UEPllc

Urban Environmental Partners, llc

Focused Phase II Assessment Report
Pine Lake Dry Cleaners Facility
2830 228th Avenue SE
Sammamish, WA

Prepared for Bryan Syrdal and Alan Green
for submittal to
HomeStreet Bank

Prepared by Urban Environmental Partners, llc

October 30, 2018

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1.0 INTRODUCTION

1.1 PURPOSE OF ASSESSMENT

Urban Environmental Partners, LLC (UEP) was commissioned by Alan Green and Bryan Syrdal to complete a Focused Phase II Environmental Assessment at the dry cleaner operation named Pine Lake Cleaners (PLC) at 2830 228th Avenue SE (the PLC Site) located on the west end of Pine Lake Plaza retail strip mall (the Property) located in Sammamish, Washington. The locations of the Property and the PLC Site are shown on Figure 1. The purpose of this assessment was to confirm the release of the dry cleaning solvent perchloroethylene (PCE) at the PLC Site, to determine the extent of the PCE impact, to identify the appropriate remedial cleanup method needed to achieve eventual regulatory closure for the site, and to prepare a rough order of magnitude estimate for the costs for implementing the cleanup remedy likely to achieve regulatory compliance.

1.2 METHODOLOGY OF SOIL GAS SURVEY

The assessment was completed using a method called a Gore Sorber™ survey to measure PCE vapors in soil gas below the building slab at the site. The soil gas survey was accomplished by using Gore Sorber™ samplers provided by a specialty subcontractor, Amplified Geochemical Imaging LLC (AGI). The survey involved installation of the Gore Sorber™ sorbent media samplers in 16 equally spaced sample locations in the expected contamination area beneath the dry cleaner floor slab, lab analysis, and eventually data analysis and presentation.

Each Gore Sorber™ passive sampler was installed through the concrete floor slab using a small hand-held roto-hammer drilling device to penetrate the concrete. The roto-hammer auger drill was then advanced to a depth of approximately 2 feet below the top of the slab. At each drilled location, the Gore Sorber™ passive sampler was installed at the bottom or final depth of the augured hole, the hole sealed in place with plastic tape, and left in place for the duration of the sampling period.

Once in place, the Gore Sorber™ samplers containing the sorbent media were left to equilibrate over several days (approximately 110 total hours) with the adjacent pore-space soil gases. At the end of the sampling period, the samplers were retrieved, sealed in lab-provided air tight sample containers, and shipped under custody overnight to the AGI lab. There, the sorbent media in each of the 16 passive samplers was analyzed for total volatile organic compounds, for PCE and the PCE degradation compounds by EPA Method 8260C, as total VOC mass, by specific compound. AGI, using their proprietary algorithm, determined the lateral distribution of the identified CVOC compounds (primarily PCE) collected by the passive samplers. The AGI analytical algorithm results visually present the contours of the PCE contamination distribution, or the "plume map", for the site. From this representation, a reasonable approximation of the PCE source and release impact area can be interpreted.

1.3 METHODOLOGY OF SOIL SAMPLE COLLCTION

Soil sample collection was accomplished by advancing a direct push sampling probe through two of the soil vapor sample locations. At soil vapor sample locations SV-2 and SV-3, soil samples were collected in the expected "release area" – adjacent to the location of the dry cleaner machine. Sampling was conducted using a hand-driven direct-push sampling probe. The direct push probe was advanced in intervals 1-foot at a time to approximately 2 feet below ground surface (bgs). Soil samples from the selected interval were immediately transferred to laboratory-provided sample bottles using the EPA Sample Kit 3050 using disposable syringes.

1.4 SCOPE OF WORK

The scope of work for this Focused Phase II Site Assessment included the following task activities:

- A review of the SoundEarth (SE) Phase I ESA (October 10, 2018), and the SE Memorandum – Environmental Investigation Summary (October 11, 2018) to obtain background information, and to review sub-slab soil gas data and soil data to design the focus and strategy of the exploration plan for the additional assessment of this report.
- A review of the Washington Geologic Information Portal at the Department of Natural Resources (DNR) website database (https://geologyportal.dnr.wa.gov) a portal to public information on publicly recorded geotechnical borings, water wells, lithologic borings, and test pits in the state.
- A pre-exploration call to the 72-hour public utility locate service (1-800 Dont Dig), and a local utility check performed, by Applied Professional Services (APS) to identify sub-slab and underground utilities (water, natural gas, electrical, sewer, etc.) to avoid contact damage to utilities at the drilled sample locations.
- Purchasing and expediting the shipment of 16 passive samplers known as Gore Sorber™ samplers from Amplified Geochemical Imaging LLC (AGI).
- Drilling 12 4-inch holes through the concrete floor slab of the dry cleaner and advancing 4 exploration holes through soil on the west and north sides of the building, and installing the Gore Sorber™ passive samplers in each location at a depth of approximately 2 feet below grade.
- Collecting 2 soil samples in the locations of passive samplers SV-2, and SV-3, at a depth of approximately 2 feet below the top of the concrete floor slab.
- Retrieving the Gore Sorber™ passive samplers after approximately 110 total hours of exposure to sub-slab soil conditions.
- Completing lab analysis of the Gore Sorber™ samples at the AGI laboratory using US EPA Lab Method 8260C for Chlorinated Volatile Organic Compounds (CVOCs).

- Completing lab analysis of the 2 soil samples at a Seattle lab, Freidman and Bruya (F&B) using US EPA lab method 8260C for CVOCs.
- Evaluating the lab results for the 2 soil samples and for the 16 Gore Sorber passive samplers to identify the PCE impacted area on the property.
- Preparing the conceptual remedial design for an *in-situ* remedial system to address the identified area of PCE contamination on the dry cleaner site.
- Preparing a rough order of magnitude (ROM) cost estimate to prepare plans and permits for the remedial cleanup, complete the remedial system design work, obtain regulatory approval of the cleanup system, and install and operate the system to treat the area of PCE impacted soil to meet WA Department of Ecology (Ecology) cleanup requirements.
- Preparing this Focused Phase II Assessment Report to present the findings of the work.

