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Alameda County
Environmental Health

June 29, 2010

Mr. Jerry Wickham
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

SUBJECT: DRAFT CORRECTIVE ACTION PLAN CERTIFICATION
ACEH Case # RO 0000357
Snow Cleaners
2678 Coolidge Avenue
Oakland, CA

Dear Mr. Wickham:

You will find enclosed one copy of the following document prepared by P&D Environmental, Inc.

- Draft Corrective Action Plan dated June 29, 2010 (document 0298.W5).

I declare, under penalty of perjury, that the information and/or recommendations contained in the above-mentioned work plan for the subject site is true and correct to the best of my knowledge.

Should you have any questions, please do not hesitate to call me at (800) 818-7669.

Cordially,
Snow Cleaners, Inc.

Harold Turner
President

Cc: Mr. LeRoy Griffin, Oakland Fire Department, Emergency Services, 250 Frank Ogawa Plaza, Suite 3341, Oakland, CA 94612 (with enclosure)

0298.L49

P&D ENVIRONMENTAL, INC.
55 Santa Clara Ave, Suite 240
Oakland, CA 94610
(510) 658-6916

June 29, 2010
Work Plan 0298.W5

Mr. Jerry Wickham
Alameda County Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

SUBJECT: DRAFT CORRECTIVE ACTION PLAN
(DP1 THROUGH DP4 AND VE1, VE2)
ACDEH Case # RO 0000357
Snow Cleaners
2678 Coolidge Avenue
Oakland, CA

Dear Mr. Wickham:

P&D Environmental, Inc. (P&D) is pleased to present this Draft Corrective Action Plan (Draft CAP) for the subject site. This Draft CAP is prepared in response to a written request from the Alameda County Department of Environmental Health (ACDEH) dated April 8, 2010. The Draft CAP addresses the following.

- Background and summary of site characterization data.
- Assessment of impacts.
- Receptor information including likely future land use scenarios, adjacent land use and sensitive receptors, and potential groundwater receptors.
- Proposed cleanup goals and the basis for the cleanup goals.
- Evaluation of remedial alternatives including discussion of feasibility and limitations for each remedial alternative.
- Detailed description of proposed remediation including confirmation sampling and monitoring during implementation.
- Post-remediation monitoring.
- Schedule of implementation and cleanup.

All work will be performed under the direct supervision of a professional geologist. This Draft CAP is prepared in accordance with guidelines set forth in the following documents.

- Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites" dated August 10, 1990 and "Appendix A - Workplan for Initial Subsurface Investigation" dated August 20, 1991;

- Department of Toxic Substances Control (DTSC) "Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties" dated January, 2005;

- DTSC "Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air" revised February 7, 2005;

- California Code of Regulations, Title 23, Chapter 16, Sections 2725 (effective October 13, 2005);

- San Francisco Bay Regional Water Quality Control Board (SFRWQCB) "San Francisco Bay Basin (Region 2) Water Quality Control Plan" dated January 18, 2007;

- Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater" dated May 2008;

- San Francisco Bay Regional Water Quality Control Board (SFRWQCB) "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater" dated May 2008;

- DTSC "Vapor Intrusion Mitigation Advisory" revised May 8, 2009;

- DTSC "Interim Guidance – Evaluating Human Health Risks From Total Petroleum Hydrocarbons (TPH)" dated June 16, 2009;

- DTSC "Advisory - Active Soil Gas Investigations" dated March 3, 2010.

A Site Location Map is attached with this work plan as Figure 1, and a Site Vicinity Map and Site Vicinity Map Detail are attached as Figures 2 and 3, respectively.

BACKGROUND AND SUMMARY OF SITE CHARACTERIZATION DATA

The site is surrounded by residential properties, some of which are zoned for mixed residential and commercial use, and is located in a residential neighborhood. Peralta Creek is located approximately 500 feet to the east and approximately 400 feet to the southeast of the subject site. The site is presently used as a dry cleaning pick up and drop off facility with dry cleaning performed at an offsite location. The site was historically used as a dry cleaning plant from approximately 1907 to 1993 or 1994. Is it P&D's understanding that a total of six Stoddard solvent Underground Storage Tanks (USTs) were removed from beneath the sidewalk adjacent to Davis Street in 1990. Limited excavation of the UST pit was performed to a depth of 15 feet. In January 1994 groundwater monitoring wells MW1 and MW2 were installed. Subsurface investigation drilling resumed in September 2004 with the drilling of boreholes B3 through B7. A Preferential Pathway/Conduit Study and also a Sensitive Receptor Survey were prepared in 2005. Additional boreholes (B8 through B11, B13 and B14) were drilled in 2007, and in 2008 the following samples were collected: soil gas samples SG1 through SG18; soil and water from boreholes B12, B15 through B19 and B21 through B32; and creek samples C1 through C5 from

Peralta Creek. In addition, groundwater monitoring wells MW3 and MW4 were installed in 2008 near the subject site. In 2009 it was determined that the Peralta Creek water flowing through Peralta Hacienda Historical Park (located to the southeast of the site and immediately south of Davis Street) is groundwater that originates from the storm drain that is located beneath Humboldt Street (located to the southeast of Peralta Creek and to the north od Davis Street), and that Peralta Creek flows in an underground concrete-lined channel beginning at the north side of Davis Street. The water flowing in the Creek channel in the Park drains through a grate at the south end of the park into the underground concrete-lined channel that contains Peralta Creek. Additional soil gas samples from properties near the subject site and building crawl space samples from two buildings located adjacent to the subject site were collected in 2010. The sample collection locations are shown in Figures 2 and 3.

A detailed site history is provided in P&D's Subsurface Investigation Report dated August 19, 2009 (document 0298.R6). The 2009 report documented historical investigations and the collection and results of soil, groundwater, creek and soil gas samples, and the installation and sampling of groundwater monitoring wells MW3 and MW4. Additional subsequent document review results for historic topographic maps, City of Oakland storm drain and sanitary sewer maps, Alameda County Flood Control District maps and a creek and watershed map of Oakland and Berkeley related to Peralta Creek drainage are provided in P&D's November 24, 2009 Subsurface Investigation Work Plan (document 0298.W4). Additional subsequent soil gas and building crawl space air sample results for samples collected on February 19, 2010 are provided in P&D's March 22, 2010 Soil Gas and Crawl Space Air Investigation Report (document 0298.R8). The most recent well sampling event occurred on May 21, 2010 and is documented in P&D's Groundwater Monitoring and Sampling Report dated June 18, 2010 (document 0298.R9).

ASSESSMENT OF IMPACTS

In accordance with CAP preparation requirements, the following elements are addressed for an assessment of impact from the contaminants.

- Physical and chemical characteristics of the contaminants,
- Hydrogeologic characteristics of the site and surrounding area,
- The proximity and quality of nearby surface water or groundwater, and the potential beneficial uses of these waters,
- The potential effects of residual contamination on nearby surface water and groundwater.

Chemicals of Concern

Based on investigations performed at and near the site to date, the chemicals of concern (COCs) are petroleum hydrocarbons (Stoddard solvent), and the dry cleaning chemical tetrachloroethene and associated decomposition chemicals. The chemicals addressed in this CAP are as follows.

- Total Petroleum Hydrocarbons as Stoddard Solvent (TPH-SS),
- Benzene,
- Toluene,
- Ethylbenzene,
- Xylenes
- Tetrachloroethene (PCE)
- Trichloroethene (TCE)
- Cis-1,2-Dichloroethene (cis-1,2-DCE)
- Trans-1,2-Dichloroethene (cis-1,2-DCE)
- Vinyl Chloride

The TPH-SS, and Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) are all petroleum hydrocarbons. PCE and the associated decomposition products (TCE, cis-1,2-DCE, trans-1,2-DCE and vinyl chloride) are all halogenated Volatile Organic Compounds (HVOCs).

Physical and Chemical Characteristics

The physical and toxic characteristics of the COCs are summarized in Appendix A. The physical and toxic characteristics of TPH-SS can be approximated by C9-C18 aliphatic hydrocarbons as identified in the DTSC "Interim Guidance – Evaluating Human Health Risks From Total Petroleum Hydrocarbons (TPH)" dated June 16, 2009. Additionally, TPH-SS is approximated by middle-range petroleum distillates (Total Petroleum Hydrocarbons Diesel-range compounds) analysis.

Persistence and Potential For Migration

The COC petroleum hydrocarbons decompose most rapidly in aerobic subsurface conditions. The COC HVOCs decompose most rapidly in anaerobic subsurface conditions. The elevated petroleum hydrocarbon concentrations that are located primarily in the immediate vicinity of the subject site are interpreted to have resulted in strongly anaerobic subsurface conditions in the immediate vicinity of the site. The strongly anaerobic conditions are interpreted to be the result of high Biological Oxygen Demand associated with the initial aerobic bacterial degradation of the TPH-SS and associated petroleum hydrocarbons. The subsequent strongly anaerobic subsurface conditions in the immediate vicinity of the site are interpreted to have resulted in diminished rates of petroleum hydrocarbon decomposition based on the absence of available oxygen for aerobic decomposition. However, the strongly anaerobic subsurface conditions are also interpreted to have resulted in the near-complete degradation of PCE and TCE in soil and groundwater at and near the site to almost entirely the decomposition products cis-1,2-DCE and to a lesser degree vinyl chloride (see Figures 10 through 13). It also appears that PCE and TCE are present in shallow soil gas at a depth of approximately 5 feet below the ground surface (bgs) at and near the site, and that cis-1,2-DCE, trans-1,2-DCE and vinyl chloride are comparatively limited in extent and concentration in shallow soil gas at and near the site (see Figures 16 through 19).

The characteristics associated with migration of the COCs are summarized in Appendix A. In accordance with SFRWQCB "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater" dated May 2008 Table J, chemicals are considered to be "volatile" if the Henry's Law constant as expressed in atm m^3/mole is greater than 0.00001 and the molecular weight is less than 200. For comparison with Appendix A Physical-Chemical data, 0.00001 is 1.0E-05. Review of Appendix A shows that based on Henry's Law constants and molecular weights, all of the COCs are considered volatile. Similarly, review of Appendix A shows that based on solubility, all of the COCs are considered soluble. Based on the volatility all of the COCs can potentially migrate in soil vapor to indoor air, and based on the solubility all of the COCs can migrate in groundwater.

Hydrogeologic Characteristics

The hydrogeology at the site is complex and not completely understood. The interpretation of groundwater flow direction and associated contaminant movement in the vicinity of the site was developed using multiple lines of evidence (topography, lithology, soil discoloration, contaminant concentration distribution, and the measured depth to water in different wells). Geologic cross sections and an in-depth discussion of site geology are provided in P&D's Subsurface Investigation Report dated August 19, 2009 (document 0298.R6).

Review of Figure 1 shows that the site is located near the top of a northeasterly-trending interfluvial (ridge-like) structure. The topography in the area surrounding the site slopes to the east and south. Although the site vicinity topography slopes to the east and south, the area between Coolidge Avenue (bordering the property on the west) and 34th Avenue (the first street encountered to the east of the site) has very little change in surface elevation. Almost all of the change in elevation between the site and Peralta Creek occurs to the east of 34th Avenue.

Peralta Creek is located approximately 500 feet to the east and approximately 400 feet to the southeast of the subject site. The creek flows towards the southwest. Portions of the creek located directly to the east of the site are lined with concrete. Based on evaluation of the concrete channel for Peralta Creek that is located beneath Davis Street, the water that flows through Peralta Hacienda Historic Park is not the same water that flows in Peralta Creek on the north side of Davis Street. Based on review of documents obtained from the City of Oakland and from the County Flood Control District (see P&D's November 24, 2009 Subsurface Investigation Work Plan (document 0298.W4)), it was determined that the water flowing in the creek through the Park is groundwater that originates from the storm drain that is located beneath Humboldt Street (located to the southeast of Peralta Creek and to the north of Davis Street), and that Peralta Creek flows in an underground concrete-lined channel beginning at the north side of Davis Street. The water flowing in the Creek channel in the Park drains through a grate at the south end of the park into the underground concrete-lined channel that contains Peralta Creek.

Based on review of regional geologic maps from U. S. Geological Survey Professional Paper 943, "Flatland Deposits - Their Geology and Engineering Properties and Their Importance to Comprehensive Planning," by E. J. Helley and K. R. Lajoie, 1979, the materials underlying the subject site and it's immediate vicinity consist of Late Pleistocene alluvium (Qpa). Late Pleistocene alluvium is described as weakly consolidated, slightly weathered, poorly sorted, irregularly interbedded clay, silt, sand, and gravel. Review of the boring logs from historical investigations shows that the subsurface materials encountered in the boreholes consist predominantly of fine-grained materials consisting of clay, silty clay, and silt, with lesser amounts of coarse-grained materials consisting of silty sand, sand and some gravel lenses.

Groundwater is interpreted to generally move in an unconfined A-water-bearing zone in the immediate vicinity of the site northeastwards and eastwards in the vicinity of the former UST pit and then towards the southeast (towards Peralta Creek) to the north of the former UST pit, based on the elevations and slope of the surface of the fine-grained materials that are encountered beginning at a depth of approximately 25 feet bgs in the vicinity of the site. Based on the presence of coarse-grained materials at depths greater than 30 feet bgs that are located between borehole B6 and well MW3, groundwater is interpreted to move vertically in a southerly-trending paleo-channel from the A-water-bearing zone to a confined B-water-bearing zone in the area between the northeast side of the subject site and 34th Avenue, and then move horizontally in the B-water-bearing zone to the south towards Peralta Creek and Peralta Hacienda Historical Park.

The historically measured depth to water in the monitoring wells located near the subject site has ranged from approximately 19.07 to 23.42 feet in well MW1; 21.18 to 25.37 feet in well MW4; 11.49 to 18.83 feet in well MW2; and 16.95 to 21.67 feet in well MW3. Review of historical groundwater monitoring well water levels shows that the water levels in wells MW1 and MW4 (screened in the B-water-bearing zone) have been consistently similar, and that the water levels in wells MW2 and MW3 (screened in the A-water-bearing zone) have been consistently similar, with a difference of approximately 6 to 7 feet in the elevations between the two sets of wells during dry season months and a difference of approximately 8 to 10 feet during wet season months. The water elevations in the wells that are screened in the A-water-bearing zone are higher than the water elevations in the wells that are screened in the B-water-bearing zone. Additionally, both the A-water-bearing zone and the B-water bearing zone respond similarly to seasonal changes in water levels, with a seasonal vertical range of water elevations to date of approximately 4.5 feet in wells MW1, MW3 and MW4, and approximately 7.5 feet in well MW2.

Soil vapors are interpreted to move preferentially in sand layers located above the water table, with vertical advective movement in the vicinity of the ground surface related to barometric pressure changes and underpressurization of structures. Review of geologic cross sections C-C' (Figures 20, 21 and 22) and D-D' (Figures 23 and 24) shows that in addition to a sand layer in the vicinity of the former UST pit that extends from approximately 15 to 25 feet bgs, a shallow sand layer is encountered to the north of the former UST pit (in the vicinity of B14) between the depths of approximately 10 and 15 feet bgs at the subject site. The shallow sand layer is a suspected natural conduit for elevated shallow soil gas vapor concentrations of COCs at and near the site.

Proximity and Beneficial Uses of Surface and Groundwater

Review of Figure 1 (a portion of the US Geological Survey 7.5 Minute Oakland East, Calif quadrangle dated 1959 (photorevised 1980)) shows surface water bodies in the vicinity of the site as follows.

- Sausal Creek (located approximately 1,600 feet to the northwest of the subject site),
- Peralta Creek (located approximately 500 feet to the east and approximately 400 feet to the southeast of the subject site),

Both of the creeks trend in a north-south direction in the vicinity of the site. Review of the hydrogeologic characteristics section above shows that Sausal Creek is upgradient from the subject site. The topography identified in Figure 1 to the north and northwest of the site also indicates that a groundwater divide separates Sausal Creek from the subject site. For these reasons, only Peralta Creek is considered for potential impacts to existing or potential beneficial uses of surface water in the vicinity of the subject site.

Review of the January 18, 2007 San Francisco Bay Basin (Region 2) Water Quality Control Plan (the Basin Plan) Table 2-1 "Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region" did not identify Peralta creek in the table. Although section 2.2.1 of the Basin Plan states that for surface water bodies "the beneficial uses of any specifically identified water body generally apply to all its tributaries," review of the Oakland Museum of California Creek and Watershed Map series Creek & Watershed Map of Oakland and Berkeley (dated 1993, revised 2000) shows that Peralta Creek discharges to San Leandro Bay, and it is therefore not possible to identify existing or potential beneficial uses for this surface water body.

Review of available Basin Plan amendments under development at the SFRWQCB website identified a proposed Basin Plan amendment that includes amendment to Table 2-1 to include Peralta Creek. The public comment period for the amendments closed on April 12, 2010, and the SFRWQCB will consider adoption of the proposed amendments at its July 14, 2010 meeting. P&D recommends that the SFRWQCB be contacted after the July 14, 2010 meeting to confirm that the proposed amendments have been adopted. The proposed existing beneficial uses of the surface water in Peralta Creek are as follows.

- Warm Freshwater Habitat (WARM),
- Wildlife Habitat (WILD),

- Water Contract Recreation (REC1), and
- NonContact Water Recreation (REC2).

As discussed in the hydrogeologic characteristics section above, groundwater is encountered at depths ranging from approximately 11 to 25 feet bgs at and near the site. Review of Figure 2-10D "Groundwater Basins: East and South Bay" of the Basin Plan identifies the site in Basin 2-9.04, also identified as the Santa Clara Valley Basin, East Bay Plain Sub-basin. Review of the Basin Plan Table 2-2 "Existing and Potential Beneficial Uses in Groundwater in Identified Basins" identified existing beneficial uses of the groundwater at and near the site as follows.

- Municipal and domestic supply (MUN),
- Industrial process supply (PRO),
- Industrial service supply (IND), and
- Agricultural supply (AGR).

A detailed explanation and discussion of each of the beneficial uses for both surface water and groundwater as identified in the Basin Plan is provided in Appendix B. In addition, the proposed amendments to the Basin Plan for surface water beneficial uses also are attached in Appendix B.

Potential Effects of Residual Contamination

The maximum horizontal extent of petroleum hydrocarbons in groundwater appears to be an area measuring approximately 140 feet wide and extending to the southeast from the subject site approximately 500 feet downgradient to the vicinity of Peralta Creek (see Figure 4). Similarly, the maximum horizontal extent of HVOCs in groundwater appears to be for a similar area and extending to Peralta Creek (see Figures 5 and 6). However, review of Figures 4 through 6 also shows that the horizontal extent of both petroleum hydrocarbons and HVOCs in groundwater has not been fully defined at proposed drilling locations B33 through B38.

The maximum vertical extent of petroleum hydrocarbons in groundwater is unknown. However, based on soil sample results, the vertical extent appears to be limited by clay that is encountered at a depth of approximately 25 feet bgs in the southern portion of the site, in the vicinity of the former UST pit, and to the southwest of the subject site (see Figures 7, 8 and 20). On the northeastern portion of the site, the vertical extent of petroleum hydrocarbons appears to extend to a depth of approximately 60 feet bgs at B14 in what is interpreted to be a buried stream channel (see Figures 7, 8 and 20). HVOCs appear to extend vertically to a depth of approximately 40 feet bgs in soil at B14 in the northeastern portion of the property (see Figures 12, 13, 21 and 22).

Based on the detected presence of cis-1,2-DCE in Peralta Creek at locations C2, C4 and C5; the detected presence of vinyl chloride in Peralta Creek at locations C2 and C4; and the detected presence of both cis-1,2-DCE and vinyl chloride in groundwater samples collected from boreholes located adjacent to Peralta Creek (see Figures 5 and 6 and Table 1, Surface Water Sample Results, Creek Water Samples) surface water quality appears to have been impacted by HVOCs associated with the groundwater plume. The presence of petroleum hydrocarbons at upstream Peralta Creek location C1 and at downstream Peralta Creek location C3 where the water in Peralta Hacienda Historical Park has originated from storm drains located beneath Humboldt Street (located to the southeast of Peralta Creek and to the north of Davis Street) and the absence of petroleum hydrocarbons at Peralta Creek location C2 suggests that petroleum hydrocarbons in Peralta Creek originate from other sources (see Figure 4 and Table 1). Additionally, the general absence of petroleum hydrocarbons in groundwater samples collected from the vicinity of Peralta Creek suggests that subsurface aerobic conditions in the vicinity of Peralta Creek may result in the decomposition of petroleum hydrocarbons in groundwater.

The bed of Peralta Creek is predominantly lined with concrete immediately to the north of Davis Street for the majority of the interval where the groundwater plume appears to intersect the creek. Based on the limited length of Peralta Creek to the north of Davis Street that appears to intersect the groundwater plume (approximately 260 lineal feet) and that beginning at the north side of Davis Street the downstream water is underground in a flood control channel, it appears that the portion of Peralta Creek that is impacted by the groundwater plume is limited in extent. Access to this portion of the creek is also limited by private property and a chain link fence.

Based on the known land use in the vicinity of the site and the results of the 2005 Sensitive Receptor Survey, it does not appear that groundwater within or near the groundwater plume is used for any of the potential beneficial uses identified in the Basin Plan. Domestic water supply in the vicinity of the site is obtained through a municipal provider. No known municipal water supplies are located within the vicinity of the COC groundwater plume. Although a private water well was identified at a property on 34th Avenue to the northeast of the subject site, the absence of COCs in well MW3 suggests that the well is located outside of the groundwater plume (see Figures 4, 5 and 6). Additionally, the well is located beneath the porch of the house and is not accessible for use without removing a portion of the porch.

Site Vicinity Map Details showing shallow soil gas sample concentrations (see Figures 14 through 19) show that TPH-Stoddard Solvent and benzene, in addition to PCE, TCE and vinyl chloride were detected in the vicinity of the subject site at concentrations exceeding their respective SFRWQCB May 2008 Table E shallow soil gas Environmental Screening Levels (ESLs) for vapor intrusion concerns for residential land use (see dotted contours on the figures for the ESL concentration. No cis-1,2-DCE soil gas concentrations at or exceeding the ESL were detected other than at SG2). Comparison of the figures showing the distribution of the COCs in groundwater with the figures showing the distribution of the COCs in soil gas shows that the groundwater distribution is southeasterly and that the soil gas distribution is easterly from the site. Review of geologic cross sections C-C' (Figures 20, 21 and 22) and D-D' (Figures 23 and 24) shows that in addition to a sand layer in the vicinity of the former UST pit that extends from approximately 15 to 25 feet bgs, a shallow sand layer is encountered to the north of the former UST pit (in the vicinity of B14) between the depths of approximately 10 and 15 feet bgs at the subject site. The shallow sand layer is a suspected natural conduit for elevated shallow soil gas vapor concentrations of COCs at and near the site.

Review of the Site Vicinity Map Details showing shallow soil gas concentrations shows that with the exception of TPH-SS, the COCs have been defined to the east and southeast of the subject site. The elevated TPH-SS soil gas results at locations SG22 and SG23 (at 2621 34th Avenue) may be related to automotive parts stored at the property. Additional soil gas investigation may be required to the southwest of the site based on the results of investigation at locations B33 and B34.

Based on the calculated cumulative incremental preliminary risk from COCs detected in crawl space air samples collected during one sampling event on February 19, 2010 at residential properties adjacent to the subject site (3320 Davis Street and 2682 Coolidge Avenue), conditions requiring on-going monitoring were identified.

