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Third Revision of Workplan to Conduct Soil and Groundwater Remediation At Former Chevron Service Station 7240 Dublin Boulevard Dublin, California

Project 2690

March 31, 2003

Prepared for:
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7240 Dublin Boulevard
Dublin, California

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Certification

This report has been prepared by SOMA Environmental Engineering, Inc. on behalf of Mr. Hooshang Hadjian and Chevron Products, the current and previous property owners of 7240 Dublin Boulevard in Dublin, California, to comply with the Alameda County Environmental Health Services' request dated October 21, 2002.

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1.0 INTRODUCTION

This workplan has been prepared by SOMA Environmental Engineering, Inc. (SOMA) on behalf of Mr. Hooshang Hadjian and Chevron Products, the current and previous property owners of 7240 Dublin Boulevard, Dublin, California (the "Site"). Currently the Site is known as Dublin Auto Wash, see Figure 1.

Currently, the Site is being used as a gasoline service station and a car wash facility and is known as Dublin Auto Wash. This workplan has been prepared in response to the Alameda County Department of Environmental Health Services' (ACDEH)'s request dated October 21, 2002.

1.1 Background

The first environmental investigation at the Site began in early 1988 when Chevron Product Company (Chevron) hired EA Engineering, Science, and Technology, Inc. (EA) to conduct a soil vapor investigation at the Site. The results of the soil gas survey indicated elevated levels of hydrocarbons beneath the Site, especially around the southern pump island.

In October 1988, HEW Drilling Company installed three groundwater monitoring wells, EA-1 through EA-3. During the installation of the groundwater monitoring wells, groundwater was encountered at depths ranging between 15 to 23 feet below ground surface (bgs). The depths of the groundwater monitoring wells were 35 to 40 feet bgs. Following the installation of the groundwater monitoring wells, the quarterly groundwater monitoring programs started. Currently, the groundwater monitoring program is conducted at the Site on a quarterly basis.

In February 1989, one 5,000-gallon and two 10,000-gallon underground storage tanks (USTs) were excavated and removed from the Site and replaced with three new USTs. During this activity, soil and groundwater samples were collected and analyzed for petroleum hydrocarbons. Following the USTs' removal and their upgrade, a total of 180 cubic yards of soil was removed and sent to Class I and Class II landfill facilities.

In March 1989 Western Geologic Resources, Inc. (WGR) drilled and sampled five soil BOREHOLES in the area of the former pump island. In addition, nine soil samples were collected from the vicinity of the former product-line trenches at depths ranging from 2.5 feet to 10.5 feet bgs. Laboratory analyses results indicated total petroleum hydrocarbon (TPH) concentrations from non-detectable to 750 milligram per kilograms (mg/Kg). In May 1990, three vapor extraction wells were installed. Air samples collected from these wells contained a maximum of 29,000 ppm benzene at the beginning of the test and 5,300 ppb after 2,049 minutes into the test. Following the installation of the three vapor extraction wells in 1990, in March 1992 the soil vapor extraction (SVE) system began operating. From December 1992 through June 1995, Geraghty & Miller operated the SVE system. Reportedly, during this period a total of 13,470 pounds of hydrocarbons were removed from the subsurface.

In September 1994, Groundwater Technology, Inc. (GTI) installed three groundwater monitoring wells, MW-1 through MW-3. The depths of these wells ranged between 21 to 26.5 feet bgs. In March 1995, elevated levels (up to 64,000 microgram per liter (μg/L)) of Methyl tertiary Butyl Ether (MtBE) were reported for the first time in MW-3.

In February 1996, Bay Area Exploration Services, Inc. installed two groundwater monitoring wells, MW-4 and MW-5 each with a total depth of 21 feet bgs. During the well installation, soil and groundwater samples were collected and analyzed for petroleum hydrocarbons. No petroleum hydrocarbons were detected in soil or groundwater samples collected from these wells. Apparently, these wells are upgradient wells and have not been impacted by the petroleum hydrocarbons.