1.5 LIMITATIONS OF REPORT

This Phase II ESA report is for intended for the exclusive use of Alan Green and Bryan Syrdal, and for the lender HomeStreet Bank. The primary purpose of this report is to provide the clients with an assessment of the extent of the impact of PCE contamination at the site. An additional purpose is to present a remedial cleanup approach that will be acceptable to WA Ecology, and that will be implemented to treat the PCE contamination on the property to achieve regulatory compliance with soil cleanup levels (CULs) under WA state cleanup regulations, WAC 173-340, the Model Toxics Control Act (MTCA). Property. The ROM remedial cleanup cost estimate is presented for planning purposes, and is a preliminary cleanup budget estimate based on previous experience at similar sites using the same or similar remedial technologies. The ROM cleanup cost estimate is not a bid to perform the work. As a ROM cost estimate, it carries a 20% contingency for different or additional costs that may be encountered during the design stage of the planning for remediation, and for different costs encountered during the bidding by contractors due to market factors.

2.0 PROPERTY DESCRIPTION

The following subsections provide a summary of the location, description, and current use of the Pine Lake Plaza property, and the dry cleaner site on the west end of the property, as well as a discussion of the geology and hydrogeology of the site and surrounding areas.

2.1 LOCATION AND ELEVATION

The dry cleaner operation, named Pine Lake Dry Cleaners, is located at 2830 228th Avenue Southeast in Sammamish, Washington, approximately 2 miles south of downtown Sammamish, Washington as shown in Figure 1. The dry cleaner facility is located on the west

end of the Pine Lake Plaza retail strip mall as shown on Figure 1. According to the USGS Topographic Map of the Issaquah, Washington Quadrangle, the Property is located at an approximate elevation of 430 to 455 feet above mean sea level (AMSL), with the highest elevations on the eastern portion of the Property. Based on elevation contour information obtained the King County iMap database, the elevation of the PLC Site is 435 feet (AMSL).

2.2 PROPERTY STRUCTURES AND IMPROVEMENTS

Pine Lake Plaza is currently occupied by a 1990-vintage, one-story building that encloses approximately 7,272 square feet of space, on a 30,501 square feet lot that is one parcel, identified as King County Tax Parcel 102406-9111 . The masonry-framed structure is heated by electricity. Additional improvements at the property include parking areas to the south and east of the building as shown on Figure 1.

2.3 CURRENT PROPERTY USES

The current tenants of the building are a dry cleaner on the west end of the building (the Site), a jewelry store, therapy offices, a salon, insurance offices, and a day spa. Exterior areas of the Property include parking areas to the south and east of the building.

2.4 GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

Geologic conditions often influence the environmental conditions of a property. Underlying soil types and bedrock formations may facilitate or impede the migration of chemical contaminants in soil, soil vapor, or groundwater. This section of the report summarizes known geologic factors and conditions at the PLC Site which have been identified from researching boring logs and groundwater conditions for borings and wells completed in the vicinity of the Site. Research at the WA DNR Geologic Information Portal database identified borings and wells in the vicinity of the site as shown at locations on Figure 1. The database provided information regarding the geologic layers and soil stratigraphy for the area, and the depth to groundwater for water supply wells in the general area of the property.

2.4.1 Geology of Site and Vicinity

The Geologic Map of King County (Booth et al. 2007), indicates that the Site is underlain by approximately 120 feet of Vashon till. These glacially compacted deposits consist of a very dense mixture of silt, sand, gravel, and clay, which typically are characterized by relatively low vertical hydraulic conductivity. The Property is located in the Sammamish glacial plateau, which is also characterized by glacial deposits of silts and sands and Vashon drift deposits including compacted sand, silt, and gravel (Vashon glacial till).

The building and concrete slab were constructed with a sandy silt subbase (reworked local till) that is approximately 2 to 3 feet thick.

2.4.2 Hydrogeology of Site and Vicinity

The WA DNR geologic database identifies 4 regional groundwater wells that have been installed within approximately 1,400 feet of the project site. The borings for the wells have been drilled to depths of between 85 feet and 199 feet below existing grade elevations, as shown on Figure 1. Database records for the regional wells identify that the regional water table is found approximately at elevation 320 feet (AMSL) in the Advanced Outwash formation. The water table and glacial formations (Till, and Outwash) are depicted on a cross-section figure from Conestoga-Rovers & Associates (CRA) on CRA Figure 5 provided in Appendix A, along with the CRA report.

2.4.3 Groundwater Conditions at the Property

In addition to the regional wells, several shallow soil borings in the near vicinity of the Site were researched to provide additional geological information. These wells are shown on Figure 1, and include CRA boring B-2, Hong West (HW) Borings BH-2, and BH-11, and AESI boring EB-3. According to DNR records, the CRA boring B-2 was drilled to 40.5 feet, and reported no groundwater in the well installation (a dry well). The HW borings B-2 and B-11 were drilled to 14 feet, and 16 feet respectively, and both borings were determined to be dry wells. The AESI boring EB-3 was drilled to 85 feet bgs from an elevation of approximately 400 feet (AMSL), and the water level in EB-3 was measured at 74 feet bgs. Boring logs for these shallow borings and vicinity wells are provided in Appendix B.

Based on the stratigraphic information on soil conditions from the various well logs, and on the observations of no available groundwater in the dry well borings, and on the information from the DNR database that indicates a minimum of approximately 120 feet of dense glacial till material overlies the saturated "advance outwash" geologic stratum in the general area of the site, there is a very low probability that there is any shallow groundwater on the Property or at the Site. Based on reviewed data, groundwater at the Property is not expected until a minimum depth of about 74 feet as shown for AESI Boring EB-3, which confirms regional groundwater occurs at approximately elevation 326 (AMSL), in close proximity to the Site.