RECEPTOR INFORMATION

The subject site is zoned for mixed commercial and residential use and is surrounded by residential properties in a residential neighborhood. Based on the distribution of COCs discussed above, the only complete exposure pathway is from soil gas to indoor air with the exception of potentially complete inhalation, dermal, and ingestion pathways for the approximately 260 lineal feet of Peralta Creek located to the north of Davis Street. However, as discussed above, only vinyl chloride has been detected at concentrations exceeding respective SFRWQCB May 2008 Table F freshwater ESL values; the detected vinyl chloride concentrations marginally exceed the applicable ESL (ESL=0.5 ug/L, sample C2 = 0.80 ug/L, sample C4 = 0.62 ug/L); and the portion of the creek that is affected is limited to approximately 260 lineal feet with limited access because of surrounding private property and a chain link fence. Based on the distribution of COC shallow soil gas concentrations (see Figures 14 through 19), the sensitive receptors presently identified for on-going monitoring of crawl space air quality are located at 3320 Davis Street and 2682 Coolidge Avenue.

Based on trends for neighborhood development observed in the past several years (the City working with the owner of a former convenience store located on the opposite side of Coolidge Avenue to convert the convenience store to residential use of the property), the likely future land use scenarios for the surrounding properties are continued residential land use. The subject site is presently used as a commercial property. The current property owner has not identified any intent to change the use of the property. Based on the mixed residential-commercial zoning and the commercial use for the subject site, P&D anticipates that the subject site will continue to be used as a commercial property.

As discussed above, domestic water supply in the vicinity of the site is obtained through a municipal provider. No known municipal water supplies are located within the vicinity of the petroleum hydrocarbon contaminant plume. Although one private water well was identified at a property on 34th Avenue to the northeast of the subject site, the absence of COCs in well MW3 suggests that the well is located outside of the groundwater plume (see Figures 4, 5 and 6). Additionally, the well is located beneath the porch of the house and is not accessible for use without removing a portion of the porch.

PROPOSED CLEANUP GOALS

The Basin Plan states that the following parameters have water quality objectives that apply to all surface waters within the region.

- Bacteria
- Bioaccumulation
- Biostimulatory
- Color
- Dissolved Oxygen
- Floating Material
- Oil and Grease
- Population and Community Ecology
- pH
- Salinity
- Sediment
- Settleable Material
- Suspended Material
- Sulfide
- Tastes and odors
- Temperature
- Toxicity
- Tubidity
- Un-ionized ammonia
- Objectives for specific chemical constituents
- Constituents of concern for municipal and agricultural water supplies
- Radioactivity

Similarly, parameters with water quality objectives for groundwater are as follows.

- Bacteria
- Organic and inorganic constituents
- Radioactivity
- Taste and odor

Review of the list of parameters for both surface water and groundwater water quality objectives shows that the two applicable parameters are as follows.

- Organic and inorganic constituents
- Taste and odor

The specific limits for each COC for these parameters are summarized in Basin Plan Table 3-5 "Water Quality Objectives for Municipal Supplies" in Appendix C. Review of Table 3.5 in Appendix C identifies water quality objectives for municipal supply (in mg/L) as follows.

- Benzene 0.001
- Toluene 0.15
- Ethylbenzene 0.7
- Xylenes 1.75
- PCE 0.005
- TCE 0.005
- Cis-1,2-DCE 0.006
- Trans-1,2-DCE 0.010
- Vinyl Chloride 0.0005
- Odor 3.0

The water quality objectives for benzene, toluene, ehtylbenzene and xylenes correspond to Maximum Contaminant Levels (MCLs) as specified in the California Code of Regulations, and the water quality objective for odor corresponds to the secondary MCL in the California Code of Regulations.

Proposed cleanup goals for surface water and groundwater will be Basin Plan water quality objectives for all of the COCs except for TPH-SS. No water quality objective is provided in the Basin Plan for TPH-SS. The proposed water quality objectives for surface water and groundwater for TPH-SS are based on the SFRWQCB May 2008 Table F (Freshwater) and A (Groundwater) ESLs for TPH (middle distillates). In addition, proposed cleanup goals for indoor air quality are SFRWQCB May 2008 Table E Indoor Air Screening Levels for residential land use. The proposed cleanup goals are summarized below.

COC	Groundwater (ug/L)	Surface Water (ug/L)	Indoor Air (ug/m^3)
TPH-SS	100	100	10,000
Benzene	1	1	84
Toluene	150	150	63,000
Ethylbenzene	700	700	980
Xylenes (total)	1,750	1,750	21,000
PCE	5	5	0.41

TCE	5	5	1.2
Cis-1,2-DCE	6	6	7.3
Trans-1,2-DCE	10	10	15
Vinyl Chloride	0.5	0.5	0.031
Odor	3.0*	None	None

Odor is expressed in units of Threshold Odor Number.

At properties where remediation is performed, the remediation will be performed until the calculated indoor air cumulative incremental carcinogenic risk is less than 1.0E-06 and the calculated indoor air cumulative hazard quotient is less than 1 for each of the remediated properties. These risk and hazard objectives are consistent with USEPA and CalEPA guidance for acceptable levels of risk and hazard for residential land use.

REMEDIAL ALTERNATIVES

CAP preparation requirements include preparation of a feasibility study to evaluate alternatives for remedying or mitigating the actual or potential adverse effects of the unauthorized release. An evaluation of the effectiveness and limitations of remedial technologies to abate COCs in soil, groundwater and soil gas at and near the subject site is provided below. The evaluated remedial technologies include excavation, soil vapor extraction, and groundwater pumping with soil vapor extraction.

Excavation

Review of TPH-SS concentrations in soil on geologic cross sections C-C', D-D', E-E' and F-F' (Figures 20, 23, 25 and 27, respectively) shows that with the exception of the former UST pit and the vicinity of boring B19, TPH-SS concentrations exceeding 1,000 mg/kg are encountered below a depth of 15 feet bgs. The TPH-SS extends to a depth of approximately 25 feet bgs beneath Davis Street and the southeastern portion of the site, and extends to a depth of over 35 feet bgs in the vicinity of borehole B15. Additionally, Figures 20 and 25 show that the horizontal extent of TPH-SS is not fully defined to the south of Davis Street or at the site to the north of the former UST pit.

Review of Figures 21 and 22 shows that elevated concentrations of HVOCs in soil are primarily located in the vicinity borehole B17. However, review of HVOC shallow soil gas concentrations in Figures 16, 17 and 18 suggest that elevated concentrations of HVOCs may also be present in soil in the vicinity of location SG2.

For purposes of discussion, the area proposed for excavation consists of the area with soil TPH-SS concentrations exceeding 1,000 mg/kg and total HVOC soil concentrations exceeding 1 mg/kg. This area extends from the vicinity of B14 to the south side of Davis Street and from the eastern property line to the vicinity of the western end of the former UST pit (an area measuring approximately 100 feet long and 70 feet wide). Although excavation may effectively remove suspected source area contamination quickly, the following limitations make excavation not feasible.

- Removal of existing structures to allow excavation to occur (storage buildings at the subject site (at locations H3, H4 and H5); a storage building at the property located immediately to the north of the subject site; and a portion of the existing main building at the subject site).
- Closing and removal of a portion of Davis Street, and temporary re-routing of both underground and overhead utilities located in Davis Street.
- Removal of soil on private property for some unknown distance to the south of Davis Street.
- Detected soil gas concentrations on adjacent properties will not be mitigated or remediated.
- Downgradient COC-impacted groundwater will not be mitigated or remediated.

Soil Vapor Extraction

In addition to the area considered above for excavation, the area considered for soil vapor extraction includes offsite locations at adjacent properties (3320 Davis Street and 2682 Coolidge Avenue) where calculated indoor air cumulative incremental carcinogenic risk is greater than 1.0E-06. Locations where soil gas concentrations exceed SFRWQCB May 2008 Table E shallow soil gas residential land use ESLs are shown in Figures 14 through 19. Vapor extraction of the proposed affected area would allow remediation to occur without the removal of existing structures or disruptions to the use of Davis Street associated with excavation. Additional factors suggesting that soil vapor extraction is feasible for the subject site include the following.

- The COCs appear to be predominantly present in sand beneath the site (see Figures 20 through 27).
- Historical seasonal low water levels expose the majority of the sand layer located beneath the former UST pit and the southeastern portion of the site.
- All of the COCs are volatile.
- Increased oxygen flow into the subsurface should facilitate aerobic conditions for decomposition of the petroleum hydrocarbons.

Limitations associated with soil vapor extraction include the following.

- Dewatering is required to expose COC-impacted subsurface materials during the wet season.
- Increased oxygen flow into the subsurface should substantially diminish anaerobic conditions and the associated decomposition of HVOCs.

- The extent of the sand layers shown on the geologic cross sections is unknown at the adjacent properties where elevated COC soil gas concentrations have been encountered.
- The silt and silty clay where the shallow soil gas samples were collected and that is located between the ground surface and the underlying sand layer where the highest COC concentrations are encountered will have lower flow rates than the sand layer.

Vapor Extraction and Groundwater Pumping

Groundwater pumping will remove COC-impacted groundwater. In addition, dual phase soil vapor extraction and groundwater pumping can enhance remedial effectiveness by lowering the water table in the sand layer to facilitate vapor extraction of COCs from the sand layer. Limitations associated with this remedial alternative include the following.

- COCs located in the A-water-bearing zone are affected.
- Wet-season groundwater pumping may result in large volumes of water to facilitate soil vapor extraction.

FEASIBILITY STUDY

Based on the remedial technologies assessed, evaluation of the feasibility of dual phase soil vapor extraction with groundwater pumping is recommended. Until a feasibility study is performed, subsurface response to the proposed remedial technologies and site-specific contaminant extraction rates are unknown. Once the proposed remedial technologies are demonstrated to be viable and site-specific subsurface response and contaminant extraction rates are evaluated, an estimate of the time necessary to achieve cleanup levels and cleanup goals can be provided.

Proposed activities for a feasibility study are provided below. The proposed activities may be modified in the field based on conditions encountered during the proposed feasibility study (i.e. large volumes of water exceeding storage capacity are pumped, or steady state groundwater drawdown or vapor extraction conditions occur rapidly).

Well Installation

A total of four dual-phase groundwater/soil vapor extraction wells (DP1 through DP4) and two soil vapor extraction wells (VE1 and VE2) will be installed at the subject site at locations shown on Figure 3. The proposed locations of the wells are also shown on Site Vicinity Map Details with COC groundwater isoconcentration contours (Figures 7 through 13); Site Vicinity Map Details with COC soil gas isoconcentration contours (Figures 14 through 19); and geologic cross sections with COC isoconcentration contours (Figures 20 through 26).

Review of geologic cross section C-C' (Figures 20, 21 and 22) shows that at proposed location VE2, perched water was encountered at a depth of approximately 15 feet during wet season months at B14, but was not encountered during dry season months at B15. Review of geologic cross sections C-C' (Figures 20, 21 and 22) and D-D' (Figures 23 and 24) shows that both proposed wells VE1 and VE2 are installed to total depths of 15 feet bgs to evaluate a sand layer that is encountered between the depths of approximately 10 and 15 feet bgs. The sand layer is a suspected natural conduit for elevated shallow soil gas vapor concentrations of COCs.

The wells will be drilled with a truck-mounted hollow stem auger drill rig and 12-inch outside diameter hollow stem augers. Soil samples will be collected at five foot intervals using a California-modified split spoon sampler lined with stainless steel or brass tubes driven by a 140 pound hammer falling 30 inches. Blow counts will be recorded every six inches. The soil from the boreholes will be logged in the field in accordance with standard geologic field techniques and the Unified Soil Classification System. The soil from the boreholes will also be evaluated with a Photoionization Detector (PID) equipped with a 10.6 eV bulb and calibrated with a 100 ppm isobutylene standard. No soil samples will be retained for laboratory analysis. Beginning at a depth of 24.0 feet bgs, borehole DP2 will be continuously sampled to the terminal depth to identify the depth of the sand-clay contact.

The wells will be constructed using 4-inch diameter Schedule 40 PVC pipe to approximate total depths with screen lengths (in feet) as follows.

Well	Total Depth	Screen Length
DP1	37	14
DP2	29	14
DP3	27	14
DP4	38	15
VE1	15	5
VE2	17	7

For each well, the screened intervals of the wells will consist of 0.020-inch factory slot screen and the well screen will be surrounded with #2/12 washed sack sand to a height of one foot above the top of the screen. Bentonite pellets will be placed in the borehole above the filter sand to a height of one foot above the sand. The remaining annular space will be filled with neat cement grout to approximately one foot below the ground surface. The tops of the wells will be covered with traffic-rated locking well vaults.

All drilling and sampling equipment will be cleaned with an Alconox solution followed by a clean water rinse or by steam cleaning prior to use in each borehole, or will be new disposable equipment. Any soil or water generated during drilling will be stored in drums at the site pending characterization and disposal.

The elevations and locations of the proposed wellheads will be surveyed vertically and horizontally by a State-licensed surveyor in accordance with State of California Water Resources Control Board (SWRCB) Geotracker guidelines.

At least 72 hours after construction, the wells will be developed by surging and over-pumping until the water discharged from the wells is relatively clear. Prior to development, the wells will be monitored for the presence of water and depth to water using an electric water level indicator with an accuracy of 0.01 feet, and for the presence of free product and sheen using a transparent bailer. Water removed from the wells during development will be stored in labeled drums onsite, pending analysis and appropriate disposal.

Well Sampling

At least 48 hours after development, wells DP1 through DP4 will be monitored for the presence of separate phase hydrocarbons and then purged and sampled. The depth to water will be measured to the nearest 0.01 foot using an electric water level indicator. The presence of free product and sheen will be evaluated using a transparent bailer.

Prior to well sampling the wells will be purged of a minimum of three casing volumes of water or until the wells have been purged dry. During purging operations, the field parameters of electrical conductivity, temperature, and pH will be monitored. Once the field parameters are observed to stabilize, and a minimum of three casing volumes have been purged or the wells have purged dry and partially recovered, water samples will be collected using a clean disposable polypropylene bailer. Records of the field parameters measured during well purging will be included with the final report.

The water samples will be transferred to 40-milliliter glass VOA vials and 1-liter amber glass bottles that will be sealed with Teflon-lined screw caps. The VOA vials will be overturned and tapped to ensure that no air bubbles are present. The VOA vials and bottles will be transferred to a cooler with ice, pending delivery to the laboratory. Chain of custody documentation will accompany the samples to the laboratory.

Groundwater Extraction Feasibility Testing

To evaluate flow rates and drawdown, groundwater will be pumped from well DP1 for 5 days. While pumping from well DP1, water levels will be monitored in wells DP1, DP2, DP3, DP4, MW1 and MW2 using pressure transducers. The pumping rate will be determined based on drawdown and recharge rates observed during well development and initial well sampling. Water pumped from the well will be stored onsite in a tank pending characterization and proper disposal, or will be discharged to either the storm drain or sanitary sewer following receipt of appropriate permits.

At the conclusion of the pump test, a water sample will be collected from well DP1 using a clean disposable polypropylene bailer. The water samples will be transferred to 40-milliliter glass VOA vials and 1-liter amber glass bottles that will be sealed with Teflon-lined screw caps. The VOA vials will be overturned and tapped to ensure that no air bubbles are present. The VOA vials and bottles will be transferred to a cooler with ice, pending delivery to the laboratory. Chain of custody documentation will accompany the samples to the laboratory.

Soil Vapor Extraction Feasibility Testing

All necessary notifications and permits will be obtained from the BAAQMD. A trailer-mounted liquid ring blower capable of generating 28 inches of Mercury vacuum and a flow rate of 400 cubic feet per minute will be used to evaluate vapor extraction feasibility at the site. Granular activated carbon will be used as the air pollution control device.

Vacuum monitoring ports will be installed at the top of each of wells DP1 through DP4, VE1, VE2 and MW2. Vapor extraction will be performed at each of wells DP1 through DP4 for one day, and at each of wells VE1 and VE2 for one half day. A step test with four different vacuums will be performed at each well. Each step will be performed for one hour. During each step, the following information and associated time of measurement will be recorded.

- Air flow rate at the extracting well. Air flow rates will be measured using a hot wire anemometer.
- Air temperature. Ambient air temperature and air temperature at the blower inlet will be monitored at the beginning and end of each step and at approximately one half hour intervals during each step.
- PID values at the extracting well. A field PID will be used to evaluate organic vapor concentrations at the beginning of each step and at approximate one half hour intervals during each step.
- Vacuum at all wells. Vacuum will be measured at approximately 15 minute intervals using magnehelic gages and verified with a monometer for all wells where vapor extraction is not taking place.
- Vacuum at the blower. The vacuum at the blower will recorded at the beginning and end of each step using a vacuum gage.

Following completion of each vacuum step test, the blower will continue to operate at the final step vacuum until a different well is used for vapor extraction. One air sample will be collected from a sampling port located at the inlet to the blower at the end of the use of each well as the well used for vapor extraction using 1-liter Summa canisters. Atmospheric barometric pressure at the site will be obtained from a local weather station for the time period of the pilot test. Once the five day pilot test is completed, the blower will be shut off and vacuum will be monitored at all of the wells to determine the rate of vacuum decay.

Arrange for Sample Analysis

All of the soil gas samples will be analyzed at Air Toxics Limited of Folsom California for TPH-SS using EPA Method TO-3 and for HVOCs by EPA Method TO-15.

All of the groundwater samples will be analyzed at McCampbell Analytical, Inc (McCampbell) of Pittsburg, California for TPH Multi-Range (TPH as Gasoline, TPH as Stoddard solvent, TPH as Diesel, and TPH as Bunker Oil) using Modified EPA Method 8015, and for BTEX and COC HVOCs using EPA Method 8260. McCampbell is a State-accredited hazardous waste testing laboratory.

Report Preparation

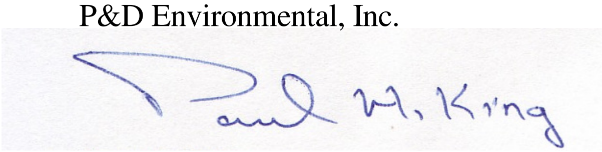
Upon receipt of the laboratory analytical results, a report will be prepared. The report will document well construction, development and sampling procedures, in addition to the feasibility test procedures. The report will include a site plan showing the drilling locations, boring logs, well construction as-built diagrams, copies of field data sheets generated during the pilot test, copies of the laboratory reports, tables summarizing the sample results, recommendations based on the sample results, and the stamp of a professional geologist. The report will also include graphs showing weather conditions (temperature, wind direction, wind speed, barometric pressure, and precipitation) for a weather station located in the site vicinity for the sample collection date and the two weeks preceding the feasibility test. The recommendations will include the following.

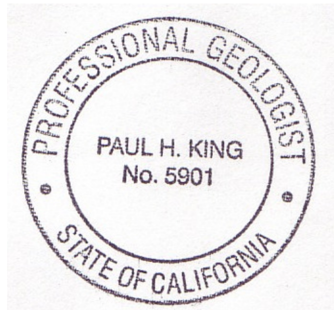
- Detailed description of proposed remediation including confirmation sampling and monitoring during implementation.
- Post-remediation monitoring.
- Schedule of implementation and cleanup.

Should you have any questions, please do not hesitate to contact us at (510) 658-6916.

Sincerely,

P&D Environmental, Inc.





Paul H. King
President
California Professional Geologist #5901
Expires: 12/31/11

Attachments:

Tables (1)

Figures (27)

Appendices (3)

TABLES

FIGURES

APPENDICES

PHK
0298.W5

TABLES

TABLE 1
SURFACE WATER SAMPLE RESULTS
CREEK WATER SAMPLES
(Samples Collected July 31, August 14, and August 21, 2008)

Sample Name	Sample Date	TPH-G	TPH-SS	TPH-D	TPH-BO	TPH-MO	VOCs by 8260
C1	7/31/08	ND<50	ND<50	55, d	**150**	ND<**250**	ND, except: 4-Isopropyl toluene = 0.84
C2	7/31/08	ND<50	ND<50	ND<50	ND<**100**	ND<**250**	ND, except: cis-1,2-Dichloroethene = 4.9, Vinyl Chloride = **0.80**
C3	7/31/08	ND<50	ND<50	52, d	**170**	ND<**250**	ND
C4	8/14/08	--	--	--	**--**	--	ND, except: cis-1,2-Dichloroethene = 3.9, Vinyl Chloride = **0.62**
C5	8/21/08	--	--	**--**	**--**	**--**	ND, except: cis-1,2-Dichloroethene = 3.4
ESL[1]		100	100	100	100	100	cis-1,2-Dichloroethene = 6.0, Vinyl Chloride = 0.5, 4-Isopropyl toluene = none

Notes:
TPH-G = Total Petroleum Hydrocarbons as Gasoline.
TPH-SS = Total Petroleum Hydrocarbons as Stoddard Solvent.
TPH-D = Total Petroleum Hydrocarbons as Diesel.
TPH-MO = Total Petroleum Hydrocarbons as Motor Oil.
ND = Not Detected.
-- = Not Analyzed.
d = Laboratory analytical report note: diesel range compounds are significant; no recognizable pattern.
[1] = Environmental Screening Level, developed by San Francisco Bay - Regional Water Quality Control Board (SF-RWQCB) updated May 2008, from Table F- Surface Water Bodies
BOLD = Concentration in excess of applicable ESL.
Results in micrograms per Liter (µg/L), unless otherwise indicated.