In December 1996, Weiss and Associates conducted a Risk Based Corrective Action (RBCA) and concluded that the Site is a "Low Risk" soil and groundwater petroleum release site and recommended the SVE system to be shut down. Based on Weiss Associates' recommendation, the SVE system was shut down, however, the ACDEH required quarterly groundwater monitoring and free product removal reports.

In February 1997, a leak in a stainless steel flex hose to dispenser No. 2 was discovered and reported to the ACDEH. Subsequently, a new product delivery system was installed to replace the existing lines. Free product was also detected in MW-3. The results of subsequent groundwater monitoring events in 1998 and 1999 showed elevated levels of MtBE (up to 13,000 μg/L) and free product in MW-3.

Due to the occurrence of the new release at the Site, Chevron Product Company believes that they should no longer be the responsible party for further site characterization, removal and monitoring of contaminants at the Site. Chevron is ready to negotiate with Mr. Hooshang Hadjian to take over the environmental responsibility for the new release at this Site.

Currently, the exiting eight groundwater monitoring wells at the Site are being monitored by Gettler-Ryan, Inc. (GRI) a subcontractor of Chevron. Figure 2 illustrates the location of the existing groundwater monitoring wells.

2.0 SCOPE OF WORK

Based on the ACDEH's letter dated October 21, 2002, the proposed scope of work includes:

1. A Conduit Study;
2. Contaminant Plume Definition;
3. Interim Soil and Groundwater Remediation;
4. Mitigation Control; and
5. A Corrective Action Plan

The following is a brief description of each task.

2.1 Conduit Study

In October 1995, GRI conducted a conduit study to evaluate the preferential flow pathways at the Site and the surrounding areas. Based on the results of GRI's report an 18-inch diameter sewer drain is passing through the eastbound lane of Dublin Boulevard immediately adjacent to the Site. The top of the 18-inch diameter sewer line is approximately 16 feet bgs. Per GRI, a 12-inch diameter water main is passing through the westbound lane of Dublin Boulevard across from the Site. The top of the 12-inch diameter water main is approximately 7 feet and 4-inches bgs.

Based on the ACDEH's request, the accuracy of the conduit study results performed by GRI will be verified and updated in order to evaluate the preferential flow pathways at the Site. In addition, a sensitive receptors survey will be conducted. The preferential flow pathways include storm drains, sewer lines and other utility lines and corridors. The sensitive receptors includes domestic, irrigation, industrial, public and drinking water wells as wells as rivers, creeks, lakes, bays, estuaries, homes, schools, day care centers and hospitals within a 2,000-foot radius of the Site. The results of the conduit study and sensitive receptor survey along with available soil and groundwater data will be used to evaluate the Site's conceptual model. However, as data indicate groundwater beneath the Site occurs at about 10 to 11 feet below the grade, therefore, the sewer lines, which are located below the watertable, could potentially act as preferential flow pathways. The accuracy of data and possibility of such a phenomenon will be verified in conducting this task.

The Site's conceptual model synthesizes Site characterization data (geology, hydrogeology, contaminant distribution, migration pathways and potential human receptors) to provide a framework for selecting pathways for quantitative analysis in conducting risk-based corrective action for evaluation of the Site's regulatory status.

2.2 Contaminant Plume Definition in Soil and Groundwater

Based on SOMA's review of investigations by previous consultants, the Site has not been fully characterized and the contaminant plume is not defined. SOMA will implement a two-phased investigation to properly characterize the Site and determine the depth and areal extent of the contaminant plume.

2.2.1 Results of Previous Investigations

Historical groundwater data has indicated elevated levels of petroleum hydrocarbons and its constituents in the groundwater beneath the Site. The maximum concentrations of contaminants have been reported in MW-3. The maximum reported concentrations of MtBE, benzene, toluene, ethylbenzene and xylenes (BTEX) and total petroleum hydrocarbons as gasoline (TPH-g) were 162,000, 4,810, 11,400, 2,800, 18,000 and 110,000 μg/L, respectively. MW-3 is a 2-inch diameter monitoring well with a total depth of 24 feet and located at the northern boundary of the Site next to the Dublin Boulevard. Historically, free phase petroleum product has been reported in MW-3. MW-3 has been completed within thick clayey sediments whose screen interval extends from 5 to 24 feet bgs.