2.4.4 Interpretation

Based on well and boring log information as presented above, it is our opinion that there is little possibility of contamination to groundwater below the Property at elevation 320 feet (AMSL) from the minor spill of PCE at the PLC Site.

3.0 PREVIOUS INVESTIGATIONS

On October 5, 2018, SoundEarth (SE) installed a single sub-slab soil gas point and collected a soil gas sample from beneath the on-Property building. A copy of the SE Memorandum with Data Tables is provided in Appendix C. The sub-slab soil gas point SS-01 was located in the

northwest portion of the dry cleaner, approximately 1 foot north of the existing dry cleaning machine. The location of SE sub-slab soil gas point SS-01 and the SE soil sample SS-01-01 is depicted on SE Figure 2. Sub-slab soil gas results for SS-01 are presented in SE Table 1. Soil results are presented in SE Table 2. Concentrations of soil gas were compared to the Washington State Model Toxics Control Act (MTCA) Method B screening level for sub-slab soil gas. The SE sub-slab soil gas analytical results indicated the following:

- PCE was detected in SE soil gas sample SS-01 at a concentration of 7,000 micrograms per cubic liter (ug/m3), which exceeds the MTCA Method B Soil Gas "Screening Level" of 321 ug/m3. Trichloroethene was detected in soil gas at a concentration of 18 ug/m3, which exceeds the MTCA Method B Soil Gas "Screening Level" of 12.3 ug/m3.

- All other CVOCs analyzed were not detected at concentrations above the applicable laboratory reporting limits or MTCA Method B Screening Levels.

3.1 INTERPRETATION

The presence of elevated PCE and TCE concentrations in soil gas below the concrete slab in sample SS-01 in the work area behind the dry cleaner machine is evidence that a release of dry cleaning solvent (PCE) has occurred at the facility. The absence of PCE and TCE in the soil sample SS01-01 collected 8-inches away from SE soil gas probe SS01 in shallow surface soil (1 foot of depth) indicates that the source or location of the PCE release is located elsewhere at the facility.

4.0 RESULTS FROM THIS ASSESSMENT

The analytical results and interpretation report provided by AGI for the 16 Gore Sorber™ samplers is provided as Appendix D. The PCE gas concentration results are Tabulated in AGI Table 1 attached. The analytical report provided by the Seattle lab F&B for soil sample results is provided as Appendix E.

4.1 Gore Sorber™ Sample Results

The data results from the AGI analysis of the 16 Gore Sorber™ samplers is provided in the table below:

Table 1 – PCE Vapor Concentration and PCE Total Mass by Sample Location

Sample Number	PCE Vapor Concentration (ug/m3)	PCE Total Mass (ug – PCE)
SV-1	6,020	49.1
SV-2	8,140	66.1

SV-3	9,670	78.6
SV-4	11,700	95.3
SV-5	7,010	57.5
SV-6	13,700	111
SV-7	20,200	167
SV-8	17,900	146
SV-9	5,670	46.3
SV-10	6,310	50.9
SV-11	12,700	104
SV-12	15,300	125
SV-13	54.9	0.42
SV-14	129	1.01
SV-15	300	2.34
SV-16	108	0.83

4.2 Soil Sample Results and Soil Gas Correlation

The concentration of PCE in soil sampled at location SV-2 was 0.041 mg/kg at 2 feet of depth below the slab. The concentration of PCE in soil at location SV-3 was 0.035 mg/kg at 2 feet of depth below the slab. The PCE concentration in soil for both these soil sample locations, at 2 feet of depth, is slightly below the MTCA Method A cleanup level (CUL) which is 0.05 mg/kg. The SV-2 soil gas concentration was 8,140 ug/m3, and the SV-3 soil gas concentration was 9,670 ug/m3. Both sample locations had soil with PCE at concentrations close to the MTCA CUL. These concentration data for PCE soil gas results and the associated PCE soil concentrations correlate with other GoreSorber™ assessments completed in the Puget Sound area in glacial till soil in other similar assessments. Other Gore Sorber™ assessments we have completed have shown that there is a high correlation between GoreSorber™ soil gas results above 10,000 ug/m3 and a soil PCE concentrations that exceed the 0.05 mg/Kg CUL. However, it is important to note the very low total mass concentrations of PCE for samples SV-1, SV-2, SV-3, SV-4, SV-5, SV-9, SV-10, SV-13, SV-14, SV-15 and SV-16. These total mass values are very low, and the low readings in the 11 listed data points, and their locations strongly suggest that only a minor spill has occurred in the surface area in the location near or at SV-7, the location with highest mass and PCE concentration.

5.0 FINDINGS AND INTERPRETATION

The Gore Sorber™ results show that some PCE has impacted soil in an area of the facility that is not associated with the usual and customary releases at the back of the dry cleaner machine, or the dry cleaner fluid and waste storage areas, which are the source areas most typical to normal dry cleaning facilities and their operations. The Gore Sorber™ results show that a release, with a relatively small mass of volume has occurred somewhere in the close proximity to sample locations SV-7 and SV-8, the 2 samples with the highest PCE concentrations. The AGI PCE concentration contour map illustrates the Gore Sorber™ results in a definitive way, and identifies the facility area with significant PCE impacts, and shows the probable source and location where the "release" has occurred. This location and identified release area could be the result of "pre-cleaning or spot removal activities" at a former work station in or near that SV-7 location. These normal spot cleaning activities typically use very small quantities of solvent, and an historic spill in this area from spot cleaning would be a minor release.

The assessment results show that shallow contaminated soil is the issue of concern at this site, and the PCE impacted area appears to be isolated to a localized area of the facility. In our experience, the shallow soil area can easily be treated with a properly designed Soil Vapor Extraction (SVE) system, installed to treat the contaminated soil just below the floor slab of this area of the dry cleaner facility. SVE systems are commonly used for limited surficial soil contamination, and are readily approved by WA Ecology for simple soil only, PCE contaminated sites like the PLC Site when there is no planned development that would necessitate soil removal as the solution for the Property.

