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ERM®

18 January 2008

Via Electronic Mail

Mr. Stephen Plunkett, Hazardous Materials Specialist
Alameda County Health Care Services Agency
Department of Environmental Health
Environmental Protection
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94520

Subject: Workplan for Interim Soil Vapor Remediation
Crow Canyon Cleaners
7272 San Ramon Road
Dublin, California
SLIC Case File # RO0002863
Global ID # T06019764784

Dear Mr. Plunkett:

On behalf of Mr. Bruce Burrows of the Burrows Company and Mr. Jim Roessler of Roessler Investments, Inc. (collectively, the "Client"), ERM-West, Inc. (ERM) presents the subject Workplan to the Alameda County Environmental Health Care Services Agency, Department of Environmental Health (ACEH).

This Workplan presents the following information:

- Project Background, including a description of the Crow Canyon Cleaners site, a brief summary of previous investigations and associated results, an overview of ERM's understanding of the site conceptual model, and a discussion of site remedial objectives; and
- Proposed Scope of Work, including installation of an active vapor recovery system.

This Workplan has been prepared pursuant to ACEH's Technical Report Request, dated 18 December 2007.

BACKGROUND

This section presents a site description, a brief summary of previous investigations, a review of the site conceptual model, and project objectives.

Site Description

The site is one suite in a commercial building located at 7214 - 7300 San Ramon Road in Dublin, California (Figure 1). The property was historically a green field until 1985, when it was developed to its current state as a strip mall with approximately 20,000 square feet of retail space. The tenants of the property include a dry-cleaning business, a Montessori preschool, a dental office, a bicycle shop, and two currently vacant spaces. The site referred to in this Workplan consists of the dry-cleaning business, which is located in the northernmost suite of the building (Crow Canyon Cleaners, 7272 San Ramon Road).

Site Investigation History

Historical site investigation activities are well documented in previous reports prepared by AEI Consultants (AEI), and most recently in the *Vapor Intrusion Investigation Workplan* (15 June 2007), which was prepared for Gabriel Chiu, the current property owner. The reader is referred to that document, as well as the reports described below, for full details of historical investigations, but the significant findings are summarized as follows.

A preliminary subsurface investigation, focused on the dry-cleaning operations at the site, was performed by AEI in January 2005 and included three borings (SB-1 through SB-3; Figure 2) to a maximum depth of 12 feet below ground surface (bgs). AEI collected three shallow soil samples and three ground water grab samples for halogenated volatile organic compound (HVOC) analysis by U.S. Environmental Protection Agency Method 8260B. Tetrachloroethylene (PCE) was detected in each of the soil and ground water samples at concentrations up to 0.071 milligram per kilogram (mg/kg) in soil and up to 22 micrograms per liter (µg/L) in ground water. Additionally, trichloroethylene (TCE), a potential PCE breakdown product, was detected in ground water at a concentration of 3.0 µg/L. The results were presented in AEI's *Phase II Subsurface Investigation Report*, dated 8 February 2005.

Based on January 2005 investigation results and correspondence with the ACEH, AEI performed additional investigation in February 2006. Soil, ground water, and soil vapor samples were collected from seven borings across the site (SB-4 through SB-10; Figure 2). PCE was detected in one soil sample, at a concentration of 0.013 mg/kg. PCE was detected in ground water samples collected from the shallow, A-zone aquifer (8-10 feet bgs) and deeper, B-zone aquifer (28-30 feet bgs) at concentrations up to 23 and 4.9 µg/L, respectively. PCE was also detected in soil vapor samples, at concentrations up to 16,000 micrograms per cubic meter (µg/m^3). Complete findings were presented in AEI's *Site Investigation Report*, dated 14 April 2006.

In follow-up to the February 2006 findings, and in accordance with ACEH's 22 August 2006 request, AEI performed additional site characterization in December 2006 and January 2007. Five soil borings (SB-11 through SB-15; Figure 2) were advanced to depths ranging from 5 to 30 feet bgs. No HVOCs were detected in soil samples. PCE and TCE were detected at concentrations indicated as "relatively low levels." Four soil vapor samples were analyzed, and PCE was detected in each sample, at concentrations ranging from 270 to 380,000 µg/m^3. TCE was detected in three of the soil vapor samples, at concentrations ranging from 4.4 to 3,200 µg/m^3. One of the HVOC detections in soil vapor was from a sample collected along the trace of a sewer line beneath the Montessori school, along the southwestern margin of the building, and at the opposite end of the school relative to the potential source of PCE at the dry-cleaners. The results of this investigation were documented in AEI's *Additional Site Investigation Report*, dated 21 February 2007.