FIGURES

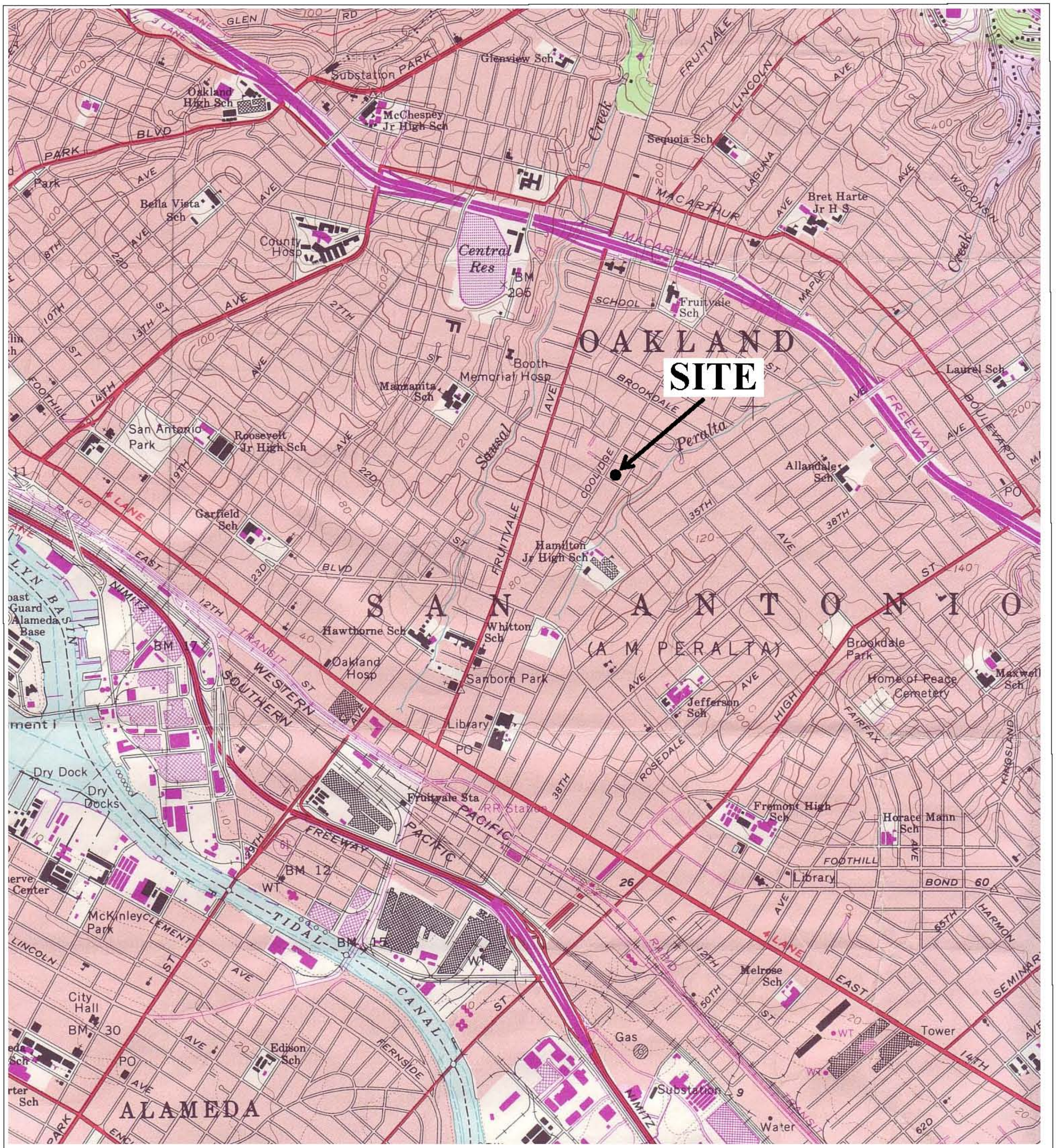


Figure 1
Site Location Map
Snow Cleaners
2678 Coolodge Avenue
Oakland, California

N

Base Map From:
U.S. Geological Survey
Oakland East, California
7.5-Minute Quadrangle
Photorevised 1980

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

0 1,000 2,000
Scale In Feet

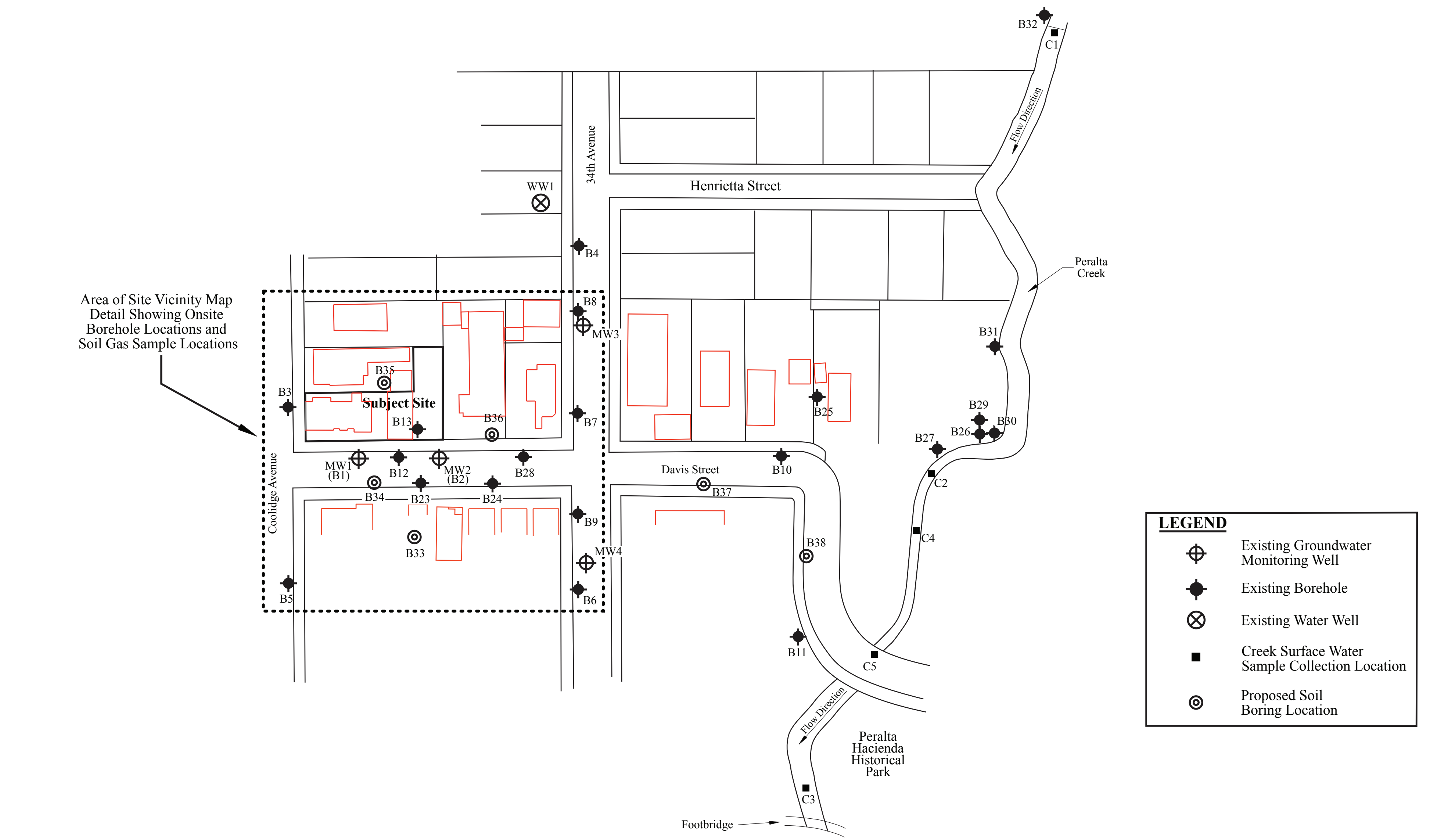


Figure 2
Site Vicinity Map Showing Area of Detail and Offsite Sample Collection Locations
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 Survey
and
Parcel Quest Assesor's Parcel Maps
Alameda County Map Disc, July 2001

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

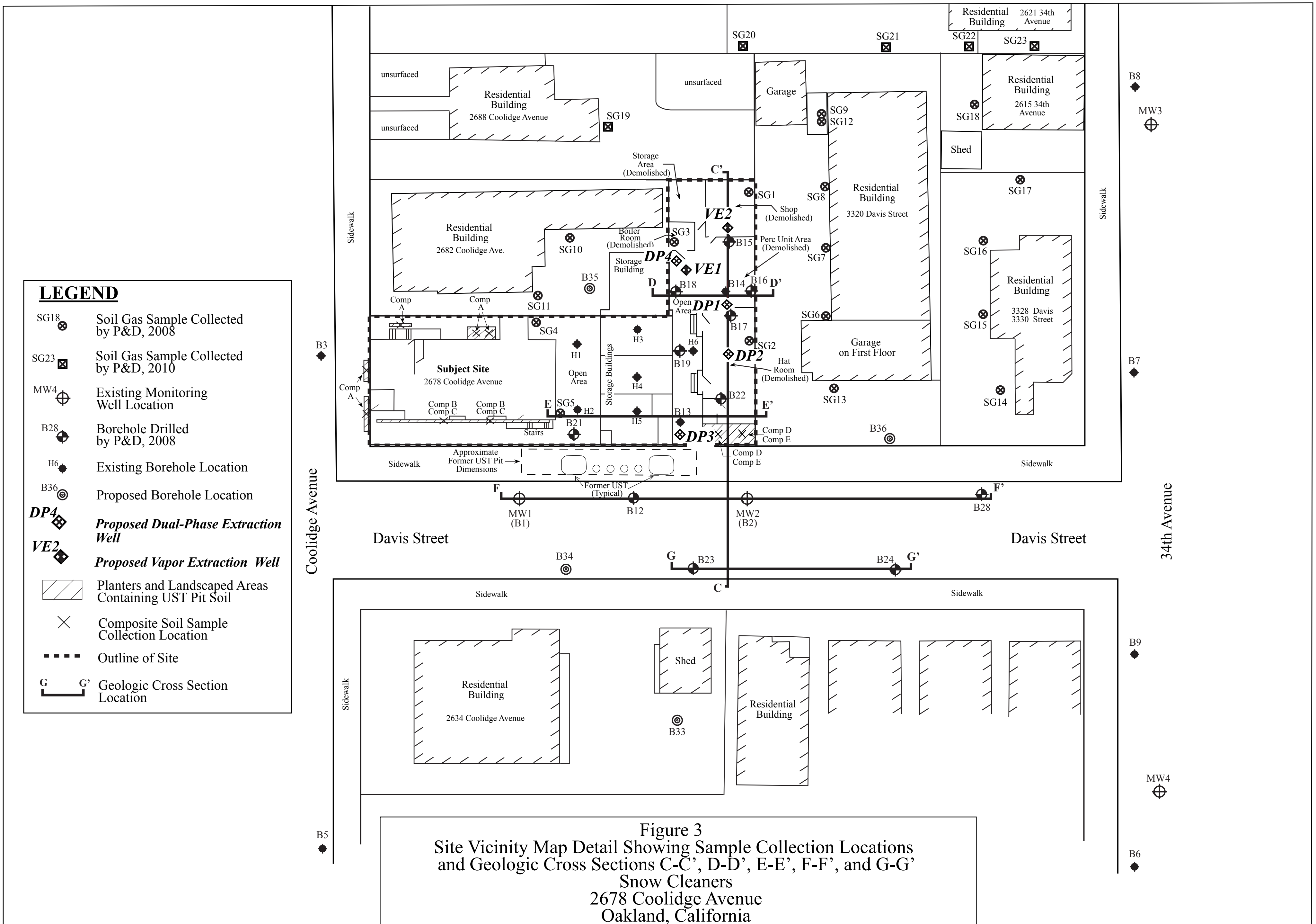


Figure 3
Site Vicinity Map Detail Showing Sample Collection Locations and Geologic Cross Sections C-C', D-D', E-E', F-F', and G-G'
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

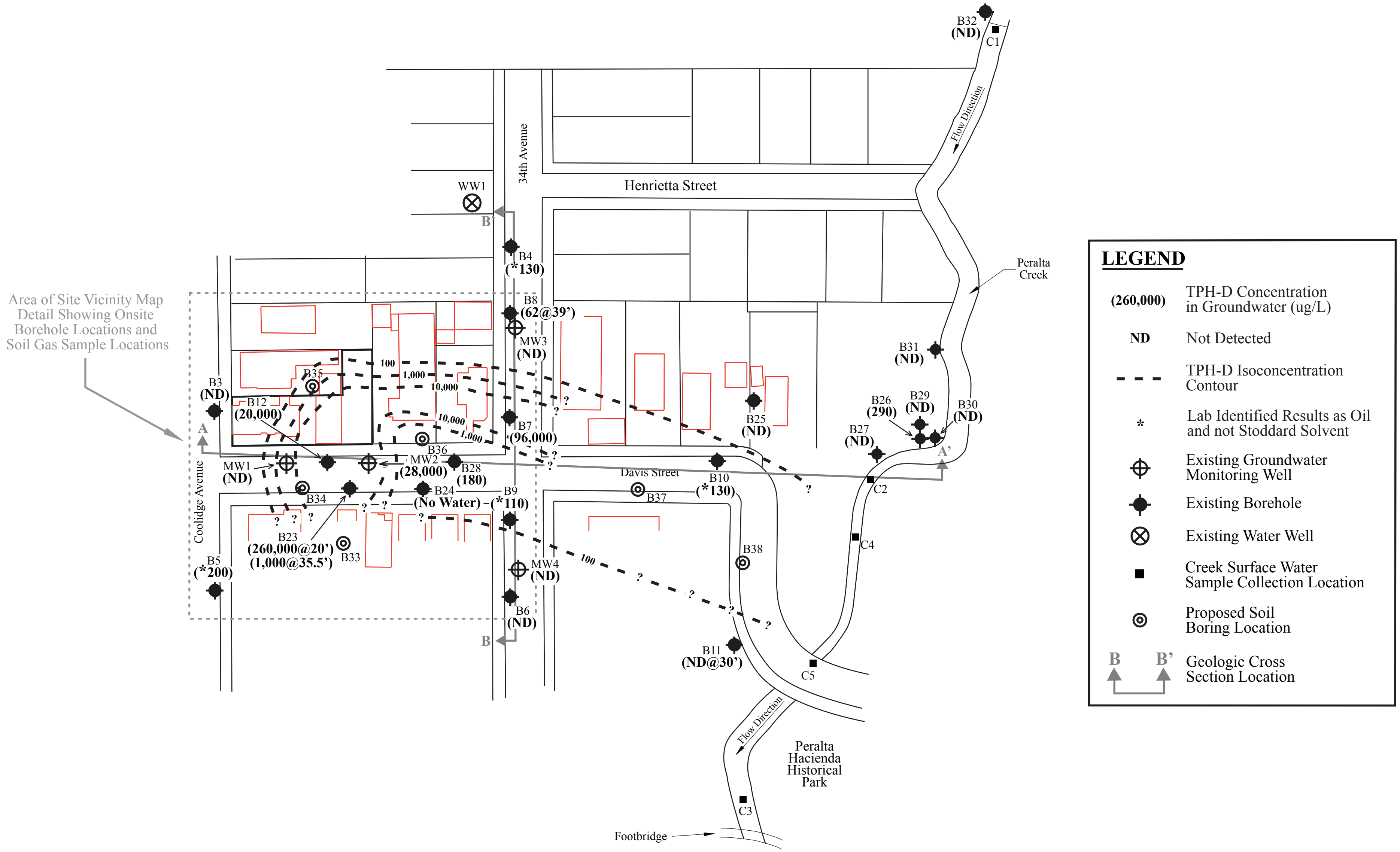


Figure 4
Site Vicinity Map
Showing Alternate Interpretation of Stoddard Solvent in Groundwater Using TPH-D Data
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:

Kier & Wright Engineers Surveyors, Inc.
September 2008 Survey

Parcel Quest Assesor's Parcel Maps
Alameda County Map Disc, July 2001

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

0 60 120
Scale in Feet

N

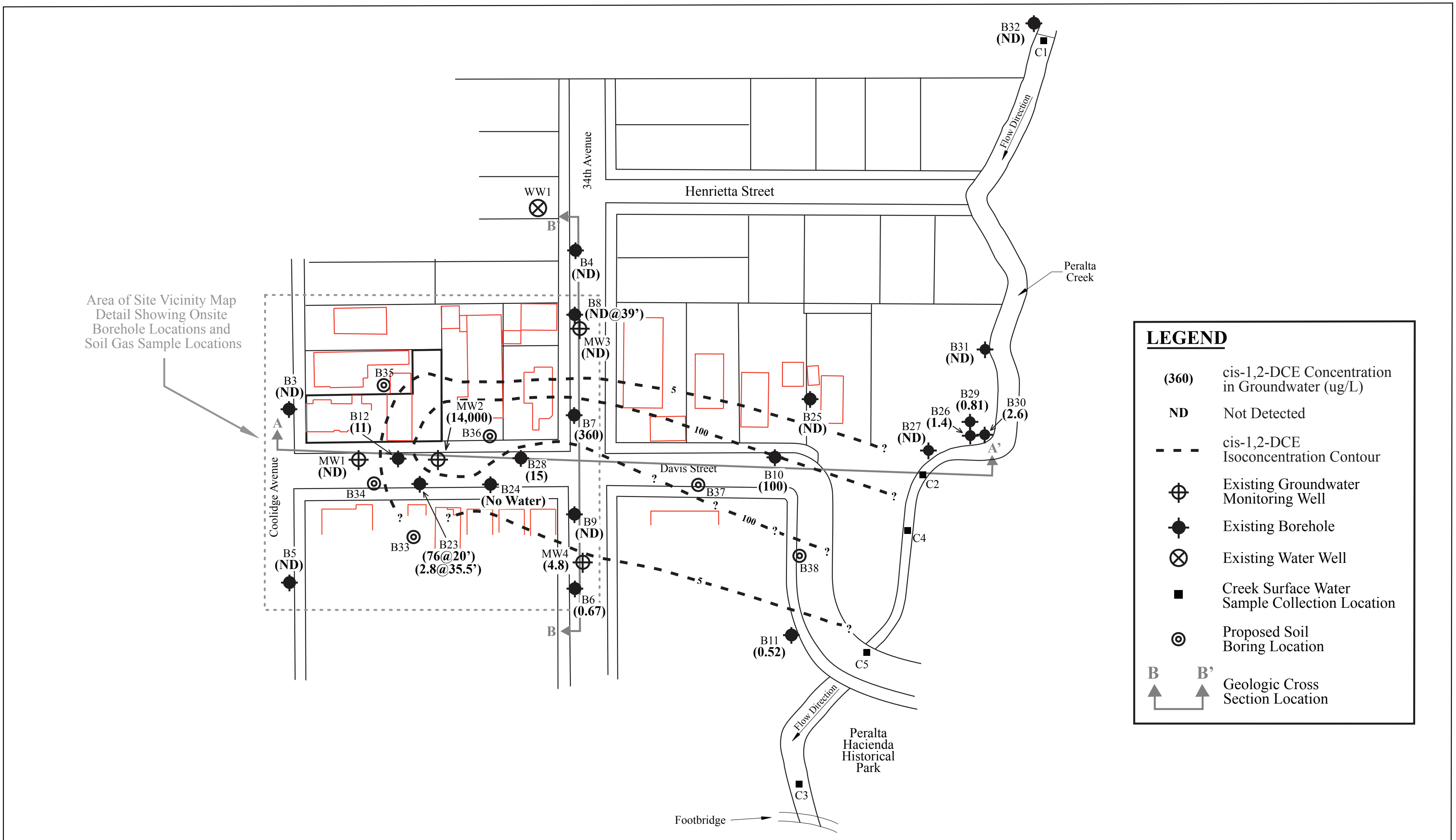


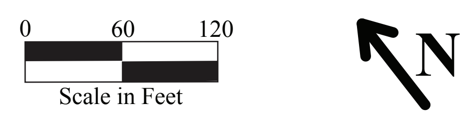
Figure 5
Site Vicinity Map
Showing cis-1,2-DCE in Groundwater
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:

Kier & Wright Engineers Surveyors, Inc.
September 2008 Survey

Parcel Quest Assesor's Parcel Maps
Alameda County Map Disc, July 2001

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610



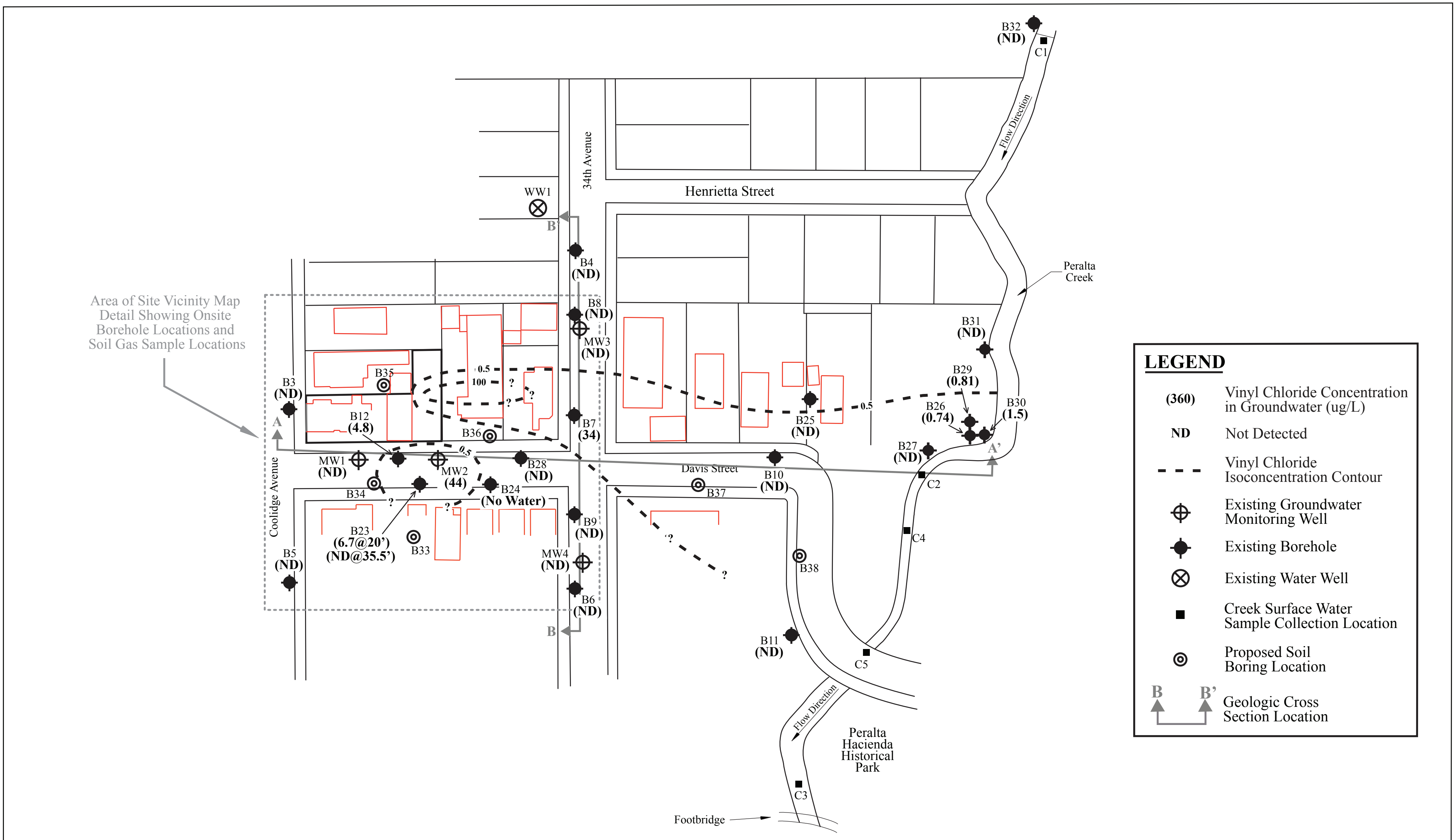


Figure 6
Site Vicinity Map
Showing Vinyl Chloride in Groundwater
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:

Kier & Wright Engineers Surveyors, Inc.
September 2008 Survey

and

Parcel Quest Assesor's Parcel Maps
Alameda County Map Disc, July 2001

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

0 60 120
Scale in Feet

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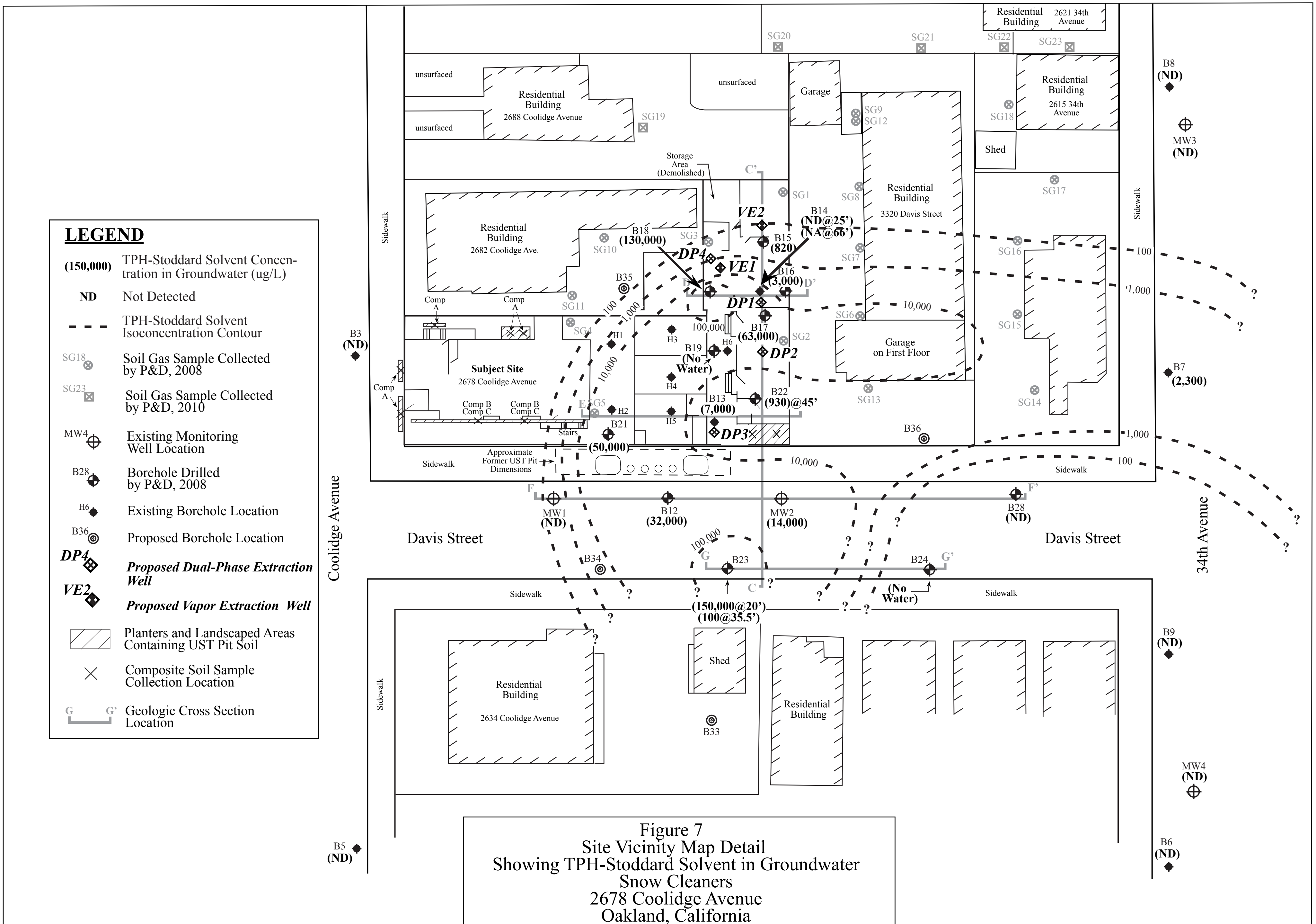

Figure 7
Site Vicinity Map Detail
Showing TPH-Stoddard Solvent in Groundwater
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

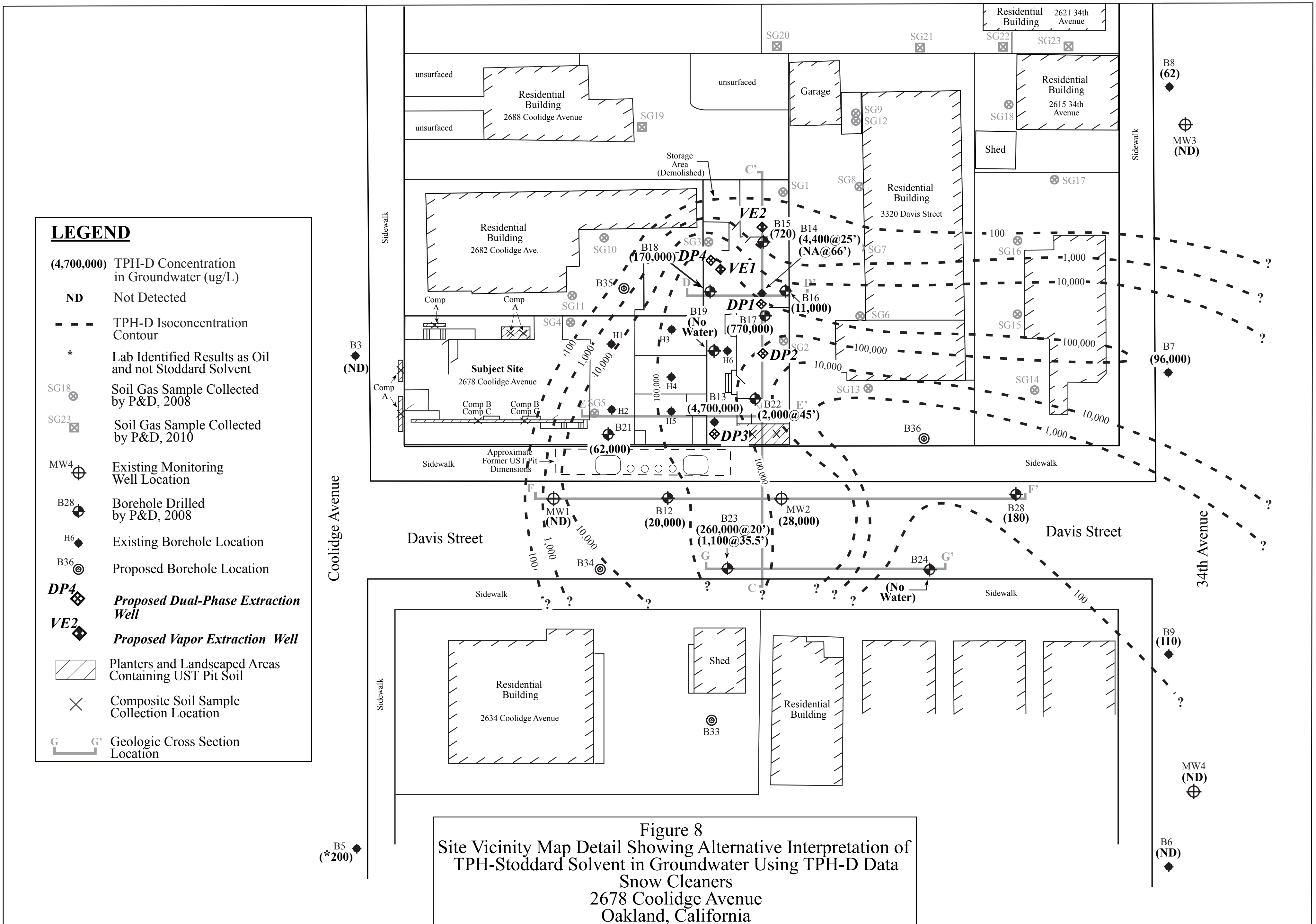

Figure 8
Site Vicinity Map Detail Showing Alternative Interpretation of TPH-Stoddard Solvent in Groundwater Using TPH-D Data
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

0 20 40
Scale in Feet

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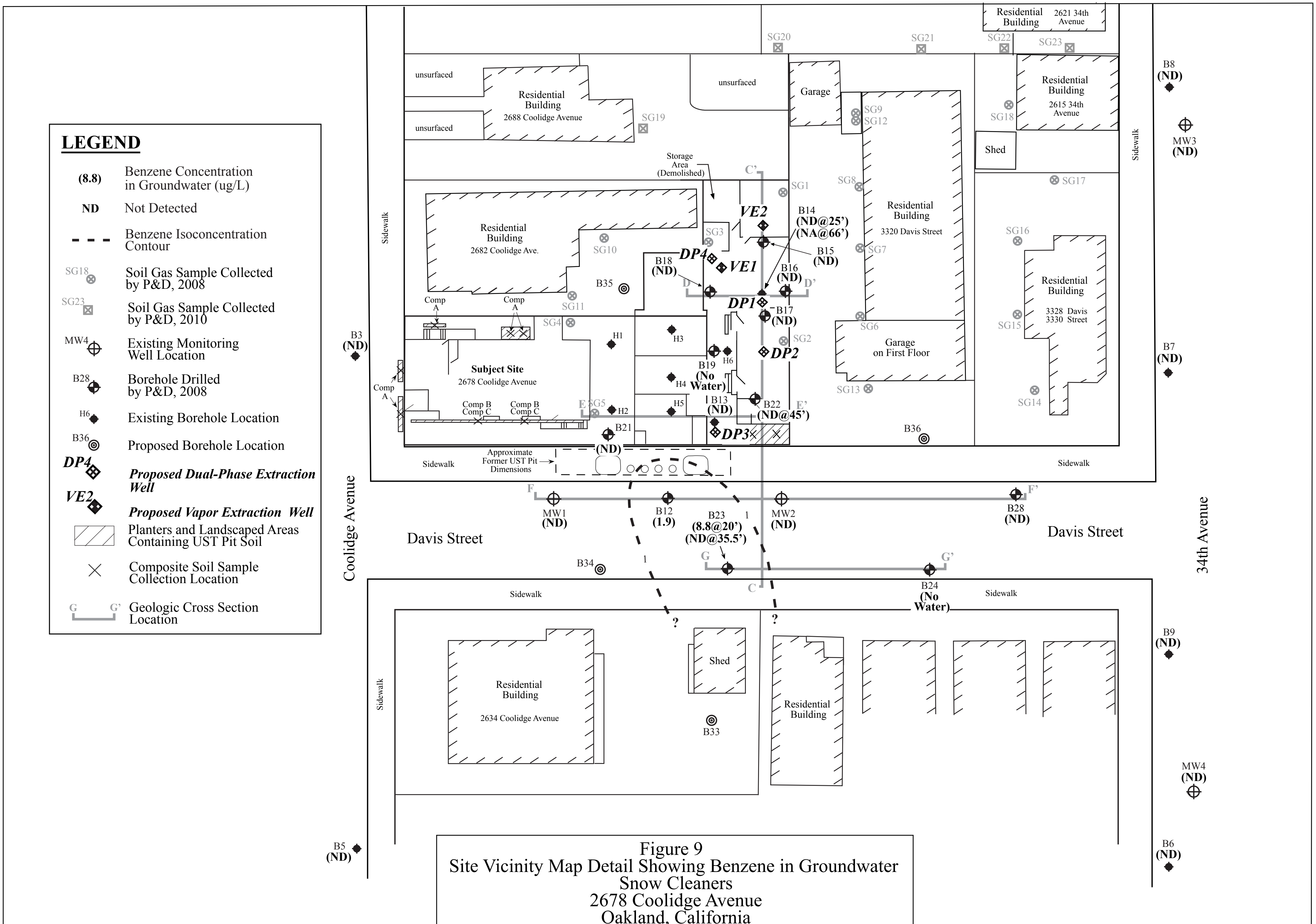

Figure 9
Site Vicinity Map Detail Showing Benzene in Groundwater
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from: Kier & Wright Engineers Surveyors, Inc. September 2008 survey	P&D Environmental, Inc. 55 Santa Clara Ave., Suite 240 Oakland, CA 94610	

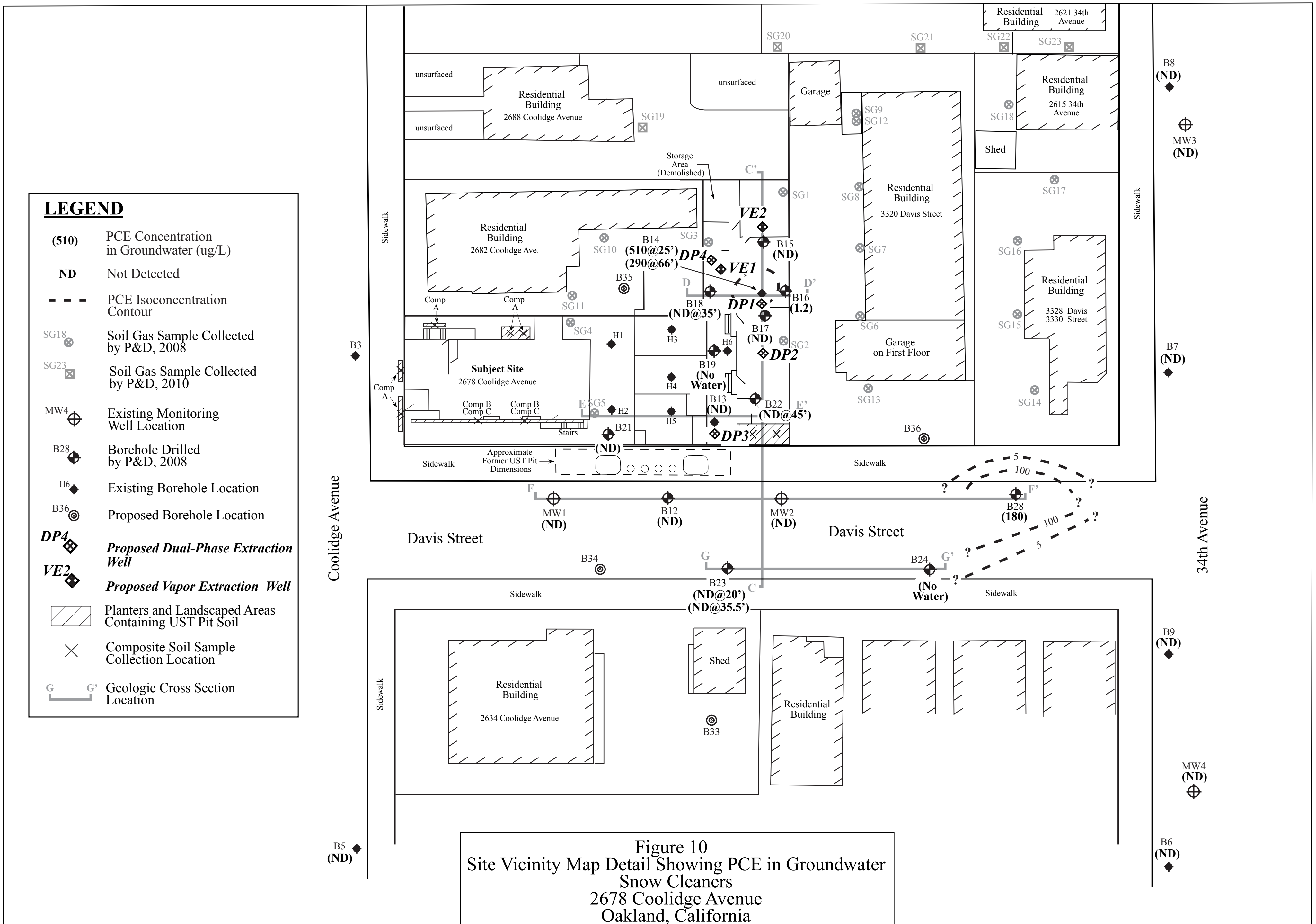

Figure 10
Site Vicinity Map Detail Showing PCE in Groundwater
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

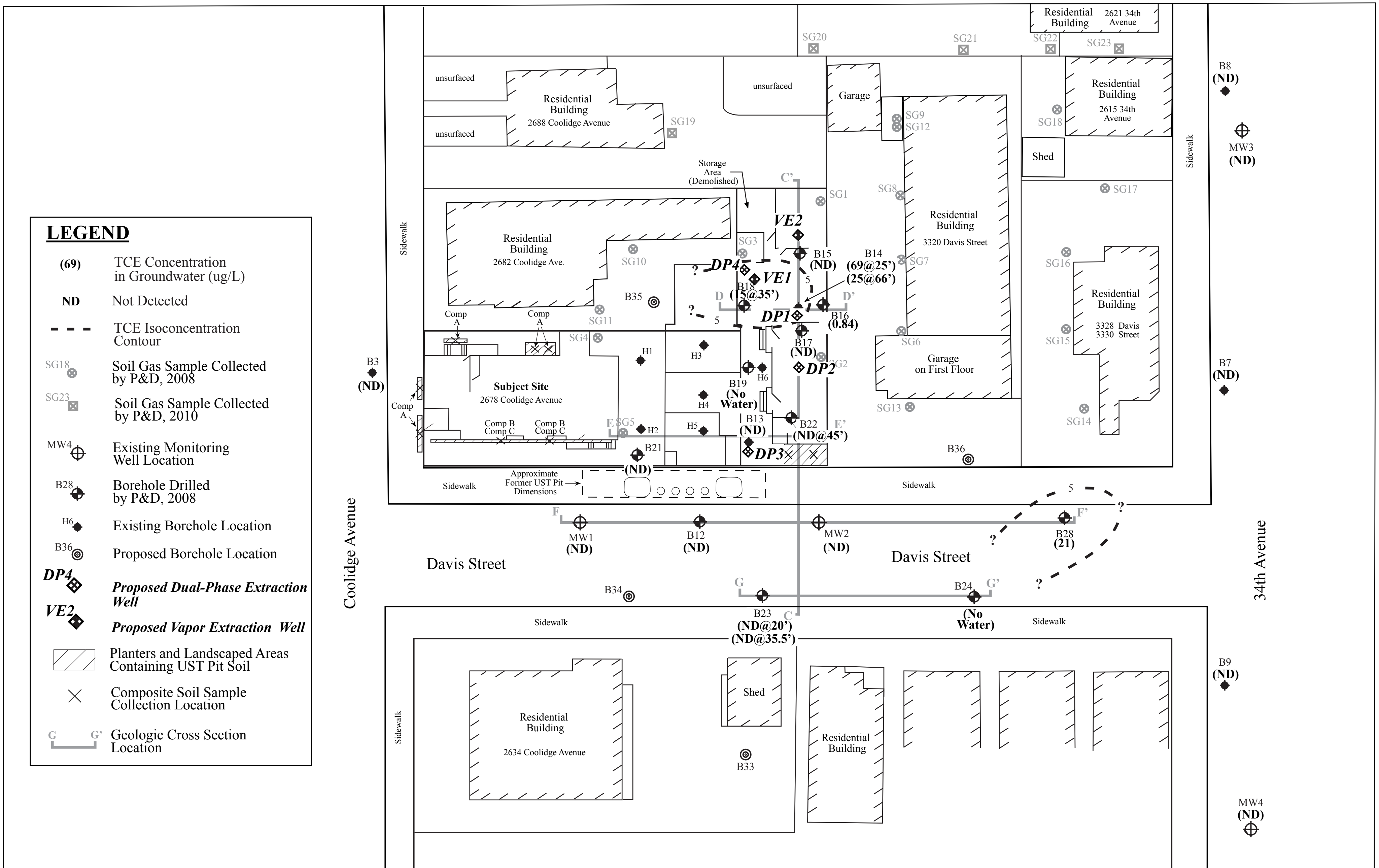

Figure 11
Site Vicinity Map Detail Showing TCE in Groundwater
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from: Kier & Wright Engineers Surveyors, Inc. September 2008 survey	P&D Environmental, Inc. 55 Santa Clara Ave., Suite 240 Oakland, CA 94610

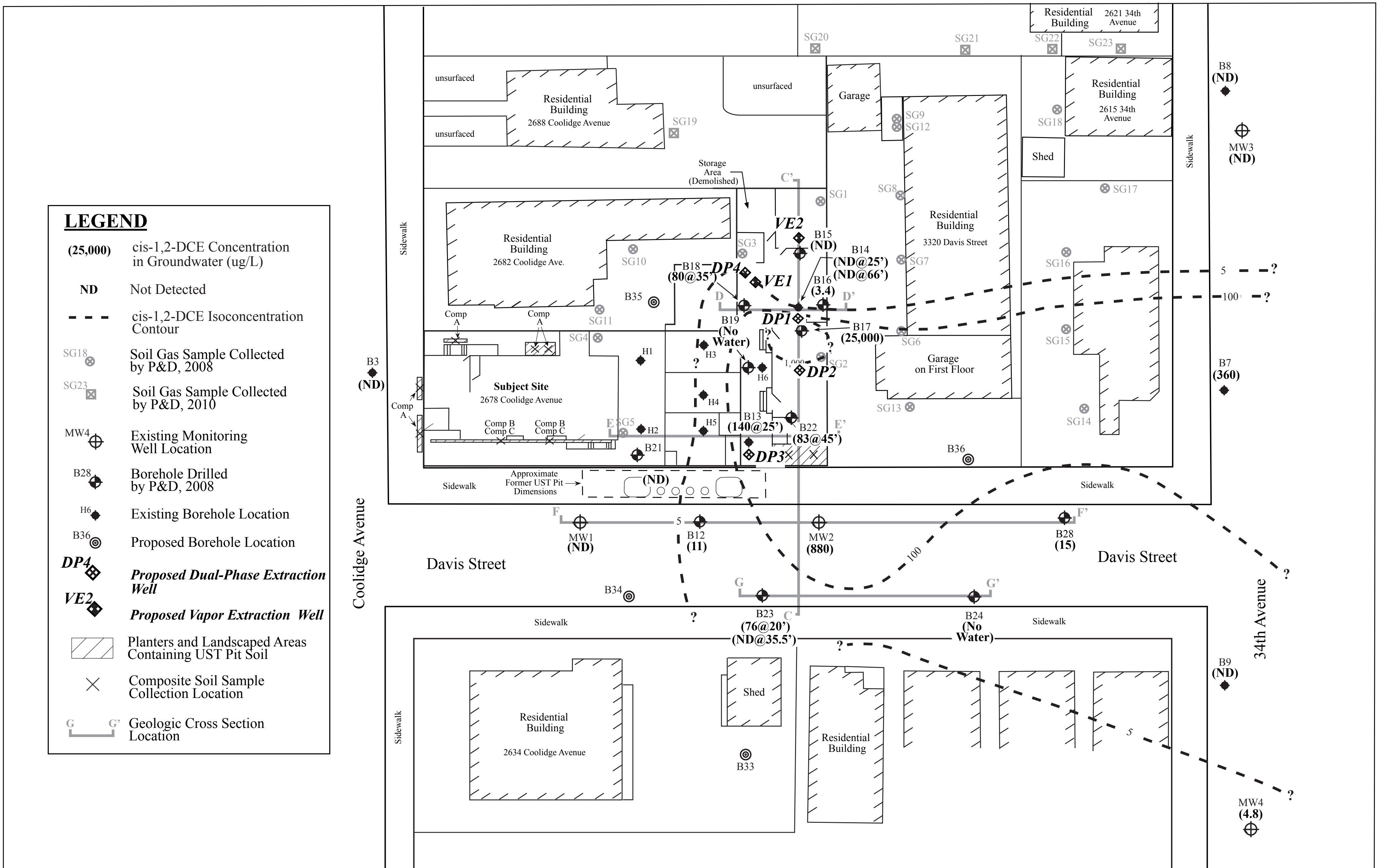

Figure 12
Site Vicinity Map Detail Showing cis-1,2-DCE in Groundwater
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