6.0 PREFERRED CLEANUP REMEDY FOR SITE

The treatment system for contaminated soil in the identified Area of Contamination (AOC) is a properly designed SVE system targeted to pass large quantities of air through the impacted the center of the source area, in order to increase the rate of PCE vapor removal. Higher air flow soils in the AOC. The SVE system for this Site will be designed with increased velocities near rates will increase volatilization of the PCE and advection of the contaminant vapor. Bioattenuation or diffusion of the contaminant is not the goal of this system. Without site specific soil data (effective porosity or air permeability), a conceptual SVE system will be designed, based on general design standards for typical SVE systems. A pilot test can be performed at the site to confirm the anticipated radius of influence (ROI) for vapor extraction, and to verify the final design of the SVE system layout.
The SVE system is intended to produce a negative pressure field below the slab and within the soil areas of greatest PCE vapor concentrations. Recovered PCE vapors in the sub-slab vadose zone may be treated using activated carbon before the extracted air is vented to atmosphere. By extracting the PCE vapor away from the slab, the SVE system creates a sub-slab depressurization effect, and thereby minimizing potential for ambient air-quality exceedances

inside the facilities. So then, the SVE soil remedy addresses the potential for vapor intrusion risk to tenant workers.

For purposes of the conceptual design, we anticipate that three horizontal vapor extraction/recovery pipes in trenches approximately 20 to 25 feet long will need to be placed within the zone of highest soil impact with highest PCE vapor readings, as shown in the preliminary design on Figure 3. One vapor recovery trench (HV-3, Figure 3) will be installed as close as possible to the interior dividing wall of the commercial space to the east (HV-3, Figure 3). Two additional vapor recovery trenches (HV-1 and HV-2, Figure 3) will be installed in the primary source area of the site. For each vapor recovery trench, the depth of base material (generally dry, loose sandy silt) is estimated at two feet, with native till below, therefore the depth or bottom of the vapor extraction trench will located approximately 6 inches above the contact with native till.

Blower or Vacuum Extraction System and Controls

A 1-horsepower rotron blower (vacuum extraction air pump) or greater capacity system will be connected to all three horizontal well locations through a header manifold, as shown in the system layout on Figure 3. Each horizontal extraction pipeline will have separate valve controls to allow variable recovery rates by each horizontal extraction well, and to allow separate treatment rates, by varying air flow for each SVE extraction trench in the contaminated area.

The extraction system and its exhaust is located outdoors in the equipment shed as shown on Figure 3. The rotron blower pulls soil vapor from the extraction points, through the header, and captures the extracted PCE vapor using granular-activated carbon prior to discharge of the vapor through an exhaust vent located above the roofline of the building.

A condensate management system will be installed that collects condensation that builds up in the vapor extraction system, and stores the condensate in a drum in the blower station area. An automated high-water shutoff switch turns the blower off when collected water builds up in the condensate storage container. Condensate liquids are removed on a general schedule, typically monthly to keep the SVE system fully operational for the maximum time.

Vapor Exhaust Treatment (Contingency)

Regulations under the Puget Sound Air Pollution Control Agency (PSAPCA) control air emissions from SVE remedial systems that discharge volatile organic compounds (VOC) to the atmosphere. PSAPCA regulations require a discharge permit if the anticipated air discharge of VOCs exceeds a total mass of 500 pounds of VOCs per year. If a system can be shown by calculation, or through empirical demonstration by measuring exhaust air concentrations, to be below that 500 pound total mass limit per year, then no permit is required for the system. With the low mass of PCE in the treatment area indicated by the soil gas vapor values and the soil contamination levels, it is expected that a PSAPCA permit will not be required for this SVE system. However, the necessary work effort to apply to PSAPCA and obtain a discharge permit, and task activities to report the monitored discharge in the air exhaust to PSAPCA under a permit have been calculated into the remedial costs estimate (Table 2) for

conservative purposes. In addition, the remedial cost budget (Table 2) has included the costs for installing activated carbon capture cannisters to treat the exhaust air VOCs (if the 500 pound per year limit is exceeded), as an additional conservative element of the remedial costs estimate.

7.0 ESTIMATE OF REMEDIAL COSTS

We have prepared a rough order of magnitude (ROM) cost estimate for the project activities to complete additional investigation to define the full extent of the PCE AOC in soil, to perform a pilot test to determine soil porosity and determine the SVE radius of influence to confirm design parameters of the preliminary design, and to complete the design and installation of the SVE soil treatment system at the Site. The ROM Cost Estimate is provided as Table 2.

The ROM Cost Estimate presents additional costs for activities that are typically needed to prepare and present a more formal remedial investigation (RI) and focused feasibility study (FSS) to Ecology to support their review and approval of the proposed remedial solution as the Cleanup Action Plan (CAP) for the site, in this case the SVE system to treat the shallow and lightly impacted soil. As shown in Table 2, the ROM cost estimate for the preparing the SVE design, install, and operational activities through regulatory review and approval is approximately $261,000. With a contingency budget of 20% to cover discrepancies in area or depth of contamination, or other agency requested additions to the remedial plan and program, the overall remedial project ROM Cost Estimate is $310,000.

Based on previous experience with Ecology on 16 other dry cleaner sites, it is our opinion that this ROM Cost Estimate is a conservative budget, and that it should provide ample funding to design and install the planned soil treatment system for the identified Area of Contamination at the Site.

