. Samples will be collected by connecting a 1-liter Summa™ canister to the tubing through a flow rate regulator calibrated to a rate of approximately 100-200 milliliters per minute (mL/min). To further evaluate potential leakage within the sampling system, a leak-check enclosure/shroud will be placed over the sample train and isopropyl alcohol will be introduced into the shroud. A PID will be used to monitor the concentration of isopropyl alcohol within the shroud during sample collection.

Soil gas samples will be analyzed for VOCs by EPA Method TO-15. A shroud sample will also be collected to correlate PID readings for the tracker gas. Several soil gas samples will be analyzed for fixed gases (oxygen, carbon dioxide, and methane) by ASTM Method D-1946 per Table 4. PANGEA will attempt to retain the soil gas monitoring wells to collect additional repeatable data.

3.6 Investigation Derived Waste (IDW)

Investigation derived waste (IDW) generated during field activities will be temporarily stored on Site on plastic sheeting. Following review of analytical results, the IDW will be transported to an appropriate facility for disposal or recycling in conjunction with other soil export from the Site for grade beam installation.

4.0 PROPOSED PILOT STUDY

Our proposed pilot test work scope is designed to evaluate the feasibility of SVE for remediation and mitigation of subsurface volatile organic compounds at the Site. To assess SVE, a SVE pilot test will be conducted and will involve the installation of SVE test wells and vapor conveyance piping in conjunction with the building redevelopment. The layout of the proposed SVE pilot test system is shown on Figure 15. A cross-section illustration of the proposed SVE wells targeting subsurface VOC impact is shown on Figure 16. The proposed SVE system conveyance piping and equipment locations are shown on Figure 17.

Due to the schedule for grade beam excavation, utility installation and additional site assessment, the SVE well installation and pilot test will be conducted in two phases. The first phase will involve well installation in the depressed slab area where SVE wells will be protected from possible damage. Initial short-term SVE testing will obtain test data to initiate discharge permitting with the Bay Area Air Quality Management District. The second phase will involve well installation after heavy excavation equipment use has ceased to protect the wells from damage, and after review of additional site assessment data. The additional SVE wells will be installed using hand digging techniques due to anticipated access issues at that stage of Site development. A second and longer SVE pilot test will be conducted after installation of the additional wells, conveyance piping and concrete slab.

The proposed scope of work involves the following:

- Task 1 - SVE well installation;
- Task 2 – SVE conveyance piping installation;
- Task 3 – SVE pilot testing;
- Task 4 – Waste disposal; and
- Task 5 – Report preparation.

4.1 SVE Test Well Installation and Sub-slab Monitoring Probe Installation

Due to the above constraints, the SVE well installation and pilot test will be conducted in two phases. To facilitate initial SVE pilot testing, the first phase will involve installation of two *shallow* (1.5 to 4 ft depth) and one *deep* (8 to 12 ft depth) SVE test wells (SVE-1A, SVE-1B and SVE-2B) as shown on Figures 15 and 16. These wells will be installed in the depressed floor slab area where SVE wells will be best protected from potential damage. The SVE test wells are located to influence the extent of VOCs found in subsurface soil gas, as shown in cross-section

view on Figure 16. These wells will allow procurement of short-term SVE test data to initiate discharge permitting with the Bay Area Air Quality Management District. Note that the SVE test well to be installed in the northwest loading area is at 3.5 ft lower elevation that the other SVE test wells.

The second phase will involve SVE well installation after heavy excavation equipment use has ceased to protect the wells from possible damage, and after review of additional site assessment data. The additional SVE wells will be installed using hand digging techniques due to anticipated access issues at that stage of Site development. A second and longer SVE pilot test will be conducted after installation of the additional wells, conveyance piping and concrete slab.

During the second phase of SVE well installation, PANGEA will install four shallow wells (SVE-3A, SVE-4A, SVE-5A and SVE-6A) to allow testing and VOC removal beneath the slab and within the shallow fill material at the Site. Site data suggests that *shallow* soil is sufficiently permeable to provide a radius of influence for SVE of approximately 30 ft. Four additional deeper SVE wells (SVE-3B, SVE-4B, SVE-5B and SVE-6B) will be installed as shown on Figure 15. Additional site assessment data from the above assessment Workplan will be used to determine if the other shallow or deeper SVE wells are merited for SVE pilot testing and future Site remediation.

The wells will be constructed of 2-inch diameter, Schedule 40 polyvinyl chloride (PVC) casing with 0.020-inch factory-slotted PVC screen and Monterey #3 sand pack, and completed with bentonite and Portland cement seal to prevent short circuiting to the surface. The wells will be completed flush with the surrounding surface in a traffic-rated well vault. Additional well installation procedures are presented in our SOPs in Appendix A.

After installation of the concrete slab, PANGEA will install three sub-slab probes (V-1, V-2 and V-3) where shown on Figure 15. As in Section 3.4, the subslab gas probes will be installed following Department of Toxic Substances Control's (DTSC) July 2015 *Advisory – Active Soil Gas Investigation* guidance. These probes will be used to monitor vacuum influence during SVE pilot testing.

4.2 SVE Conveyance Piping

Underground SVE conveyance piping leading from each SVE test well to the temporary SVE system will be installed adjacent to the grade beam excavations. The conveyance piping layout is shown on Figure 17. Two-inch diameter, Schedule 40 PVC, SVE conveyance piping from each well will embedded with at least two inches of sand above and below. The SVE conveyance

piping will be manifolded inside the SVE system enclosure with the manifold header pipe connected to the SVE blower (Figure 15). The SVE system will include valves, meters, gauges and/or sampling ports to facilitate flow control flow and parameter measurement for individual wells. The pilot test will be conducted with temporary extraction equipment and vapor-phase carbon treatment equipment.

4.3 Construction Quality Assurance and Quality Control

The SVE pilot test system design will include construction quality assurance and quality control (QA/QC) requirements to be implemented during the installation of the system, including:

- Appropriately qualified and certified contractors will be used with experience installing the specified SVE test wells and conveyance piping.
- A pre-installation meeting will be held including the contractor, owner, architect/engineer, and other trades that may be affected by the installation of the system, or must know to protect the system during the performance of their activities.
- Prior to completion of the vent risers at roof level, the vent setback and clearance will be verified for conformance with air permit requirements.
- Testing procedures for ensuring that the installed SVE pilot test wells and piping perform as designed will be conducted. These tests may include, but are not limited to positive and negative pressure leak tests.

Upon completion of the SVE pilot test system, a report will be prepared documenting that the SVE test wells, conveyance piping and extraction/treatment equipment were installed in accordance with the design specifications and that the specific construction QA/QC procedures were performed and yielded satisfactory results. The report will also include a map documenting the ‘as-built’ construction of the SVE test wells and piping, including necessary field changes to the design.

4.4 Pilot Testing

PANGEA will conduct an initial one- to two-day SVE test from the loading dock area to evaluate the ability of SVE to remove VOCs from the Site subsurface. PANGEA will notify the Bay Area Air Quality Management District (BAAQMD) prior to performing the SVE testing.

After installation of additional SVE wells, underground conveyance piping, concrete slab, and sub-slab monitoring probes, PANGEA will conduct a five-day SVE test to evaluate the ability of SVE to remove VOCs from the Site subsurface using the full SVE pilot study system. PANGEA will again notify the Bay Area Air Quality Management District (BAAQMD) prior to performing the SVE testing. The testing will evaluate VOC concentrations in soil vapor, determine VOC mass removal rates, measure applied vacuum rates required to induce air flow, and will evaluate the radius of vacuum influence. Site subslab gas probes, soil gas wells, and SVE wells will be used to evaluate vacuum influence during SVE testing.

PANGEA will first evaluate SVE using shallow SVE test wells and then using the deeper SVE test well(s). The vapor extraction testing will consist of brief constant vacuum test on each SVE test well for approximately 15 to 30 minutes. Depending on observed applied vacuum, PANGEA may conduct step testing by increasing the vacuum to evaluate performance at different applied vacuums. During these tests, PANGEA will measure vapor extraction flow rate, contaminant concentration, applied vacuum in the SVE test well and the vacuum influence in nearby observation probes/wells. A photo-ionization detector (PID) will be used to field measure VOC concentrations from the test wells. Magnehelic pressure gauges will be used to measure the vacuum applied and induced in observation wells. Select vapor samples will be collected near the beginning or end of each test for correlation with PID readings and mass removal rate estimation. Near the end of testing of each well, vacuum influence measurements will be collected.

After initial testing, PANGEA may adjust flow from individual wells to optimize VOC mass removal rates. Individual well testing is primarily planned for the first or second day of testing/removal. Subsequent extraction will be conducted to provide mass removal. Soil vapor samples will be collected in one-liter Tedlar™ bags and submitted to a state-certified laboratory for analysis of VOCs by EPA Method 8260 or TO-15.

Soil vapors will be extracted from the wells using a 5-horsepower regenerative blower capable of applying vacuum of approximately 6 inches of mercury and a flow rate of approximately 150 cubic feet per minute. The vapor control system will include two 200-lb carbon canisters plumbed in series consistent with BAAQMD requirements. A PID will be used to monitor the influent, midpoint and effluent of the carbon treatment system.

Vacuum influence data from existing nearby subslab gas probes and soil gas wells will help determine if additional SVE wells are merited. Test data will help select appropriately-sized equipment for further vapor extraction and treatment, and provide data for obtaining an air discharge permit from the BAAQMD.

4.5 Waste Disposal

Soil cuttings from well installation will be stored onsite in appropriate containers pending laboratory analytical results. Upon receipt of the analytical reports, the waste will be transported to an appropriate disposal/recycling facility. Alternatively, the soil cuttings will be disposed following the procedures specified in the Site Management Plan for disposal of the grade beam excavation waste soil.

4.6 Report Preparation

PANGEA will describe SVE well installation details and SVE pilot test procedures and results within the requested Draft Corrective Action Plan (CAP). The report will present tabulated SVE extraction and vacuum influence data for evaluation of the effectiveness of the SVE pilot test well and monitoring network. The Draft CAP will provide recommendations for Site remediation.

Site assessment procedures and results will also be incorporated into the Draft CAP.

5.0 REFERENCES

ACEHD 1999, *Remedial Action Completion Certification Letter*, Scott Company, 1919 Market Street, Oakland California, January 22.

CalEPA/DTSC, 2010, *Proven Technologies and Remedies Guidance, Remediation of Chlorinated Volatile Organic Compounds in Vadose Zone Soil,* April 2010

CalEPA/DTSC, 2011, *Vapor Intrusion Mitigation Advisory (VIMA),* October 2011

CalEPA/DTSC, 2012, *Advisory – Active Soil Gas Investigations,* April 2012

PANGEA Environmental Services, Inc., 2016, *Site Assessment Report*, 1919 Market Street, Oakland California, October 6.

Partner Engineering & Science, Inc., 2016, *Phase II Subsurface Investigation Report*, 1919 Market Street, Oakland California, March 28.

Partner Engineering & Science, Inc, 2016, *Additional Subsurface Investigation Report*, 1919 Market Street, Oakland California, May 2.