0 20 40
Scale in Feet

N

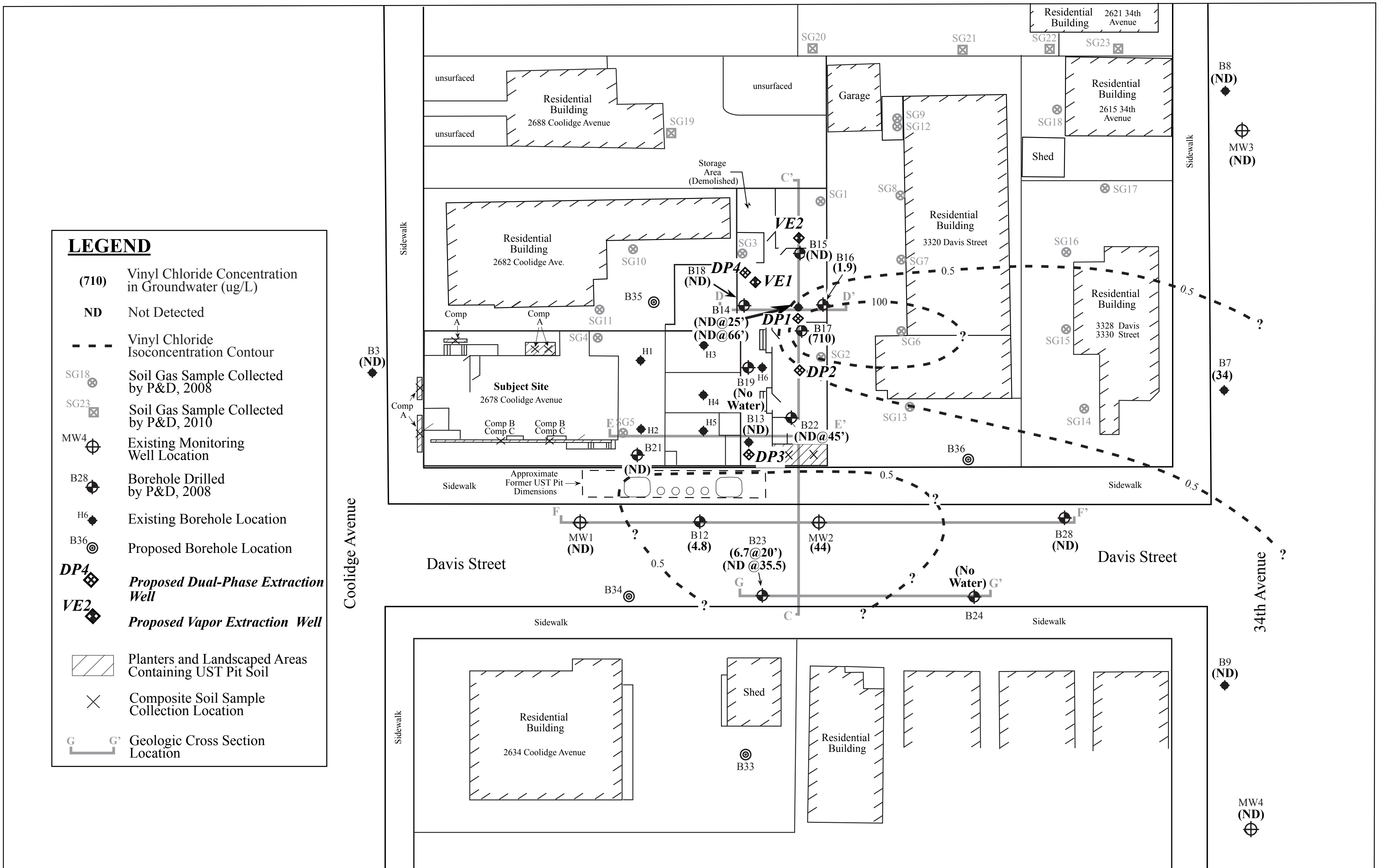

Figure 13
Site Vicinity Map Detail Showing Vinyl Chloride in Groundwater
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

0 20 40
Scale in Feet

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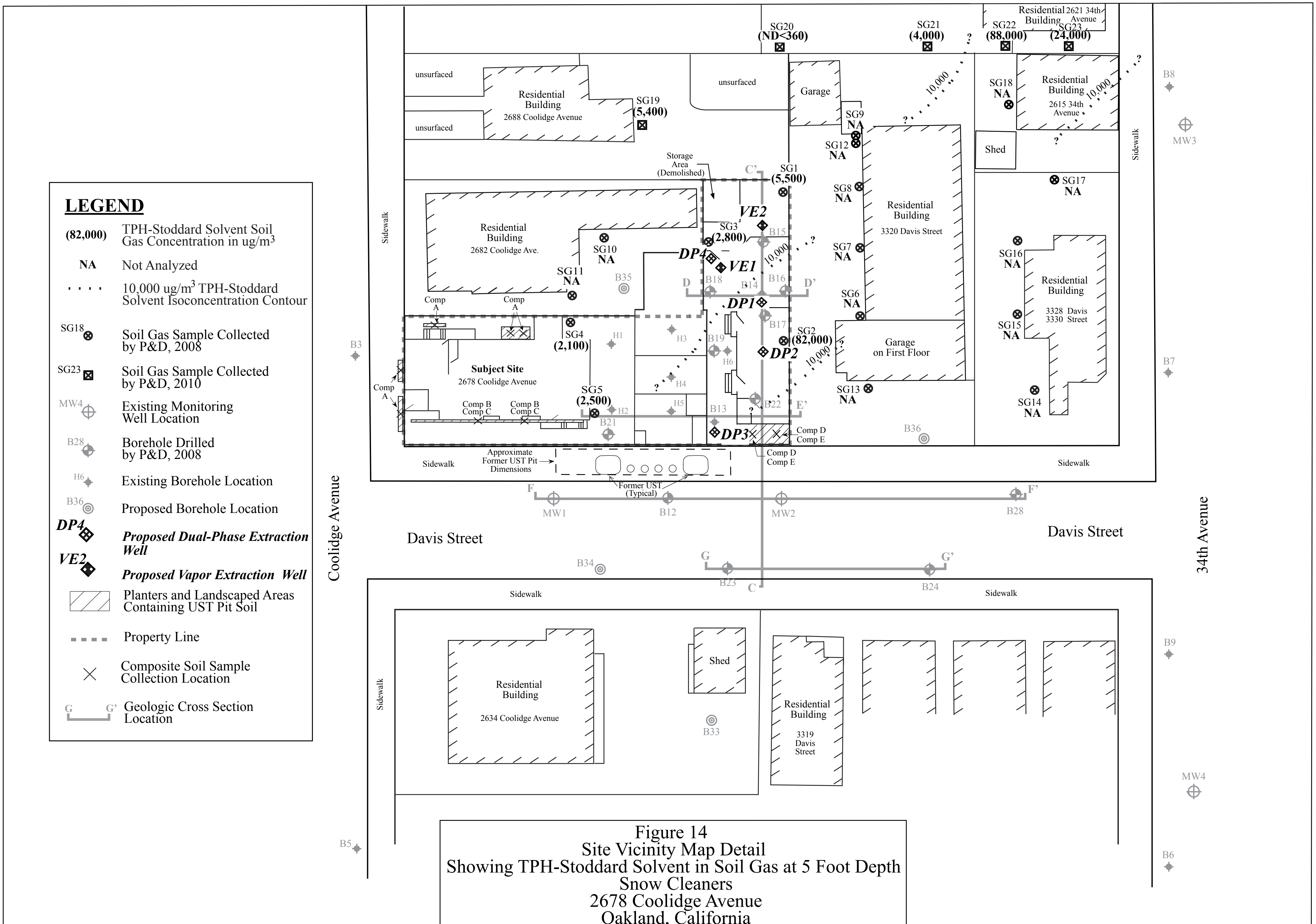

Figure 14
Site Vicinity Map Detail
Showing TPH-Stoddard Solvent in Soil Gas at 5 Foot Depth
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

Scale in Feet: 0, 20, 40

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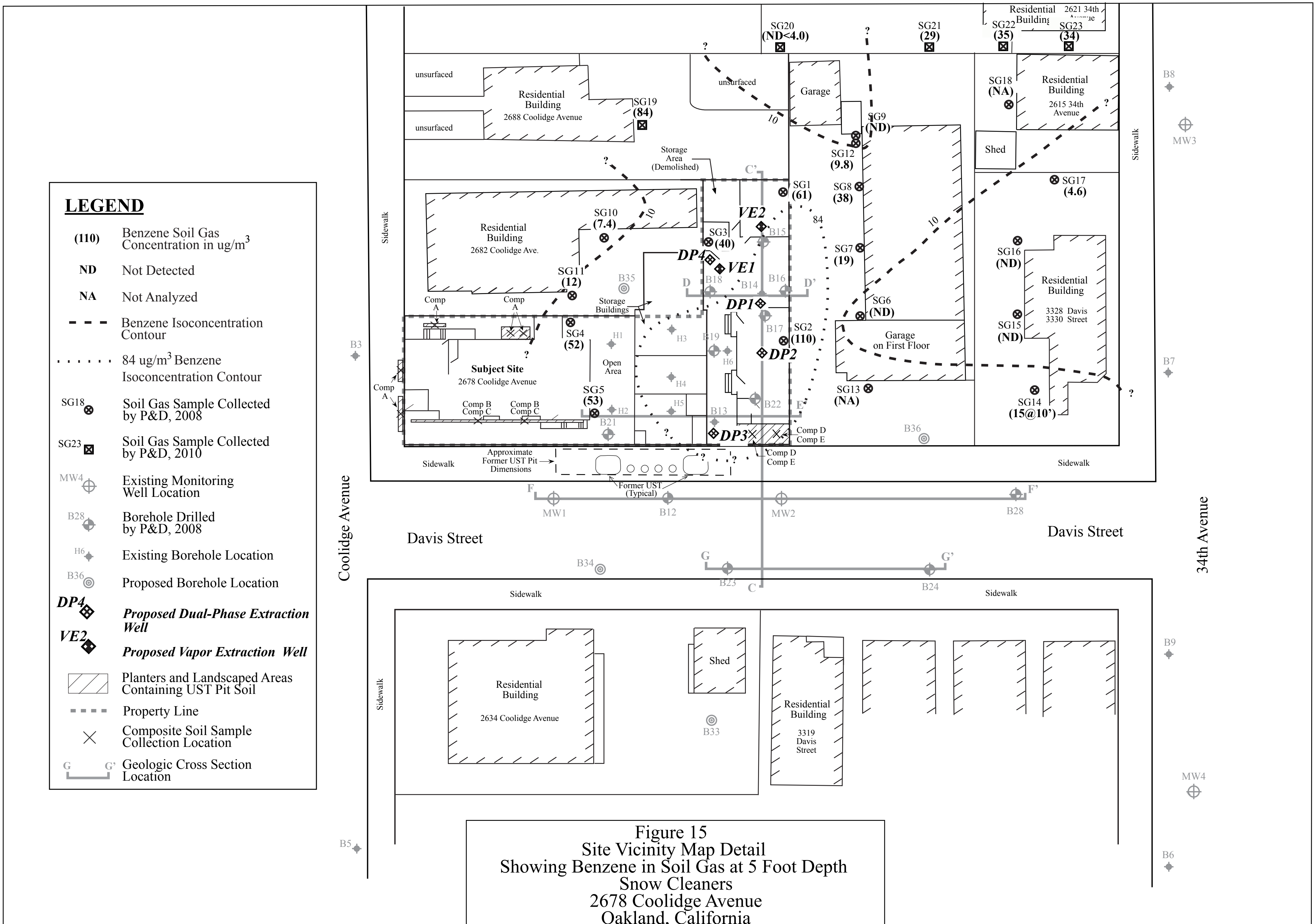

Figure 15
Site Vicinity Map Detail
Showing Benzene in Soil Gas at 5 Foot Depth
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

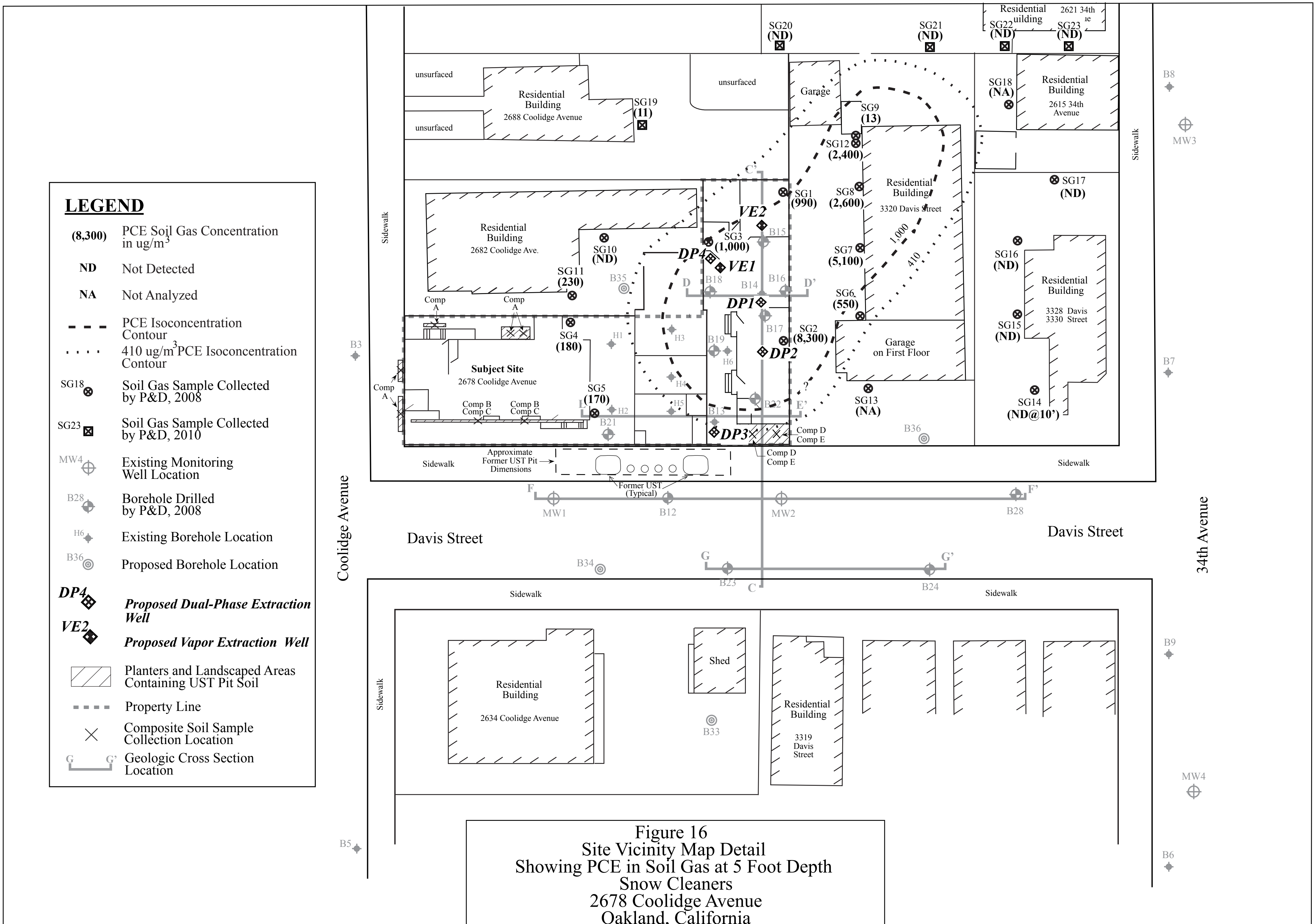

Figure 16
Site Vicinity Map Detail
Showing PCE in Soil Gas at 5 Foot Depth
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

0 20 40
Scale in Feet

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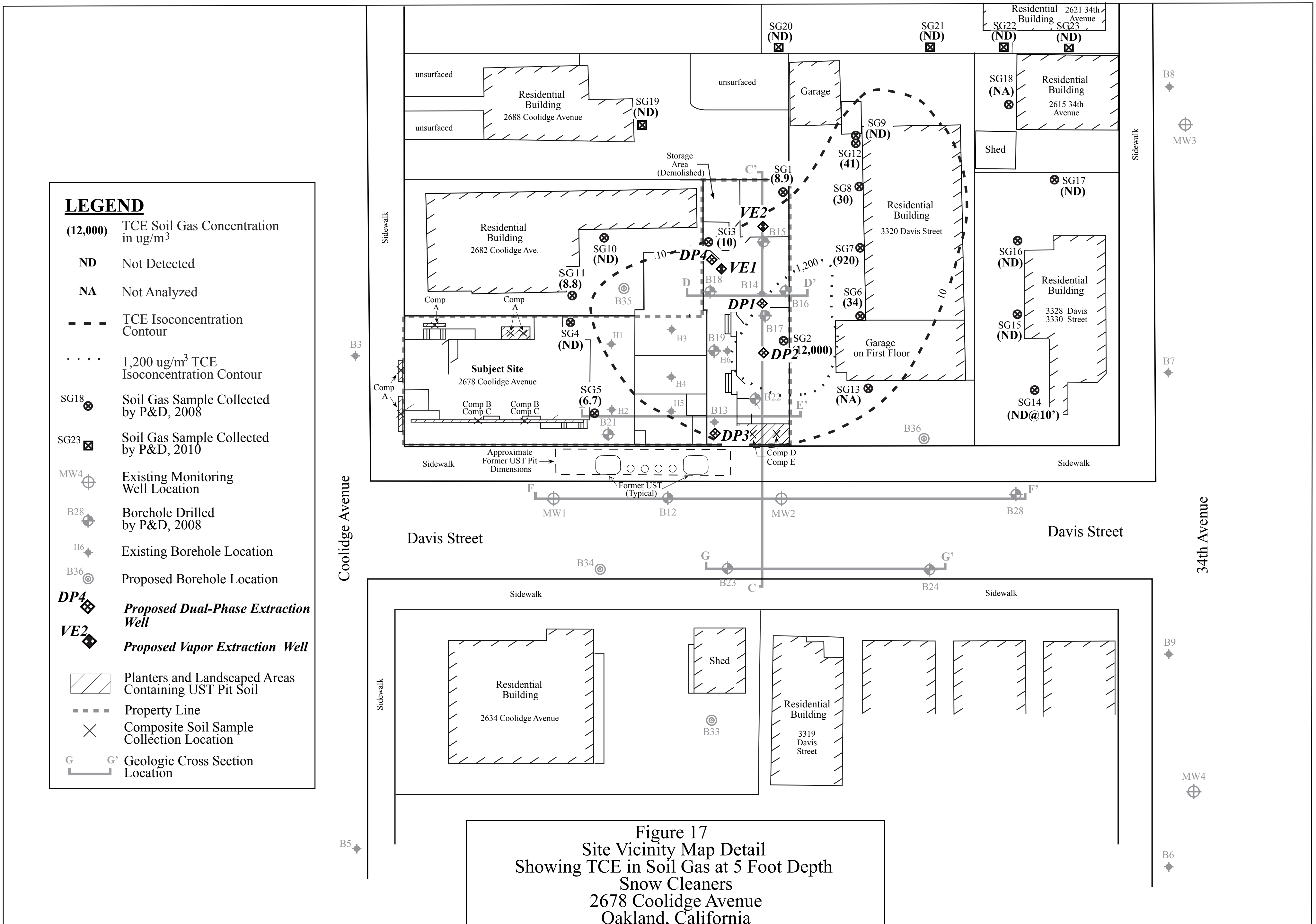

Figure 17
Site Vicinity Map Detail
Showing TCE in Soil Gas at 5 Foot Depth
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

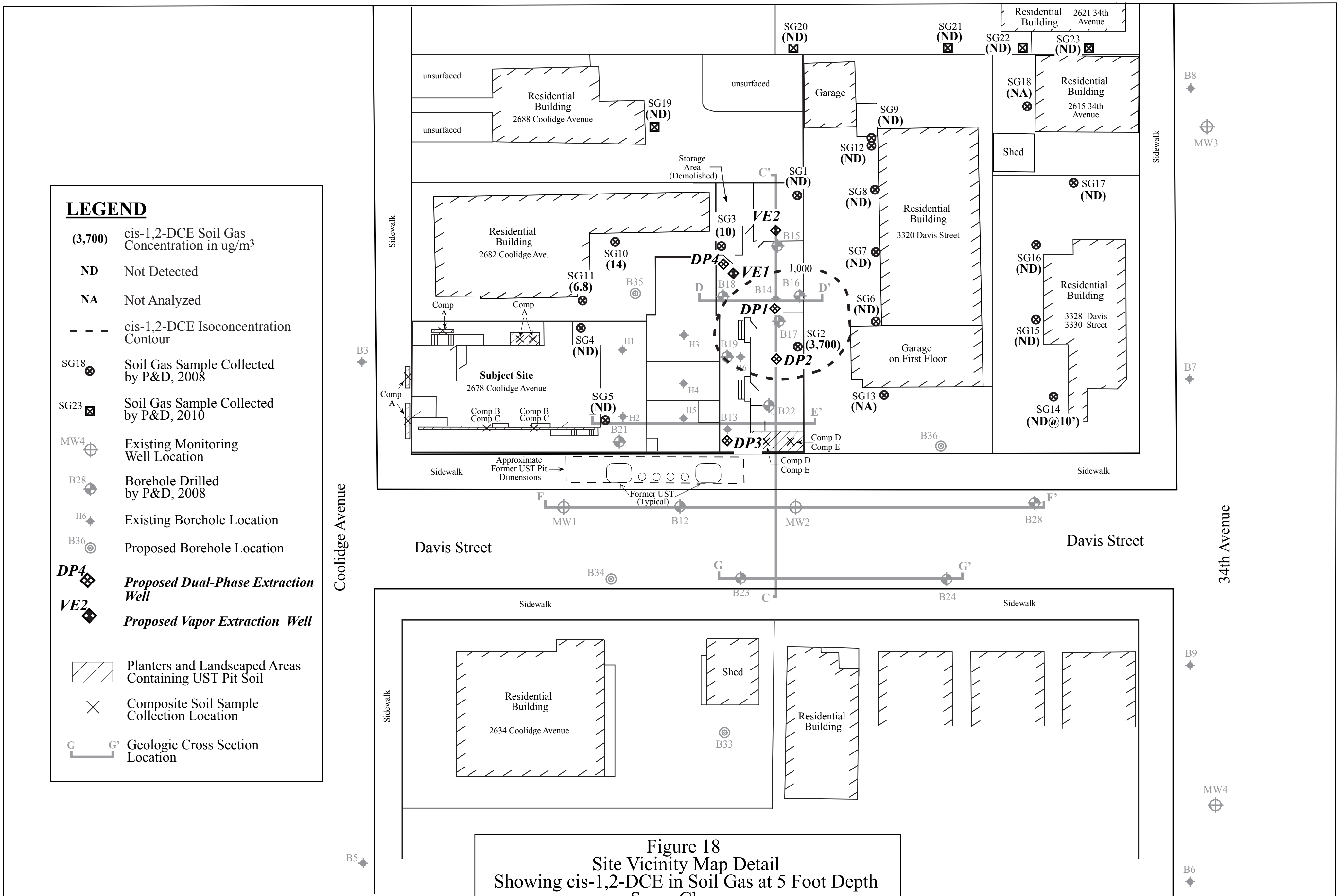

Figure 18
Site Vicinity Map Detail
Showing cis-1,2-DCE in Soil Gas at 5 Foot Depth
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

0 20 40
Scale in Feet

N

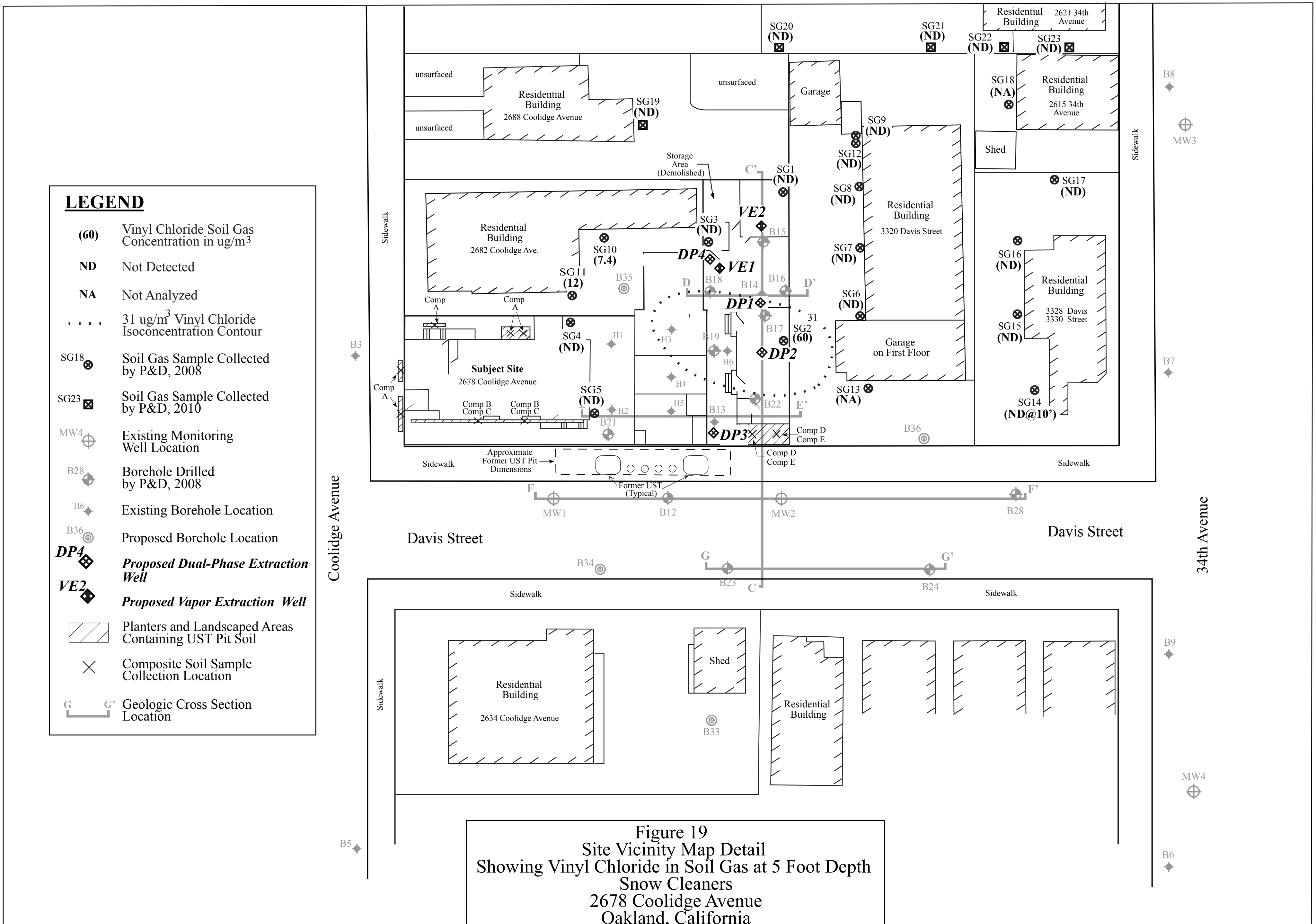

Figure 19
Site Vicinity Map Detail
Showing Vinyl Chloride in Soil Gas at 5 Foot Depth
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

