IMPACT Environmental Services

March 15, 2007

Mr. Steven Plunkett:
Alameda County Environmental Health Services
1131 Harbor Bay Parkway
San Francisco, CA 94105

Re: Work Plan for Site Characterization
1409-1417 12th Street, Oakland, California
Fuel Leak Case No. RO2933

Mr. Plunkett:

This workplan presents the proposed scope of work to characterize the extent of petroleum hydrocarbons in soil, groundwater, and soil-vapor at 1409-1417 12th Street, Oakland, California (Figure 1). This workplan is being prepared in response to a request from the Alameda County Environmental Health (ACEH) to characterize the extent of contamination related to the unauthorized fuel release at the subject property[1]. This workplan is submitted by Impact Environmental Services (Impact) on behalf of the property owner, Mrs. Shirley E. Thompson.

SITE BACKGROUND

Site Description

The Subject Property is located in a predominately residential area in the western section of the city of Oakland, Alameda County, California (Figure 1). The subject Property comprises the Alameda County assessor parcel 004-063-06 and is bordered to the north by 12th Street and residential development, to the south by a vacant lot, on the east by Mandela Parkway, and to the west by a residential development (Figure 2). The property is located approximately 1-mile southeast of San Francisco Bay and 1-mile north of Oakland Inner Harbor. The elevation of the site is approximately 17 feet above mean sea level (USGS West Oakland 7.5 Minute Quadrangle). Portions of the site are paved with asphalt and the remainder is covered by grass and soil. Several mounds of soil up to 2 feet high are present in the southeast portion of the

[1] Alameda County Environmental Health, "Fuel Leak Case No. RO2933, 1409-1417 12th Street, Oakland, California", February 26, 2007.

subject property.

Historical records indicate that the property was occupied by a service station from circa 1957 to the circa 1969. The subject property was either vacant or occupied by residential dwellings from at least 1902 to circa 1956. Sanborn maps from 1957, 1958, 1961 and 1967 appear to show three underground fuel storage tanks (USTs) located in the southeast corner of the service station. The 1961 Sanborn map appears to show a fourth UST or AST along the west property boundary. According to a previous report, a magnetometer survey performed at the subject property (circa 1999) revealed no magnetic anomalies indicative of buried underground storage tanks. However, communications with the Oakland Fire Department Hazardous Materials Division, confirmed that no records exist of UST removal from the Subject Property[2].

Geologic Setting

The Subject Property is located in the East Bay Plain of the San Francisco Bay Area. This region is dominated by northwest trending topography enclosed in the Coast Range Province of California. The site is located in a " Merritt Sand Outcrop" groundwater subarea, which has a maximum thickness of 65 feet, and the local gradient is directed toward the west to southwest[3]. Based on information provided by a previous investigation, soil beneath the property consists primarily of silty-sand to at least 16 feet bgs. Groundwater is first encountered between 10.5 and 13.5 below ground surface (bgs) and stabilizes at approximately 11 feet bgs. Groundwater in the vicinity of the subject property is assumed to flow to the west of southwest, towards San Francisco Bay.

Previous Environmental Investigations at the Subject Property

In August 1999, East Bay Asian Local Development Corporation (EBALDC) contracted Blymer Engineers of Alameda, California to conduct a subsurface investigation at the subject property[4]. EBALDC was considering purchasing the subject property from Mrs. Thompson for infill development of residential housing units.

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2 Verbal Communication, *LeRoy Griffin, Oakland Fire Department Hazardous Materials Division,* May 25, 2006.

3 Hickenbottom and Muir, *Geohydrology and Groundwater Quality Overview of the East Bay Plain Area, Alameda County, California, 205 (J) Report*, 1988.

4 Blymer Engineers, Inc., *Subsurface Investigation Vacant Parcel 1409-1417 12th Street, Oakland, California,* August 25, 1999.