Figures

Soil Boring Location

Regional Groundwater Well Location

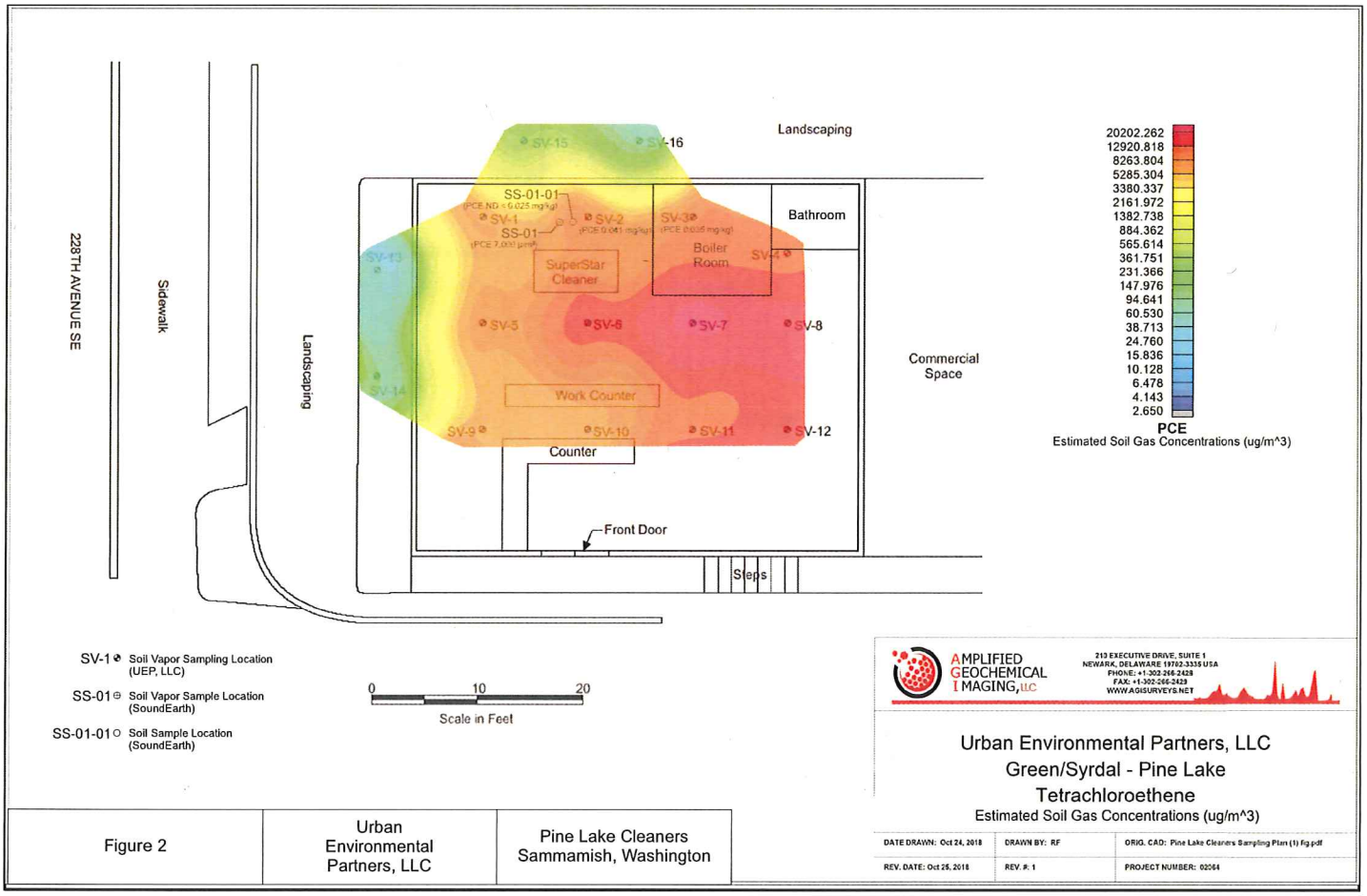
(74' BGS) Groundwater Depth in Feet Below Ground Surface

N

0 500 1000

Scale in Feet

Urban Environmental Partners, LLC	Pine Lake Cleaners Sammamish, Washington	Figure 1 Location of Site and Regional Groundwater Wells



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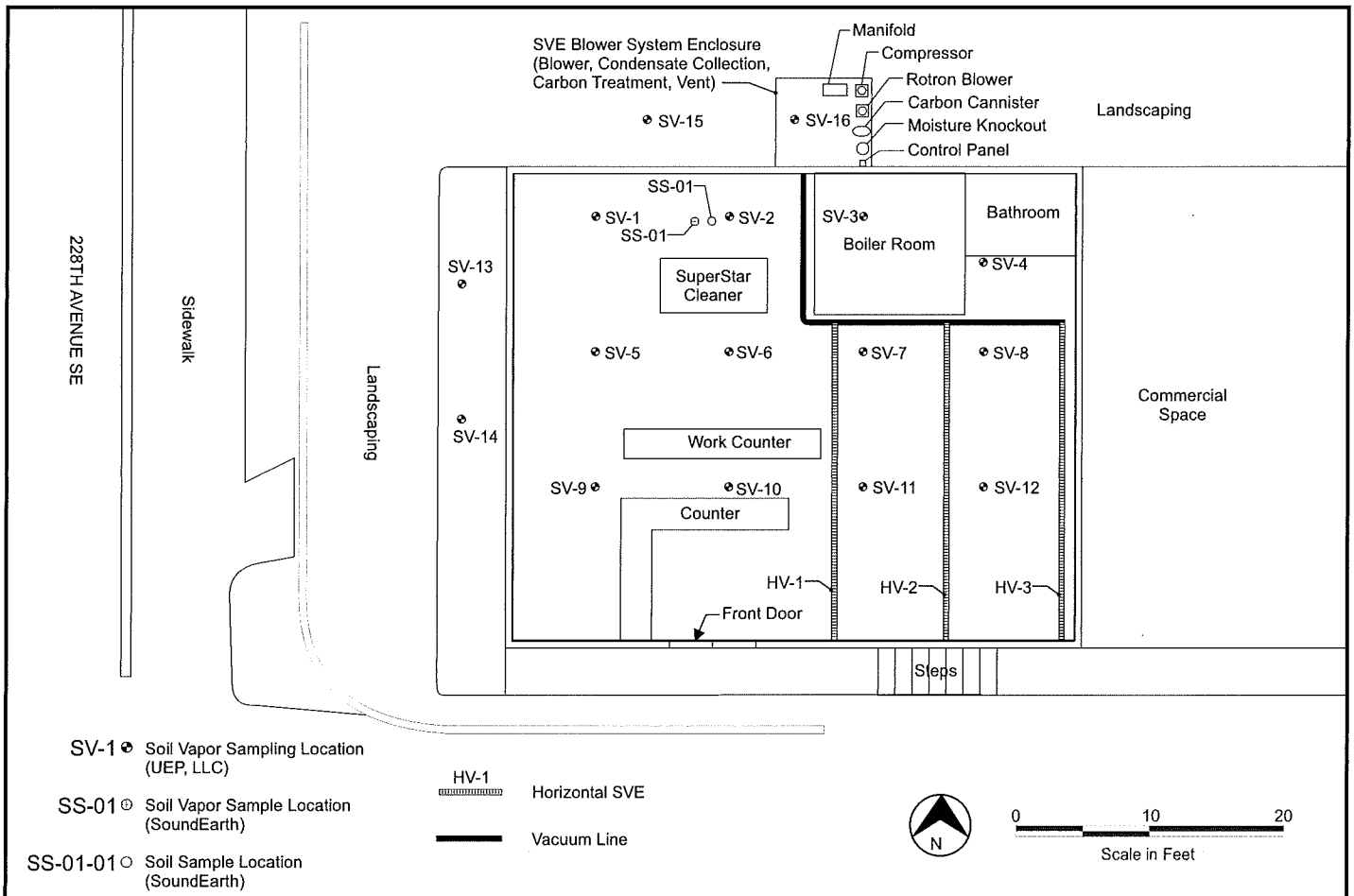
Urban Environmental Partners, LLC
Green/Syrdal - Pine Lake
Tetrachloroethene
Estimated Soil Gas Concentrations (ug/m^3)