Historically, elevated levels of chemicals especially MtBE were also reported in MW-1 and MW-2 at 5,200 and 3,100 μg/L, respectively. MW-1 and MW-2 are also 2-inch diameter wells whose screen intervals are from 5 feet bgs to 24 feet bgs.

The results of the laboratory analyses on groundwater samples collected from the downgradient monitoring wells EA-1 through EA-3 do not suggest the presence of elevated levels of MtBE and other contaminants. However, reviewing the lithologic logs of EA-1 through EA-3 indicate that these are deeper than the upgradient monitoring wells (MW-1 through MW-5) and their screen intervals are much longer than the upgradient wells. The screened interval of EA-1 and EA-2 are from 10 to 40 feet bgs and the screen interval of EA-3 is from 5 feet to 35 feet bgs. This makes the data interpretation somewhat difficult since the depth and the screen interval of the upgradient and downgradient wells are not identical.

2.2.2 Proposed Investigation

SOMA proposes to characterize shallow vadose-zone contamination and deeper soil and groundwater contamination at the Site. The soil contamination will be characterized with shallow hollow-stem auger boreholes. Deeper contamination within the first and deeper water-bearing zones will be characterized with a two-phase approach described below.

2.2.2.1 Groundwater and Deeper Soil Contamination

In light of the current information it appears that the vertical and horizontal extent of MtBE and other petroleum chemicals have not been identified. In order to better understand the Site's geology and evaluate the actual thickness of the water-bearing zone(s), initially, SOMA proposes to drill a cone penetrometer test (CPT) hole at the Site. CPT is a process whereby subsurface soil characteristics are determined when a cone penetrometer attached to a data acquisition system is pushed into the subsurface using a hydraulic ram. The CPT provides a rapid, reliable and economical means of determining soil stratigraphy, relative density, strength and hydrogeologic information. Using direct push methodology, CPT does not generate soil cuttings, thus eliminating the need for special handling and costly disposal.

In order to calibrate the CPT readings, SOMA proposes drilling a stratigraphy borehole using a hollow stemmed auger (HSA) adjacent to the CPT hole. This borehole may be continuously sampled and logged throughout the entire depth of the hole by SOMA's geologist and compared with the CPT readings for calibration purposes. The geological information gathered in conducting this task will be used to identify different water-bearing zones and aquitards as well as different lenses of clay layers beneath the Site at the locations of the other CPTs. Figure 3 shows the location of the proposed CPT and HSA boreholes.

SOMA's communications with Mr. Dave Fisch (Fisch Environmental) indicated that a two-phase evaluation allows for a more focused investigation. The first phase will involve drilling one stratigraphic borehole and advancing an adjacent CPT borehole. After correlating and lithologically verifying the CPT data with the HSA borehole logs, the CPT data will be used to determine the hydrogoelogic character of the water-bearing zones and the groundwater sampling intervals. By characterizing the water-bearing zones as unconfined or confined with high or low hydraulic head, SOMA will select the type of groundwater sampling device for each water-bearing zone. To avoid heaving sands and potential cross-contamination issues, the CPT data will also be used to guide the seating of the bottom of the sampling device into the lower confining layer.

For water-bearing zones with low hydraulic head, additional boreholes will be advanced with a Geoprobe™ Dual Tube DT21 groundwater profiler and soil sampler. This sampling system is ideal for water-bearing zones with low hydraulic head because the sampling chamber can be decontaminated downhole. The CPT data will reveal whether or not the water-bearing zone is under low/high hydraulic head. However, water-bearing zones with high hydraulic head will flood the sampling chamber and cross-contaminate subsequent samples and water–bearing zones. Decontaminating the DT-21 profiler under these conditions is awkward, time consuming and inefficient. For water-bearing zones under hydraulic pressure, the Geoprobe™ SP-15 groundwater sampling system would be more feasible. The SP-15 sampler can conveniently be withdrawn with the groundwater samples and, after decontamination, replaced inside the same borehole.