The investigation consisted of the installation of five on-site exploratory borings (B1 through B5) and the collection of soil and grab groundwater samples. All soil and grab groundwater samples were analyzed for total petroleum hydrocarbons as gasoline (TPHg) by modified EPA Method 8015, and benzene, toluene, ethylbenzene and total xylenes (BTEX) and methyl *tert*-butyl ether (MTBE) by EPA Method 8020. In addition, all of the soil samples and three groundwater samples (GW-3, GW-4, and GW-5) were analyzed for total lead using EPA Methods 6010 and 239.2. Grab groundwater sample GW-5 was also analyzed for Volatile Organic Compounds (VOCs) by EPA Method 8260.

TPHg at concentrations up to 1,500 milligrams per kilogram (mg/kg) and BTEX compounds at concentrations up to 120 mg/kg were detected in soil samples collected from borings B3 and B5. The highest concentrations were detected just above first-encountered groundwater at a depth of 10.5 to 11.5 feet bgs. Lead was detected in all soil samples (with the exception of sample B1-5) at concentrations indicative of background levels. TPHg at concentrations up to 110,000 micrograms per liter (µg/L), benzene up to 5,800 µg/L, toluene up to 16,000 µg/L, ethylbenzene up to 31,000 µg/L, and total xylenes up to 18,000 µg/L were detected in groundwater samples GW-2 and GW-3. The laboratory noted the presence of a "lighter than water immiscible sheen" in groundwater samples GW-3 and GW-5. Lead was not detected in any of the groundwater samples above the method reporting limit of 0.005 milligrams per liter (mg/L). The following VOCs were detected in groundwater sample GW-5: benzene (5,400 µg/L), 1,2-dichloroethane (1,2-DCA, 500 µg/L), ethylbenzene (3,800 µg/L), n-propylbenzene (550 µg/L), toluene (18,000 µg/L), 1,2,4-trimethylbenzene (4,900 µg/L), 1,3,5-trimethylbenzene (1,100 µg/L), and total xylenes (23,000 µg/L). The detected concentrations of TPHg and BTEX in groundwater samples from borings B2, B3, and B5 exceed respective San Francisco Bay Regional Water Quality Control Board (RWQCB) environmental screening levels (ESLs)[5] for commercial and residential land use scenarios. The concentration of 1,2-DCA detected in groundwater sample GW-5 also exceeds the ESL for that compound.

[5] *Screening For Environmental Concerns at Sites with Contaminated Soil and Groundwater*, San Francisco Bay Regional Water Quality Control Board, February 2005.

In July, 2006, Impact conducted a Phase I Environmental Site Assessment (Phase I) for the Subject Property[6]. The scope of the Phase I included a reconnaissance of the site and vicinity to assess current land use, review of historical records to establish past land use and to help evaluate the likelihood that past land use resulted in subsurface contamination. Geologic maps and environmental reports were also reviewed to evaluate general geologic and hydrogeologic conditions in the area including the presence of groundwater and regional hydrogeologic features dictating groundwater flow direction. Government agency files were reviewed for information regarding subsurface contamination and use, storage and disposal of hazardous materials at the site and vicinity.

The subject property was not on any government lists. However, the Phase I concluded that the subject property was occupied by a gasoline service station from circa 1957 to circa 1969. Based on review of the Blymer report, previous activities at the site appear to have resulted in hydrocarbon contamination of soils and groundwater at the property.

SCOPE OF WORK

Existing site-specific data indicates that soil and groundwater have been impacted with elevated levels of petroleum hydrocarbons and associated compounds. The extent of this hydrocarbon contamination has not been fully defined. As a result, the potential risk and potential sources of contamination will need to be evaluated. Impact recommends the following tasks to characterize the extent of petroleum hydrocarbons and associated VOCs in soil, soil-vapor, and groundwater at the Subject Property.

Pre-field Activities

Pre-field activities include preparing this workplan for submittal to the ACEH. Pre-investigation activities include scheduling subcontractors, and preparing a site health and safety plan. Exploratory boring locations will be marked and cleared by a private underground utility locator. As part of this task, Impact will obtain the necessary exploratory boring permits from Alameda County Public Works Department. Underground Service Alert (USA) will be notified a

[6] Impact Environmental Services, *Phase I Environmental Site Assessment 1409-1417 12th Street Oakland California*, August 25, 2006 (revised December 13, 2006).

minimum of 48-hours before the start of fieldwork. The ACEH will be notified at least 10 days in advance of boring installation.