DATE DRAWN: Oct 24, 2018	DRAWN BY: RF	ORIG. CAD: Pine Lake Cleaners Sampling Plan (1) fig.pdf
REV. DATE: Oct 26, 2018	REV. #: 1	PROJECT NUMBER: 02064

Figure 2	Urban Environmental Partners, LLC	Pine Lake Cleaners Sammamish, Washington



Urban Environmental Partners, LLC	Pine Lake Cleaners Sammamish, Washington		Figure 3 Conceptual SVE Design Layout

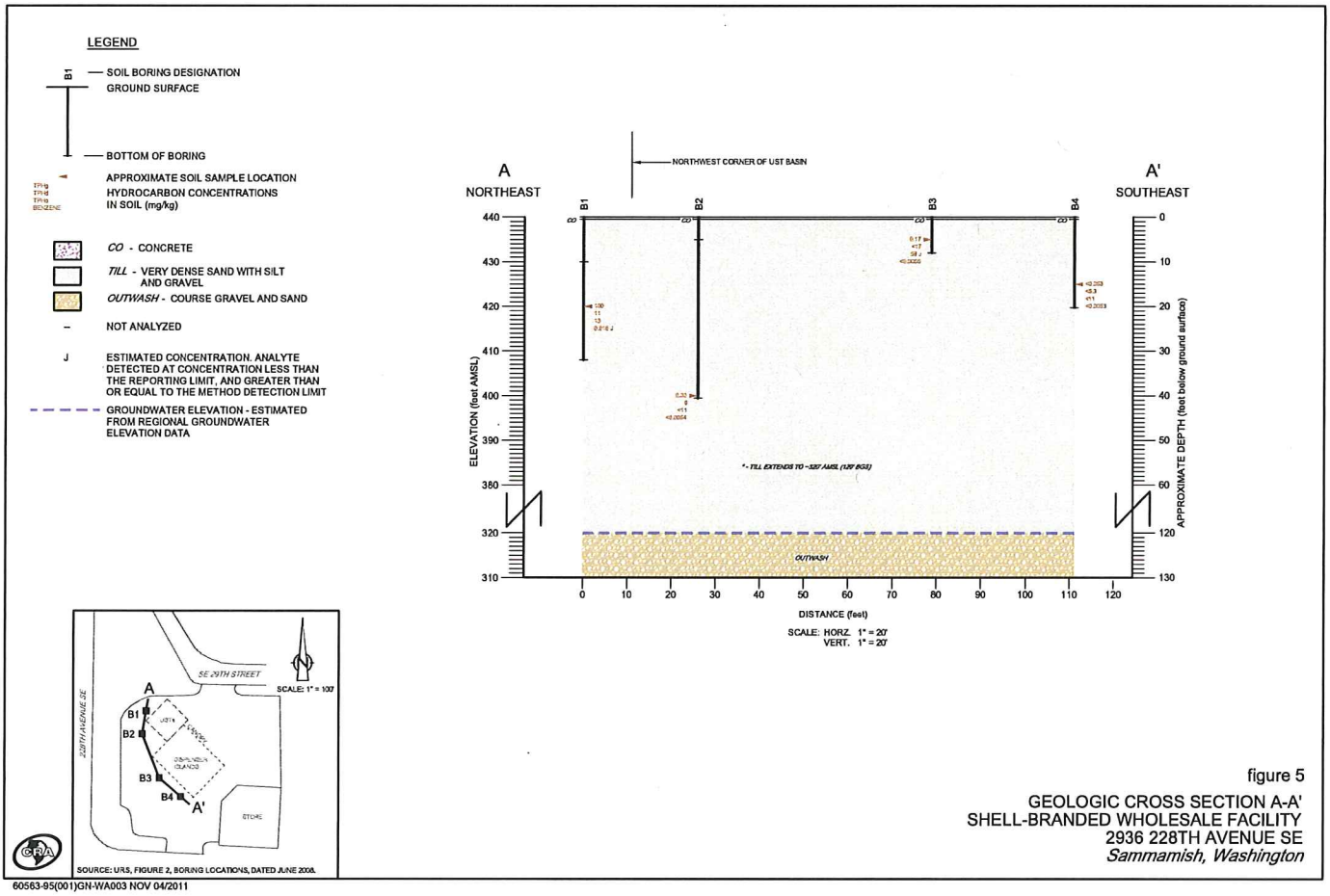


figure 5

GEOLOGIC CROSS SECTION A-A'
SHELL-BRANDED WHOLESALE FACILITY
2936 228TH AVENUE SE
Sammamish, Washington