The second phase of the investigation will use one or both of the above sampling systems to evaluate the vertical and horizontal extent of the groundwater contamination. As per Dave Fisch, soil and groundwater sampling from several water-bearing zones can be accomplished within one borehole.

SOMA's field crew will attempt to collect soil and groundwater samples at the capillary-fringe interface between the vadose zone and saturated zones or wherever the lithology changes in order to evaluate the vertical extent of contaminants along the entire borehole. The actual depth of the groundwater sampling boreholes will be determined in the field after reviewing the mobile laboratory test results on soil and groundwater samples. If the results of two consecutive samples do not indicate the presence of petroleum hydrocarbons, the drilling operation will be terminated. Figure 3 shows the location of the proposed boreholes. Since a mobile laboratory will be used, soil samples will be collected in the conventional way instead of using EPA 5035 protocol.

2.2.2.2 Procedures to Avoid Cross Contamination

Because the lead cone and rods are the same diameter, the sampling system does not create an annulus to allow for aquifer cross-contamination. With this sampling system, soil and contaminant residuum from overlying soil units is easily squeezed off the smooth outside probe surface by lateral confining pressures. The groundwater sampling chamber will also be over-purged, the entire probe will be retrieved, and the sampling chamber will be decontaminated. During the sampling of deeper water-bearing zones, conductor casings will be used to isolate upper and more contaminated water-bearing zones. In addition, the connections and fittings will be sealed with Teflon tape to exclude external influences. These boreholes will also be tremie grouted from the bottom up, to further reduce the potential for cross contamination of water-bearing zones.

2.2.2.3 Shallow Soil Contamination

To evaluate the horizontal extent of soil contamination, additional shallow vadose-zone boreholes may be required to characterize the soil near the former damaged flex line. SOMA is plans to drill 6 additional shallow HSA boreholes in the vicinity of the former damaged flex line area where the spill occurred. Figure 3 shows the location of the proposed shallow boreholes. These HSA boreholes will be continuously sampled to provide soil analytical data to delineate the extent of soil contamination. If the results of this subsurface exploration indicate that soil excavation is an effective alternative, the data generated during this investigation will help remove fuel-impacted soils within the chemical source areas.

All sampling equipment will be cleaned with a tri-sodium phosphate solution and double rinsed with clean water between samplings. All sampling equipment and augers will be steam cleaned between boreholes. All rinsed water and soil cuttings will be stored on-site in 55-gallon hazardous waste drums pending the analytical results for disposal.

2.2.2.4 Laboratory Analysis

To expedite the soil and groundwater investigation, Severn Trent Laboratory (STL) of Pleasanton, California, a state certified laboratory will be retained to conduct on-site laboratory analysis of the soil and groundwater samples. STL is capable of analyzing 15-16 soil and groundwater samples per day. Each soil and groundwater sample will be analyzed for TPH-g, BTEX, and fuel additives, such as oxygenates and HVOCs lead scavengers including:

1. MtBE;
2. tertiary amyl methyl ether (TAME);
3. ethyl tertiary butyl ether (ETBE)
4. diisopropyl ether (DIPE)
5. tertiary butyl alcohol (TBA);
6. ethanol;
7. methanol;
8. 1,2-dichloroethane (1,2-DCA); and
9. dibromomethane;

using EPA Method 8260.

TPH-g will be measured using EPA Method 5030/GCFID. EPA Method 8260 will be used to measure BTEX.

The data generated during the soil and groundwater investigation (SWI) will be used to plot three-dimensional plots and assess the total mass of petroleum hydrocarbons in the soil and groundwater.