Exploratory Boring and Temporary Piezometer Installation

Impact recommends installing twelve exploratory borings (B-6 through B-13) to define the lateral extent of petroleum hydrocarbons and VOCs in soil and shallow groundwater. Four of the twelve exploratory borings (B-6, B-8, B-16 and SB-17) will be converted to temporary piezometers to allow for one-time groundwater elevation measurements that will be used to calculate groundwater flow direction and groundwater gradient at the subject property. Exploratory boring locations are presented in Figure 3.

Borings B-6 through B-8 will be used to evaluate the presence of petroleum hydrocarbons in soil and groundwater along the northern property boundary. Borings B-9 and B-10 will be used to define the lateral extent of petroleum hydrocarbons detected in borings B3 and B5. Boring B-11 will be used to evaluate the potential presence of petroleum hydrocarbons near a possible former tank location (as shown in the 1961 Sanborn map) along the west property boundary. Borings B-12, B-13, B-14, and B-15 will be used to define the lateral extent of petroleum hydrocarbons detected in borings B2, B3 and B5. Boring B-14 will also be used to evaluate the presence of petroleum hydrocarbons in soil and groundwater along the east property boundary. Boring B-15 will also be used to evaluate the presence of petroleum hydrocarbons in soil and groundwater south of boring B2 and north of a possible former UST location. Boring B-16 will also be used to evaluate the presence of petroleum hydrocarbons in soil and groundwater along the southern property boundary. Boring B-17 will be used to evaluate the potential presence of petroleum hydrocarbons near three possible former tanks (as shown in the 1957, 1958, 1961, and 1967 Sanborn maps) near the southeast property boundary.

<u>Subsurface Data Collection</u>

Exploratory borings will be advanced using the Enviro-Core direct push sampling methods. The Enviro-Core system consists of 2.5-inch-diameter steel drive casing and a 1.8-inch-diameter inner sample barrel that are simultaneously pushed, driven, or vibrated into the ground. Continuous soil cores will be collected in butyrate tubes inside the inner sample barrel. After being advanced three to four feet, the inner sample barrel is retrieved while the drive casing is left in place to prevent borehole collapse. After retrieving the inner core barrel, the samples will

be removed and stored for chemical analyses or lithologic identification. Sample rods will then be placed at the bottom of the borehole for additional three-foot sample collection runs until the desired borehole depth is achieved.

Soil samples will be logged by a California Registered Geologist according to the Unified Soil Classification System (USCS). Periodic soil samples will be screened in the field using an organic vapor meter (OVM) to provide a qualitative estimate of volatile hydrocarbons in the soil. Two soil samples will be collected from each boring at approximate depths of 5 and 10 feet bgs and submitted to the laboratory for analysis.

Borings will be advanced at least three feet beyond first encountered groundwater. Small-diameter, flush-threaded PVC casing and 0.010-inch, machine-slotted screened casing will be installed in the completed borehole with the screened interval of the casing extending at least two feet above the observed static groundwater elevation. An oil-water interface probe will be used to measure the static water-level and to gauge for floating product prior to collection of each grab groundwater sample. Grab groundwater samples will be collected from the PVC casing using new, disposable Teflon® bailers or a low-flow peristaltic pump.

All soil and groundwater samples will be properly containerized, labeled, and preserved in ice upon collection. Chain of custody documentation will accompany samples submitted to the laboratory for analysis. All down-hole equipment will be steam cleaned before use and between borings. Soil cuttings and decontamination rinsate will be properly containerized for disposal. These materials will be disposed of consistent with analytical results. Each boring will be grouted to the ground surface with bentonite-cement slurry via tremie pipe.

Soil and Groundwater Sample Analysis

Entech Analytical Laboratories, a state-certified laboratory, will analyze soil and groundwater for TPHg by EPA Method 8015M and VOCs by EPA Method 8260.