Tables

AMPLIFIED GEOCHEMICAL IMAGING ANALYTICAL RESULTS
210 EXECUTIVE DRIVE, SUITE 1, NEWARK, DE
URBAN ENVIRONMENTAL PARTNERS, LLC, SEATTLE, WA
AGI TARGET COMPOUNDS
ESTIMATED SOIL-GAS CONCENTRATIONS
GREEN/SYRDAL - PINE LAKE
ORDER #02064

FIELD		
ID	**TCE, ug/m^3**	**PCE, ug/m^3**
SV - 1	<13.7	6020 E
SV - 2	<13.8	8140 E
SV - 3	<13.8	9670 E
SV - 4	<13.8	11700 E
SV - 5	<13.7	7010 E
SV - 6	70.0	13700 E
SV - 7	192	20200 E
SV - 8	<13.8	17900 E
SV - 9	<13.7	5670 E
SV - 10	<13.8	6310 E
SV - 11	<13.7	12700 E
SV - 12	<13.8	15300 E
SV - 13	<13.8	54.9
SV - 14	<13.8	129
SV - 15	<13.9	300
SV - 16	<13.9	108
Trip Blank	<13.8	<2.65
Trip Blank	<13.8	<2.65
Method Blank	<13.8	<2.65

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Table 2 - Remedial Cleanup Cost Estimate
Air Sparge/Soil Vapor Extraction System (AS/SVE)
Pine Lake Site - 2830 228th Street SE, Sammamish, WA

10/30/2018

Project Environmental Activities to Address Impacted Soil		TASK SUMMARY COSTS			ASSUMPTIONS & VOLUMES
		Professional Fees - Summary of Estimated Costs	Driller/Lab, Remedial Contractor Costs, Agency Fees, Soil Disposal, and Construction Costs	SUBTASK AND TASK TOTALS	
TASK 1 - Data Review & Analysis, Data Gap ID and Resolution, Additional Investigation, Pre-Remedial Design/Engineering Analysis - Conceptual Project Planning: Schedule, Permits, Design Docs, Budgets, and Communication with Meetings, and Project Logistics and Management					
1.1	Data Review and Data Gap Analysis, Identify Critical Project Costs Elements, Site Visit/Mark Locates, Define Project, Establish Team/Schedule, Complete Sub-Contracts	$2,200	$0	$2,200	Need to Define Potential VI Impacts to Jewelry tenant and define south boundary
1.2	Additional Environmental Investigation: Drilling, Complete Additional Soil Sampling Probes - Define Full Treatment Area , Establish Soil Baseline Concentrations ; Install One Deep GW MW (85 feet)	$4,800	$12,000	$16,800	Permit & Fees, After Hours Work: Mobe, Drill, Sample, Restore, Demobe, Lab
1.3	Pilot Test to Define ROI, and determine need for AS	$2,260	$4,600	$6,860	Drill and Install Pressure gauges, install Vacuum Blower and Test ROI
1.4	Preliminary Remedial Engineering & Design Work for Soil *In-Situ* Treatment via AS/SVE	$5,120	$0	$5,120	Initial Design Work and Detailed Costing for *In-Situ* Treatment of Impacted Soils,
1.5	Permit Issues Identification, and Timeline Impacts, Scheduling Considerations	$540	$0	$540	
1.6	Interface with Owner, Tenants and Lenders - Remedial Plan, Construction Logistics, Regulatory Path Process and Timeline, and Other Issues	$1,080	$0	$1,080	Approx. 6 hours
1.7	Task Project Management and Admin - Scheduling, and Logistics	$540	$0	$540	1 Month
	TASK 1 TOTAL:	$16,540	$16,600	$33,140	
TASK 2 - Prepare Regulatory Documents for Ecology VCP - Requirements under MTCA (2018)					
2.1	Remedial Investigation (RI) Report	$7,700	$0	$7,700	RI using Existing Data for Characterization of Property Issues, Not Site
2.2	Focused Feasibility Study (FS) -Soil Only	$6,400	$0	$6,400	Focused FS for Soil Treatment - VCP Quality/Detail; No Disproportionate Cost Analysis (DCA) anticipated
2.3	Cleanup Action Plan (CAP)	$8,400	$0	$8,400	Simple SVE Installation
2.4	Project Management and Administrative Support for Task	$1,020	$0	$1,020	1 Month
		$23,520	$0	$23,520	
TASK 3 - Ecology Regulatory Process through VCP - Approval of RI/FS - CAP (2019)					
3.1	Voluntary Cleanup Program (VCP) Application & Support Documents	$3,000	$0	$3,000	
3.2	Ecology Correspondence, Meetings, and Regulatory Review Fees	$2,000	$5,000	$7,000	
3.3	Project Management and Administrative Support for Task	$3,000	$0	$3,000	3 Months
	TASK 3 TOTAL:	$8,000	$5,000	$13,000	
TASK 4 - Remedial System Design, Remedial Action Planning, Preparation, Permits, & Contracting (2019)					
4.1	Health and Safety Plan	$1,500	$0	$1,500	
4.2	AS/SVE System Design: Plans, Specs, and Equipment	$6,800	$0	$6,800	
4.3	60%, 90% Design Plans, and Bid Package	$4,400	$2,000	$6,400	
4.4	Site Walk with Contractors	$640	$0	$640	
4.5	Bid Questions/Responses and Bid Review/Selection and Contracting	$340	$0	$340	
4.6	Order Long Lead Time Equipment: Air Compressor, Rotron Blower, Manifold Controls, XXXX	$1,400	$0	$1,400	
4.7	Project Management and Administrative Support for Task	$1,020	$0	$1,020	1 Month
	TASK 4 TOTAL:	$16,100	$2,000	$18,100	