2.3 Interim Soil and Groundwater Remediation

If the results of the SWI suggest the presence of ongoing source(s) that are continuing to add mass to the existing plume, they will be removed. The removal process may include excavation and off-site transport of contaminated soils, piping or any other remaining sources. The removal process may also include operation of the existing SVE system, testing and repairing of the system if necessary.

If the results of the SWI suggest the presence of floating product at the top of the watertable, a new groundwater well will be drilled and a product skimmer canister will be installed to remove the free product from groundwater before formulating and evaluating a corrective action plan (CAP).

2.3.1 Status of Existing Soil Vapor Extraction System

The existing vapor extraction system is composed of three horizontal wells. The first horizontal well is located at the northwest end of the pump islands. The second well is located east side of the pump island, while the third horizontal well is located along the north, east and south perimeter of the tank field. The horizontal wells are presumably buried between 3 and 4 feet below surface grade inside piping trenches. In addition, there are three recovery wells namely VW-1 through VW-3, which are used to monitor the radius of influence only, and they were never directly connected to the system. The existing system was designed to remove absorbed phase hydrocarbons within the vadose zone in the vicinity of the pump islands. The current system is not designed to remediate groundwater and would not effectively remove dissolved MtBE from the groundwater.

Based on the ACHEH's request, on January 29, 2002, the SVE system was turned on and two soil gas samples were collected. The soil gas samples were analyzed for BTEX, TPH-g and MtBE. The results of the laboratory analyses showed that only one of the samples contained 0.66 micrograms per liter of benzene. The other sample did not contain the hydrocarbons and MtBE concentrations above the laboratory detection limits. Appendix A includes the laboratory results and chain of custody form.

Based on the fact that depth to groundwater is about 10 feet bgs and the burial depth of the horizontal wells is about 3 to 4 feet bgs and the results of the latest investigation did not indicate the presence of hydrocarbons and MtBE in the soil gas, operation of the SVE system does not seem to be effective in the remediation and removal of MtBE from the groundwater.

2.4 Mitigation Control

The purpose of mitigation control is to intercept the contaminant plumes and preventing them from further migrating to off-site receptors. SOMA is planning to conduct a groundwater pumping/slug test and groundwater flow and chemical transport modeling to design a groundwater extraction system that would effectively remove the contaminant plume from the groundwater and prevent it from further migration.

2.4.1 Perform Aquifer Hydraulic Testing

To evaluate hydraulic conductivity of the saturated sediments, aquifer hydraulic testing will be conducted on on- and off-site monitoring wells. Due to the fine-grained nature of saturated sediments, the existing groundwater monitoring wells cannot be used for conducting conventional groundwater pumping tests. The existing wells will go dry upon pumping, therefore a long term pumping test cannot be performed. As a result, SOMA is planning to perform slug tests on all groundwater monitoring wells. Falling head or rising head tests will be performed on these wells and the results will be analyzed using an in-house computer software called "SLUG". This software is SOMA's proprietary software, which has been developed to evaluate the results of slug test analysis using Hvorslev, Jacob Cooper & Bredehoeft, Ferris and Knowles and Bouwer Methods.

2.4.2 Conduct Groundwater Flow and Chemical Transport Modeling

SOMA will compile groundwater monitoring data, hydraulic conductivity and site characterization data to conduct groundwater flow and chemical transport modeling. The purpose of the groundwater flow modeling and chemical transport assessment is to assess plume stability under a no-action scenario and to evaluate the effectiveness of different remedial alternatives. The groundwater flow modeling also may assess to design a groundwater extraction system to remove fuel-impacted groundwater if warranted. The results of this groundwater study may also help evaluate the capture zone and simulated flow rates out of the groundwater extraction system if the pump-and-treat becomes an attractive remedial alternative. Evaluation of the groundwater extraction rate is an important parameter in selecting an effective groundwater treatment technology for removing chemicals from impacted groundwater. This information is essential in the evaluation and preparation of a CAP, which will be discussed later.