Piezometer Installation, Development, and Surveying

Four (SB-6, SB-8, SB-11 and SB-17) of the twelve exploratory borings will be converted to temporary small-diameter piezometers to allow for one-time groundwater elevation measurements that will be used to calculate groundwater flow direction. Temporary piezometers will be constructing using 1-inch-diameter, Schedule 40, flush-threaded PVC casing and 0.010-

inch, machine-slotted screened casing. The piezometers will be constructed with the screened interval of the casing extending at least two feet above the observed static groundwater elevation. The sand pack (Lonestar #2/12) for the piezometers will be placed in the annular space around the casing from the bottom of the boring to a minimum of 2 feet above the screened interval. At least a 2-foot-thick seal of bentonite pellets was placed above the sand pack. Above the bentonite, a sanitary seal of neat cement will placed to within one foot of the ground surface. All down-hole equipment, casing, and screen will be steam cleaned before use.

Piezometers will be developed and surveyed using standard techniques. A surge block, peristaltic pump with disposable tubing, and bailer were used to develop each piezometer by removing a minimum three casing volumes of water. A licensed surveyor will survey the top-of-casing elevation of the piezometers to the nearest 0.01-foot relative to an appropriate datum so that groundwater flow direction and gradient can be calculated. The location of the piezometers will be surveyed consistent with AB288. Piezometers will be decommissioned by either pressure-grouting or drill-out methods and filled with neat cement following piezometer surveying and collection of depth to groundwater measurements.

Evaluation of Indoor Air Inhalation Risk

Impact recommends collecting twelve soil vapor samples in the vicinity of the proposed exploratory boring locations in accordance with the Department of Toxic Substance Control California Environmental Protection Agency (DTSC) guidance document[7]. All soil-vapor samples will be collected prior installation of exploratory borings.

Soil-vapor probes will be installed using a Geoprobe 5400 direct-push sampling rig. The probes will be installed by pushing a hollow rod with a retractable tip to the target sampling depth of 5 feet bgs. After reaching the target sampling depth, the sampling rod will be withdrawn 6 inches, exposing a screened interval immediately above the retractable tip. Before retraction, the screened interval will be pre-connected to polyethylene tubing to prevent the intrusion of surface air. Before sampling, bentonite will be used at the surface around the sampling rod to inhibit surface air intrusion; shaving cream or isopropanol will be used along the sampling train to provide leak detection material. After approximately fifteen to thirty minutes, the sampling train

[7] DTSC Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air-Interim Final, February 7, 2005.

volume will be purged three times at a rate of approximately 100 milliliters per minute (ml/min) using a 100-ml syringe. During purging, volatile hydrocarbons will be measured in the field using an OVA. A 6-liter Summa canister will be used to collect a sample at a rate of 100 to 200 ml/min. The Summa canister sample will be properly labeled and transported (non-chilled) to a state-certified laboratory with chain-of-custody documentation. After sampling is completed, the rod will be withdrawn and the boring will be backfilled with neat cement mixed with 4% bentonite.

Soil-vapor samples will be analyzed by EPA Method TO-3 for TPH and BTEX. Samples will also be analyzed for VOCs by EPA Method TO-15 and the leak detection compound (propane or isopropanol) by Air Toxics of Folsom, California.

Site Characterization Report

Impact will prepare a Site Characterization Report presenting the soil, grab groundwater, and soil-vapor results. A groundwater contour map will be generated from piezometer-derived elevation information. The report will also provide conclusions regarding the extent of hydrocarbons and VOC contamination at the site and present proposed groundwater monitoring well locations.

If you have any questions or require additional information, please feel free to contact us.