In response to these findings, and at ACEH's request on 9 May 2007, the 15 June 2007 *Vapor Intrusion Investigation Workplan* referenced above was prepared by AEI. Implementation of the additional soil vapor investigation is currently pending. ERM is providing to ACEH (under separate cover) an implementation schedule associated with that scope of work and, as noted below, certain technical details associated with installation of an interim remediation system will not be known until that effort is completed.

In partial fulfillment of ACEH's 9 May 2007 request, AEI implemented an indoor air investigation at the Montessori school on 20 October 2007. Two indoor air samples (IDA-1 and IDA-2; Figure 2) and one outdoor air sample (ODA-1; Figure 2) were collected using 6-liter Summa™ canisters. A planned third indoor air sample (IDA-3; Figure 2) could not be collected due to equipment malfunction. PCE was detected in each of the indoor samples (1.1 to 1.3 µg/m^3) and in the outdoor air sample at 0.34 µg/m^3. No TCE or other potential PCE breakdown products were detected. The PCE concentrations for both indoor air samples exceeded the California Human Health Screening Level (CHHSL) for residential indoor air of 0.41 µg/m^3. The results were reported in AEI's 7 November 2007 letter entitled *Indoor Air Sampling/Montessori School*.

On 13 December 2007, ERM performed an indoor air sampling effort at the Montessori school. The purpose of the investigation was to collect indoor and outdoor air samples at the same locations sampled by AEI (including the failed indoor location) and compare the results. ERM's investigation yielded similar results for indoor air, with PCE concentrations ranging from 1.2 to 1.3 µg/m^3. The PCE concentration detected in the outdoor air sample was slightly more than twice that found by AEI (0.79 µg/m^3). All PCE detections exceeded the CHHSL for residential indoor air. No TCE or other potential PCE breakdown products were detected. ERM's results, including a comparison to the previous AEI results, were presented in a letter report entitled *Indoor Air Sampling Results*, dated 7 January 2008.

Site Conceptual Model

In its 15 June 2007 *Vapor Intrusion Investigation Workplan*, AEI presented a site conceptual model (SCM) considering the occurrence and extent of the PCE release, a survey of water supply and monitoring wells potentially impacted by the release, a utility survey, and evaluation of potential sensitive receptors. Based on our review of ACEH's 25 July 2007 comment letter on the workplan, ERM understands that ACEH concurs with the SCM and that future data should be considered when updating it, as appropriate.

ERM's proposed remedial approach is consistent with the SCM and considers the following factors:

- The release of PCE into soil and ground water was likely the result of surface spillage from the dry-cleaning equipment, into drains, or into the landscaped area outside the rear of the facility;
- PCE is present at elevated concentrations in soil vapor (up to 380,000 µg/m^3), suggesting that it may be highly mobile in that particular medium;

- The primary pathway for PCE in soil vapor beneath the Montessori school appears to be backfill material around a sewer line that runs generally northwest to southeast beneath the school and, to a lesser extent, fill materials upon which the building was constructed;
- There is little evidence of PCE breakdown, based on the limited amount of potential PCE breakdown products in soil, ground water, and soil vapor; and
- The primary sensitive receptors are children and staff present at the Montessori school, which operates from approximately 9:00 A.M. until noon on weekdays.

Remedial Objectives

The objectives of the proposed remedial action are to evaluate and implement a remedial technology that will be effective in reducing PCE concentrations in soil and indoor air. Specifically, the proposed remediation system will be designed to reduce, to the extent possible, PCE concentrations within the Montessori school to below the CHHSL for indoor air.

ERM notes that, to a large degree, the design and implementation of the remedial program addressed herein is dependent upon the findings associated with AEI's 15 June 2007 *Vapor Intrusion Investigation Workplan*, which ACEH approved and provided technical comments for in a letter dated 25 July 2007. In particular, the results for additional soil vapor investigation at up to 22 additional locations will need to be considered when finalizing the remedial design. As a result, this Workplan is presented on a conceptual basis, assuming that active remediation will be required.

Based upon the results of the additional investigation specified in the 15 June 2007 workplan, which ERM will implement on behalf of the Client (a schedule for implementation of that workplan is being submitted to ACEH under separate cover), and potential risk evaluation considering all soil, ground water, and soil vapor data, it may be found that simple engineering controls are the best remedial alternative to mitigate the effects of the PCE present in indoor air at the Montessori school. These engineering controls could potentially include the following:

- Modifying the operating parameters of the current HVAC system servicing the Montessori school;

- Installing additional HVAC components to enhance air movement; and
- Opening doors/windows to provide better ventilation to the space affected.