Base Map from:
Kier & Wright Engineers Surveyors, Inc.
September 2008 survey

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55 Santa Clara Ave., Suite 240
Oakland, CA 94610

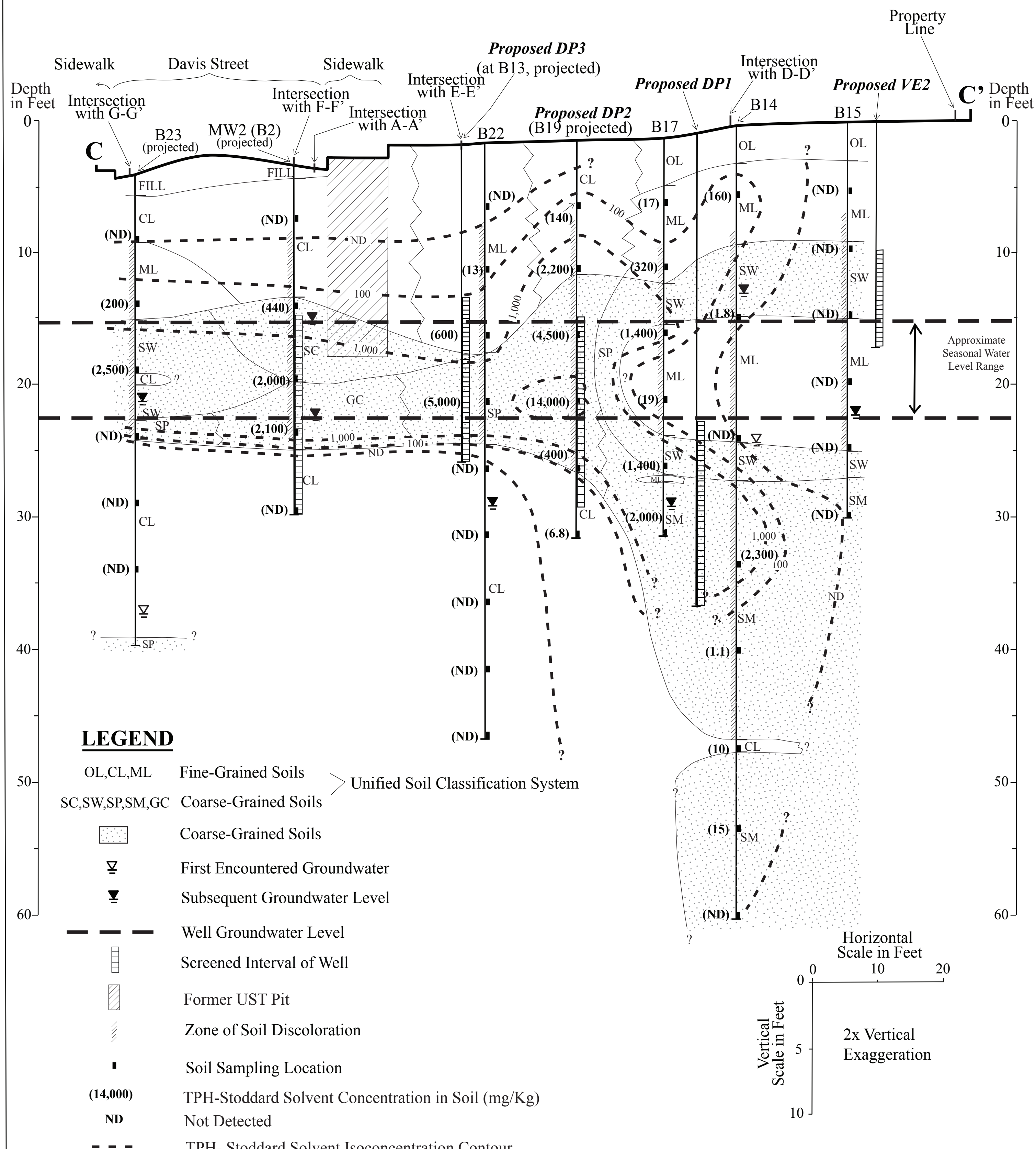


Figure 20

Geologic Cross Section C-C' Showing TPH-Stoddard Solvent in Soil

Snow Cleaners

2678 Coolidge Avenue

Oakland, California

P&D Environmental, Inc.

55 Santa Clara Ave., Suite 240

Oakland, CA 94610

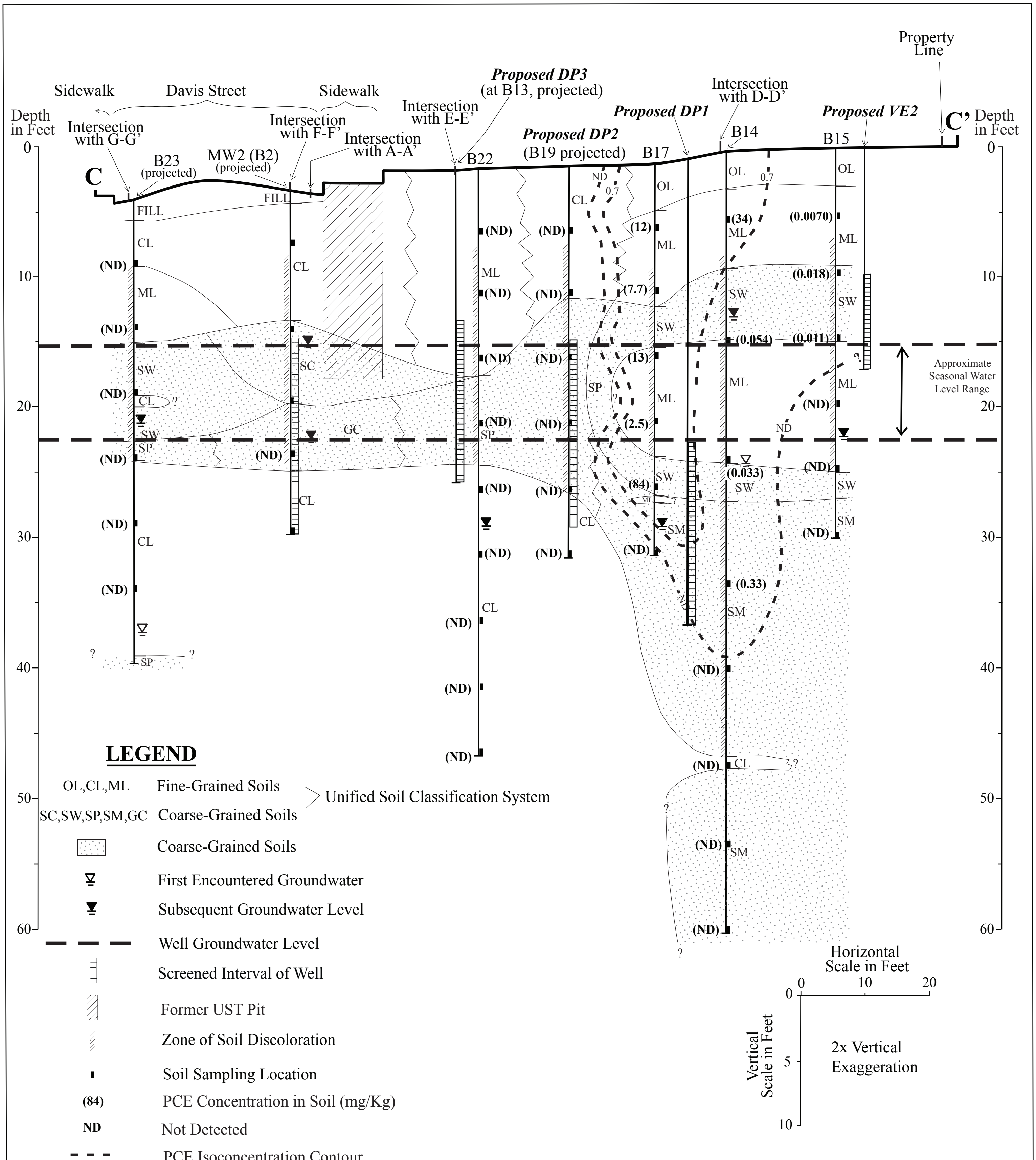


Figure 21
Geologic Cross Section C-C' Showing PCE in Soil
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

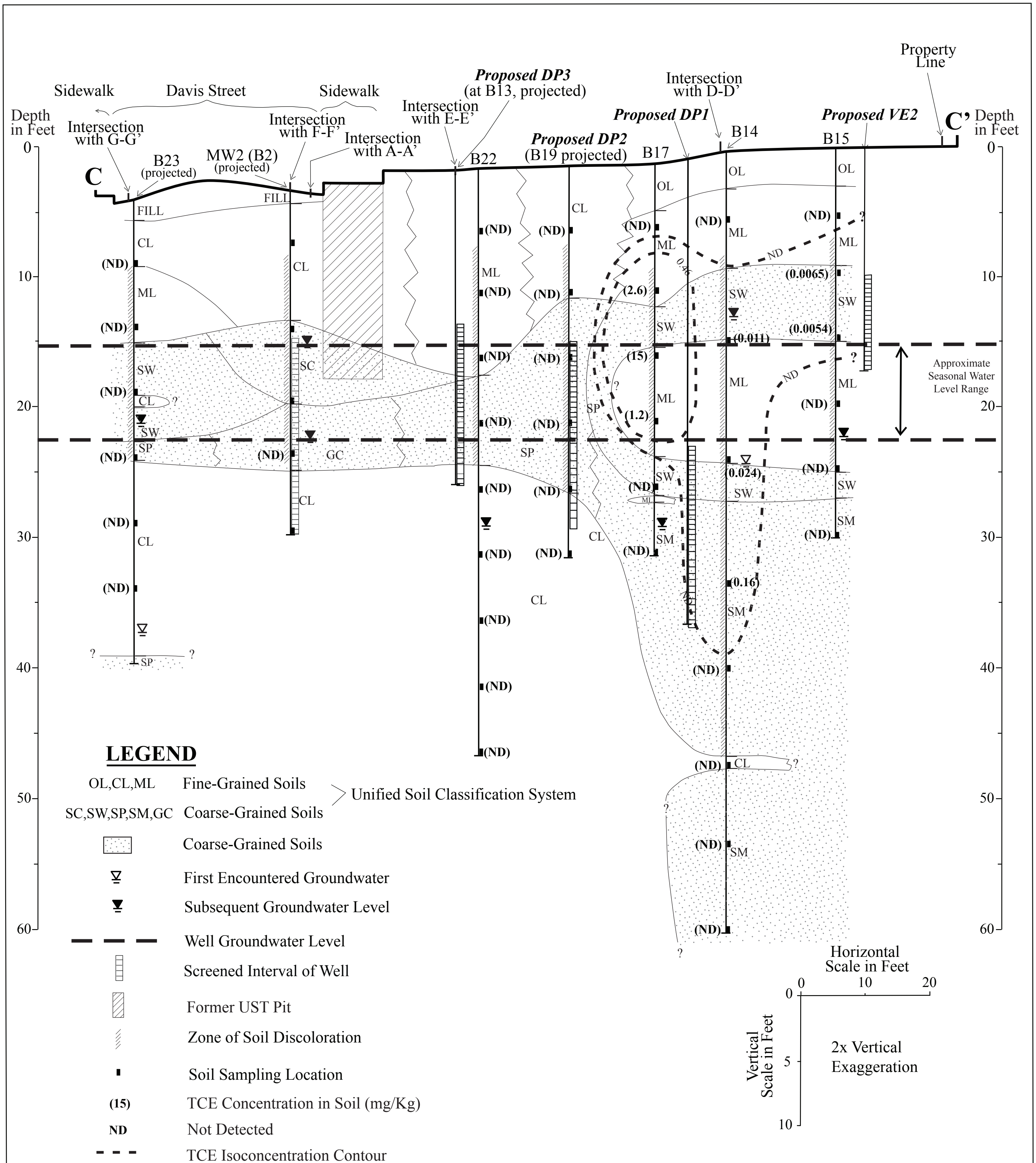


Figure 22
Geologic Cross Section C-C' Showing TCE in Soil
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

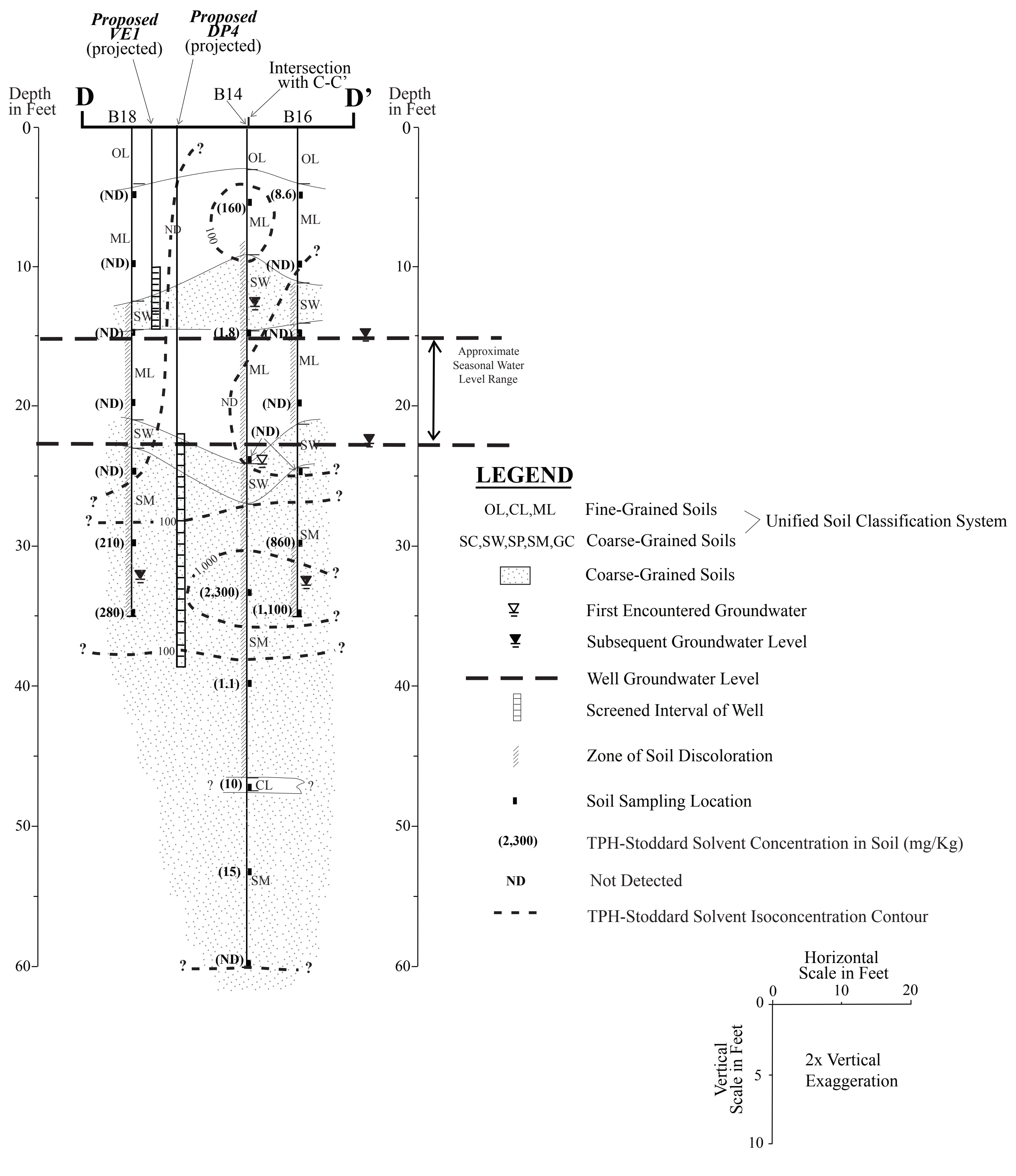
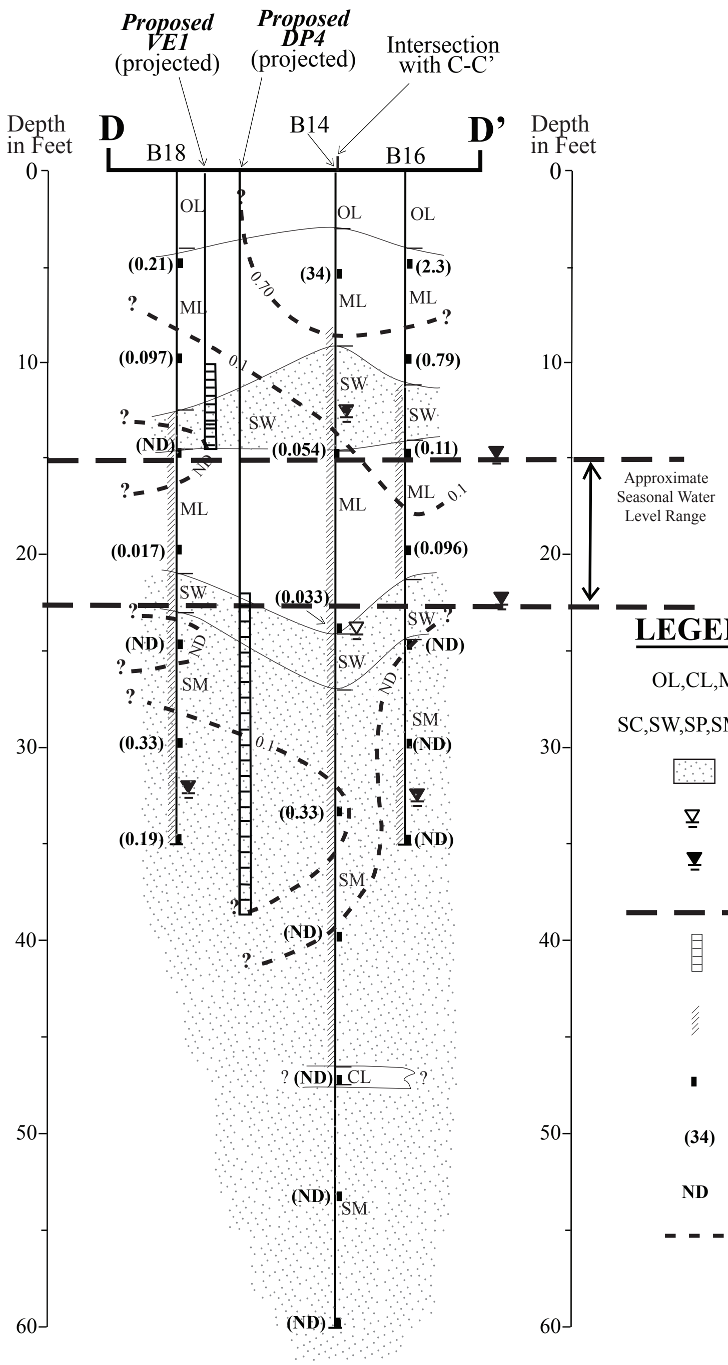


Figure 23
Geologic Cross Section D-D' Showing TPH-Stoddard Solvent in Soil
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610



LEGEND

OL,CL,ML	Fine-Grained Soils	Unified Soil Classification System
SC,SW,SP,SM,GC	Coarse-Grained Soils	
	Coarse-Grained Soils	
	First Encountered Groundwater	
	Subsequent Groundwater Level	
	Well Groundwater Level	
	Screened Interval of Well	
	Zone of Soil Discoloration	
	Soil Sampling Location	
(34)	PCE Concentration in Soil (mg/Kg)	
ND	Not Detected	
	PCE Isoconcentration Contour	

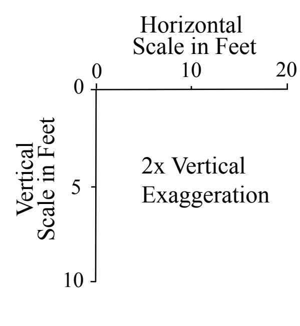


Figure 24
Geologic Cross Section D-D' Showing PCE in Soil
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