Sincerely,
Impact Environmental Services

Joseph A. Cotton, P.G.7378
Principal Environmental Geologist

Attachments:
Figure 1 – Site Location Map
Figure 2 – Site Plan
Figure 3 – Proposed Exploratory Boring and Soil Vapor Sample Locations

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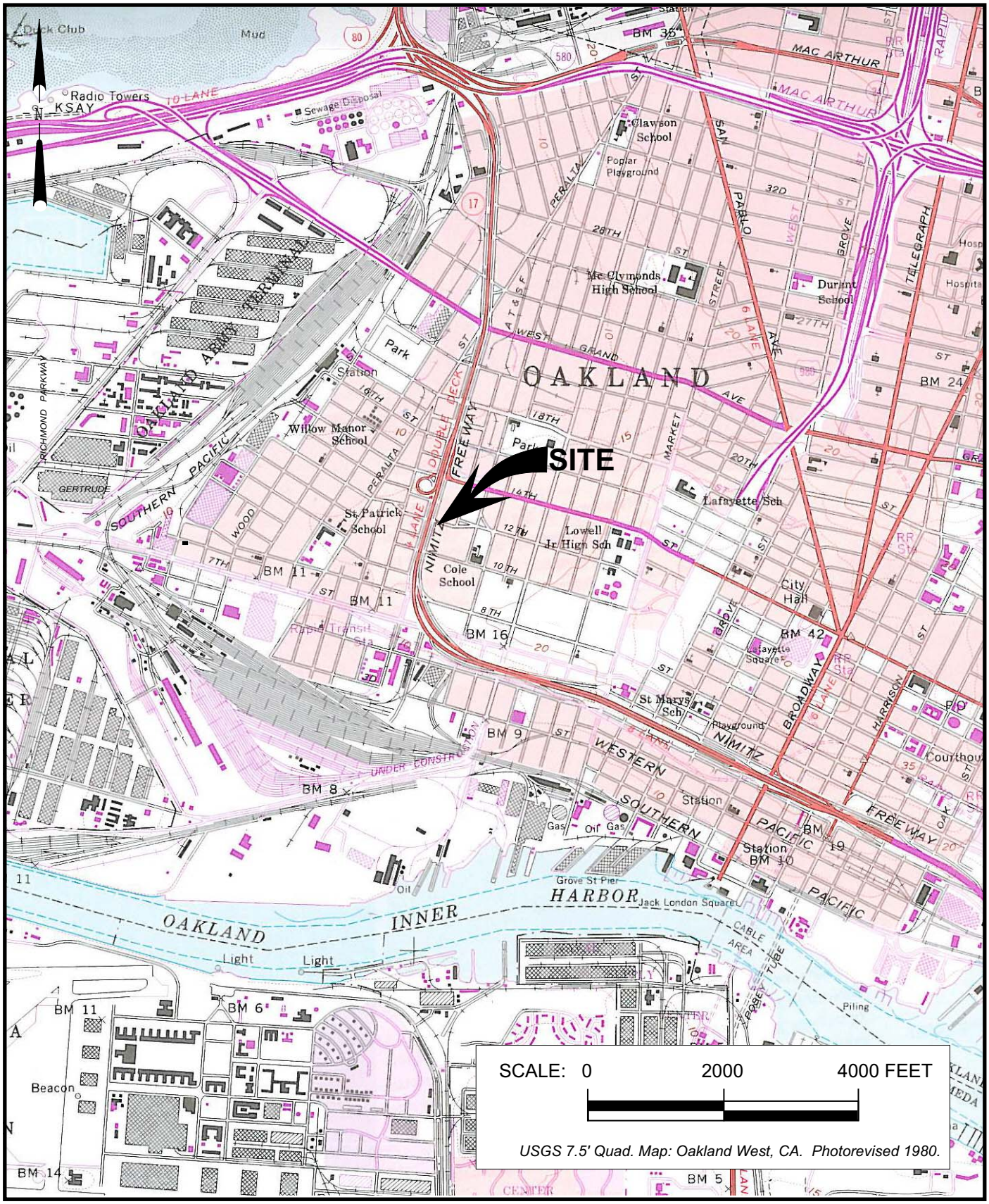
cc: Ms. Shirley E. Thompson, 1155 Hopkins Way. Berkeley, CA