Figure 1

1919 Market Street
Oakland, California

PANGEA

Vicinity Map

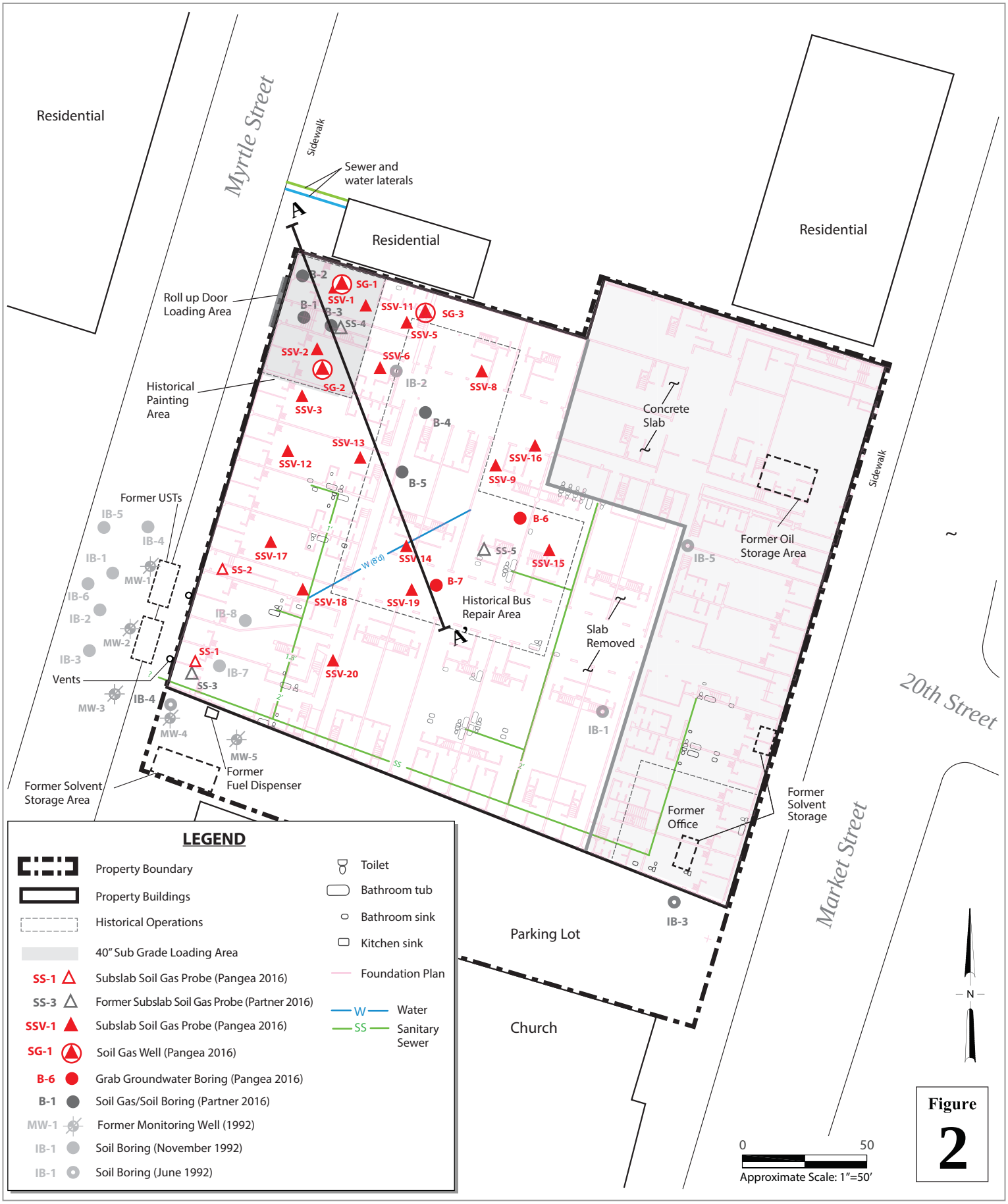
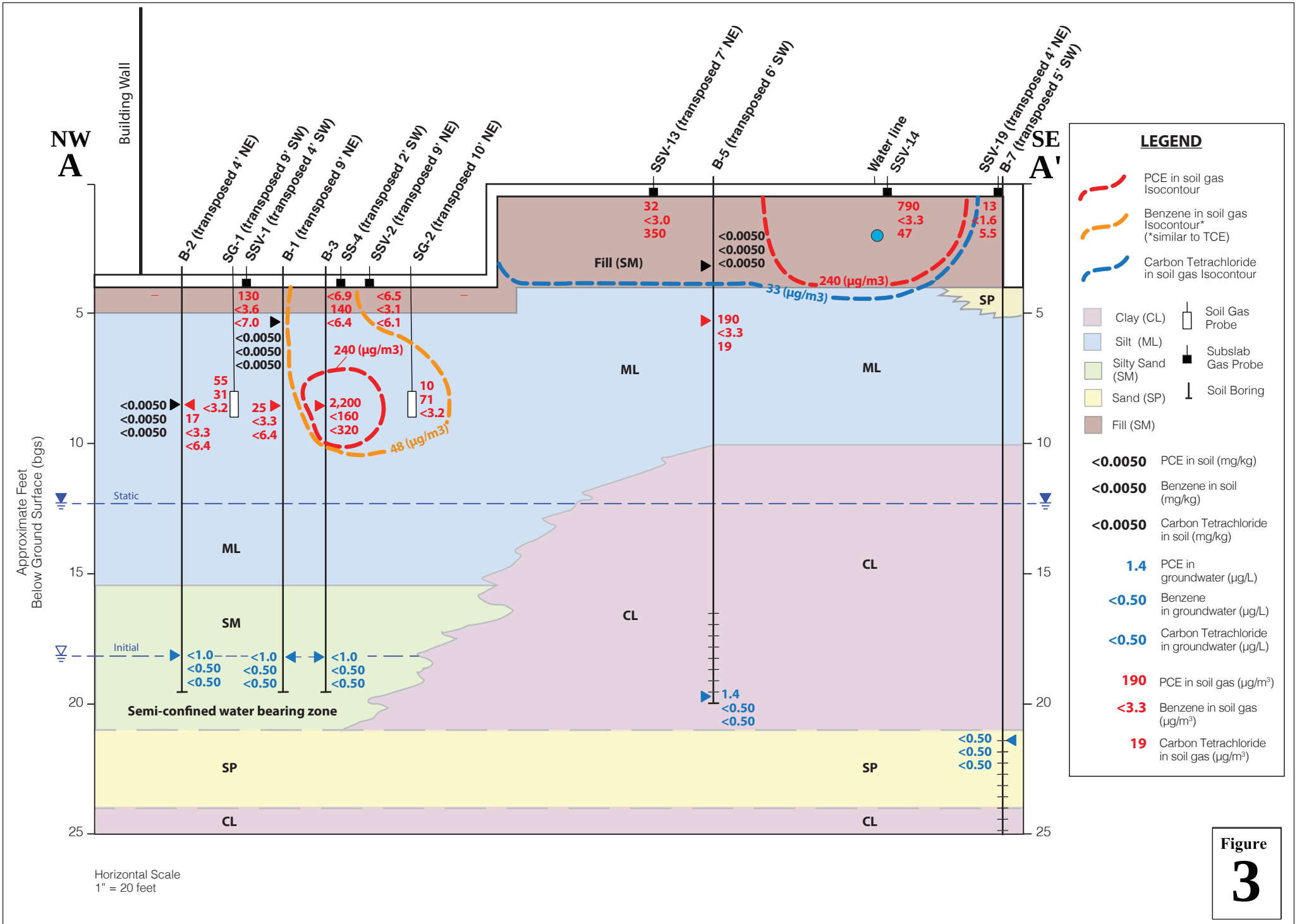


Figure 2

1919 Market Street
Oakland, California

PANGEA

Site Map



Horizontal Scale
1" = 20 feet

Figure
3

1919 Market Street
Oakland, California

PANGEA

Cross Section A- A'