Recognizing that these potential engineering controls may not be effective in achieving the remedial objectives, ERM has considered more aggressive options. Given the current information for the site, ERM proposes to install an active sub-slab depressurization (SSD) system to capture vapors before they enter the indoor space at the Montessori school.

SSD systems are frequently used in residential and commercial buildings to mitigate radon and volatile organic compound (VOC) vapor intrusion into buildings. They can be either passive or active systems. Both systems are constructed similarly; however, active SSD systems utilize an electric fan or blower, while passive systems are vented directly to the atmosphere and may use a roof mounted non-powered vent fan.

Active SSD systems typically consist of a fan or blower that draws air from the soil beneath a building and discharges it to the atmosphere through a series of collection and discharge pipes. One or more holes are cut through the building slab so that the extraction pipe(s) can be placed in contact with subgrade materials, in order for soil gas to be drawn in from beneath the slab. The exhaust from the blower is generally routed away from windows, doors, or other openings in the building using polyvinyl chloride (PVC) pipe or rain gutter downspout material.

Active SSD systems generally fall into two categories: low vacuum/high volume and high vacuum/low volume. Subsurface conditions will dictate which system will be most effective. Sites with more permeable soils, such as sand and gravel, allow more air flow with a lower vacuum applied. Centrifugal blowers are generally used in this case. These blowers operate quietly and can provide up to 300 standard cubic feet per minute (scfm) air flow rate and up to 20 inches of water vacuum at the point of extraction, depending on sub-surface conditions. Systems with these blowers typically use 4-inch-diameter PVC piping for conveyance. Consistent with our understanding of the SCM, whereby the primary pathway for PCE in soil vapor beneath the Montessori school is backfill material around a subsurface sewer line, these backfill materials would likely be considerably more permeable than the surrounding in situ soil. It follows, then, that a low-vacuum approach is appropriate for the site.

PROPOSED SCOPE OF WORK

To meet the stated project objectives, ERM has developed the following proposed scope of work:

- Interim remediation system design;
- Interim remediation system installation;
- Interim remediation system startup testing to determine SSD system operating parameters (i.e., extracted flow rate, vacuum applied, approximate mass removal rate);
- Post-installation indoor air and system monitoring to determine the actual effectiveness of the applied remedial alternative; and
- Interim remediation system completion reporting, to include documentation of installation procedures, system startup operational data, effectiveness of the SSD system at mitigating the migration of vapors through the subsurface, and system as-built specifications.

Details for these activities are presented below.

Interim Remediation System Design

As described above under the discussion regarding the SCM, ERM understands that the primary pathway for PCE migration in soil vapor at the site is through backfill materials associated with a sewer line positioned beneath the Montessori school and, to a lesser extent, fill materials upon which the building is constructed. Previous investigations have not quantified the physical parameters (e.g., permeability to air) that will control vapor migration associated with these fill materials. ERM will coordinate appropriate testing of the fill materials as part of our implementation of AEI's 15 June 2007 workplan.

Based upon soil testing results and, as described above, our assumption that an active SSD system will be most appropriate to site conditions, ERM will develop specifications for an interim remediation system. The primary consideration will be selecting an active SSD fan/blower that is optimally effective at removing sub-surface vapors. Specific design details will be provided to ACEH in an interim remediation system completion report, as described below.

Interim Remediation System Installation

Based on our understanding of the SCM, the collection point(s) for the interim remediation system will be installed within the sewer line backfill material. Ideally, the collection point would be installed within the central portion of the area to be mitigated by the system. However, in the case of the Montessori school, that would not be feasible without major construction to bury the piping from the collection point (in the approximately central portion of the school) to the point of discharge. Taking this constraint into consideration, ERM proposes one collection point within the Montessori school, preferably in the utility closet area in the extreme northwestern corner of the space (SSD-1; Figure 2).

Based upon the results of the December 2006/January 2007 soil vapor investigation, where both PCE and TCE were detected in soil vapor along the southwestern margin of the Montessori school (SB-15; Figure 2), and on results to be obtained from implementation of the 15 June 2007 workplan, it may be prudent to install a second SSD system in the northeastern corner of the currently vacant space (former dance school) adjacent to the Montessori school. This location (SSD-2; Figure 2) would provide an opportunity to capture some downgradient vapors from the subsurface, and maximize soil vapor recovery from beneath the Montessori school without additional invasive construction activities. ERM will make that determination, with input from ACEH, following completion of the proposed additional investigation.