SOMA proposes utilizing the combination of the U.S. Geological Survey Modular 3-Dimensional Groundwater Flow Model (MODFLOW) and the 3-D Modular Transport (MT-3D) model of Zhang (1998) for conducting groundwater flow and chemical transport modeling. SOMA will calibrate MODFLOW using site-specific data to design a groundwater extraction system.

2.4.3 Conduct Risk-Based Corrective Action Plan (RBCA)

The State Water Control Board's supplemental instructions dated December 8, 1995 entitled "Interim Guidance on Required Cleanup at Low Risk Fuel Site" will be followed to define the Site's regulatory status in connection with the soil and groundwater contamination. Based on the interim guidance document, in order to define the Site's regulatory status the following items will be considered using the existing soil and groundwater data:

1. The leak has been stopped and on-going source(s) including free-product, have been removed or remediated to the extent practicable;
2. The Site has been adequately characterized;
3. Status of the dissolved hydrocarbon plumes; are they expanding or shrinking?;
4. No water wells, deeper drinking water aquifers, surface water, or other sensitive receptors are likely to be impacted;
5. The Site presents no significant risks to human health; and finally
6. The Site presents no significant risk to the environment.

The result of the SWI will reveal if the source of the contamination still exists. Historically, MW-3 has shown the presence of floating product. During the SWI, it will be furthered determined whether or not the free phase petroleum product still exists beneath the Site. In the event the free product still exists, it will be removed using a product removal canister.

By implementation of the SWI, the Site would be adequately characterized as stated in item #2, see Section 2.2.

SOMA will conduct a 2,000-foot radius search to locate sensitive receptors such as water wells, and surface water bodies. The results of such an evaluation will be incorporated into a RBCA study.

To evaluate the impact of the Site related chemicals on on- and off-site workers, SOMA proposes to use the ASTM-RBCA approach. The results of a RBCA study will reveal the impact of Site related chemicals on current Site workers and nearby workers and determine risk-based cleanup levels of soil and groundwater, which will be protective of human health and the environment.

Finally, by taking the above-mentioned steps, SOMA will determine whether or not the Site can be categorized as a "High Risk Soil/Groundwater Site" based on the State Water Board Interim Guidance Document. Such an evaluation will necessitate and justify the need for soil and groundwater remediation in on- and off-site areas.

SOMA will utilize the U.S. Geological Survey Modular Three-Dimensional Groundwater Flow Model (MODFLOW) developed in 1998 in combination with Modular Three Dimensional Transport Model (MT-3D) developed in 1998 in conducting the modeling. To conduct groundwater flow modeling SOMA is planning to conduct a pumping test or at least a series of slug tests to evaluate the hydraulic conductivity of the saturated sediments. The results of the pumping tests will be incorporated in the groundwater flow model to evaluate the expected flow rate and simulated capture zone of the groundwater extraction system. The simulated flow rate will be used in conducting a CAP for the selection of the most effective, feasible and least costly alternative for groundwater remediation.

2.5 Corrective Action Plan

If the results of our evaluation require us to categorize the Site as a High Risk Soil/Groundwater site, then site remediation will become necessary. As such, SOMA will prepare a CAP and submit it to the ACDEH for regulatory review/approval. The CAP will compare different remedial alternatives in terms of their effectiveness, implementability and cost. As a result, the most feasible, effective and at the same time less costly alternative will be selected for the soil/groundwater remediation in on- and off-site areas for the protection of human health and the environment.

2.6 Report Preparation

A technical report will be prepared to document the soil and groundwater conditions and the extent of petroleum chemical contamination in on- and off-site areas. The technical report will include figures, tables and a detailed description of field investigation procedures and the results of soil and groundwater evaluations, as well as our recommendations for remediation purposes, if warranted.