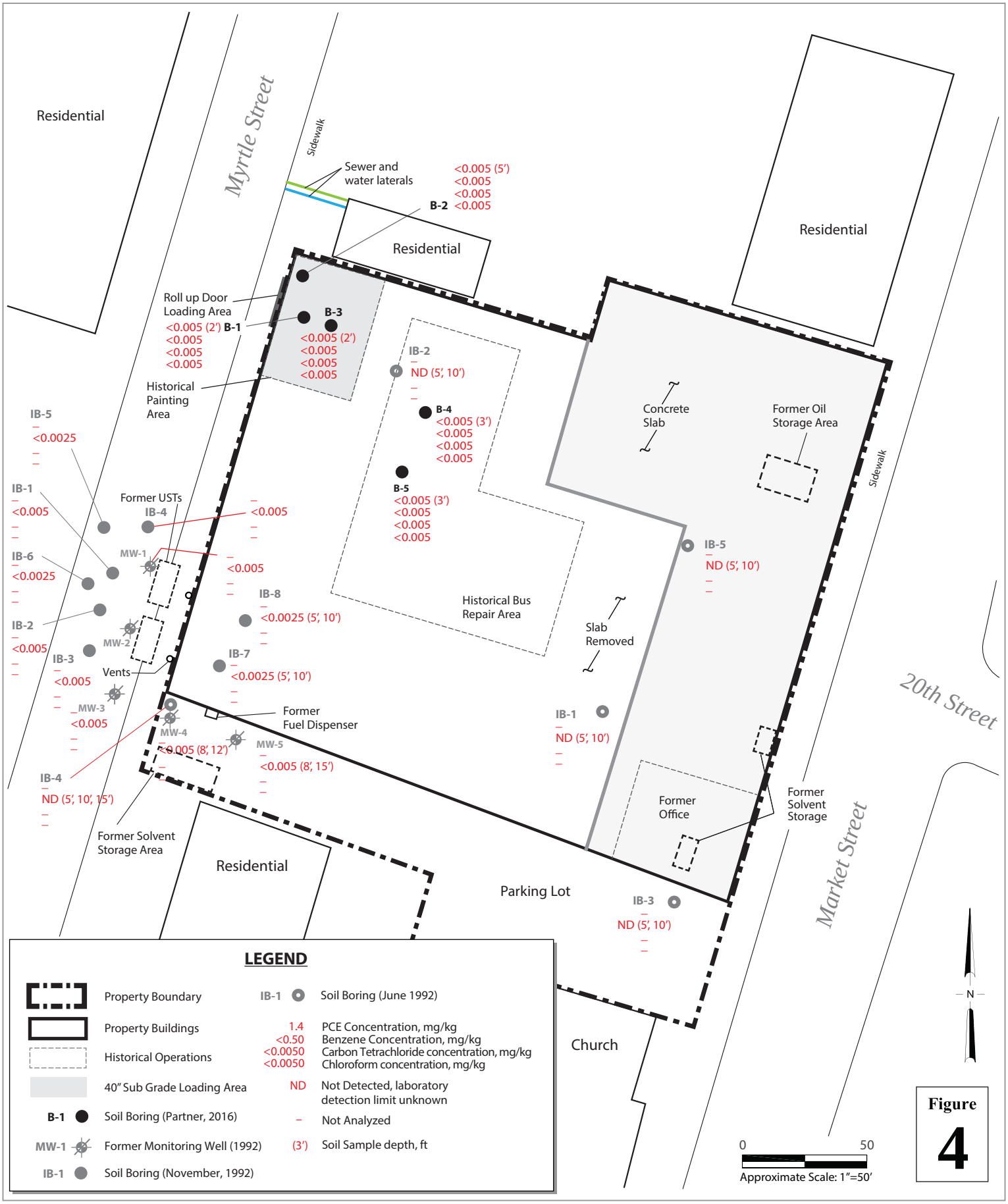


Figure 4

1919 Market Street
Oakland, California

PANGEA

Maximum VOCs in Soil

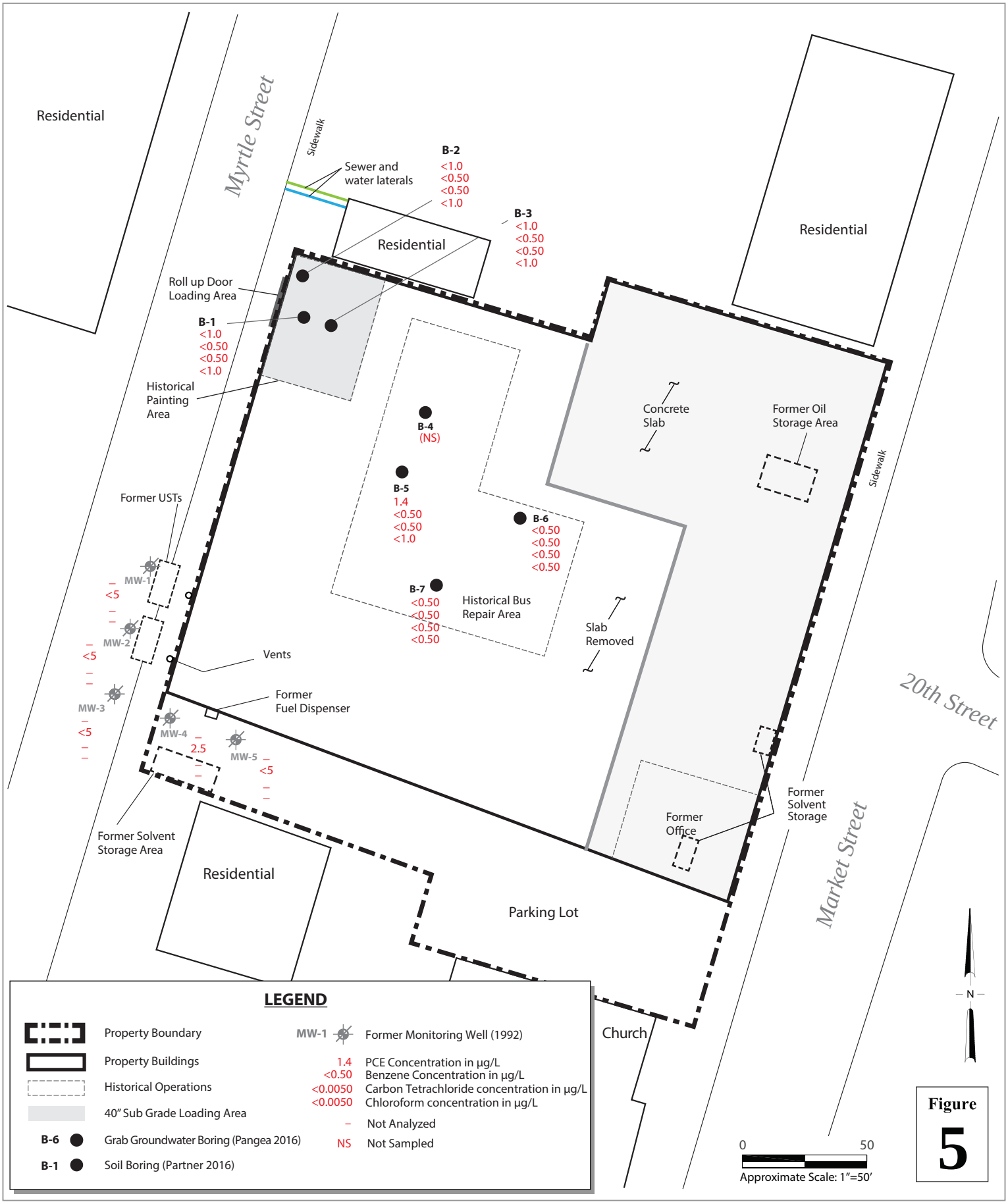
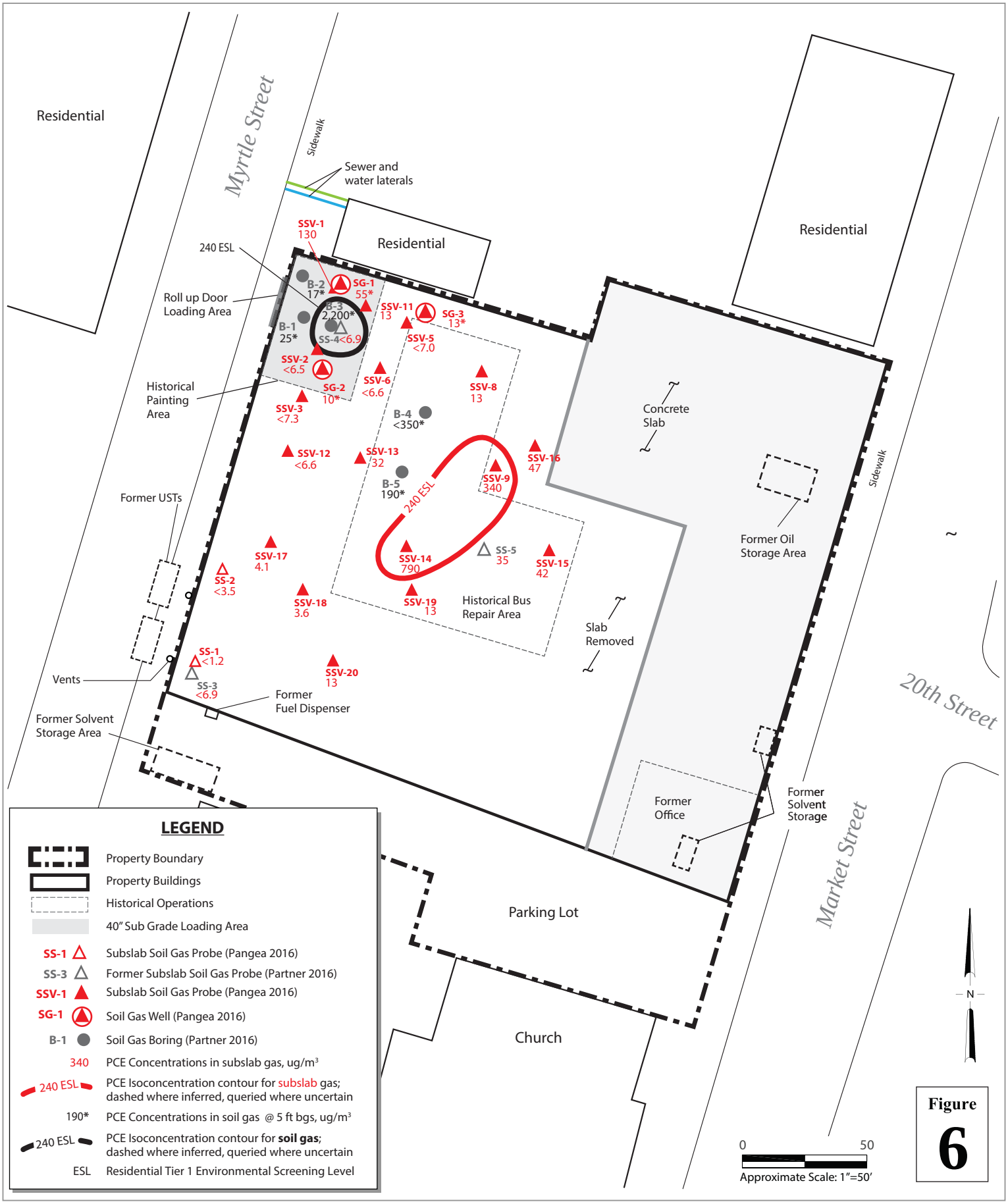