It will be noted in Figure 2 that the locations of SSD-1 and SSD-2 (if the latter is needed) are within 5-10 feet of an exterior wall. Accordingly, it may be feasible to install the respective SSD systems on the building's exterior, eliminating the need to impact floors and exterior walls during system installation. This will be dictated to a large degree by the extent that PCE vapors have migrated along the backfill materials, as will be evaluated during implementation of the *Vapor Intrusion Investigation Workplan*. Another consideration is that the lack of sufficient non-permeable surface material (i.e., floor slab) may allow air to be drawn in from the surface rather than from below the building where soil vapors appear to be impacting indoor air at the Montessori school. We will evaluate these issues carefully with ACEH upon completion of the planned additional investigation. Consistent with our understanding of the SCM, it will remain necessary to install the systems within the sewer line backfill materials, as described above, whether inside or outside the building.

Prior to implementing system installation activities described below, ERM will coordinate identification of the precise alignment of the sewer line and other potential utilities beneath the Montessori school, primarily to ensure that the system is appropriately placed within the sewer line backfill materials, but also to ensure that no damage to any of the utilities occurs as a result of system installation. We will notify Underground Services Alert, as required by law, and also contract the services of a licensed underground utility locator to trace the lateral extent of the utilities. As necessary, ERM will research and obtain an air permit through the Bay Area Air Quality Management District (BAAQMD) to address air emissions from the proposed remedial action.

The SSD system collection point will be installed by cutting the concrete floor slab and removing an area approximately 2 feet by 2 feet. The subsurface material will be dug out to a depth of approximately 3 feet to ensure the collection pipe is installed within both the foundation fill materials and sewer pipe backfill. The collection pipe, consisting of slotted PVC casing, will be inserted into the hole, which will then be backfilled with gravel to promote airflow around the collection point. The collection point will extend to the surface of the floor slab and be routed to the nearest exterior wall. The concrete floor slab will be finished to match the existing surface.

A hole will be cored through the wall, and the collection pipe will be connected to the fan/blower located outside the building. ERM will coordinate with building management to identify the most suitable location for the fan/blower. All electrical connections will be installed by a licensed electrician.

The exhaust stack from the fan/blower will be installed such that the exit point is above the roofline of the building, at least 10 feet away from any building openings.

System Startup Testing

Following completion of interim remediation system installation, we anticipate the SDD system will operate continuously and field data will be collected to determine vacuum applied, air flow rates, VOC concentrations removed, and the mass recovery rate. Magnahelic gauges will be used to measure the vacuum applied to the subsurface. A digital anemometer will be used to measure the velocity of the air as it is extracted through the fan/blower. The velocity will be converted to flow rate based upon the size of the pipes used in the SSD system. Approximate VOC concentrations will be determined on site by collecting an air sample from the discharge side of the SSD system in a Tedlar bag and using a photoionization detector to measure the VOCs within it. Additionally, a discharge air sample will be collected in a Summa canister and sent to a laboratory to be analyzed for TO-15 SIM for confirmation of VOC concentrations. From this information, the approximate mass removal rate can be determined.

Post-Installation Monitoring

Following startup testing, ERM will implement periodic indoor air sampling to determine the effect of the SSD system on the indoor air of the Montessori school. Whereas we will work with ACEH to determine an appropriate sampling schedule, at this point we anticipate weekly indoor air monitoring for 1 month following system installation, and monthly for 6 months thereafter. Indoor air sampling will be performed in accordance with the protocol established by AEI (as reported in its 7 November indoor air sampling report), and replicated by ERM (as reported in its 7 January indoor air sampling report).

If required by the air permit issued by the BAAQMD, exhaust vapor concentration measurements will be periodically monitored, as part of the system operation and maintenance, to determine if further treatment, such as filters or carbon, will be necessary. Also, vapor samples will be collected as needed and submitted for laboratory analysis by Method TO-15 SIM.

Reporting

Following completion of the installation activities described herein, including system startup testing, ERM will prepare a report documenting installation procedures and as-built system specifications. The report will include analytical data from initial indoor air sampling and system monitoring, as appropriate and required by BAAQMD. The data will be presented in tabular form, with laboratory reports and system specifications provided as appendices. Also as appropriate and necessary, the report will provide recommendations regarding frequency of follow-up monitoring and factors to be considered when evaluating the duration of system operation. In accordance with ACEH requirements, ERM will submit one electronic copy of the report to the ACEH, and will download a complete copy (in portable document format) to the ACEH ftp site.