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Fremont, CA 94538

Figure 1

1409 to 1417 12th STREET
OAKLAND, CALIFORNIA

SITE LOCATION

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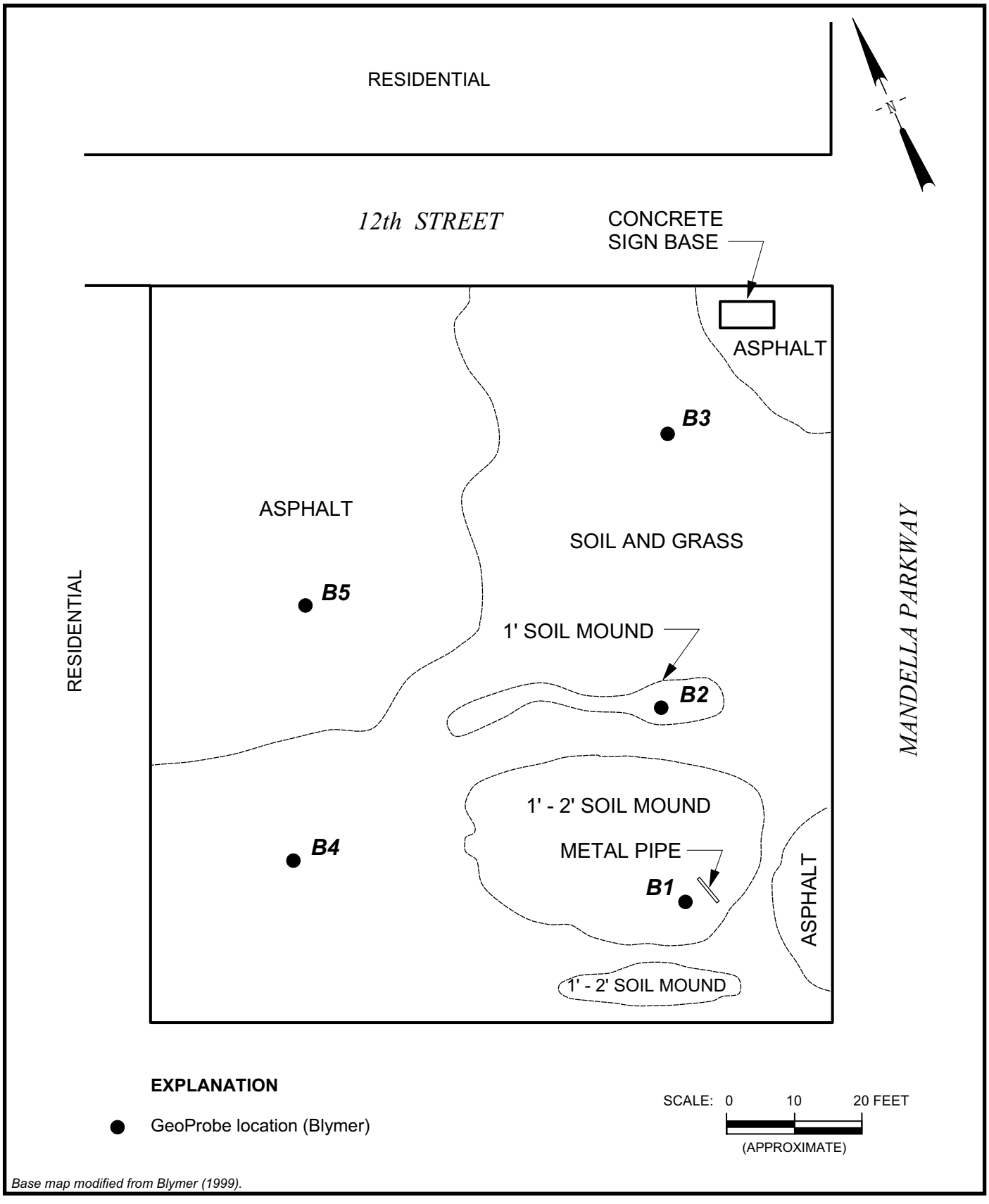

Base map modified from Blymer (1999).