Figure 5

1919 Market Street
Oakland, California

PANGEA

Maximum VOCs in Groundwater



1919 Market Street
Oakland, California

PANGEA

PCE in Subslab Gas and Soil Gas

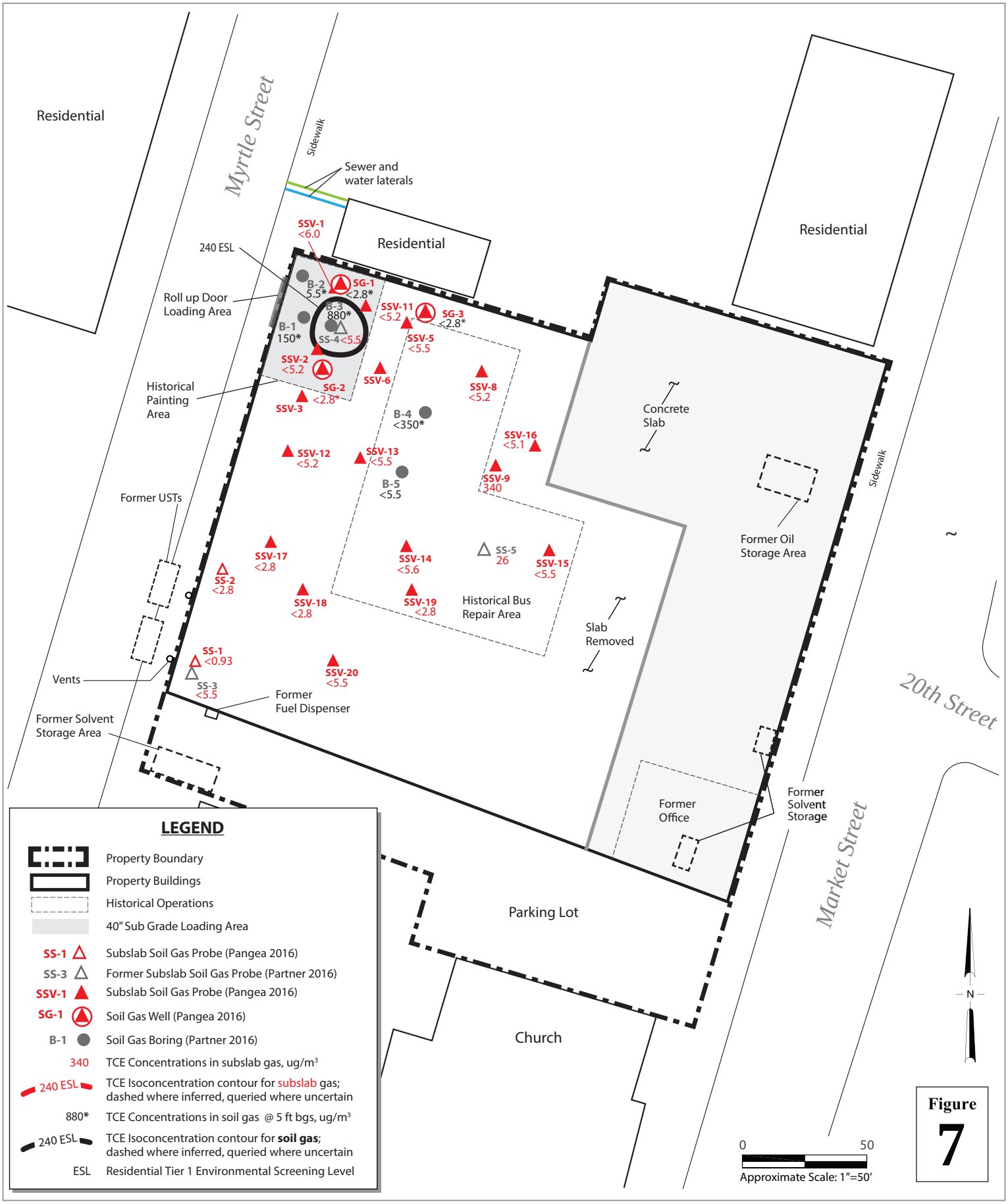


Figure 7

1919 Market Street
Oakland, California

PANGEA

TCE in Subslab Gas and Soil Gas

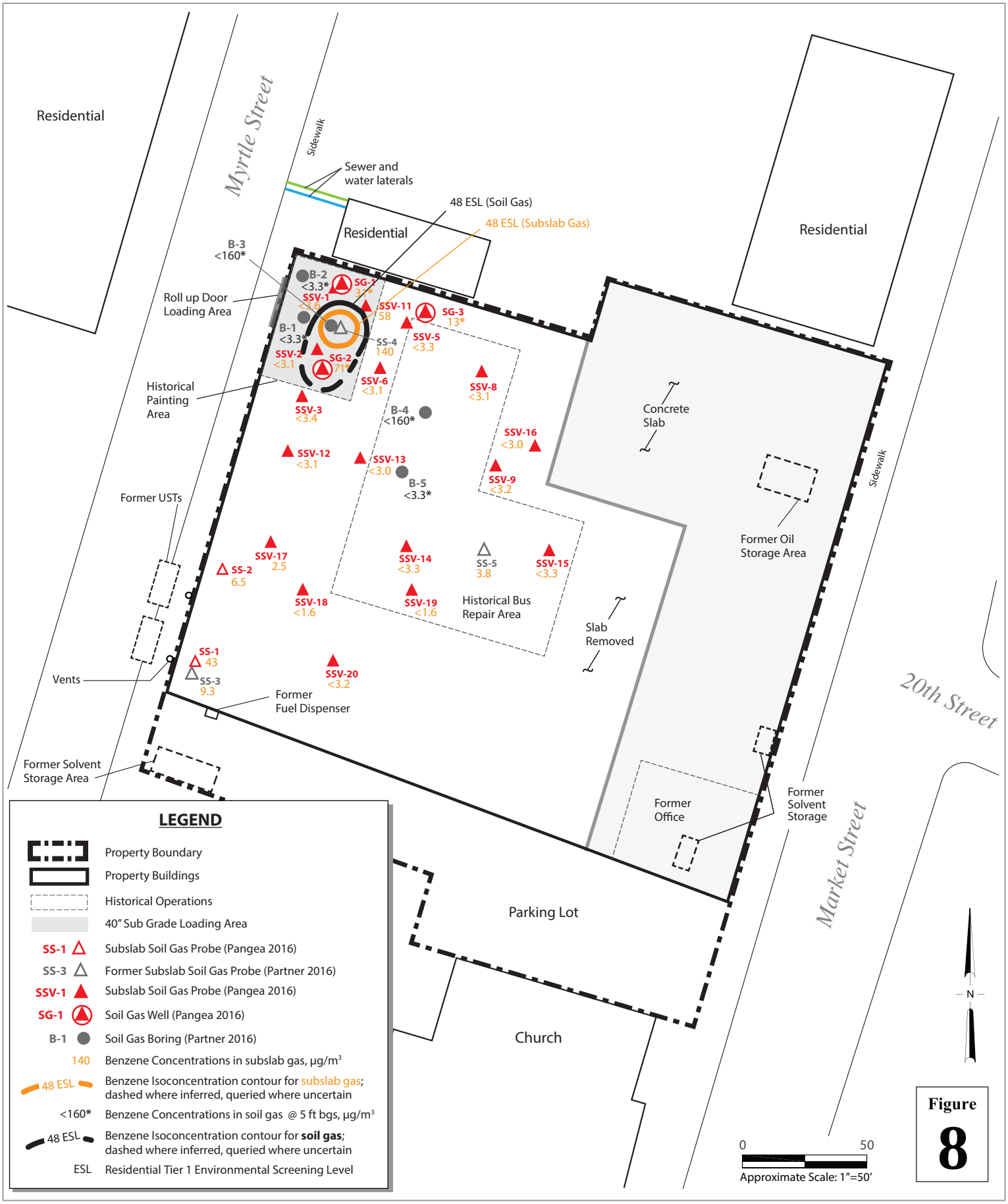


Figure 8

1919 Market Street
Oakland, California

PANGEA

Benzene in Subslab and Soil Gas

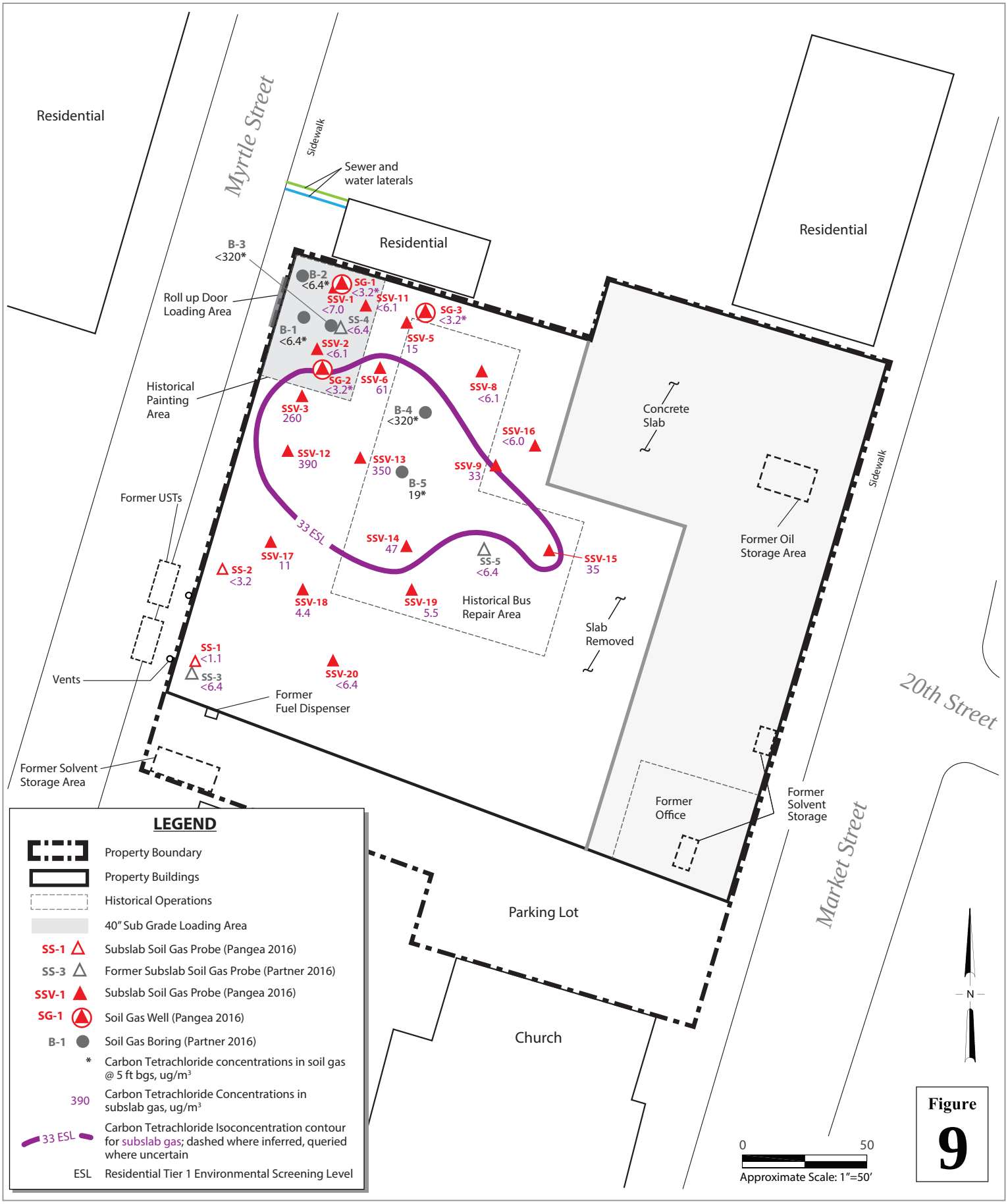
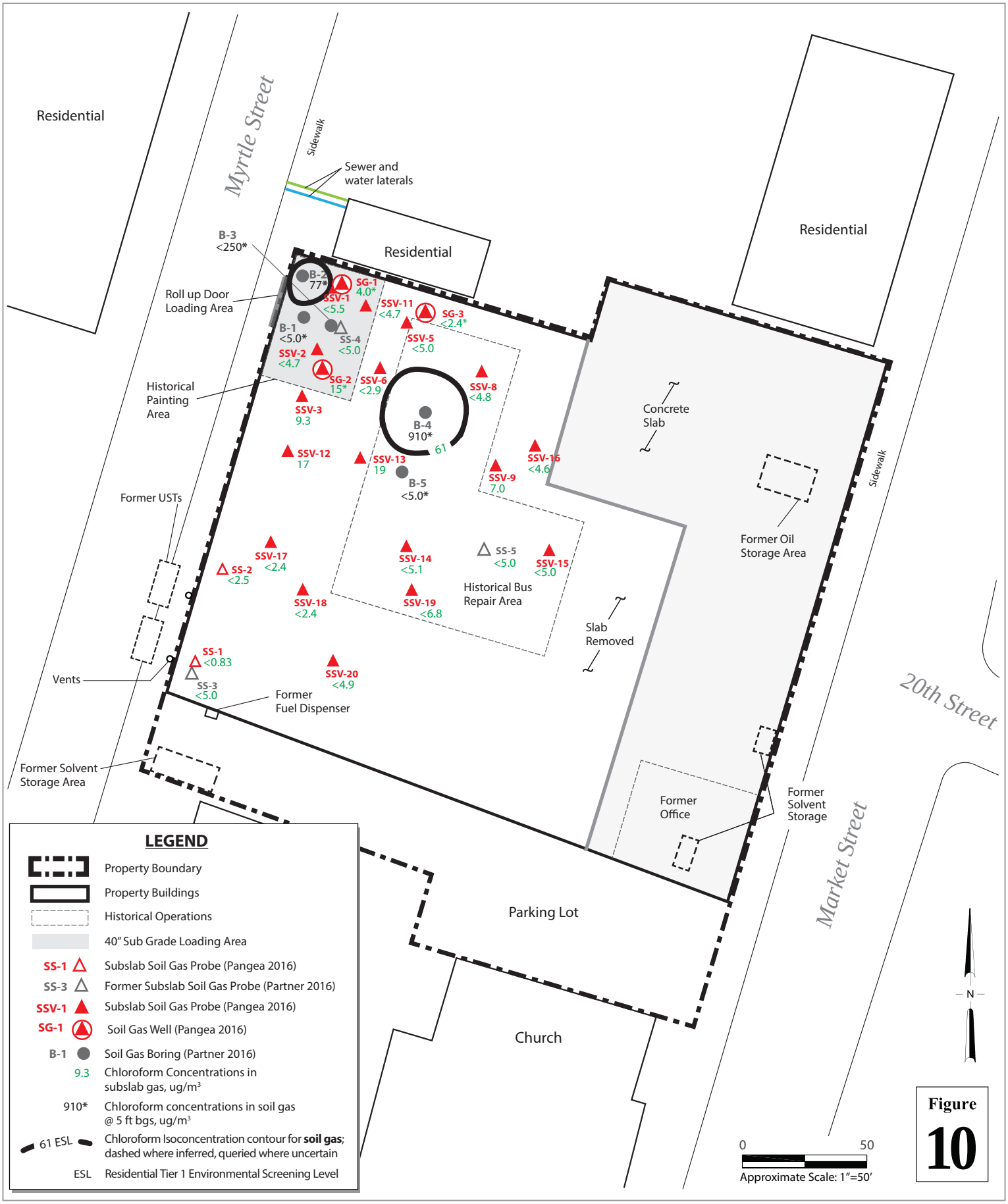