CLOSING

The undersigned declare, under penalty of perjury, that the information and/or recommendations contained in the attached document are true and correct to the best of our knowledge.

If you have any questions or comments regarding this submittal, please contact one of the undersigned at 925.946.0455.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
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C 70110
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KMM/MEQ/abg/76649.01

cc: Mr. Bruce Burrows
Mr. Jim Roessler
Karl Morthole, Esq.
Mr. Gabriel Chiu

enclosures – Figures 1 and 2

Figures

Project No. 0076649.01
Date: 01/16/08
Drawn By: J. Estrada
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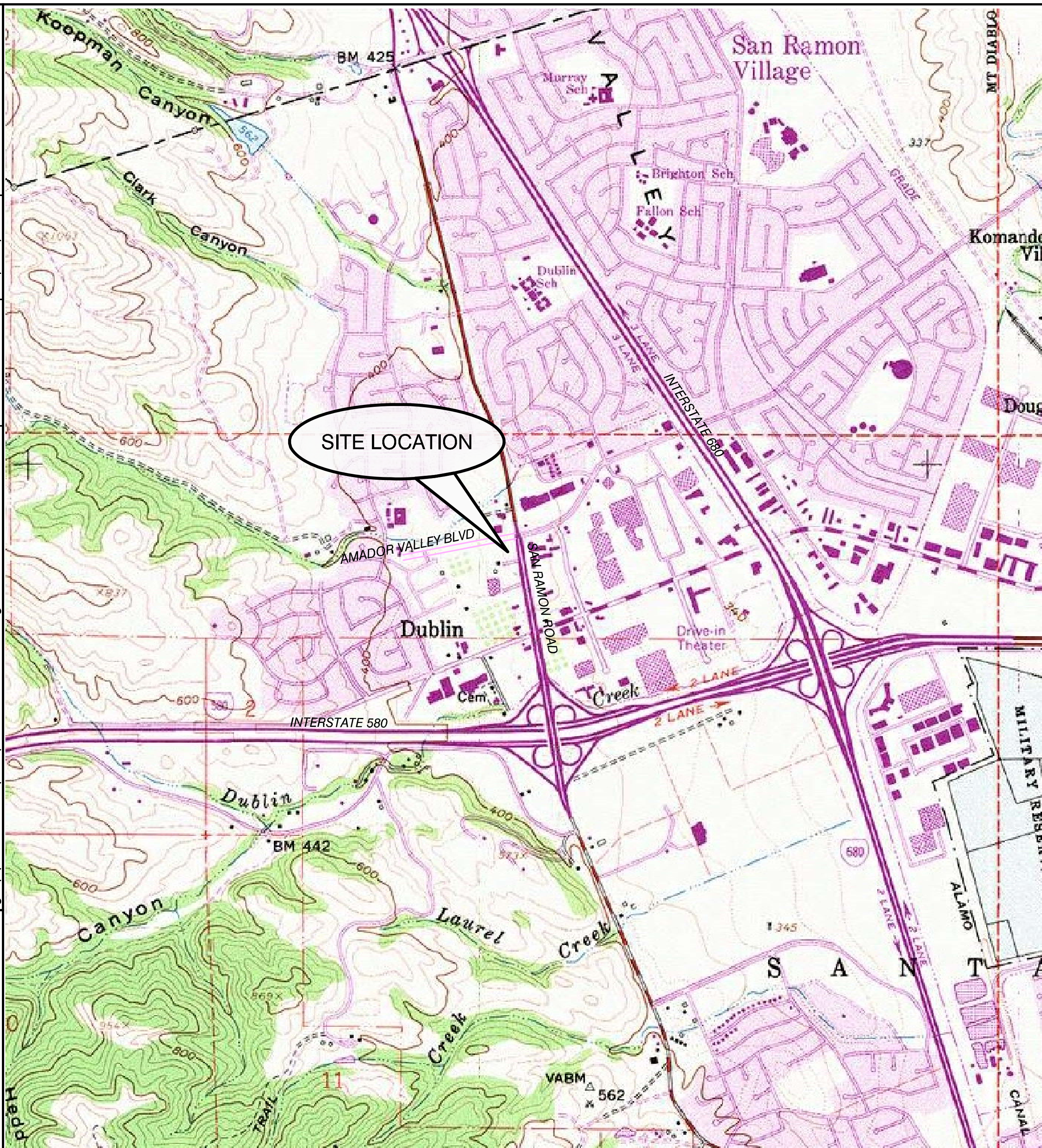