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Table 2 - Remedial Cleanup Cost Estimate
Air Sparge/Soil Vapor Extraction System (AS/SVE)
Pine Lake Site - 2830 228th Street SE, Sammamish, WA

10/30/2018

	Project Environmental Activities to Address Impacted Soil	TASK SUMMARY COSTS			ASSUMPTIONS & VOLUMES
		Professional Fees - Summary of Estimated Costs	Driller/Lab, Remedial Contractor Costs, Agency Fees, Soil Disposal, and Construction Costs	SUBTASK AND TASK TOTALS	
TASK 5 - Install AS/SVE System - Remedial Action Components (2019)					
5.1	Mobilization, Mark Utilities, and Site Security, Install Electric Power Drop amd Meter	$1,000	$9,500	$10,500	
5.2	Limited Access Rig - Install Air Sparge Points IF Needed	$1,800	$2,800	$4,600	
5.3	Saw Cut Concrete Trenches - 200 Liner Feet	$1,220	$3,600	$4,820	$18/LF
5.4	Trenching - Soil Removal and Gravel Bed Placement	$2,880	$2,200	$5,080	40 Tons Gravel
5.5	Install Air Sparge Pipes and Horizontal SVE Extraction Pipes, Pressure Meters	$2,240	$1,800	$4,040	
5.6	Install Electrical Panel and Controls - North Side of Building	$1,280	$7,400	$8,680	Control Panel - Grainger
5.7	Install Compressor and Blower with Manifold System, and Telemetry Connection, Air Filter, and Weather Enclosure	$2,560	$70,000	$72,560	Rogers Machinery, Grainger, Cascade Machinery, HD Fowler
5.8	Remove Dirt, Disposal As Contained-Out PCE Soil (~40 Tons)	$560	$3,600	$4,160	Waste Management- Wenatchee - $90/Ton
5.9	Restore Concrete Floor and Paint	$2,220	$2,400	$4,620	600 SF
5.11	Project Management and Administrative Support for Task (2 Months Remedial Period)	$2,400	$0	$2,400	Assumes 2 months
	TASK 5 TOTAL:	$18,160	$103,300	$120,000	
Task 6- Post Construction AS/SVE Maintenance Checks and Operations					
6.1	Monthly Operations Check, Monitoring Air Discharge, Complete Status Checklist (2 Years - 24 Events)	$16,800	$800	$17,600	Drain knock-out water, check belts, connections, pressures, measure air flow and VOCs in Discharge, Miscellaneous parts, lubricant, travel
6.2	Client and Ecology Communications - Monthly	$4,320	$0	$4,320	
	TASK 6 TOTAL:	$21,120	$800	$21,920	
TASK 7 - Post Remedial Action Yearly Reporting (2019 and 2020)					
7.1	Interim Cleanup Action Report	$5,600	$1,000	$6,600	
7.2	Quarterly Status Report (Memo with Checklists) to Ecology (8 Events)	$2,000	$0	$2,000	
	TASK 7 TOTAL:	$7,600	$1,000	$8,600	
TASK 8 - Groundwater Compliance Monitoring (2019 - 2020)					
8.2	Quarterly Groundwater Monitoring (Quarterly for 1 Well over 2 Years) 8 Events	$9,600	$1,600	$11,200	$1,200/event
8.3	Yearly Status Report to Ecology, 2 Events	$4,000	$0	$4,000	Yearly over 2 Years (2 Events)
	TASK 8 TOTAL:	$13,600	$1,600	$15,200	
TASK 9 - Project Documentation and Closeout (2019 - 2020)					
9.1	Request to Decommission AS/SVE System and MW - Opinion from Ecology MTCA Program	$1,080	$0	$1,080	
9.2	GW Well Decommissioning (1 Well) @ $1,000/well	$640	$1,000	$1,640	
9.3	Decommission AS/SVE, Remove Enclosure and Equipemnt, Terminate Power Controls/Service	$1,280	$800	$2,080	
9.4	Project Management and Administrative Support for Task (1 Month)	$1,220	$0	$1,220	1 Month
	TASK 9 TOTAL:	$4,220	$1,800	$6,020	

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10/30/2018

Project Environmental Activities to Address Impacted Soil	TASK SUMMARY COSTS			ASSUMPTIONS & VOLUMES
	Professional Fees - Summary of Estimated Costs	Driller/Lab, Remedial Contractor Costs, Agency Fees, Soil Disposal, and Construction Costs	SUBTASK AND TASK TOTALS	

SUMMARY OF COST ESTIMATE	Subtotal Professional Fees and Lab Costs:	$129,000	
	Permit and Remedial Subcontractors, Soil Disposal, Lab Analytical, Field Equipment, and ODCs:	$132,000	
SUBTOTAL	ESTIMATED SUBTOTAL (ROUNDED):	$261,000	
PROJECT COSTS INFLATION & CONTINGENCY (20%)	INFLATION & CONTINGENCY (20%)	$52,200	
TOTAL PROJECT BALLPARK ESTIMATE	ESTIMATED TOTAL (ROUNDED):	$310,000	

COST AND BUDGET ASSUMPTIONS/LIMITATIONS	
• Cost estimate is preliminary engineer's estimate based on experience and typical unit rates for similar SVE remedial projects.	
• Additional investigation, engineering and design work may produce different design factors, so the 20% contngecy is included.	
• Permitting costs and fees for Agency approval will be dependent upon engineering design methods selection.	
• Ecology approval through VCP will be dependent upon Case Manager assignment, and on their approval of SVE as the most likely and probable remedial system.	