Figure 9

1919 Market Street
Oakland, California

PANGEA

Carbon Tetrachloride in Subslab Gas and Soil Gas



1919 Market Street
Oakland, California

PANGEA

Chloroform in Subslab Gas and Soil Gas

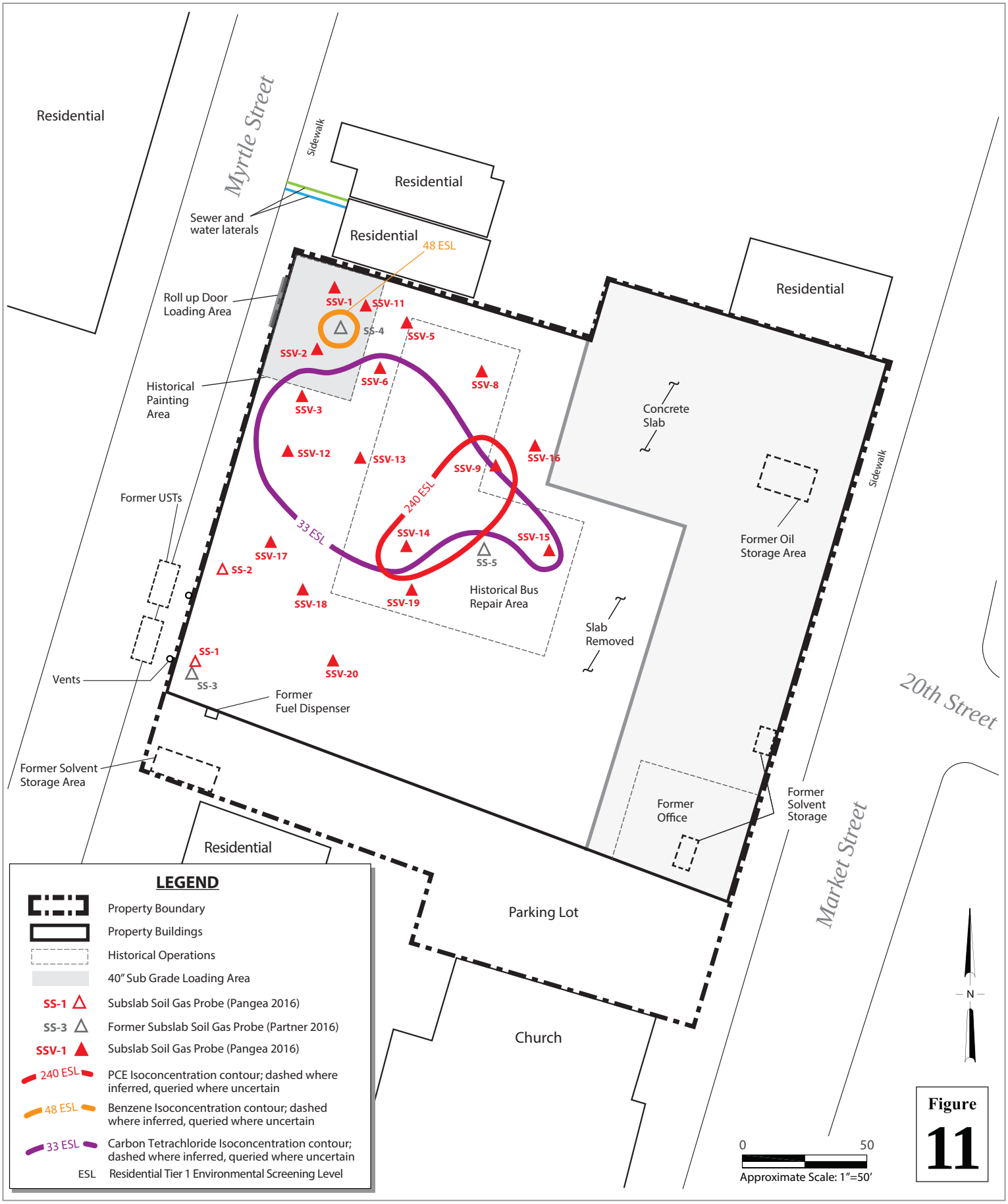


Figure 11

1919 Market Street
Oakland, California

PANGEA

VOCs in Subslab Gas
Plume Map

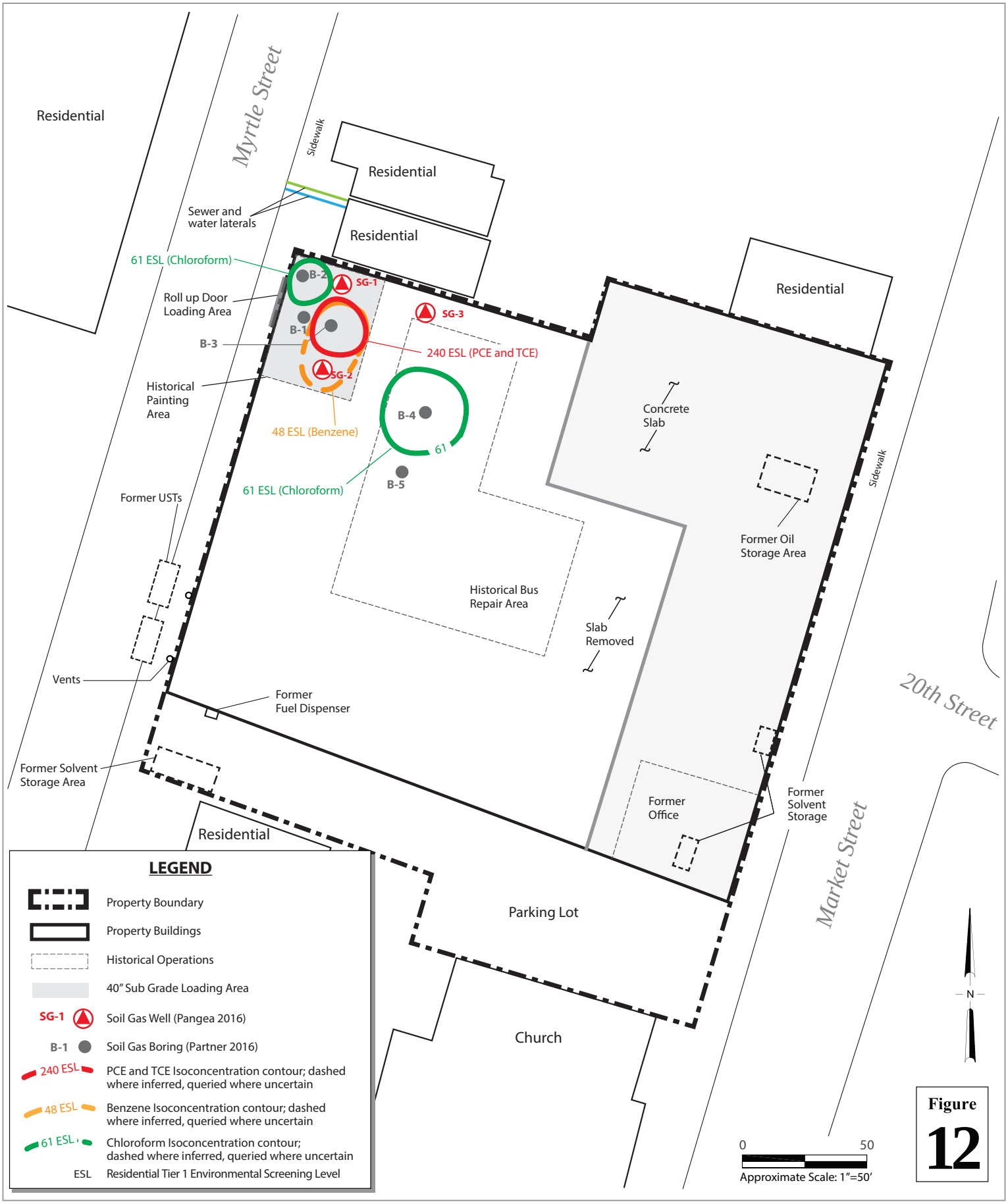


Figure 12

1919 Market Street
Oakland, California

PANGEA

VOCs in Soil Gas
Plume Map

Figure 13

1919 Market Street
Oakland, California

PANGEA

Proposed Sampling Locations and VOC Subslab Gas Plumes

Figure 14

1919 Market Street
Oakland, California

PANGEA

Proposed Sampling Locations and VOC Soil Gas Plumes

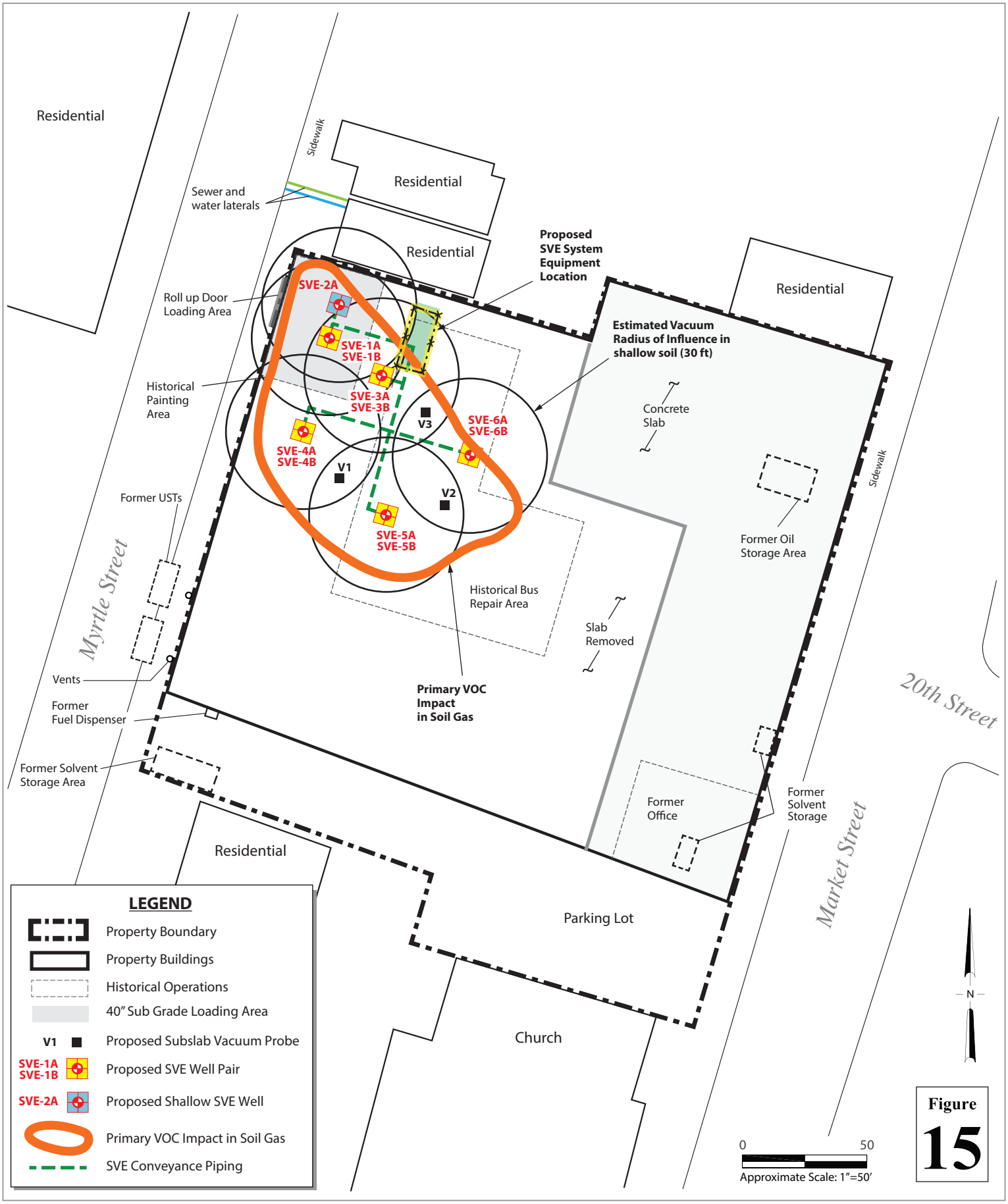


Figure 15

1919 Market Street
Oakland, California

PANGEA

Proposed SVE Pilot Test System Layout

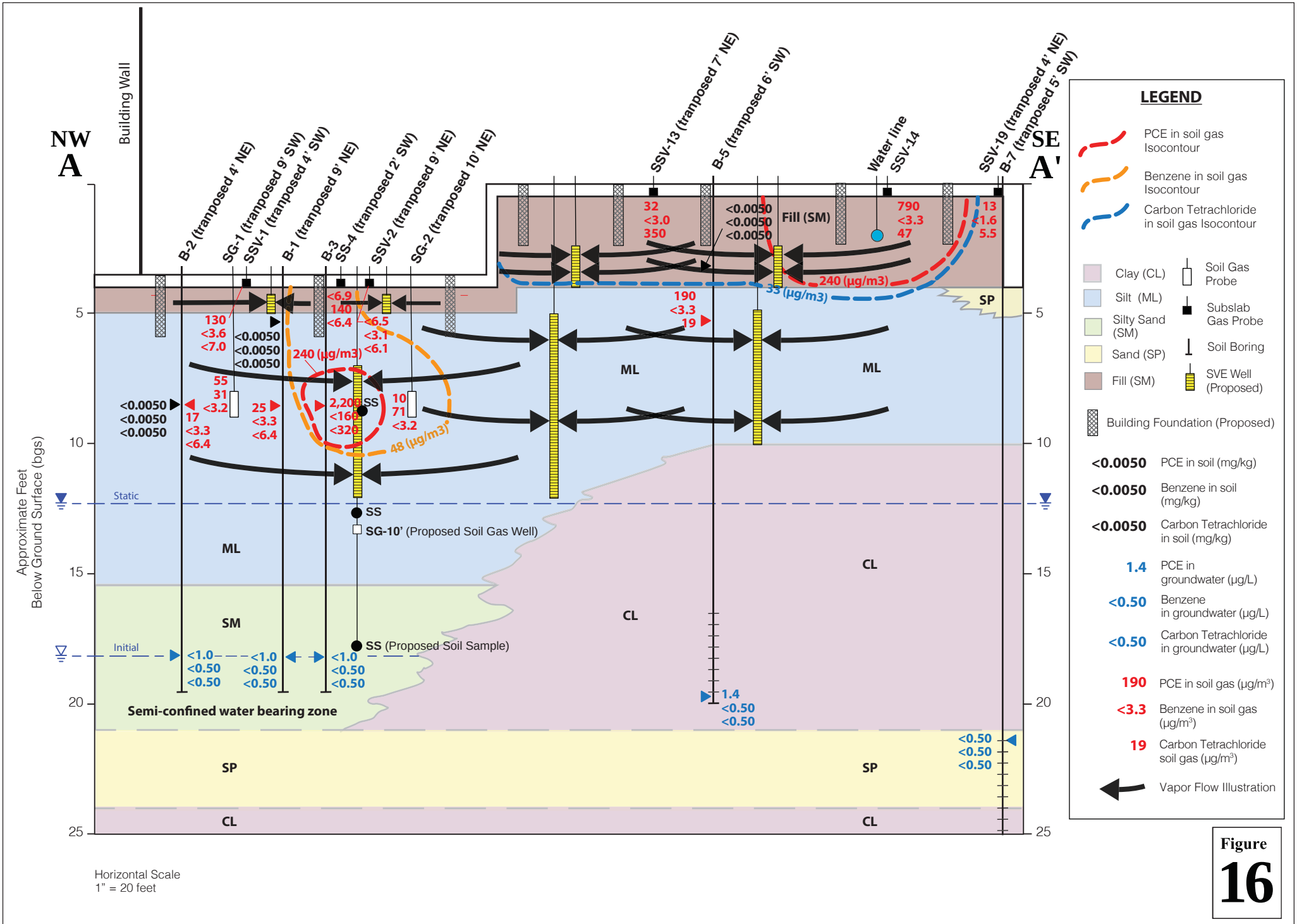


Figure
16

1919 Market Street
Oakland, California

PANGEA

Cross Section of Proposed SVE Wells
and Proposed Sampling

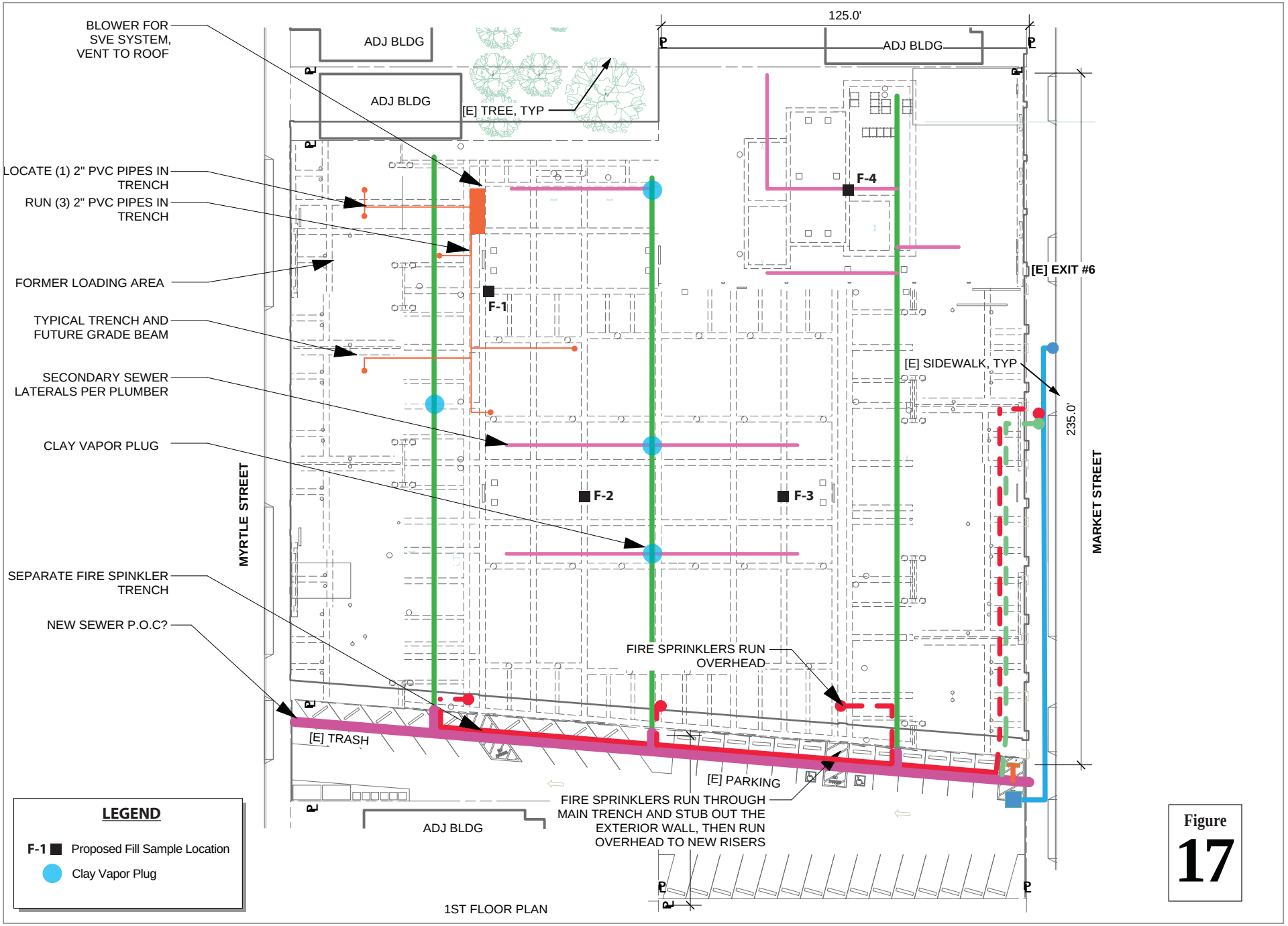


Figure 17

1919 Market Street
Oakland, California

PANGEA

Proposed SVE System Conveyance Piping, Equipment Location and Fill Sample Location

Pangea

Table 1. Soil Analytical Data - 1919 Market Street, Oakland, California

Boring / Sample ID	Date Sampled	Sample Depth (ft bgs)	TPHg	TPHd	TPHmo	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	1,2-DCA	PCE	TCE	1,1,1-TCA	Carbon Tetrachloride	Chloroform	NOTES
			mg/Kg														
		Soil Tier 1 ESL:	100	230	5,100	0.044	2.9	1.4	2.3	0.033	0.0045	0.42	0.46	7.8	0.048	0.068	
June 1992 Soil Sampling																	
IB-1	June 1992	5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
		10.5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
IB-2	June 1992	5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
		10.5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
IB-3	June 1992	5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
		10.5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
IB-4	June 1992	5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