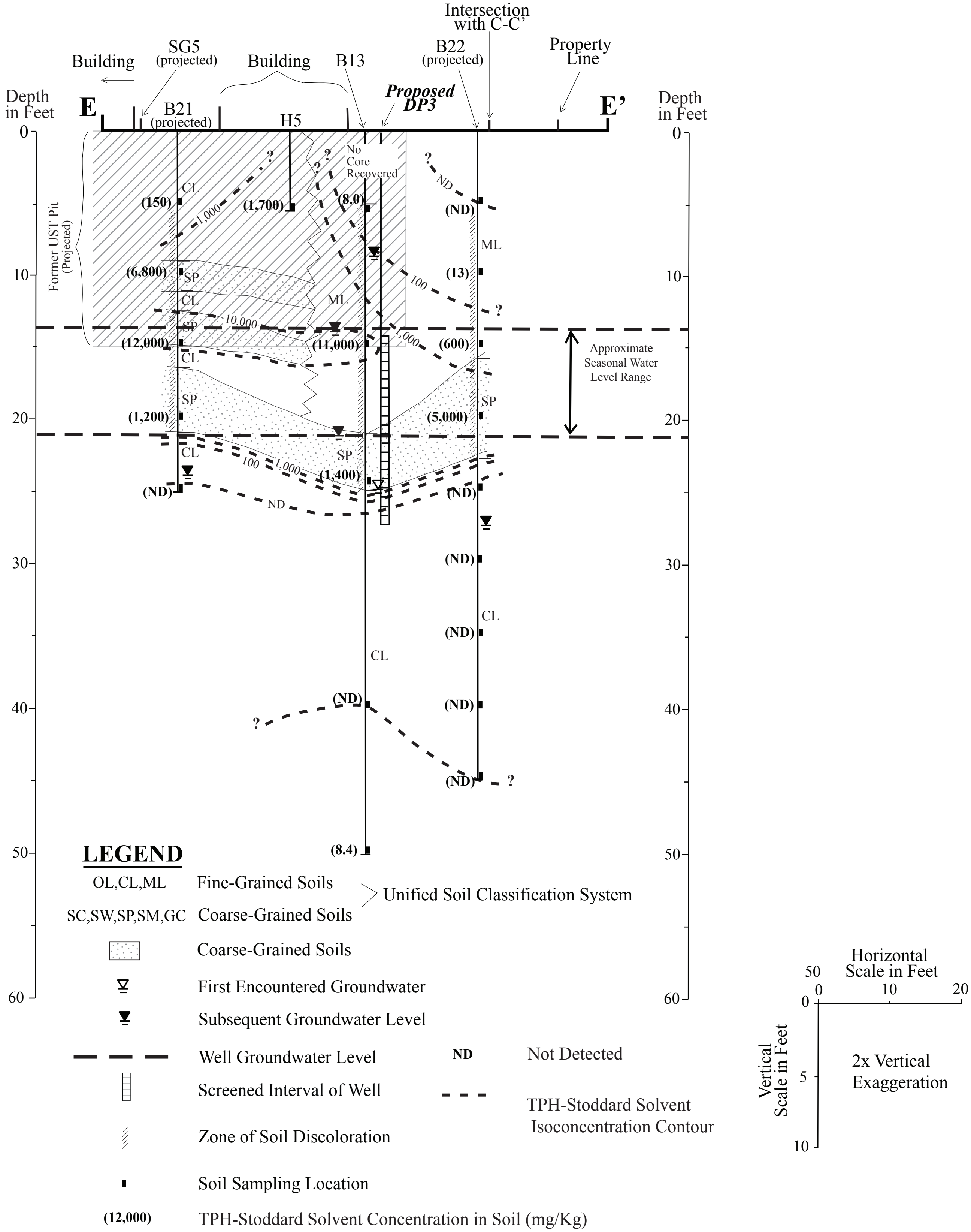


Figure 25
Geologic Cross Section E-E' Showing TPH-Stoddard Solvent in Soil
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

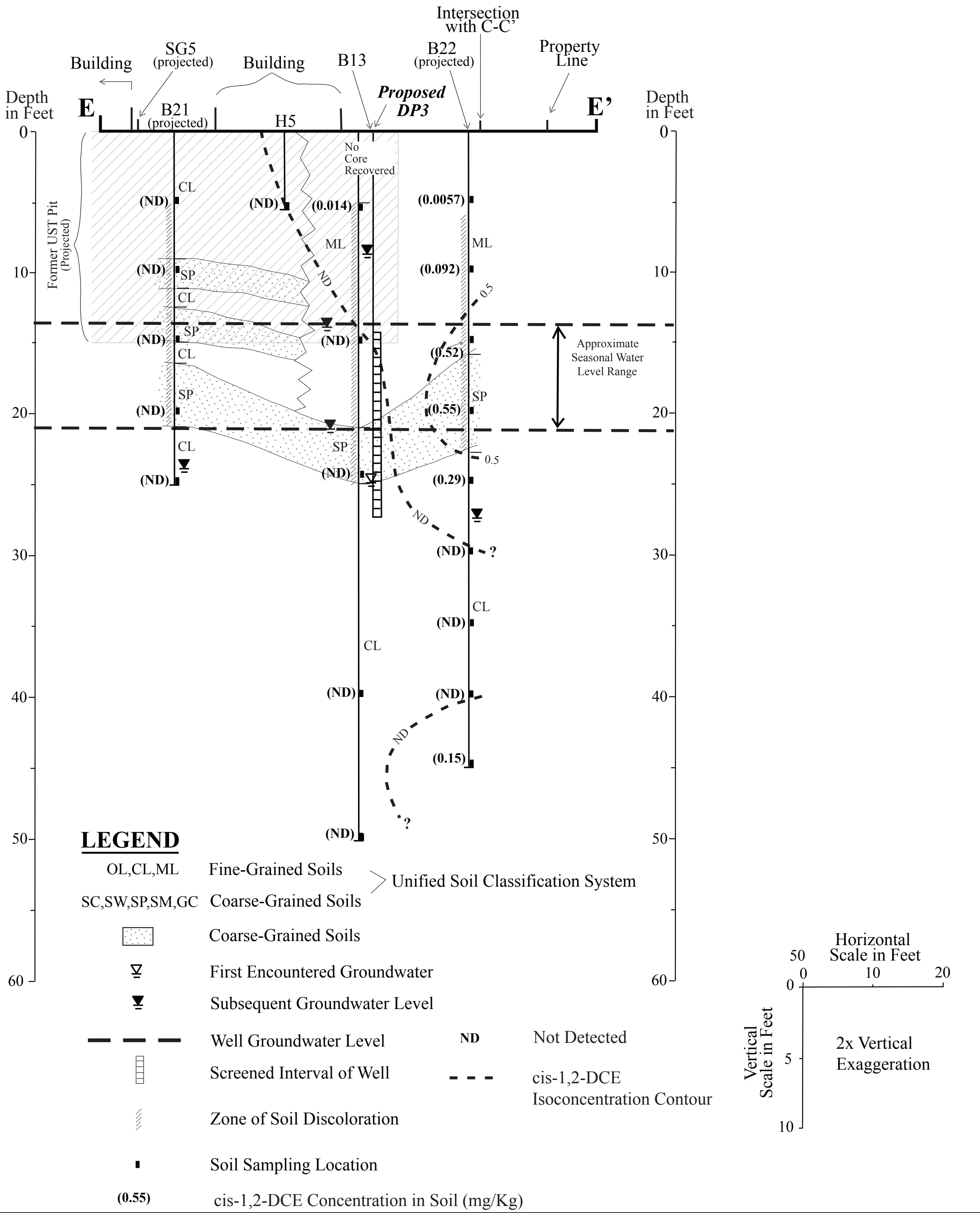


Figure 26
Geologic Cross Section E-E' Showing cis-1,2-DCE in Soil
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

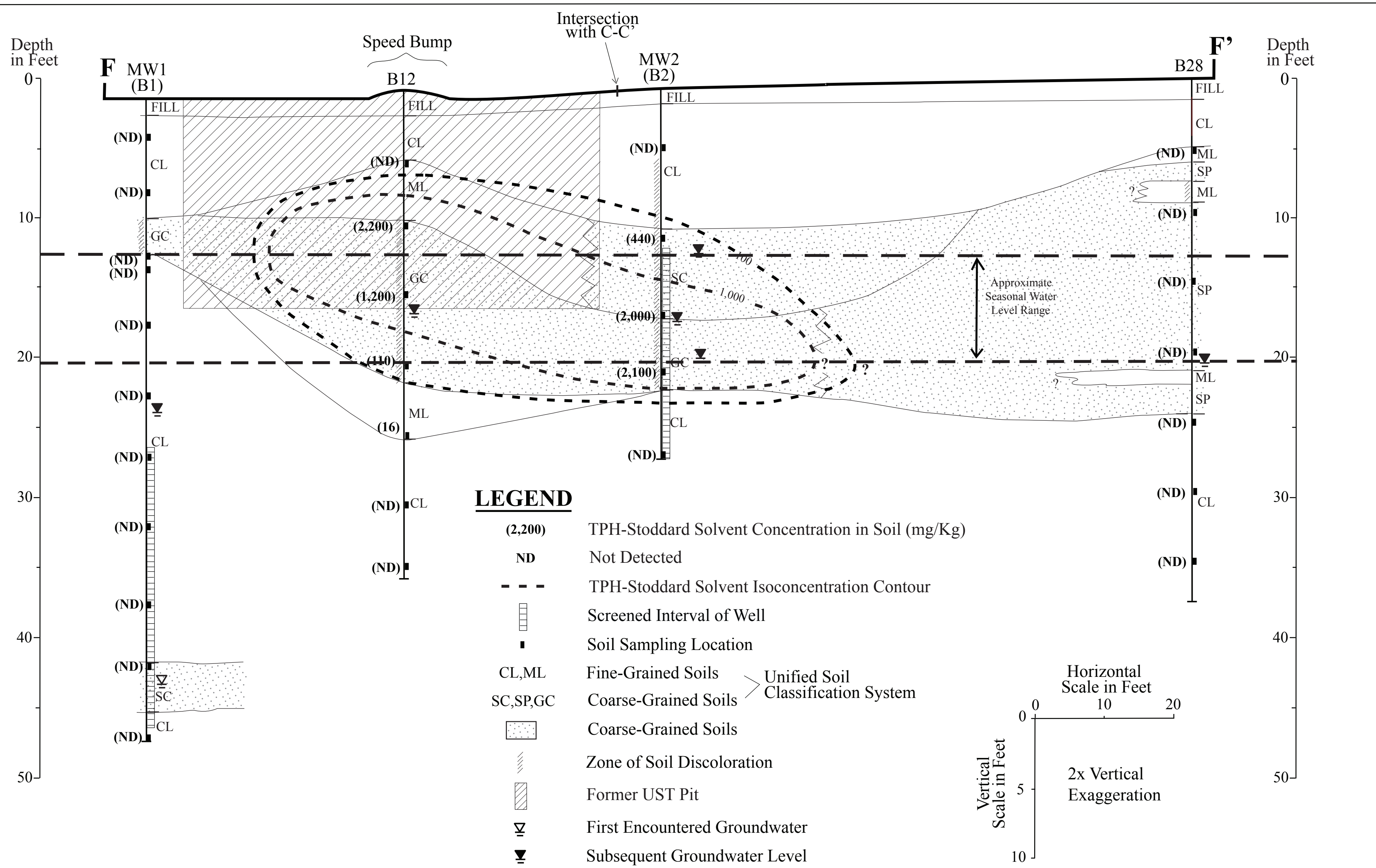


Figure 27
Geologic Cross Section F-F' Showing TPH-Stoddard Solvent in Soil
Snow Cleaners
2678 Coolidge Avenue
Oakland, California

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Oakland, CA 94610

APPENDIX A

Physical-Chemical and Toxicity Characteristics for Chemicals of Concern

Physical-Chemical and Toxicity Characteristics for Chemical of Concern

Chemical Properties Lookup Table

CalEPA Toxicity Criteria in bold (last updated 2/4/09 DTSC/HERD)

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Unit risk factor, URF ($(mg/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)	URF extrapolated (X)	RfC extrapolated (X)	Original EPA Values: Unit risk factor, URF ($(mg/m^3)^{-1}$)	Original EPA Values: Reference conc., RfC (mg/m^3)	Original EPA Values: URF extrapolated (X)	Original EPA Values: RfC extrapolated (X)
8052413	TPH-SS*	2.51E+05	1.00E-01	1.00E-05	3.40E-02	1.20E+02	1.90E+00	25	473.00	568.90	7,000	None	None	None	None	None	None	None	None	None
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.79E+03	2.27E-01	5.54E-03	25	353.24	562.16	7,342	2.9E-05	3.0E-02	7.81E+01			7.8E-06	0.0E+00		
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.62E-03	25	383.78	591.79	7,930	0.0E+00	3.0E-01	9.21E+01			0.0E+00	4.0E-01		
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.22E-01	7.86E-03	25	409.34	617.20	8,501	2.5E-06	1.0E+00	1.06E+02			0.0E+00	1.0E+00		
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.00E-01	7.32E-03	25	412.27	617.05	8,523	0.0E+00	1.0E-01	1.06E+02		?	0.0E+00	1.0E-01		
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.12E-01	5.18E-03	25	417.60	630.30	8,661	0.0E+00	1.0E-01	1.06E+02			0.0E+00	1.0E-01		
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.13E-01	7.64E-03	25	411.52	616.20	8,525	0.0E+00	1.0E-01	1.06E+02		?	0.0E+00	1.0E-01		
127184	Tetrachloroethene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.53E-01	1.84E-02	25	394.40	620.20	8,288	5.9E-06	3.5E-02	1.66E+02			3.0E-06	0.0E+00		
79016	Trichloroethene	1.66E+02	7.90E-02	9.10E-06	1.47E+03	4.21E-01	1.03E-02	25	360.36	544.20	7,505	2.0E-06	6.0E-01	1.31E+02	?		1.1E-04	4.0E-02	X	
156592	cis-1,2-Dichloroethene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544	7192	0.0E+00	3.5E-02	9.69E+01		X	0.0E+00	3.5E-02		X
156605	trans-1,2-Dichloroethene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.84E-01	9.36E-03	25	320.85	516.5	6717	0.0E+00	6.0E-02	9.69E+01		X	0.0E+00	7.0E-02		X
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-05	8.80E+03	1.10E+00	2.69E-02	25	259.25	432.00	5,250	7.8E-05	1.0E-01	6.25E+01			8.8E-06	1.0E-01		

NOTES:
TPH-SS = Total Petroleum Hydrocarbons as Stoddard solvent.
* = Data obtained from the California Department of Toxic Substances Control (DTSC) document *Interim Guidance Evaluating Human Health Risks from Total Petroleum Hydrocarbons (TPH)*, dated June 16, 2009.

APPENDIX B

SFRWQCB Basin Plan Beneficial Uses

- Existing Beneficial Uses Dated January 18, 2007
- Proposed Beneficial Uses for Adoption on July 14, 2010

SFRWQCB Basin Plan Beneficial Uses - Existing Dated
January 18, 2007

CHAPTER 2: BENEFICIAL USES

State policy for water quality control in California is directed toward achieving the highest water quality consistent with maximum benefit to the people of the state. Aquatic ecosystems and underground aquifers provide many different benefits to the people of the state. The beneficial uses described in detail in this chapter define the resources, services, and qualities of these aquatic systems that are the ultimate goals of protecting and achieving high water quality. The Regional Board is charged with protecting all these uses from pollution and nuisance that may occur as a result of waste discharges in the region. Beneficial uses of surface waters, groundwaters, marshes, and mudflats presented here serve as a basis for establishing water quality objectives and discharge prohibitions to attain this goal.

2.1 DEFINITIONS OF BENEFICIAL USES

The following definitions (in italic) for beneficial uses are applicable throughout the entire state. A brief description of the most important water quality requirements for each beneficial use follows each definition (in alphabetical order by abbreviation).

2.1.1 AGRICULTURAL SUPPLY (AGR)

Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

The criteria discussed under municipal and domestic water supply (MUN) also effectively protect farmstead uses. To establish water quality criteria for livestock water supply, the Regional Board must consider the relationship of water to the total diet, including water freely drunk, moisture content of feed, and interactions between irrigation water quality and feed quality. The University of California Cooperative Extension has developed threshold and limiting concentrations for livestock and irrigation water. Continued irrigation often leads to one or more of four types of hazards related to water quality and the nature of soils and crops. These hazards are (1) soluble salt accumulations, (2) chemical changes in the soil, (3) toxicity to crops, and (4) potential disease transmission to humans through reclaimed water use. Irrigation water classification systems, arable soil classification systems, and public health criteria related to reuse of wastewater have been developed with consideration given to these hazards.

2.1.2 AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

Areas designated by the State Water Board.

These include marine life refuges, ecological reserves, and designated areas where the preservation and enhancement of natural resources requires special protection. In these areas, alteration of natural water quality is undesirable. The areas that have been designated as ASBS in this Region are Bird Rock, Point Reyes Headland Reserve and Extension, Double Point, Duxbury Reef Reserve and Extension, Farallon Islands, and James V. Fitzgerald Marine Reserve, depicted in Figure 2-1. The 2001 California Ocean Plan (see Chapter 5) prohibits waste discharges into, and requires wastes to be discharged at a sufficient distance from, these areas to assure maintenance

The requirements for groundwater recharge operations generally reflect the future use to be made of the water stored underground. In some cases, recharge operations may be conducted to prevent seawater intrusion. In these cases, the quality of recharged waters may not directly affect quality at the wellfield being protected. Recharge operations are often limited by excessive suspended sediment or turbidity that can clog the surface of recharge pits, basins, or wells.

Under the state Antidegradation Policy, the quality of some of the waters of the state is higher than established by adopted policies. It is the intent of this policy to maintain that existing higher quality to the maximum extent possible.

Requirements for groundwater recharge, therefore, shall impose the Best Available Technology (BAT) or Best Management Practices (BMPs) for control of the discharge as necessary to assure the highest quality consistent with maximum benefit to the people of the state. Additionally, it must be recognized that groundwater recharge occurs naturally in many areas from streams and reservoirs. This recharge may have little impact on the quality of groundwaters under normal circumstances, but it may act to transport pollutants from the recharging water body to the groundwater. Therefore, groundwater recharge must be considered when requirements are established.

2.1.8 INDUSTRIAL SERVICE SUPPLY (IND)

Uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Most industrial service supplies have essentially no water quality limitations except for gross constraints, such as freedom from unusual debris.

2.1.9 MARINE HABITAT (MAR)

Uses of water that support marine ecosystems, including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

In many cases, the protection of marine habitat will be accomplished by measures that protect wildlife habitat generally, but more stringent criteria may be necessary for waterfowl marshes and other habitats, such as those for shellfish and marine fishes. Some marine habitats, such as important intertidal zones and kelp beds, may require special protection.

2.1.10 FISH MIGRATION (MIGR)

Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.

The water quality provisions acceptable to cold water fish generally protect anadromous fish as well. However, particular attention must be paid to maintaining zones of passage. Any barrier to migration or free movement of migratory fish is harmful. Natural tidal movement in estuaries and unimpeded river flows are necessary to sustain migratory fish and their offspring. A water quality barrier, whether thermal, physical, or chemical, can destroy the integrity of the migration route and lead to the rapid decline of dependent fisheries.

Water quality may vary through a zone of passage as a result of natural or human- induced activities. Fresh water entering estuaries may float on the surface of the denser salt water or hug one shore as a result of density differences related to water temperature, salinity, or suspended matter.

2.1.11 MUNICIPAL AND DOMESTIC SUPPLY (MUN)

Uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply.

The principal issues involving municipal water supply quality are (1) protection of public health; (2) aesthetic acceptability of the water; and (3) the economic impacts associated with treatment- or quality-related damages.

The health aspects broadly relate to: direct disease transmission, such as the possibility of contracting typhoid fever or cholera from contaminated water; toxic effects, such as links between nitrate and methemoglobinemia (blue babies); and increased susceptibility to disease, such as links between halogenated organic compounds and cancer.

Aesthetic acceptance varies widely depending on the nature of the supply source to which people have become accustomed. However, the parameters of general concern are excessive hardness, unpleasant odor or taste, turbidity, and color. In each case, treatment can improve acceptability although its cost may not be economically justified when alternative water supply sources of suitable quality are available.

Published water quality objectives give limits for known health-related constituents and most properties affecting public acceptance. These objectives for drinking water include the U.S. Environmental Protection Agency Drinking Water Standards and the California State Department of Health Services criteria.

2.1.12 NAVIGATION (NAV)

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

2.1.13 INDUSTRIAL PROCESS SUPPLY (PRO)

Uses of water for industrial activities that depend primarily on water quality.

Water quality requirements differ widely for the many industrial processes in use today. So many specific industrial processes exist with differing water quality requirements that no meaningful criteria can be established generally for quality of raw water supplies. Fortunately, this is not a serious shortcoming, since current water treatment technology can create desired product waters tailored for specific uses.

2.1.14 PRESERVATION OF RARE AND ENDANGERED SPECIES (RARE)

Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.

The water quality criteria to be achieved that would encourage development and protection of rare and endangered species should be the same as those for protection of fish and wildlife habitats generally. However, where rare or endangered species exist, special control requirements may be necessary to assure attainment and maintenance of particular quality criteria, which may vary slightly with the environmental needs of each particular species. Criteria for species using areas of special biological significance should likewise be derived from the general criteria for the habitat types involved, with special management diligence given where required.

2.1.15 WATER CONTACT RECREATION (REC1)

Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and uses of natural hot springs.

Water contact implies a risk of waterborne disease transmission and involves human health; accordingly, criteria required to protect this use are more stringent than those for more casual water-oriented recreation.

Excessive algal growth has reduced the value of shoreline recreation areas in some cases, particularly for swimming. Where algal growths exist in nuisance proportions, particularly bluegreen algae, all recreational water uses, including fishing, tend to suffer.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.16 NONCONTACT WATER RECREATION (REC2)

Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Water quality considerations relevant to noncontact water recreation, such as hiking, camping, or boating, and those activities related to tide pool or other nature studies require protection of habitats and aesthetic features. In some cases, preservation of a natural wilderness condition is justified, particularly when nature study is a major dedicated use.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.17 SHELLFISH HARVESTING (SHELL)

Uses of water that support habitats suitable for the collection of crustaceans and filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

Shellfish harvesting areas require protection and management to preserve the resource and protect public health. The potential for disease transmission and direct poisoning of humans is of considerable concern in shellfish regulation. The bacteriological criteria for the open ocean, bays, and estuarine waters where shellfish cultivation and harvesting occur should conform with the standards described in the National Shellfish Sanitation Program, Manual of Operation.

Toxic metals can accumulate in shellfish. Mercury and cadmium are two metals known to have caused extremely disabling effects in humans who consumed shellfish that concentrated these elements from industrial waste discharges. Other elements, radioactive isotopes, and certain toxins produced by particular plankton species also concentrate in shellfish tissue. Documented cases of paralytic shellfish poisoning are not uncommon in California.

2.1.18 FISH SPAWNING (SPWN)

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Dissolved oxygen levels in spawning areas should ideally approach saturation levels. Free movement of water is essential to maintain well-oxygenated conditions around eggs deposited in sediments. Water temperature, size distribution and organic content of sediments, water depth, and current velocity are also important determinants of spawning area adequacy.

2.1.19 WARM FRESHWATER HABITAT (WARM)

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

The warm freshwater habitats supporting bass, bluegill, perch, and other panfish are generally lakes and reservoirs, although some minor streams will serve this purpose where stream flow is sufficient to sustain the fishery. The habitat is also important to a variety of nonfish species, such as frogs, crayfish, and insects, which provide food for fish and small mammals. This habitat is less sensitive to environmental changes, but more diverse than the cold freshwater habitat, and natural fluctuations in temperature, dissolved oxygen, pH, and turbidity are usually greater.

2.1.20 WILDLIFE HABITAT (WILD)

Uses of waters that support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.

The two most important types of wildlife habitat are riparian and wetland habitats. These habitats can be threatened by development, erosion, andsedimentation, as well as by poor water quality.

The water quality requirements of wildlife pertain to the water directly ingested, the aquatic habitat itself, and the effect of water quality on the production of food materials. Waterfowl habitat is particularly sensitive to changes in water quality. Dissolved oxygen, pH, alkalinity, salinity, turbidity, settleable matter, oil, toxicants, and specific disease organisms are water quality characteristics particularly important to waterfowl habitat. Dissolved oxygen is needed in waterfowl habitats to suppress development of botulism organisms; botulism has killed millions of waterfowl. It is particularly important to maintain adequate circulation and aerobic conditions in shallow fringe areas of ponds or reservoirs where botulism has caused problems.

2.2 PRESENT AND POTENTIAL BENEFICIAL USES

2.2.1 SURFACE WATERS

Surface waters in the Region consist of non-tidal wetlands, rivers, streams, and lakes (collectively described as inland surface waters), estuarine wetlands known as baylands, estuarine waters, and coastal waters. In this Region, estuarine waters consist of the Bay system including intertidal, tidal, and subtidal habitats from the Golden Gate to the Region's boundary near Pittsburg and the lower portions of streams that are affected by tidal hydrology, such as the Napa and Petaluma rivers in the north and Coyote and San Francisquito creeks in the south.

Inland surface waters support or could support most of the beneficial uses described above. The specific beneficial uses for inland streams include municipal and domestic supply (MUN), agricultural supply (AGR), industrial process supply (PRO), groundwater recharge (GWR), water contact recreation (REC1), noncontact water recreation (REC2), wildlife habitat (WILD), cold freshwater habitat (COLD), warm freshwater habitat (WARM), fish migration (MIGR), and fish spawning (SPWN). The San Francisco Bay Estuary supports estuarine habitat (EST), industrial service supply (IND), and navigation (NAV) in addition to all of the uses supported by streams.