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Figure 2

1409 to 1417 12th STREET
OAKLAND, CALIFORNIA

SITE PLAN

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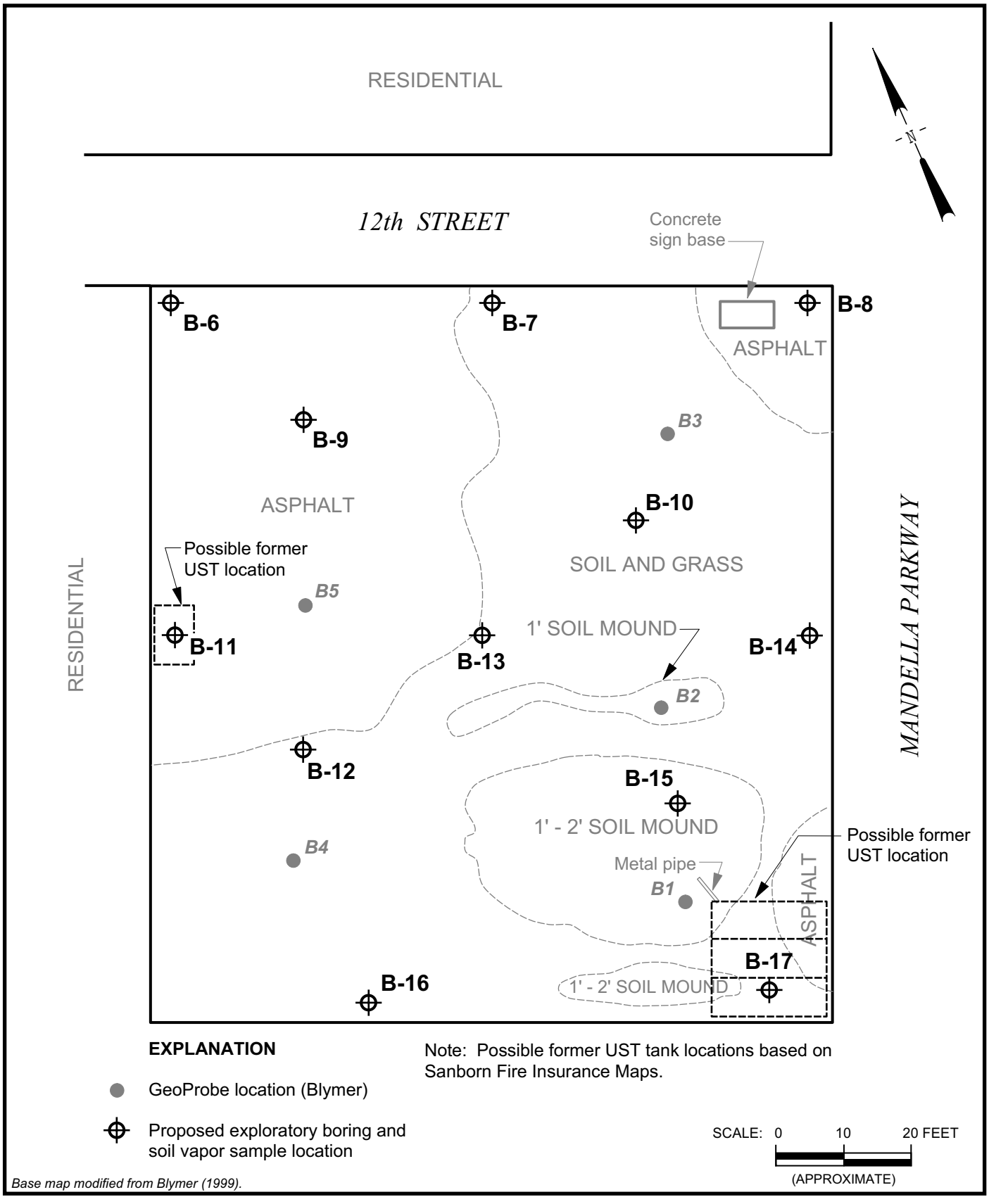

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Figure 3

1409 to 1417 12th STREET
OAKLAND, CALIFORNIA

PROPOSED EXPLORATORY BORING AND SOIL VAPOR SAMPLE LOCATIONS

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