		10.5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
		15	2.5	--	--	ND	0.016	0.030	0.10	--	--	--	--	--	--	--	
IB-5	June 1992	5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
		10.5	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	
November 1992 Soil Sampling																	
IB-1	11/25/1992	6	2.8	<10	<10 / 14[a]	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
		11	87	**300**	<20	<0.005	<0.005	<0.005	0.030	--	--	--	--	--	--	--	
IB-2	11/25/1992	6	<0.50	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
		11	23	<10 / 12[a]	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
IB-3	11/25/1992	6	<0.5	<10	13 / <10[a]	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
		11	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
IB-4	11/25/1992	6	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
		11.5	13	170	27	<0.05	<0.05	<0.05	<0.05	--	--	--	--	--	--	--	
IB-5	11/25/1992	7	<1	<1	<10	<0.0025	<0.0025	<0.0025	<0.0025	--	--	--	--	--	--	--	
		11.5	<1	<1	<10	<0.0025	<0.0025	<0.0025	<0.0025	--	--	--	--	--	--	--	
IB-6	11/25/1992	7	<1	<1	<10	<0.0025	<0.0025	<0.0025	<0.0025	--	--	--	--	--	--	--	
		11.5	<1	<1	<10	d	<0.0025	<0.0025	<0.0025	--	--	--	--	--	--	--	
IB-7	11/25/1992	5	<1	<1	<10	<0.0025	<0.0025	<0.0025	<0.0025	--	--	--	--	--	--	--	
		10	**560**	44	<10	<0.0025	<0.0025	<0.0025	<0.0025	--	--	--	--	--	--	--	
IB-8	11/25/1992	5	<1	<1	11	<0.0025	<0.0025	<0.0025	<0.0025	--	--	--	--	--	--	--	
		10	**160**	76	<10	<0.0025	<0.0025	1,100	<0.0025	--	--	--	--	--	--	--	
MW-1	1992	5	40	140	<10	<0.05	<0.05	<0.05	<0.05	--	--	--	--	--	--	--	
		10.5	**430**	**1,100**	61	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	
		13	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
MW-2	1992	5.5	**120**	180	<10	<0.05	<0.05	<0.05	<0.05	--	--	--	--	--	--	--	
		10.5	**310**	**1,200**	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	
		15.5	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
MW-3	1992	5.5	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
		10.5	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	