FIGURES

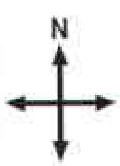
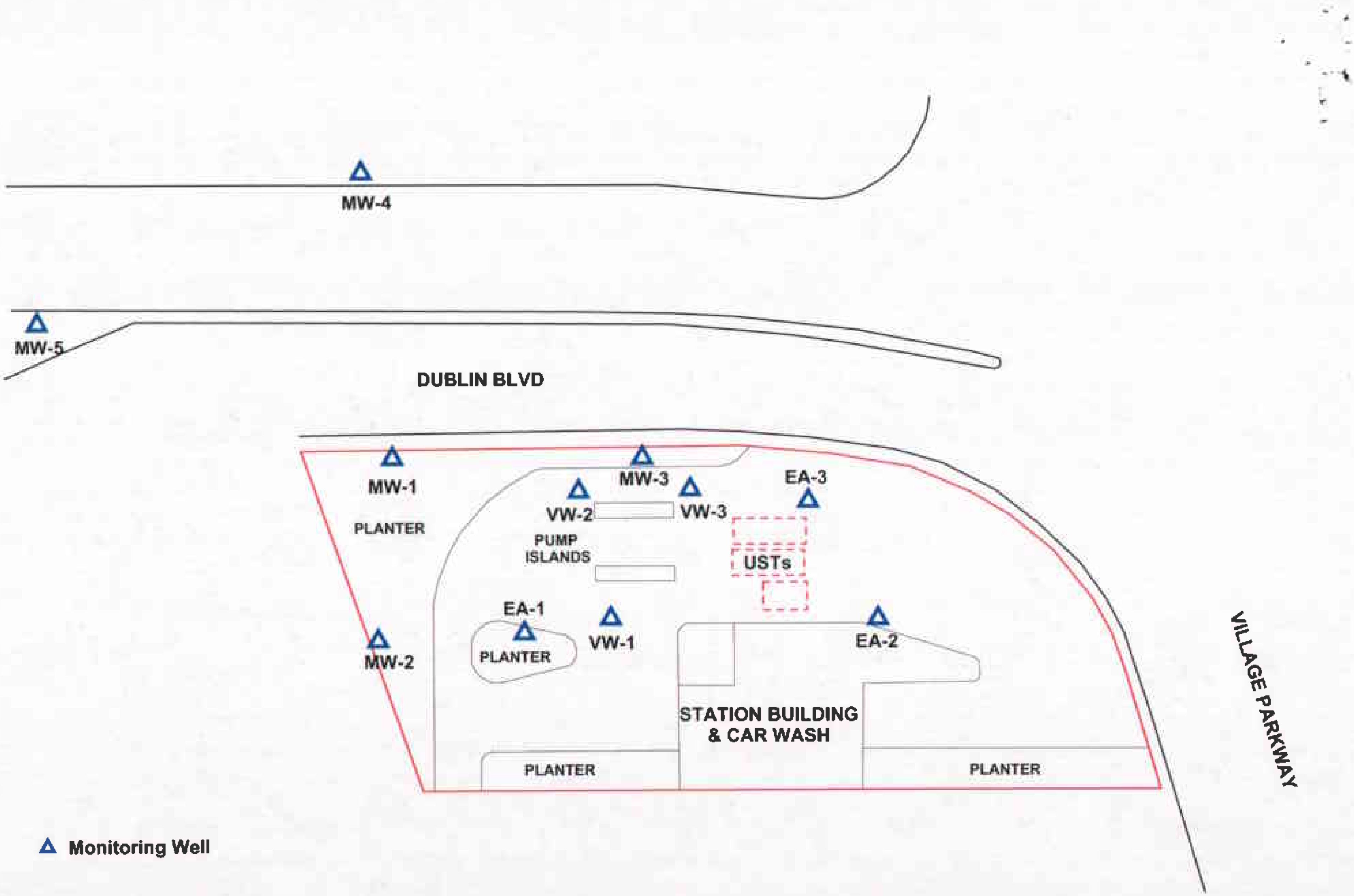


Figure 1: Site vicinity map.



approximate scale in feet

0 25 50

Figure 2: Site map showing location of existing monitoring wells.