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Figure 1
Site Location Map
7272 San Ramon Road
Dublin, California

ERM 01/08

References:
TOPO!® Software
U.S.G.S. 7.5 Minute Series (Topographic) Quadrangle, Dublin, California
Dated: 1980

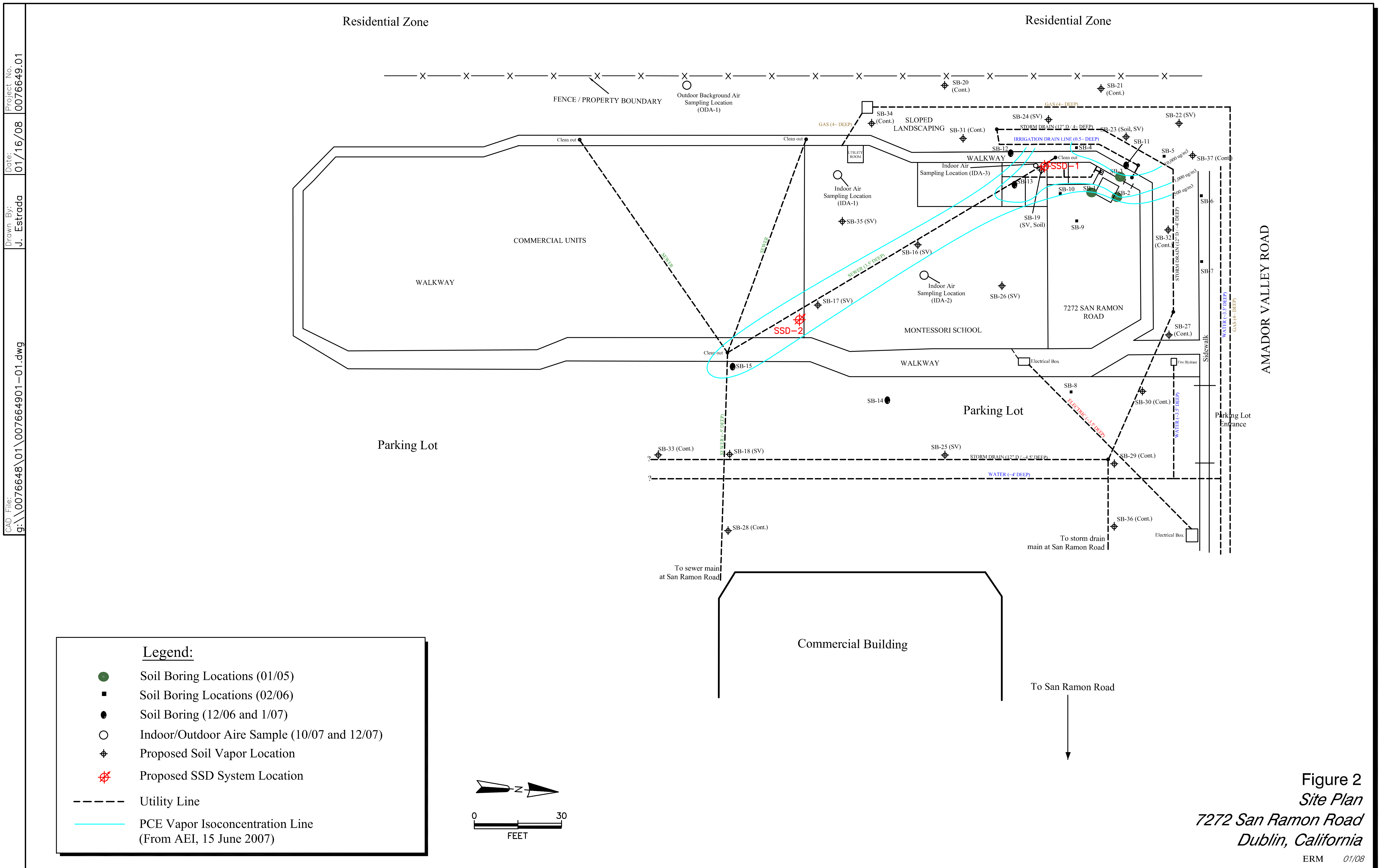

Figure 2
Site Plan
7272 San Ramon Road
Dublin, California

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