Pangea

Table 1. Soil Analytical Data - 1919 Market Street, Oakland, California

Boring / Sample ID	Date Sampled	Sample Depth (ft bgs)	TPHg	TPHd	TPHmo	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	1,2-DCA	PCE	TCE	1,1,1-TCA	Carbon Tetrachloride	Chloroform	NOTES
			mg/Kg														
		Soil Tier 1 ESL:	100	230	5,100	0.044	2.9	1.4	2.3	0.033	0.0045	0.42	0.46	7.8	0.048	0.068	
		15.5	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005								
MW-4	1992	8	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
		12.5	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
MW-5	1992	8	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
		14.5	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	--	--	--	--	--	--	--	
April 2016 Soil Sampling																	
B-1	04/15/2016	2.0[1]	--	--	--	<0.0050	<0.0050	<0.0050	<0.015	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
B-2	04/15/2016	5.0[1]	--	--	--	<0.0050	<0.0050	<0.0050	<0.015	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
B-3	04/15/2016	2.0[1]	--	--	--	<0.0050	<0.0050	<0.0050	<0.015	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
B-4	04/15/2016	3	--	--	--	<0.0050	<0.0050	<0.0050	<0.015	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
B-5	04/15/2016	3	--	--	--	<0.0050	<0.0050	<0.0050	<0.015	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	

Legend:

TPHg = Total Petroleum Hydrocarbons as gasoline by EPA Method 8015.

TPHd = Total Petroleum Hydrocarbons as diesel by EPA Method 8015.

TPHmo = Total Petroleum Hydrocarbons as motor oil by EPA Method 8015.

Benzene, Toluene, Ethylbenzene and Xylenes by EPA Method 8021.

1,2-DCA = 1,2-Dichloroethane

PCE = Tetrachloroethene

TCE = Trichloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

mg/Kg = milligrams per kilogram

ft bgs = Depth below ground surface in feet.

ND = analyte(s) not detected, detection limit unkowwn

< n = Chemical not present at a concentration in excess of detection limit shown.

-- = Not analyzed

ESL = Environmental Screening Level, from California Regional Water Quality Control Board - San Francisco Bay Region, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Revised February 2016 (Revision 3).

[a] = duplicate sample taken

(1) = Grade elevation is 40" below rest of building so sample depth is approximately 3.3 ft lower than samples collected outside of Loading Area

contaminant detected above reporting limit

Bold concentrations exceed screening levels (Tier 1 ESLs)

Pangea

Table 2. Groundwater Analytical Data - 1919 Market St, Oakland, CA

Well ID	Date Sampled	Sample Depth (ft bgs)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	1,2-DCA	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	Carbon Tetrachloride	Chloroform	NOTES
			µg/L														
VI ESL - Shallow GW, Residential (≤ 10 ft):			1.1	3,600	13	1,300	20	6.1	3.0	5.6	110	1,000	0.061	4,900	0.22	2.3	
Historical Monitoring Well Data																	
MW-1	8/7/1992	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	12/3/1992	--	<0.5	14	1.8	2.5	--	--	--	--	--	--	--	--	--	--	
	6/11/1993	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	1/13/1994	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	1/10/1995	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	6/12/1997	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10/22/1997	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	5/7/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-2	8/7/1992	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	12/3/1992	--	<0.5	14	1.9	2.5	--	--	--	--	--	--	--	--	--	--	
	6/11/1993	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	1/13/1994	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	1/10/1995	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	6/12/1997	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	10/22/1997	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	5/7/1998	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
MW-3	8/7/1992	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	12/3/1992	--	<0.5	16	2.4	3.5	--	--	--	--	--	--	--	--	--	--	
	6/11/1993	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	1/13/1994	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	1/10/1995	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	6/12/1997	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10/22/1997	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	5/7/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-4	8/7/1992	--	**20**	150	7.5	340	--	--	--	--	--	--	--	--	--	--	
	12/3/1992	--	**13**	36	8.2	31	--	--	--	--	--	--	--	--	--	--	
	6/11/1993	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	1/13/1994	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	1/10/1995	--	**25**	52	**43**	230	--	--	--	--	--	--	--	--	--	--	
	6/12/1997	--	**5.2**	5.2	**30**	130	--	--	--	--	--	--	--	--	--	--	
	10/22/1997	--	**17**	18	**110**	300	--	--	--	--	--	--	--	--	--	--	
	5/7/1998	--	**8.8**	<0.5	9.9	22	--	--	--	--	--	--	--	--	--	--	
MW-5	8/7/1992	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	12/3/1992	--	<0.5	33	3.5	4.2	--	--	--	--	--	--	--	--	--	--	
	6/11/1993	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	

Table 2. Groundwater Analytical Data - 1919 Market St, Oakland, CA

Well ID	Date Sampled	Sample Depth (ft bgs)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	1,2-DCA	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	Carbon Tetrachloride	Chloroform	NOTES
			µg/L														
VI ESL - Shallow GW, Residential (≤ 10 ft):			1.1	3,600	13	1,300	20	6.1	3.0	5.6	110	1,000	0.061	4,900	0.22	2.3	
MW-5 cont.	1/13/1994	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	1/10/1995	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	
	6/12/1997	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10/22/1997	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	5/7/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Groundwater Data																	
B-1-GW	4/11/2016	16*	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	
B-2-GW	4/11/2016	16*	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	
B-3-GW	4/11/2016	16*	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	
B-5-GW	4/11/2016	20	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	
B-6-GW	9/1/2016	21-25	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
B-7-GW	9/1/2016	21-25	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	

Legend:

TPHg = Total Petroleum Hydrocarbons as gasoline by EPA Method 8015.

TPHd = Total Petroleum Hydrocarbons as diesel by EPA Method 8015.

TPHmo = Total Petroleum Hydrocarbons as motor oil by EPA Method 8015.

1,2-DCA = 1,2-Dichloroethane

PCE = Tetrachloroethene

TCE = Trichloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

µg/L = Micrograms per Liter

ft bgs = feet below ground surface in feet

< n = Chemical not present at a concentration in excess of detection limit shown.

-- = Not analyzed

ESL = Environmental Screening Level, from California Regional Water Quality Control Board - San Francisco Bay Region, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Revised February 2016 (Revision 3).

* = Surface elevation approximately 3.3 ft below other borings

contaminant detected above reporting limit

Bold concentrations exceed shown screening levels

Pangea

Table 3. Soil Gas Analytical Data - 1919 Market Street, Oakland, California

Boring/ Sample ID	Date Sampled	Sample Depth (ft bgs)	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	1,2-DCA	PCE	TCE	1,1,1-TCA	Carbon Tetrachloride	Chloroform	Other VOCs	Isopropyl Alcohol (Leak Check Compound)	Oxygen	Methane [1]	Notes
			ug/m^3														%	%	
Residential ESL for soil/subslab gas:			300,000	48	160,000	560	52,000	41	54	240	240	520,000	33	61	Varies	NA	---	---	
Subslab Soil Gas Samples																			
SS-1	02/05/16	0.5	380	43	27	1.3	9.0	1.9	<0.70	<1.2	<0.93	2.3	<1.1	<0.83	*	12	17	<0.20	
SS-2	02/05/16	0.5	<1,000	6.5	16	<2.2	<6.6	5.3	<2.1	<3.5	<2.8	<2.8	<3.2	<2.5	--	16	17	<0.19	
SS-3[2]	03/11/16	0.5	--	9.3	140	19	100	--	<4.1	<6.9	<5.5	<5.6	<6.4	<5.0	--	--	--	--	
SS-4[2]	03/11/16	0.5	--	**140**	35	6.9	46	--	<4.1	<6.9	<5.5	<5.6	<6.4	<5.0	--	--	--	--	
SS-5	03/11/16	0.5	--	3.8	19	<4.4	25.6	--	<4.1	35	26	67	<6.4	<5.0	--	--	--	--	
SSV-1	08/01/16	0.5	--	<3.6	8.2	<4.9	9.7	<23	<4.5	130	<6.0	<6.1	<7.0	<5.5	*	14	--	--	
SSV-2	08/01/16	0.5	--	<3.1	8.1	<4.2	6.3	<20	<3.9	<6.5	<5.2	<5.3	<6.1	<4.7	--	--	--	--	
SSV-3	08/01/16	0.5	--	<3.4	4.2	<4.6	5.6	<22	<4.3	<7.3	<5.7	10	**260**	9.3	--	38	--	--	
SSV-5	08/01/16	0.5	--	<3.3	5.9	<4.5	7.5	<21	<4.1	<7.0	<5.5	<5.6	15	<5.0	--	21	--	--	
SSV-6	08/01/16	0.5	--	<3.1	4.5	<4.2	6.2	<20	<3.9	<6.6	<5.2	18	**61**	<4.8	*	13	--	--	
SSV-8	08/01/16	0.5	--	<3.1	<3.7	<4.2	<8.4	<20	<3.9	13	<5.2	80	<6.1	<4.8	*	--	--	--	
SSV-9	08/01/16	0.5	--	<3.2	<3.8	<4.4	<8.4	<21	<4.1	**340**	<5.5	220	33	7.0	*	--	--	--	
SSV-11	08/17/16	0.5	--	5.8	34	<4.2	15.3	<20	<3.9	13	<5.2	<5.3	<6.1	<4.7	--	10	--	--	
SSV-12	08/17/16	0.5	--	<3.1	<3.7	17	168	<20	<3.9	<6.6	<5.2	17	**390**	17	--	21	--	--	
SSV-13	08/17/16	0.5	--	<3.0	<3.5	<4.0	<8.0	<19	<3.7	32	<5.0	79	**350**	19	--	<9.1	--	--	
SSV-14	08/17/16	0.5	--	<3.3	<3.9	<4.5	<9.0	<22	<4.2	**790**	<5.6	240	**47**	<5.1	--	13	--	--	
SSV-15	08/17/16	0.5	--	<3.3	<3.9	<4.5	<9.0	<22	<4.2	42	<5.5	260	**35**	<5.0	--	15	--	--	
SSV-16	08/17/16	0.5	--	<3.0	<3.6	<4.1	<8.2	<20	<3.8	47	<5.1	52	<6.0	<4.6	--	20	--	--	
SSV-17	09/01/16	0.5	--	2.5	5.9	<2.2	<6.6	<5.3	<2.0	4.1	<2.8	5.3	11	<2.4	*	320	--	--	
SSV-18	09/01/16	0.5	--	<1.6	4.5	<2.2	<6.6	<5.3	<.20	3.6	<2.8	12	4.4	<2.4	*	150	--	--	