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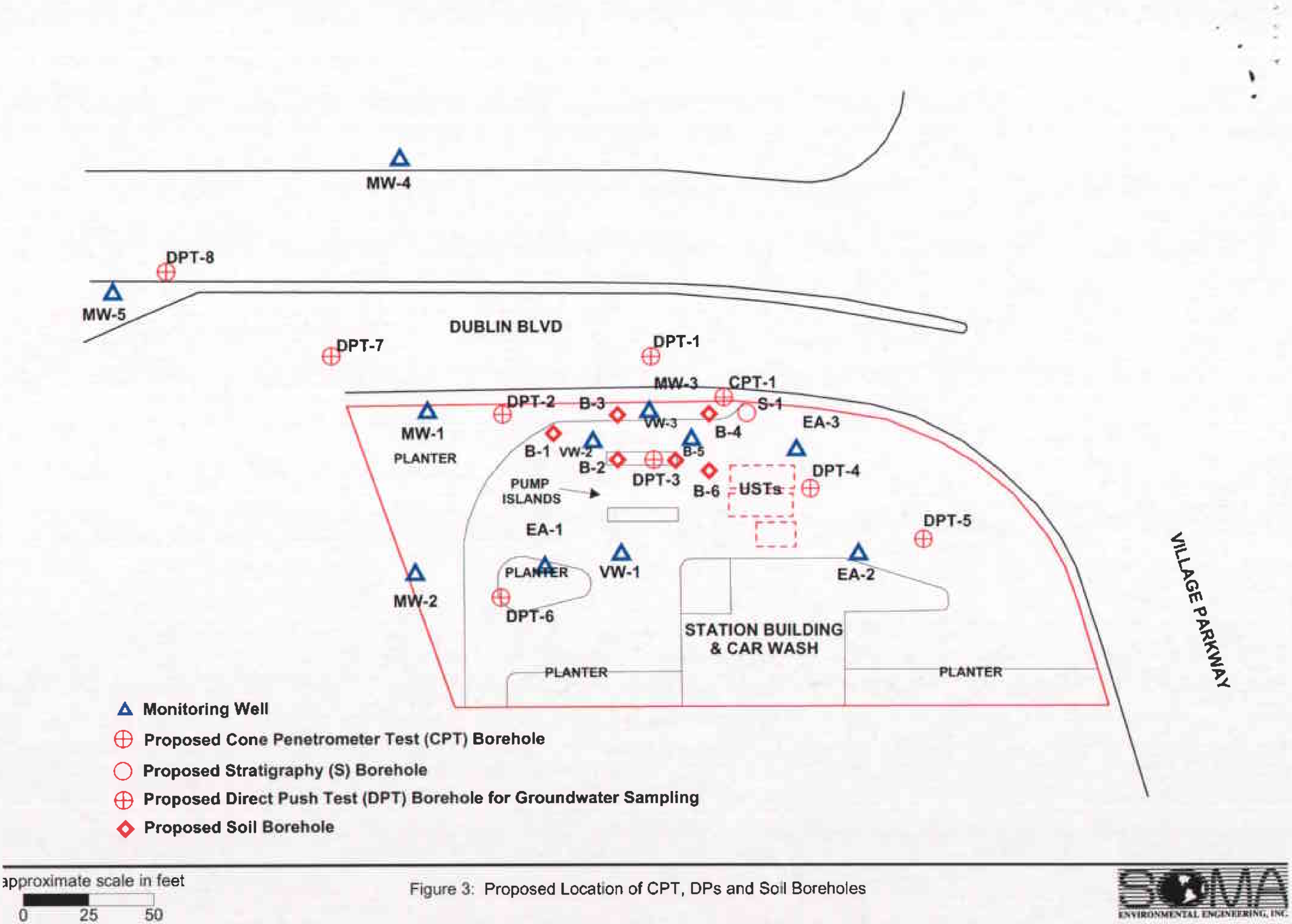

Figure 3: Proposed Location of CPT, DPs and Soil Boreholes