Coastal waters' beneficial uses include water contact recreation (REC1); noncontact water recreation (REC2); industrial service supply (IND); navigation (NAV); marine habitat (MAR); shellfish harvesting (SHELL); ocean, commercial and sport fishing (COMM); and preservation of rare and endangered species (RARE). In addition, the California coastline within the Region is endowed with exceptional scenic beauty.

Beneficial uses of each significant water body have been identified and are organized according to the seven major hydrologic units within the Region (Figure 2-2). Table 2-1 contains the beneficial uses for water bodies that have been designated in the Region. The maps locating each water body (Figures 2-3 through 2-9) were produced using a geographical information system (GIS) at the Water Board. The maps use the hydrologic basin information compiled by the California Interagency Watershed map, with supplemental information from the Oakland Museum of California Creek and Watershed Map series, the Contra Costa County Watershed Atlas, and the San Francisco Estuary Institute EcoAtlas. More detailed representations of each location can be created using this GIS version.

The beneficial uses of any specifically identified water body generally apply to all its tributaries. In some cases a beneficial use may not be applicable to the entire body of water, such as navigation in Richardson Bay or shellfish harvesting in the Pacific Ocean. In these cases, the

SFRWQCB Basin Plan Beneficial Uses - Proposed for Adoption on July 14, 2010

SOUTH BAY BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN MATEO COUNTY, continued																			
Borel Creek															E	E	E	E	
O'Neill Slough										E						E	E	E	
Foster City Lagoon										E						E	E	E	
Belmont Slough										E			E	E		E	E	E	
Belmont Creek															E	E	E	E	
Laurel Creek (San Mateo)															E	E	E	E	
Bay Slough (San Mateo)										E			E			E	E	E	
Steinberger Slough										E			E			E	E	E	
Bair Island Wetlands										E			E			E	E	E	
Corkscrew Slough										E			E			E	E	E	
Smith Slough (San Mateo)										E			E			E	E	E	
Pulgas Creek															E	E	E	E	
Cordilleras Creek															E	E	E	E	
Redwood Slough										E			E			E	E	E	E
Redwood Creek – nontidal (San Mateo)															E	E	E	E	
Arroyo Ojo de Agua															E	E	E	E	
Westpoint Slough										E			E			E	E	E	
Atherton Creek															E	E	E	E	
Ravenswood Slough										E			E			E	E	E	
ALAMEDA COUNTY																			
Oakland Inner Harbor										E						E	E	E	E
Merritt Channel							E			E						E	E	E	
Lake Merritt							E	E		E				E	E	E	E	E	
Glen Echo Creek															E	E	E	E	
Sausal Creek (Alameda)									E				E	E	E	E	E	E	
Peralta Creek															E	E	E	E	
Lion Creek									E						E	E	E	E	
Arroyo Viejo									E						E	E	E	E	
Rifle Range Creek															E	E	E	E	
San Leandro Bay							E			E		E	E			E	E	E	E
~~Lower~~ San Leandro Creek			E						E			~~P~~E	E	~~P~~E	~~P~~E	E	~~P~~E	~~P~~E	
Grass Valley Creek			E						E						E	E	E	E	

E: Existing beneficial use E*: Existing beneficial use, but administrative or physical barriers to full body contact are in place P: Potential beneficial use

Amend the language of Chapter 2 as follows. Underline indicates new text, strikethrough indicates deleted text. Section 2.2.2, entitled Groundwater, and Tables 2-2 and 2-3 are not shown because there are no changes.

CHAPTER 2: BENEFICIAL USES

State policy for water quality control in California is directed toward achieving the highest water quality consistent with maximum benefit to the people of the state. Aquatic ecosystems and underground aquifers provide many different benefits to the people of the state. The beneficial uses described in detail in this chapter define the resources, services, and qualities of these aquatic systems that are the ultimate goals of protecting and achieving high water quality. The ~~Regional~~ Water Board is charged with protecting all these uses from pollution and nuisance that may occur as a result of waste discharges in the region. Beneficial uses of surface waters, including wetlands, and groundwaters~~, marshes, and mudflats wetlands~~ presented here serve as a basis for establishing water quality objectives and discharge prohibitions to attain th~~i~~ese goals.

Beneficial use designations for any given water body do not rule out the possibility that other beneficial uses exist or have the potential to exist. Existing beneficial uses that have not been formally designated in this Basin Plan are protected whether or not they are identified. While the tables in this Chapter list a large, representative portion of the water bodies in our region, it is not practical to list each and every water body.

2.1 DEFINITIONS OF BENEFICIAL USES

The following definitions (in italic) for beneficial uses are applicable throughout the entire state. A brief description of the most important water quality requirements for each beneficial use follows each definition (in alphabetical order by abbreviation).

2.1.1 AGRICULTURAL SUPPLY (AGR)

Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

The criteria discussed under municipal and domestic water supply (MUN) also effectively protect farmstead uses. To establish water quality criteria for livestock water supply, the ~~Regional~~ Water Board must consider the relationship of water to the total diet, including water freely drunk, moisture content of feed, and interactions between irrigation water quality and feed quality. The University of California Cooperative Extension has developed threshold and limiting concentrations for livestock and irrigation water. Continued irrigation often leads to one or more of four types of hazards related to water quality and the nature of soils and crops. These hazards are (1) soluble salt accumulations, (2) chemical changes in the soil, (3) toxicity to crops, and (4) potential disease transmission to humans through reclaimed water use. Irrigation water classification systems, arable soil classification systems, and public health criteria related to reuse of wastewater have been developed with consideration given to these hazards.

2.1.2 AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

Areas designated by the State Water Board.

These include marine life refuges, ecological reserves, and designated areas where the preservation and enhancement of natural resources requires special protection. In these areas, alteration of natural water quality is undesirable. The areas that have been designated as ASBS in this Region are Bird Rock, Point Reyes Headland Reserve and Extension, Double Point, Duxbury Reef Reserve and Extension, Farallon Islands, and James V. Fitzgerald Marine Reserve, depicted in Figure 2-1. The ~~2001~~ California Ocean Plan ~~(see Chapter 5)~~ prohibits waste discharges into, and requires wastes to be discharged at a sufficient distance from, these areas to assure maintenance of natural water quality conditions. These areas have been designated as a subset of State Water Quality Protection Areas as per the Public Resources Code.

2.1.3 COLD FRESHWATER HABITAT (COLD)

Uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold freshwater habitats generally support trout and may support ~~the~~ anadromous salmon and steelhead fisheries as well. Cold water habitats are commonly well-oxygenated. Life within these waters is relatively intolerant to environmental stresses. Often, soft waters feed cold water habitats. These waters render fish more susceptible to toxic metals, such as copper, because of their lower buffering capacity.

2.1.4 ~~OCEAN,~~ COMMERCIAL~~,~~ AND SPORT FISHING (COMM)

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms ~~in oceans, bays, and estuaries~~, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

To maintain ~~ocean~~ fishing, the aquatic life habitats where fish reproduce and seek their food must be protected. Habitat protection is under descriptions of other beneficial uses.

2.1.5 ESTUARINE HABITAT (EST)

Uses of water that support estuarine ecosystems, including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds), and the propagation, sustenance, and migration of estuarine organisms.

Estuarine habitat provides an essential and unique habitat that serves to acclimate anadromous fishes (e.g., salmon, striped bass) migrating into fresh or marine water conditions. The protection of estuarine habitat is contingent upon (1) the maintenance of adequate Delta outflow to provide mixing and salinity control; and (2) provisions to protect wildlife habitat associated with marshlands and the Bay periphery (i.e., prevention of fill activities). Estuarine habitat is generally associated with moderate seasonal fluctuations in dissolved oxygen, pH, and temperature and with a wide range in turbidity.

2.1.6 FRESHWATER REPLENISHMENT (FRESH)

Uses of water for natural or artificial maintenance of surface water quantity or quality.

Fresh water inputs are important for maintaining salinity balance, flow, and/or water quantity for such surface waterbodies as marshes, wetlands, and lakes.

2.1.7 GROUNDWATER RECHARGE (GWR)

Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting saltwater intrusion into freshwater aquifers.

The requirements for groundwater recharge operations generally reflect the future use to be made of the water stored underground. In some cases, recharge operations may be conducted to prevent seawater intrusion. In these cases, the quality of recharged waters may not directly affect quality at the wellfield being protected. Recharge operations are often limited by excessive suspended sediment or turbidity that can clog the surface of recharge pits, basins, or wells.

Under the state Antidegradation Policy, the quality of some of the waters of the state is higher than established by adopted policies. It is the intent of this policy to maintain that existing higher water quality to the maximum extent possible.

Requirements for groundwater recharge, therefore, shall impose the Best Available Technology (BAT) or Best Management Practices (BMPs) for control of the discharge as necessary to assure the highest quality consistent with maximum benefit to the people of the state. Additionally, it must be recognized that groundwater recharge occurs naturally in many areas from streams and reservoirs. This recharge may have little impact on the quality of groundwaters under normal circumstances, but it may act to transport pollutants from the recharging water body to the groundwater. Therefore, groundwater recharge must be considered when requirements are established.

2.1.8 INDUSTRIAL SERVICE SUPPLY (IND)

Uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Most industrial service supplies have essentially no water quality limitations except for gross constraints, such as freedom from unusual debris.

2.1.9 MARINE HABITAT (MAR)

Uses of water that support marine ecosystems, including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

In many cases, the protection of marine habitat will be accomplished by measures that protect wildlife habitat generally, but more stringent criteria may be necessary for waterfowl marshes and other habitats, such as those for shellfish and marine fishes. Some marine habitats, such as important intertidal zones and kelp beds, may require special protection.

2.1.10 FISH MIGRATION (MIGR)

Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.

The water quality provisions acceptable to cold water fish generally protect anadromous fish as well. However, particular attention must be paid to maintaining zones of passage. Any barrier to migration or free movement of migratory fish is harmful. Natural tidal movement in estuaries and unimpeded river flows are necessary to sustain migratory fish and their offspring. A water quality barrier, whether thermal, physical, or chemical, can destroy the integrity of the migration route and lead to the rapid decline of dependent fisheries.

Water quality may vary through a zone of passage as a result of natural or human- induced activities. Fresh water entering estuaries may float on the surface of the denser salt water or hug one shore as a result of density differences related to water temperature, salinity, or suspended matter.

2.1.11 MUNICIPAL AND DOMESTIC SUPPLY (MUN)

Uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply.

The principal issues involving municipal water supply quality are (1) protection of public health; (2) aesthetic acceptability of the water; and (3) the economic impacts associated with treatment- or quality-related damages.

The health aspects broadly relate to: direct disease transmission, such as the possibility of contracting typhoid fever or cholera from contaminated water; toxic effects, such as links between nitrate and methemoglobinemia (blue babies); and increased susceptibility to disease, such as links between halogenated organic compounds and cancer.

Aesthetic acceptance varies widely depending on the nature of the supply source to which people have become accustomed. However, the parameters of general concern are excessive hardness, unpleasant odor or taste, turbidity, and color. In each case, treatment can improve acceptability although its cost may not be economically justified when alternative water supply sources of suitable quality are available.

Published water quality objectives give limits for known health-related constituents and most properties affecting public acceptance. These objectives for drinking water include the U.S. Environmental Protection Agency Drinking Water Standards and the California State Department of Health Services criteria.

2.1.12 NAVIGATION (NAV)

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Navigation is a designated use where water is used for shipping, travel, or other transportation by private, military, or commercial vessels.

2.1.13 INDUSTRIAL PROCESS SUPPLY (PROC)

Uses of water for industrial activities that depend primarily on water quality.

Water quality requirements differ widely for the many industrial processes in use today. So many specific industrial processes exist with differing water quality requirements that no meaningful criteria can be established generally for quality of raw water supplies. Fortunately, this is not a serious shortcoming, since current water treatment technology can create desired product waters tailored for specific uses.

2.1.14 PRESERVATION OF RARE AND ENDANGERED SPECIES (RARE)

Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.

The water quality criteria to be achieved that would encourage development and protection of rare and endangered species should be the same as those for protection of fish and wildlife habitats generally. However, where rare or endangered species exist, special control requirements may be necessary to assure attainment and maintenance of particular quality criteria, which may vary slightly with the environmental needs of each particular species. Criteria for species using areas of special biological significance should likewise be derived from the general criteria for the habitat types involved, with special management diligence given where required.

2.1.15 WATER CONTACT RECREATION (REC1)

Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and uses of natural hot springs.

Water contact implies a risk of waterborne disease transmission and involves human health; accordingly, criteria required to protect this use are more stringent than those for more casual water-oriented recreation.

Excessive algal growth has reduced the value of shoreline recreation areas in some cases, particularly for swimming. Where algal growths exist in nuisance proportions, particularly bluegreen algae, all recreational water uses, including fishing, tend to suffer.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.16 NONCONTACT WATER RECREATION (REC2)

Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Water quality considerations relevant to noncontact water recreation, such as hiking, camping, or boating, and those activities related to tide pool or other nature studies require protection of habitats and aesthetic features. In some cases, preservation of a natural wilderness condition is justified, particularly when nature study is a major dedicated use.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.17 SHELLFISH HARVESTING (SHELL)

Uses of water that support habitats suitable for the collection of crustaceans and filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

Shellfish harvesting areas require protection and management to preserve the resource and protect public health. The potential for disease transmission and direct poisoning of humans is of considerable concern in shellfish regulation. The bacteriological criteria for the open ocean, bays, and estuarine waters where shellfish cultivation and harvesting occur should conform with the standards described in the National Shellfish Sanitation Program, Manual of Operation.

Toxic metals can accumulate in shellfish. Mercury and cadmium are two metals known to have caused extremely disabling effects in humans who consumed shellfish that concentrated these elements from industrial waste discharges. Other elements, radioactive isotopes, and certain toxins produced by particular plankton species also concentrate in shellfish tissue. Documented cases of paralytic shellfish poisoning are not uncommon in California.

2.1.18 FISH SPAWNING (SPWN)

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Dissolved oxygen levels in spawning areas should ideally approach saturation levels. Free movement of water is essential to maintain well-oxygenated conditions around eggs deposited in sediments. Water temperature, size distribution and organic content of sediments, water depth, and current velocity are also important determinants of spawning area adequacy.

2.1.19 WARM FRESHWATER HABITAT (WARM)

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

The warm freshwater habitats supporting bass, bluegill, perch, and other ~~pan~~fish are generally lakes and reservoirs, although some minor streams will serve this purpose where stream flow is sufficient to sustain the fishery. The habitat is also important to a variety of nonfish species, such as frogs, crayfish, and insects, which provide food for fish and small mammals. This habitat is less sensitive to environmental changes, but more diverse than the cold freshwater habitat, and natural fluctuations in temperature, dissolved oxygen, pH, and turbidity are usually greater.

2.1.20 WILDLIFE HABITAT (WILD)

Uses of waters that support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.

The two most important types of wildlife habitat are riparian and wetland habitats. These habitats can be threatened by development, erosion, and sedimentation, as well as by poor water quality.

The water quality requirements of wildlife pertain to the water directly ingested, the aquatic habitat itself, and the effect of water quality on the production of food materials. Waterfowl habitat is particularly sensitive to changes in water quality. Dissolved oxygen, pH, alkalinity, salinity, turbidity, settleable matter, oil, toxicants, and specific disease organisms are water quality characteristics particularly important to waterfowl habitat. Dissolved oxygen is needed in waterfowl habitats to suppress development of botulism organisms; botulism has killed millions of waterfowl. It is particularly important to maintain adequate circulation and aerobic conditions in shallow fringe areas of ponds or reservoirs where botulism has caused problems.

2.2 ~~PRESENT~~ EXISTING AND POTENTIAL BENEFICIAL USES

2.2.1 SURFACE WATERS

Surface waters in the Region consist of non-tidal wetlands, rivers, streams, and lakes (collectively described as inland surface waters), estuarine wetlands known as baylands, estuarine waters, and coastal waters. In this Region, estuarine waters consist of the Bay system including intertidal, tidal, and subtidal habitats from the Golden Gate to the Region's boundary near Pittsburg and the lower portions of streams that are affected by tidal hydrology, such as the Napa and Petaluma rivers in the north and Coyote and San Francisquito creeks in the south.

Inland surface waters support or could support most of the beneficial uses described above. The specific beneficial uses for inland streams include municipal and domestic supply (MUN), agricultural supply (AGR), commercial and sport fishing (COMM), freshwater replenishment (FRESH), industrial process supply (PRO), groundwater recharge (GWR), preservation of rare and endangered species (RARE), water contact recreation (REC1), noncontact water recreation (REC2), wildlife habitat (WILD), cold freshwater habitat (COLD), warm freshwater habitat (WARM), fish migration (MIGR), and fish spawning (SPWN).

The San Francisco Bay Estuary supports estuarine habitat (EST), industrial service supply (IND), and navigation (NAV) in addition to ~~all of the uses supported by streams~~COMM, RARE, REC1, REC2, WILD, MIGR, and SPWN.

Coastal waters' beneficial uses include water contact recreation (REC1); noncontact water recreation (REC2); industrial service supply (IND); navigation (NAV); marine habitat (MAR); shellfish harvesting (SHELL); ocean, commercial and sport fishing (COMM); wildlife habitat (WILD), fish migration (MIGR), fish spawning (SPWN), and preservation of rare and endangered species (RARE). In addition, the California coastline within the Region is endowed with exceptional scenic beauty.

The beneficial uses of any specifically identified waterbody generally apply to all its tributaries. In some cases a beneficial use may not be applicable to the entire body of water, such as navigation in Richardson Bay or shellfish harvesting in the Pacific Ocean. In these cases, the Water Board's judgment regarding water quality control measures necessary to protect beneficial uses will be applied.

Designated beneficial uses are often, but not always, present along the entire water body. Specific beneficial uses near or downgradient of discharges will be evaluated by the Water Board during the

APPENDIX C

SFRWQCB Basin Plan Water Quality Objectives

Table 3-5: Water Quality Objectives for Municipal Supply

Parameter	Objective (in MG/L)
Physical:	
Color (units)[a]	15.0
Odor (number)[a]	3.0
Turbidity (NTU)[a]	5.0
pH[b]	6.5 - 8.0
TDS[c]	500.0
EC (mmhos/cm)[c]	900
Corrosivity	non-corrosive
Inorganic Parameters:	
Aluminum[d]	1.0[d] / 0.2[a]
Antimony[d]	0.006
Arsenic[d]	0.05
Asbestos[d]	7 MFL[e]
Barium[d]	1.0
Beryllium[d]	0.004
Chloride[c]	250.0
Cadmium[d]	0.005
Chromium[d]	0.05
Copper[a]	1.0
Cyanide[d]	0.15
Fluoride[f]	0.6 - 1.7[g]
Iron[a]	0.3
Lead[b]	0.05
Manganese[a]	0.05
Mercury[d]	0.002
Nickel[d]	0.1
Nitrate (as NO_3)[d]	45.0
Nitrate + Nitrite (as N)[d]	10.0
Nitrite (as N)[d]	1.0
Selenium[d]	0.05
Silver[b]	0.1
Sulfate[c]	250.0
Thallium[d]	0.002
Zinc[a]	5.0
Organic Parameters:	
MBAS (Foaming agents)[a]	0.5
Oil and grease[b]	none
Phenols[b]	0.001
Trihalomethanes[b]	0.1
Chlorinated Hydrocarbons:	
Endrin[h]	0.002
Lindane[h]	0.0002
Methoxychlor[h]	0.03
Toxaphene[h]	0.003
2,3,7,8-TCDD (Dioxin)[h]	3×10^{-8}
2,4-D[h]	0.07
2,4,4-TP Silvex[h]	0.05

Parameter	Objective (in MG/L)
Synthetic Organic Chemicals:	
Alachor[h]	0.002
Atrazine[h]	0.001
Bentazon[h]	0.018
Benzo(a)pyrene[h]	0.0002
Dalapon[h]	0.2
Dinoseb[h]	0.007
Diquat[h]	0.02
Endothall[h]	0.1
Ethylene dibromide[h]	0.00005
Glyphosate[h]	0.7
Heptachlor[h]	0.00001
Heptachlor epoxide[h]	0.00001
Hexachlorecyclopentadiene[h]	0.001
Molinate[h]	0.02
Oxarnyl[h]	0.05
Pentachlorophenol[h]	0.001
Picloram[h]	0.5
Polychlorinated Biphenyls[h]	0.0005
Simazine[h]	0.004
Thiobencarb[h]	0.07 / 0.001
Volatile Organic Chemicals:	
Benzene[h]	0.001
Carbon Tetrachloride[h]	0.005
1,2-Dibromo-3-chloropropane[h]	0.0002
1,2-Dichlorobenzene[h]	0.6
1,4-Dichlorobenzene[h]	0.005
1,1-Dichloroethane[h]	0.005
1,2-Dichloroethane[h]	0.0005
cis-1,2-Dichloroethlyene[h]	0.006
trans-1,2-Dichloroethylene[h]	0.01
1,1-Dichloroethylene[h]	0.006
Dichloromethane[h]	0.005
1,2-Dichloropropane[h]	0.005
1,3-Dichloropropene[h]	0.0005
Ethylbenzene[h]	0.7
Methyl-tert-butyl ether[h]	0.13 / 0.005
Monochlorobenzene[h]	0.07
Styrene[h]	0.1
1,1,2,2-Tetrachloroethane[h]	0.001
Tetrachloroethylene[h]	0.005
1,2,4-Trichlorobenzene[h]	0.005
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane[h]	0.005
Trichloroethylene[h]	0.005
Trichlorofluoromethane	0.15

Parameter	Objective (in MG/L)
Volatile Organic Chemicals (cont'd):	
1,1,2-Trichloro-1,2,2-trifluoromethane[h]	1.2
Toluene[h]	0.15
Vinyl Chloride[h]	0.0005
Xylenes (single or sum of isomers)[h]	1.750
Radioactivity:	
Combined Radium-226 and Radium-228[i]	5
Gross Alpha Particle Activity[i]	15i
Tritium[i]	20,000
Strontium-90[i]	8
Gross Beta Particle Activity[i]	50
Uranium[i]	20

NOTES:

a. Secondary Maximum Contaminant Levels as specified in Table 64449-A of Section 64449, Title 22 of the California Code of Regulations, as June 3, 2005.

b. Table III-2, 1986 Basin Plan

c. Secondary Maximum Contaminant Levels as specified in Table 64449-B of Section 64449, Title 22 of the California Code of Regulations, as of June 3, 2005. (Levels indicated are "recommended" levels. Table 64449-B contains a complete list of upper and short-term ranges.)

d. Maximum Contaminant Levels as specified in Table 64431-A (Inorganic Chemicals) of Section 64431, Title 22 of the California Code of Regulations, as of June 3, 2005.

e. MFL = million fibers per liter; MCL for fibers exceeding 10 um in length.

f. Flouride objectives depend on temperature.

g. A complete list of optimum and limiting concentrations is specified in Table 64433.2-A of Section 64433.2, Title 22 of the California Code of Regulations, as of June 3, 2005.

h. Maximum Contaminant Levels as specified in Table 64444-A (Organic Chemicals) of Section 64444, Title 22 of the California Code of Regulations, as of June 3, 2005.

i. Maximum Contaminant Levels as specified in Table 4 (Radioactivity) of Section 64443, Title 22 of the California Code of Regulations, as of June 3, 2005.

j. Included Radium-226 but excludes Radon and Uranium.

MG/L Milligrams per liter
pCi/L pico Curries per liter