Table 3. Soil Gas Analytical Data - 1919 Market Street, Oakland, California

Boring/ Sample ID	Date Sampled	Sample Depth (ft bgs)	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	1,2-DCA	PCE	TCE	1,1,1-TCA	Carbon Tetrachloride	Chloroform	Other VOCs	Isopropyl Alcohol (Leak Check Compound)	Oxygen	Methane [1]	Notes
			ug/m^3														%	%	
Residential ESL for soil/subslab gas:			300,000	48	160,000	560	52,000	41	54	240	240	520,000	33	61	Varies	NA	---	---	
SSV-19	09/01/16	0.5	--	<1.6	3.1	<2.2	<6.6	<5.3	11	13	<2.8	160	5.5	6.8	*	110	--	--	
SSV-20	09/01/16	0.5	--	<3.2	6.4	<4.4	<13	13	<4.1	13	<5.5	13	<6.4	<4.9	*	<100	--	--	
Soil Gas Samples																			
B-1[2]	04/29/16	5.0[3]	--	<3.3	<3.8	<4.4	<8.8	--	<4.1	25	150	<5.6	<6.4	<5.0	--	--	--	--	
B-2[2]	04/29/16	5.0[3]	--	<3.3	<3.8	66	400	--	<4.1	17	5.5	<5.6	<6.4	**77**	--	--	--	--	
B-3[2]	04/29/16	5.0[3]	--	<160	<190	<220	<220	--	<210	**2,200**	**880**	<280	<320	<250	--	--	--	--	
B-4[2]	04/29/16	5.0	--	<160	<190	<220	<220	--	<210	<350	<270	<280	<320	**910**	--	--	--	--	
B-5[2]	04/29/16	5.0	--	<3.3	<3.8	<4.4	<8.8	--	<4.1	190	<5.5	46	19	11	--	--	--	--	
SG-1	09/06/16	5.0[3]	--	31	24	2.6	14	<5.3	<2.0	55	<2.8	<2.8	<3.2	4.0	*	<50	--	--	
SG-2	09/06/16	5.0[3]	--	**71**	120	17	80	<5.3	<2.0	10	<2.8	<2.8	<3.2	15	*	<50	--	--	
SG-3	09/06/16	5.0	--	13	38	8.3	53	<5.3	<2.0	13	<2.8	3.4	<3.2	<2.4	*	<50	--	--	

Legend:

VOC = Volatile Organic Compounds

TPHg = Total Petroleum Hydrocarbons as gasoline

1,2-DCA = 1,2-dichloroethane

PCE = Tetrachloroethene

TCE = Trichloroethene

1,1,1-TCA = 1,1,1-trichloroethane

ug/m^3 = Micrograms per cubic meter of air.

ft bgs = Depth interval below ground surface in feet.

< n = Chemical not present at a concentration in excess of detection limit shown.

-- = not analyzed

ESL = Environmental Screening Level for Shallow Soil Gas for Evaluation of Potential Vapor Intrusion (Table E-2). Established by the SFBRWQCB, Interim Final - November 2007 (Revised February 2016).

(1) = The lower explosion limit for methane is 4.4 to 5%.

(2) = Samples collected by Partner Engineering and Science, Inc. as part of seperate investigation

(3) = Grade elevation is 40" below rest of building so sample depth is approximately 8.3 ft relative to samples collected outside of Loading Area

contaminant detected above reporting limit

Bold concentrations exceed shown screening levels

Table 4 - Sampling and Analysis Plan: 1919 Market Street, Oakland, CA

Objective/Rationale	Medium	Sample Type	Sample Depth	*Soil Analysis*							*GW Analysis*		*Soil Gas Analysis*		Notes
				TPH	VOCs	CAM 17	SVOCs	PCBs	Pest.	Asbestos	TPH	VOCs	VOCs	Fixed Gases	
Vertical delineation of PCE soil gas hot spot in loading area	soil gas	1 Deeper soil gas monitoring well	10 ft*	4	4								1	1	No subslab development work planned here. SVE wells will target this area during study.
	soil	3 soil samples from 1 soil gas well boring	5,10,15 ft*	3	3										
Delineate soil gas plume onsite	soil gas	Re-sample wells SG-1+SG-2 (loading area)	5 ft										2	2	Repeat data near PCE hot spot and adjacent residence.
		7 new soil gas wells in building	5 ft										7		
Delineate soil gas plume offsite along Myrtle Street	soil gas	3 new soil gas wells along Myrtle Street	5 ft										3		West and northwest of impacted loading area.
Further assess former UST area	soil gas	2 new soil gas wells in building	5 ft										2	1	Soil gas wells help since slab removed. Soil and water analyses for 8260 for LTCP data gap.
	soil	2 samples from 1 boring	5,10 ft	2	2										
	groundwater	1 grab groundwater sample	15-20 ft								1	1			
Assess fill in landscape areas	subslab gas	1 in landscaping and near residence	0.25 ft										1		Subslab gas also evaluates conditions near northeastern residence.
	soil	4 samples from 3 landscape areas	2 ft	4	4	4	4	4	4	4					
Assess storage areas identified in Phase I	subslab gas	2 subslab gas near former storage	0.25 ft										2		Evaluates eastern portion of site where limited assessment.
	soil	3 samples from 3 soil borings	5 ft	3	3										
	groundwater	2 grab groundwater samples	15-20 ft								2	2			
Evaluate conditions near southern receptors	soil gas	2 new soil gas wells in parking lot	5 ft										2		Adjacent residence and church.
			Total analysis quantity:	16	16	4	4	4	4	4	3	3	22 (w/shroud and dup)	4	84 total analyses

Notes and Abbreviations:

TPH = Total petroleum hydrocarbons as gas, diesel, motor oil

Pest. = Organochlorine pesticides

Fixed Gases = Oxygen, Carbon Dioxide, and Methane

* = Grade elevation of Loading Area is 3.3 ft lower than rest of building so sample depth is approximately 3.3 ft lower than samples collected outside of Loading Area

APPENDIX A

Standard Operating Procedures

STANDARD FIELD PROCEDURES FOR SOIL BORINGS

This document describes Pangea Environmental Services' standard field methods for drilling and sampling soil borings. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor odor or staining, estimate ground water depth and quality, and to submit samples for chemical analysis.

Soil Classification/Logging

All soil samples are classified according to the Unified Soil Classification System by a trained geologist, scientist or engineer working under the supervision of a California Registered Engineer, California Registered Geologist (RG) or a Certified Engineering Geologist (CEG). The following soil properties are noted for each soil sample:

- Principal and secondary grain size category (i.e. sand, silt, clay or gravel)
- Approximate percentage of each grain size category,
- Color,
- Approximate water or product saturation percentage,
- Observed odor and/or discoloration,
- Other significant observations (i.e. cementation, presence of marker horizons, mineralogy), and
- Estimated permeability.

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or hydraulic-push technologies. At least one and one half ft of the soil column is collected for every five ft of drilled depth. Additional soil samples are collected near the water table and at lithologic changes. With hollow-stem drilling, samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments beyond the bottom of the borehole. With hydraulic-push drilling, samples are typically collected using acetate liners. The vertical location of each soil sample is determined by measuring the distance from the middle of the soil sample tube to the end of the drive rod used to advance the split barrel sampler or the acetate tube. All sample depths use the ground surface immediately adjacent to the boring as a datum. The horizontal location of each boring is measured in the field from an onsite permanent reference using a measuring wheel or tape measure.

Drilling and sampling equipment is steam-cleaned prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Storage, Handling and Transport

Sampling tubes or cut acetate liners chosen for analysis are trimmed of excess soil and capped with Teflon tape and plastic end caps. Soil samples are labeled and stored at or below 4°C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

Field Screening

Soil samples collected during drilling will be analyzed in the field for ionizable organic compounds using a photo-ionization detector (PID) with a 10.2 eV lamp. The screening procedure will involve placing an undisturbed soil sample in a sealed container (either a zip-lock bag, glass jar, or a capped soil tube). The container will be set aside, preferably in the sun or warm location. After approximately fifteen minutes, the head space within the container will be tested for total organic vapor, measured in parts per million on a volume to volume basis (ppmv) by the PID. The PID instrument will be calibrated prior to boring using hexane or isobutylene. PID measurements are used along with the field observations, odors, stratigraphy and ground water depth to select soil samples for analysis.

Water Sampling

Water samples collected from borings are either collected from the open borehole, from within screened PVC inserted into the borehole, or from a driven Hydropunch-type sampler. Groundwater is typically extracted using a bailer, check valve and/or a peristaltic pump. The ground water samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory.

Pangea often performs electrical conductivity (EC) logging and/or continuous coring to identify potential water-bearing zones. Hydropunch-type sampling is then performed to provide discrete-depth grab groundwater sampling within potential water-bearing zones for vertical contaminant delineation. Hydropunch-type sampling typically involves driving a cylindrical sheath of hardened steel with an expendable drive point to the desired depth within undisturbed soil. The sheath is retracted to expose a stainless steel or PVC screen that is sealed inside the sheath with Neoprene O-rings to prevent infiltration of formation fluids until the desired depth is attained. The groundwater is extracted using tubing inserted down the center of the rods into the screened sampler.

Duplicates and Blanks

Blind duplicate water samples are collected usually collected only for monitoring well sampling programs, at a rate of one blind sample for every 10 wells sampled. Laboratory-supplied trip blanks accompany samples collected for all sampling programs to check for cross-contamination caused by sample handling and transport. These trip blanks are analyzed if the internal laboratory QA/QC blanks contain the suspected field contaminants. An equipment blank may also be analyzed if non-dedicated sampling equipment is used.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe.

Waste Handling and Disposal

Soil cuttings from drilling activities are usually stockpiled onsite on top of and covered by plastic sheeting. At least four individual soil samples are collected from the stockpiles for later compositing at the analytic laboratory. The composite sample is analyzed for the same constituents analyzed in the borehole samples. Soil cuttings are transported by licensed waste haulers and disposed in secure, licensed facilities based on the composite analytic results.

Ground water removed during sampling and/or rinsate generated during decontamination procedures are stored onsite in sealed 55 gallon drums. Each drum is labeled with the drum number, date of generation, suspected contents, generator identification and consultant contact. Disposal of the water is based on the analytic results for the well samples. The water is either pumped out using a vacuum truck for transport to a licensed waste treatment/disposal facility or the individual drums are picked up and transported to the waste facility where the drum contents are removed and appropriately disposed.

STANDARD FIELD PROCEDURES FOR VAPOR EXTRACTION WELLS

This document describes Pangea Environmental Services' standard field methods for drilling and installing vapor extraction wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Well Construction

Vapor extraction wells are installed in soil borings to facilitate vapor extraction and evaluation of soil gas conditions. Well depths and screen lengths are based on groundwater depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically stop a few feet above the static water level. Pangea typically avoids screening vapor extraction wells across one coarse-grained unit through a clay layer (at least three feet thick) and into another coarse-grained unit; under such conditions Pangea typically recommends multiple vapor extraction wells.

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. A rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two ft above the well screen. A two feet thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of Portland type I, II cement.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security.

Surveying

When required, the well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark.