PHASE II ENVIRONMENTAL SITE ASSESSMENT

1700 Airport Way South, Seattle, WA

Prepared for: Evergreen Treatment Services

Project No. 180043 • February 21, 2019 • FINAL

Aspect CONSULTING

earth + water

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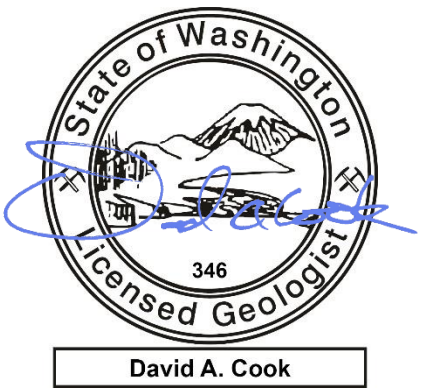

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Executive Summary

Aspect Consulting, LLC (Aspect) completed a Phase II Environmental Site Assessment (ESA) at 1700 Airport Way S in Seattle, Washington (King County tax parcel number 7666-20-2855) (herein referred to as the Subject Property) in December 2018. The Subject Property is currently developed with one building. The south wing of the building includes a former warehouse that has been converted into office space and treatment rooms used by Evergreen Treatment Services (ETS). The north wing of the building is a warehouse most recently used by Emerald Recycling as part of their used oil recycling facility. The building was initially constructed in 1914/1915 as a factory for the Western Blower Company, manufacturer of blowers for saw mills and furnaces. The Subject Property is shown relative to surrounding physical features in the Vicinity Map, Figure 1. The Subject Property is currently privately owned and zoned as industrial.

The objectives of the Phase II ESA services completed at the Subject Property were to:

1) Evaluate the presence and nature of volatile contaminants of potential concern (COPCs) in soil gas beneath the Subject Property.
2) Evaluate the potential presence of soil contamination associated with current or past sources of contamination on the Subject Property or on nearby adjacent properties.
3) Evaluate the potential presence of groundwater contamination associated with current or past sources of contamination on the Subject Property or on nearby upgradient properties.

Based on the Phase I ESA that Aspect previously conducted, several potential sources of contamination were identified on the Subject Property. Recognized Environmental Conditions (RECs) identified in the Phase I ESA are summarized on Figure 2 and include historical manufacturing operations by Western Blower Company and hazardous and non-hazardous waste handling by Northwest EnviroService as well as recent used oil waste handling in the northern portion of the Subject Property. These property-use activities indicate a potential for petroleum, solvents, and metals contamination to soil and/or groundwater at the Subject Property from on property potential sources, and a risk for vapor encroachment or intrusion to Subject Property structures.

Based on the RECs identified in the Phase I ESA, COPCs identified for the Subject Property include:

- Gasoline-range total petroleum hydrocarbons (TPH)
- Diesel- and oil-range TPH
- Volatile organic compounds (VOCs), which include chlorinated solvents
- Metals
- Cyanide

For this Phase II ESA investigation, Aspect advanced four soil borings that were completed as monitoring wells. The Phase II ESA sampling program included installation of four monitoring wells: two towards the center of the Subject Property near the former loading dock and one just west (or downgradient) of each wing of the property building. Aspect also completed four temporary soil gas sampling points. Select samples were submitted for laboratory analysis. Soil, groundwater, and soil gas conditions beneath the Subject Property are summarized below.

Soil

Prior to site development, the Subject Property was located at the edge of the Elliott Bay tide flats, which were filled in the early 1900s. This is reflected in the soils observed during sampling. Fill material was observed up to a depth of 15 to 19 feet below ground surface (bgs). Fill soils consist of silty fine to coarse sand and sandy silt. In all borings except AMW-3 to the south, fragments of brick, glass, ceramics, and shell were observed between 9 and 15 feet bgs. Fill soils are underlain by a clay to sandy clay unit (representative of historical tideflat deposits).

Six soil samples were selected for laboratory analysis based on field observations and relative to identified RECs. Two analytes were detected above the Model Toxics Control Act (MTCA) Method A cleanup levels (CULs). These exceedances were at 12.5 feet bgs at location AMW-1 at concentrations of 27.8 and 4,720 milligrams per kilogram (mg/kg) for arsenic and lead, respectively. The arsenic value slightly exceeds the CUL of 20 mg/kg while lead is more than an order of magnitude greater than the CUL of 250 mg/kg.

VOCs, gasoline-, diesel-, and oil-range TPHs, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), cadmium, chromium, copper, manganese, mercury, nickel, and zinc either were not detected or were detected in soil at concentrations less than the MTCA Method A or B CULs.

Groundwater

In the four monitoring wells Aspect installed, groundwater was encountered beneath the Subject Property at a depth of 4.5 to 5.7 feet bgs with a westerly flow direction. Four groundwater samples were submitted for analysis. At a concentration of 2.9 micrograms per liter (µg/L), vinyl chloride exceeds MTCA Method CULs (0.2µg/L) in well AMW-1, located west of the north wing of the building. Dissolved arsenic concentrations above the MTCA Method A CUL (5 µg/L) were detected in off-property wells AMW-1 and AMW-3 at concentrations ranging between 11 and 20.3 µg/L, respectively.

Soil Gas

Aspect collected four temporary sub-slab soil gas samples (SV-1 through SV-4), two in each wing of the property building, and submitted them for analysis of VOCs. Based on the chemical analytical soil gas results, the following contaminants were detected at concentrations greater than the MTCA Method B Screening Levels (adjusted to commercial exposure): benzene, trichloroethene (TCE), vinyl chloride, 1,3-butadiene, and acrolein.

The risk of vapor intrusion was evaluated by estimating indoor air concentrations from the highest detected concentration of each of the above contaminants using the Johnson-

Ettinger Model for vapor intrusion (JEM). Based on the model results, indoor air concentrations of vinyl chloride may exceed MTCA Method B CULs in the north wing. The model did not predict exceedances of the other contaminants in the north wing or of any contaminants in the south wing.

It's important to note that TCE in soil gas is under review by the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) due to new toxicological data indicating health effects in pregnant women. Draft Ecology guidance is suggesting that a more rigorous evaluation be conducted for TCE when evaluating vapor intrusion risk. In addition, recent Ecology guidance has indicated that for certain chemicals (including TCE and vinyl chloride), modeling predictions may need additional site data (e.g., confirmatory indoor air data) to support the evaluation of vapor intrusion risk.

Data collected at the Subject Property provide some, but not all, of the evidence that may be necessary to eliminate future considerations of TCE soil gas at this property, based on these guidance documents. While the actions completed during this study to evaluate vapor intrusion risk show no unacceptable risk under current site conditions, additional monitoring may be prudent to provide more certainty and ultimately receive Ecology concurrence that the vapor intrusion pathway is incomplete.

Recommendations

Chlorinated solvents (TCE and vinyl chloride) have been detected in soil gas on the northern portion of the Subject Property. The sump in the southeast corner of the north wing is a suspected source of the elevated TCE and vinyl chloride. Aspect recommends that the sump be cleaned, following which soil gas should be resampled in the north wing of the building. If concentrations remain elevated in soil gas, mitigation measures may be necessary (such as active and/or passive venting systems) for that portion of the building to be occupied.

If the northern portion of the Subject Property is redeveloped, additional soil and groundwater sampling may be warranted to better assess potential impacts in this portion of the property. Impacts to soil and groundwater are currently managed through the existing restrictive covenant.

The Executive Summary should be used only in the context of the full report for which it is intended.

1 Introduction

This report summarizes Aspect Consulting, LLC's (Aspect) Phase II Environmental Site Assessment (ESA) for the Subject Property located at 1700 Airport Way S in Seattle, Washington (King County tax parcel number 7666-20-2855), referred to herein as the Subject Property. The Subject Property is currently developed with one building. The southern wing of the building includes a former warehouse that has been converted into office space and treatment rooms used by Evergreen Treatment Services (ETS). The northern wing of the building is a warehouse most recently used by Emerald Recycling as part of their used oil recycling facility. The building was initially constructed in 1914/1915 as a factory for the Western Blower Company, manufacturer of blowers for saw mills and furnaces. The Subject Property is shown relative to surrounding physical features on Figure 1, Vicinity Map.

During the Phase II ESA study, four sub-slab vapor pins and two groundwater monitoring wells were installed within the Subject Property boundary and an additional two groundwater monitoring wells were installed in the City of Seattle right-of-way (ROW), west of the Subject Property. Soil samples were obtained from monitoring well installations for chemical analysis. Groundwater samples were obtained from the four monitoring wells for chemical analysis. Soil gas samples were obtained from four temporary sub-slab soil gas sampling pins for chemical analysis.

2 Purpose and Scope of Services

The objectives of this Phase II ESA completed at the Subject Property during August 2018 were to:

1) Evaluate the presence and nature of volatile contaminants of potential concern (COPCs) in soil gas beneath the Subject Property.

2) Evaluate the potential presence of soil contamination associated with current or past sources of contamination on the Subject Property.

3) Evaluate the potential presence of groundwater contamination associated with current or past sources of contamination on the Subject Property.

The specific scope of services for the Phase II ESA is as follows:

- **Soil and Groundwater Evaluation.** Completed four groundwater monitoring wells (AMW-1 through AMW-4) to obtain soil and groundwater samples from the subsurface. Following well development, groundwater samples were collected for chemical analysis of COPs (listed below), based on historical and current sources of contamination identified in the Phase I ESA (Aspect, 2018), including:

  - Gasoline-range total petroleum hydrocarbons (TPH) using Northwest Method NWTPH-Gx
  - Diesel- and oil-range TPH using Northwest Method NTWPH-Dx
  - Volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 8260D
  - Polycyclic aromatic hydrocarbons (PAHs) using EPA Method 8270D/SIM
  - Select metals (arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, zinc) using EPA Method 6020B
  - Cyanide (groundwater only) by SM 4500-CN

- **Vapor Intrusion Evaluation.** Installed four temporary sub-slab soil gas sampling pins (SV-1 through SV-4) inside the two wings of the Subject Property building. Obtained soil gas samples from the sub-slab pins to evaluate the potential vapor intrusion risk and submitted the samples for VOC analysis using EPA Method TO-15.
- **Data Evaluation.** Evaluated the field and laboratory results relative to Washington State Model Toxics Control Act (MTCA) Method A/B Cleanup Levels (CULs) and Method B Screening Levels. Performed indoor air modeling using the Johnson and Ettinger Model (JEM) for analytes that exceeded the MTCA Method B screening levels for sub-slab soil gas.

3 Background

3.1 Phase I ESA Recognized Environmental Conditions

Based on the results of the Phase I ESA Aspect previously conducted (Aspect, 2018), eight Recognized Environmental Conditions (RECs) were identified in association with the Subject Property:

1) **Restrictive covenant on Subject Property.** A restrictive covenant recorded for the property requires the building and pavement be maintained as a protective cover over subsurface soil contamination including arsenic, lead, benzo(a)pyrene (a PAH compound), and TPH. Soil sampling locations, the basis of the covenant requirements, were north of the former loading dock, illustrated on Figure 2. Notification to the Washington State Department of Ecology (Ecology) is required for redevelopment or other disturbance to the cover. The restrictive covenant includes a prohibition of groundwater use due to elevated concentrations of manganese in groundwater at well MW-1 (Figure 2).

2) **Historical manufacturing on property by Western Blower.** Materials and equipment used during manufacturing may have resulted in releases of oil, solvents and metals. Historical building plans for the north warehouse area indicate the basement was the machine shop with a plating area at the northeast corner. In addition to the other contaminants listed above, a cyanide release can be associated with metals plating.

3) **Spills and releases to drains from former property use by Northwest EnviroService (NWES).** NWES used the loading dock located towards the center of the Subject Property building for loading and unloading hazardous and non-hazardous waste from 1987 to 1995. Environmental reports indicate hazardous waste handling and treatment was completed on the northern adjacent property, also owned by NWES. Limited sampling completed in 1995 identified metals, oil and PAH contamination in soil and concrete.

4) **Used oil recycling activities by Emerald Recycling.** Practices may have resulted in releases of oil, solvents, and metals on the northern portion of the Subject Property.

5) **Large engine maintenance/cleaning (north warehouse).** Large engines were potentially cleaned or maintained historically on the main warehouse floor.

6) **Fill material.** Based on borings completed on the north adjacent property, approximately 10 feet of undocumented fill material underlies the Subject Property. Fill material can result in elevated concentrations of metals, oil, and PAHs in soil.

7) **Potential heating oil underground storage tank.** Historical building records indicate the Subject Property was heated by an oil burner. The boiler room was located near the west central entrance to the building.

Phase I findings are summarized on Figure 2.

3.2 Contaminants of Potential Concern

Based on the RECs identified in the Phase I ESA, including historical site use, the presence of unknown fill, and our review of previous environmental reports, COPCs were identified for the Subject Property. The COPCs are defined as contaminants that may be present in soil, groundwater, or soil vapor based on the RECs identified, but have not yet been confirmed to be present. The COPCs for the Subject Property include:

- Gasoline-range total petroleum hydrocarbons (TPH)
- Diesel- and oil-range total petroleum hydrocarbons (TPH)
- VOCs, which include chlorinated solvents
- Metals
- Cyanide

Select soil and groundwater samples obtained from the monitoring wells completed during this study were submitted for chemical analysis of each of the COPCs. Selection of soil samples submitted for laboratory analysis is outlined in Section 6.

4 Current Site Conditions

The Subject Property is located at an elevation of approximately 25 feet above mean sea level. The Subject Property is completely covered by impervious surfaces, including the existing building. The southern wing of the building is a former warehouse converted into office space and treatment rooms used by ETS. The northern wing of the building is a warehouse recently used by Emerald Recycling as part of their used oil recycling facility. The remainder of the Subject Property is covered by paved parking. Current Subject Property features are labeled in Figure 2 and exploration locations are illustrated on Figure 3.

5 Subsurface Conditions

5.1 Soil

Historical Sanborn maps for the predevelopment Subject Property vicinity indicate that the Elliott Bay tide flats were located at the Subject Property and Airport Way was a plank road. The tide flats were filled in the early 1900s. This is reflected in the soils observed during sampling. Fill material was observed up to a depth of 15 to 19 feet below ground surface (bgs). Fill soils consist of silty fine to coarse sand and sandy silt. In all borings except AMW-3 to the south, fragments of brick, glass, ceramics, and shell were observed between 9 and 15 feet bgs. Fill soils are underlain by a clay to sandy clay unit.

This same clay unit was observed in borings completed by others on the north adjacent property and is noted to extend at least 500 feet north of the Subject Property. Boring logs are provided in Appendix A.

5.2 Groundwater

Groundwater monitoring wells AMW-1 through AMW-4 were installed on December 9, 2018. The monitoring wells were developed on December 10, 2018 and sampled on December 17, 2018. At the time of sample collection, depth to water ranged between 4.5 and 5.7 feet bgs. Wells were surveyed by Aspect staff to an arbitrary datum (rather than NAVD 88). Based on the groundwater elevation data, the general groundwater flow direction beneath the Subject Property is westerly (Figure 3).

6 Sampling and Analytical Results

This section provides a summary of the soil, groundwater and soil gas sampling results. Sampling locations are illustrated on Figure 3. The Phase II ESA sampling program included installation of four monitoring wells: two towards the center of the Subject Property near the former loading dock and one just west (or downgradient) of each wing of the property building.

6.1 Soil Sampling and Chemical Analytical Results

Four monitoring wells, AMW-1 through AMW-4, were completed on December 9, 2018. The monitoring wells were advanced using a direct push drill rig operated by Cascade, Inc of Woodinville, Washington. All wells were advanced to a depth of 20 feet bgs. Continuous soil cores were collected for characterization. Boring locations are illustrated on Figure 3. The boring logs are included in Appendix A.

All soil samples were field-screened for evidence of petroleum and/or VOC-related contamination using visual methods, water sheen tests, and a quantitative measurement of headspace vapor using a photoionization detector (PID). While a slight sheen or sheen were observed in some soils up to a depth of 15 feet bgs, no odors or PID detections were noted in the field screening. Samples were selected based on observations of sheen and known historical activities as well as to provide characterization of fill materials.

A total of six soil samples from multiple depths were submitted for chemical analysis of the following COPCs:

- Gasoline-range TPH using Northwest Method NWTPH-Gx
- Diesel- and oil-range TPH using Northwest Method NTWPH-Dx
- Metals (arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, zinc) using EPA Method 6020B

Additionally, two soil samples were submitted for chemical analysis of VOCs using EPA Method 8260D and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) using EPA

Method 8270D/SIM. Selected soil samples were submitted to the state-certified laboratory.

Chemical analytical results of the soil samples obtained from this study are presented on Table 1. Figure 4 present a summary of the contaminants detected in soil at concentrations greater than the MTCA Method A CULs for unrestricted land use (or Method B CULs if no Method A CUL is available). Laboratory reports are presented in Appendix B.

Two analytes were detected above the MTCA Method A (unrestricted land use) CULs. These exceedances were at 12.5 feet bgs at location AMW-1 at concentrations of 27.8 and 4,720 milligrams per kilogram (mg/kg) for arsenic and lead, respectively. The arsenic value slightly exceeds the CUL of 20 mg/kg while lead is more than an order of magnitude greater than the CUL of 250 mg/kg.

The only other analytes detected in the samples submitted for analyses were cPAHs at location AMW-4 at a depth of 2.5 feet bgs but at concentrations well below CULs.

6.2 Groundwater Sampling and Chemical Analytical Results

AMW-1 through AMW-4 were completed as groundwater monitoring wells on December 9, 2018 in accordance with Washington Administrative Code (WAC) 173-160. Monitoring well construction details are shown on the boring log for each monitoring well in Appendix A. The monitoring well screens were set between approximately 4 and 15 feet bgs in order to span the water table surface which was measured at a depth of 4.5 to 5.7 feet bgs.

Following installation, monitoring wells were developed to remove fine-grained material from inside the well casing and filter pack, to improve hydraulic communication between the well screen and the surrounding water-bearing formation, and allowed to equilibrate for more than 24-hours prior to sampling.

Groundwater samples were obtained from the four wells installed by Aspect on December 17, 2018 using low-flow purging and sampling methods techniques with a peristaltic pump and dedicated polyethylene tubing. The groundwater samples were submitted for chemical analysis of the following COPCs:

- Gasoline-range TPH using Northwest Method NWTPH-Gx
- Diesel- and oil-range TPH using Northwest Method NTWPH-Dx
- VOCs using EPA Method 8260D
- Dissolved metals (arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc) using EPA Method 6020B
- Total cyanide by EPA Method SM 4500-CN.

Chemical analytical results of the groundwater samples obtained from this study are presented on Table 2. Figure 5 present a summary of the contaminants detected in soil at concentrations greater than the MTCA Method A CULs for unrestricted land use (or

Method B CULs if no Method A CUL is available). Laboratory reports are presented in Appendix B.

The following contaminants were detected at concentrations greater than the MTCA Method A CUL (or MTCA Method B if no Method A CUL exists) in the groundwater samples:

- Arsenic was detected at concentrations greater than the MTCA Method A CUL (5 micrograms per liter (µg/L) at AMW-1 and AMW-3 at 11.4 and 20.3 µg/L.
- Vinyl chloride was detected at well AMW-1 at a concentration of 2.9 µg/L. The MTCA Method A CUL is 0.2 µg/L.

The remaining COPCs, including TPH, VOCs, and remaining metals (cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc), were either not detected or were detected at concentrations less than the corresponding MTCA Method A CUL.

6.3 Soil Gas Sampling Chemical Analytical Results

Aspect completed soil vapor sampling in accordance with Ecology's *Draft Guidance for Evaluating Vapor Intrusion (VI) in Washington State: Investigation and Remedial Action* (draft VI guidance; Ecology 2018a). On December 10, 2018, Aspect installed four sub-slab Cox-Colvin® vapor pins (SV-1 through SV-4), two in each wing of the property building (Figure 3). Vapor pins area installed using a rotary hammer and soil gas samples were collected from directly below the concrete slab. Samples were collected using laboratory-supplied and certified-evacuated 1-liter SUMMA canisters fitted with 150-milliliters-per-minute (mL/min) flow controller and dedicated sampling train, per the following procedures:

1) Prior to sampling, a shut-in test was performed by inducing a vacuum to the sampling train (including dedicated disposable Teflon tubing, fittings, and connections to the SUMMA canister). A minimum vacuum of 15 inches of mercury was applied for a period of 5 minutes.

   No change in vacuum was observed during the shut-in test, indicating that the sampling train was free of leaks that could introduce ambient air to the soil vapor sample.

2) The tubing was then enclosed in a leak-testing shroud at the surface, and helium tracer gas was applied until approximately 30 percent helium was measured inside the shroud. A total of 500 mL of air/vapor was purged through the extraction point to ensure that any remaining ambient air inside the sampling train was removed, to identify a poor seal between the vapor extraction point and the slab, and to facilitate field screening of soil vapors prior to sampling.

   Helium tracer gas was not detected in the purged vapor at significant concentrations, indicating an adequate seal.

3) After confirming that no significant leakage was present in the sampling train or around the vapor extraction point seal and that all remaining ambient air had been removed from the sampling apparatus, the SUMMA canisters were opened and

allowed to fill at 150 mL/min over approximately 5 minutes, or when the canister vacuum reached -5 inches of mercury.

4) All vapor pins were removed after collection of the soil gas sample and holes were repaired with concrete.

Soil gas samples were submitted for chemical analysis of volatiles using EPA Method TO-15 and helium using ASTM International (ASTM) Method D-1946. Results are presented in Table 3 and exceedances are illustrated on Figure 6. Results have been screened against MTCA Method B Sub-Slab Soil Gas Screening Levels adjusted for commercial exposure[1]. Only samples collected from the north wing contained contaminants at concentrations greater than screening levels, as summarized below:

- Exceedances at location SV-4, located near the sump, were:
    - Benzene at a concentration of 150 micrograms per cubic meter (µg/m^3), screening level of 36 µg/m^3.
    - Trichloroethene (TCE) at a concentration of 43 µg/m^3, screening level of 41 µg/m^3.
    - Vinyl chloride at a concentration of 320 µg/m^3, screening level of 31 µg/m^3.
- Exceedances at location SV-3 were:
    - 1,3-Butadiene at a concentration 12 µg/m^3, screening level of 9 µg/m^3.
    - Acrolein at a concentration of 3.8 µg/m^3, screening level of 1 µg/m^3.

Johnson-Ettinger Vapor Intrusion Model Results

For those COPCs which exceeded the MTCA Method B Screening Levels, the highest concentration was used to evaluate the vapor intrusion risk by estimating indoor air concentrations using the JEM. Estimated indoor air concentrations produced using the JEM are provided in Table 6. Model output files are provided in Appendix C. For the five compounds that exceed soil gas screening levels, only vinyl chloride is predicted to potentially exceed indoor air action levels, based on JEM.

[1] The screening level is adjusted from a residential exposure scenario (24 hours per day, 7 days per week) to a commercial exposure scenario (10 hours per day, 5 days per week). This adjustment is performed in accordance with Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State*.

7 Conclusions

7.1 Soil

Based on the chemical analytical results of soil from borings spaced at limited locations, soil impacts were limited to a sample collected from a depth of 12.5 feet, just west of the Subject Property (AMW-1). Fill material was observed to a depth of 15 feet bgs. Fill soils do not necessarily represent a regulatory reporting condition, but special handling and off-property management and disposal may be warranted for any subsurface maintenance activities. Also, any subsurface disturbances are to be completed in accordance with the existing restrictive covenant.

7.2 Groundwater

In the four monitoring wells Aspect installed, groundwater was encountered beneath the Subject Property at a depth of 4.5 to 5.7 feet bgs with a westerly flow direction. Vinyl chloride exceeds MTCA Method CULs (0.2 µg/L) in the off-property well located west the north wing of the building (AMW-1) at a concentration of 2.9 µg/L. Dissolved arsenic concentrations above the MTCA Method A CUL (5 µg/L) were detected in off-property wells AMW-1 and AMW-3 at concentrations ranging between 11 and 20.3 µg/L.

7.3 Soil Gas

Based on the chemical analytical results of the soil vapor testing (see Section 8 and Table 4), the following contaminants were detected at concentrations greater than the MTCA Method B Screening Level (adjusted for commercial exposure) for sub-slab soil vapor samples:

- 1,3-Butadiene
- Acrolein
- Benzene
- Trichloroethene (TCE)
- Vinyl chloride

The risk of vapor intrusion was evaluated by estimating indoor air concentrations from the highest detected concentration of each of the above contaminants using the JEM. Based on the model results, indoor air concentrations of vinyl chloride may exceed MTCA Method B CULs in the north wing of the building. The model did not predict exceedances of the other contaminants in the north wing of the building or of any contaminants in the south wing of the building.

It's important to note that TCE in soil gas is under review by EPA and Ecology due to new toxicological data indicating health effects in pregnant women. Draft Ecology guidance is suggesting that a more rigorous evaluation be conducted for TCE when

evaluating vapor intrusion risk (Ecology 2018c). In addition, recent Ecology guidance (Ecology 2018b) has indicated that for certain chemicals (including TCE and vinyl chloride), modeling predictions may need additional site data (e.g., confirmatory indoor air data) to support the evaluation of vapor intrusion risk.

Data collected at the Subject Property provide some, but not all of the evidence that may be necessary to eliminate future considerations of TCE soil gas at this property, based on these guidance documents. While the actions completed during this study to evaluate vapor intrusion risk show no unacceptable risk under current site conditions, additional monitoring may be prudent to provide more certainty and ultimately receive Ecology concurrence that the vapor intrusion pathway is incomplete.

7.4 Recommendations

Chlorinated solvents (TCE and vinyl chloride) have been detected in soil gas on the northern portion of the Subject Property. The sump in the southeast corner of the north wing is a suspected source of the elevated TCE and vinyl chloride. Aspect recommends that the sump be cleaned, following which soil gas should be resampled in the north wing of the building. If concentrations remain elevated in soil gas, mitigation measures may be necessary (such as active and/or passive venting systems) for that portion of the building to be occupied.

If the northern portion of the Subject Property is redeveloped, additional soil and groundwater sampling may be warranted to better assess potential impacts in this portion of the property. Impacts to soil and groundwater are currently managed through the existing restrictive covenant.

8 References

Aspect Consulting, LLC (Aspect) 2018. Phase I Environmental Site Assessment, 1700 Airport Way South, Seattle, Washington - Draft, dated October 5, 2018.

Washington State Department of Ecology, 2018a. "Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action," dated October 2009 and Revised February 2016 and April 2018.

Washington State Department of Ecology, 2018b. Frequently Asked Questions (FAQs) Regarding Vapor Intrusion (VI) and Ecology's 2009 Draft VI Guidance, Implementation Memorandum No. 21, dated November 15, 2018.

Washington State Department of Ecology, 2018c. DRAFT Vapor Intrusion (VI) Investigations and Short-term Trichloroethene (TCE) Toxicity, Implementation Memorandum No. 22, dated November 21, 2018.

Limitations

Work for this project was performed for Evergreen Treatment Services (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to **Appendix D titled "Report Limitations and Guidelines for Use**" for additional information governing the use of this report.

TABLES

Table 1. Soil Sampling Results

Project No. 180043, Evergreen Treatment Services, Seattle, Washington

Chemical Name	MTCA Cleanup Levels [a]	Natural Background for Metals [b]	AMW-1 [c] 12/09/2018 12.5 ft	AMW-2 12/09/2018 2.5 ft	AMW-2 12/09/2018 5.5 ft	AMW-3 12/09/2018 5 ft	AMW-4 12/09/2018 2.5 ft	AMW-4 [c] 12/10/2018 8 ft
			Downgradient of North Warehouse	Downgradient of Former Loading Dock		Downgradient of South Warehouse	Adjacent to Former Loading Dock	
Gasoline and diesel-range petroleum hydrocarbons not detected in any of these samples.								
Metals in mg/kg								
Arsenic	20	7	**27.8**	**6.93**	--	**5.39**	**5.59**	< 1 U
Cadmium	2	1	**2**	< 1 U	--	< 1 U	< 1 U	< 1 U
Chromium		48	**22.2**	**42.6**	--	**34.1**	**18.2**	**23.4**
Copper	3200	36	**404**	**28.7**	--	**29.8**	**22**	**11.4**
Lead	250	24	**4720**	**35.3**	--	**5.21**	**32.1**	**7.35**
Mercury	2	0.07	< 1 UJ	< 1 U	--	< 1 U	< 1 U	< 1 U
Nickel	1600	48	**19.6**	**44**	--	**49.7**	**21.5**	**35.7**
Zinc	24000	85	**911**	**66.8**	--	**48.8**	**71.2**	**25.7**
PAHs in mg/kg								
Benz(a)anthracene	1.4		--	--	--	< 0.01 U	**0.013**	--
Benzo(a)pyrene	0.1		--	--	--	< 0.01 U	**0.02**	--
Benzo(b)fluoranthene	1.4		--	--	--	< 0.01 U	**0.028**	--
Benzo(k)fluoranthene	14		--	--	--	< 0.01 U	< 0.01 U	--
Chrysene	140		--	--	--	< 0.01 U	**0.017**	--
Dibenzo(a,h)anthracene	0.14		--	--	--	< 0.01 U	< 0.01 U	--
Indeno(1,2,3-cd)pyrene	1.4		--	--	--	< 0.01 U	**0.018**	--
Total cPAHs TEQ (ND = 1/2 RDL)	0.1		--	--	--	< 0.00755 U	**0.02707**	--

Notes

a - Cleanup levels based on Model Toxics Control Act Method A for unrestricted land use. For analytes where no Method A cleanup level is available, the Method B cleanup level is provided.

b - Background metals concentrations from Natural Background Soil Metals Concentrations in Washington State, Washington State Department of Ecology, Publication #94-115, October 1994.

c - Samples from AMW-1 at 12.5 feet and AMW-4 at 8 feet were also run for volatile organic compounds. No VOCs detected.

mg/kg - milligrams per kilogram

Bold - detected

Blue - analyte was detected at a concentration greater than the MTCA Method B Cleanup Level for Sub-Slab Soil Gas adjusted for commercial exposure scenario.

U - non-detect

Table 2. Groundwater Sampling Results

Project No. 180043, Evergreen Treatment Services, Seattle, Washington

Chemical Name	MTCA Cleanup Levels [a]	AMW-1 12/17/18	AMW-2 12/17/18	AMW-3 12/17/18	AMW-4 12/17/18
Dissolved Metals in µg/L					
Arsenic	5	**11.4**	**4.33**	**20.3**	< 1 U
Cadmium	5	< 1 U	< 1 U	< 1 U	< 1 U
Chromium	50	< 1 U	< 1 U	< 1 U	< 1 U
Copper	640	< 5 U	< 5 U	< 5 U	< 5 U
Lead	15	< 1 U	< 1 U	< 1 U	< 1 U
Manganese	2240	**575**	**302**	**680**	**485**
Mercury	2	< 1 U	< 1 U	< 1 U	< 1 U
Nickel	320	**1.31**	**3.8**	**2.22**	**2.24**
Zinc	4800	< 5 U	< 5 U	< 5 U	< 5 U
TPHs in µg/L					
Diesel Range Organics	500	< 50 U	**73 X**	< 50 U	< 50 U
VOCs in µg/L					
Vinyl Chloride	0.2	**2.9**	< 0.2 U	< 0.2 U	< 0.2 U

Notes

a - Cleanup levels based on Model Toxics Control Act Method A for unrestricted land use. For analytes where no Method A cleanup level is available, the Method B cleanup level is provided.

µg/L - micrograms per liter

Bold - detected

U - non-detect

X - Chromatographic pattern did not match fuel standard

Blue - analyte was detected at a concentration greater than the MTCA Method B Cleanup Level for Sub-Slab Soil Gas adjusted for commercial exposure scenario.

Table 3. Sub-Slab Soil Gas Sampling Results

Project No. 180043, Evergreen Treatment Services, Seattle, Washington

Analyte	Subslab Soil Gas Results and Applicable Screening Levels						Johnson & Ettinger's Model Predicted Indoor Air Results ($\mu g/m^3$)[b]	MTCA Method B Indoor Air Screening Level (Residential) ($\mu g/m^3$)[a]	MTCA Method B Indoor Air Screening Level (Commercial)[a] [$\mu g/m^3$]
	MTCA Method B Subslab Soil Gas Screening Level (Residential) [$\mu g/m^3$][a]	MTCA Method B Subslab Soil Gas Screening Level (Commercial) [$\mu g/m^3$][a]	SV-1 12/10/18	SV-2 12/10/18	SV-3 12/10/18	SV-4 12/10/18			
Volatile Organic Compounds (by Method TO-15) in $\mu g/m^3$ (detected compounds only)									
1,1,2 - Trichlorotrifluoroethane	457,000	1,523,333	< 1.1 U	< 1.1 U	**2.1**	< 1.1 U	--	13,700	45,700
1,1-Dichloroethane	52.1	174	< 0.57 U	< 0.61 U	**1.7**	**0.91**	--	1.6	5.2
1,1-Dichloroethene	3050	10,167	< 0.56 U	< 0.59 U	**0.62**	**5.1**	--	91.4	305
1,2,4-Trimethylbenzene	107	357	< 3.4 U	< 3.7 U	< 3.7 U	**5.8**	--	3.2	11
1,2-Dichloropropane	8.33	28	**0.9**	**0.85**	**0.58**	**0.57**	--	0.25	0.83
1,3,5-Trimethylbenzene			< 3.4 U	< 3.7 U	< 3.7 U	**5.6**	--		
1,3-Butadiene	2.78	9	< 0.03 U	< 0.03 U	**12**	< 0.03 U	0.04291	0.0833	0.28
1-Propene			< 1 U	< 1 U	**52**	**1700 E**	--		
2,2,4-Trimethylpentane			< 6.5 U	< 7 U	< 7 U	**380 E**	--		
2-Butanone	76200	254,000	**17**	**13**	**30**	**24**	--	2,290	7,633
Acetone			**130**	**160**	**430 E**	**780 E**	--	14,200	47,333
Acrolein	0.305	1	< 1.3 U	< 1.4 U	**3.8**	< 1.4 U	0.01384	0.0091	0.03
Benzene	10.7	36	**3.8**	**4.1**	**19**	**150**	0.7559	0.32	1.1
Butane			**15**	**19**	**44**	**2000 E**	--		
Chloroethane	152000	506,667	< 3.7 U	< 4 U	< 4 U	**7.9**	--	4,570	15,233
Chloroform	3.62	12	**0.46**	**0.61**	**0.7**	< 0.074 U	--	0.109	0.36
cis-1,2-Dichloroethene (DCE)			< 0.56 U	< 0.59 U	**2.9**	**220**	--		
Cyclohexane			< 9.6 U	< 10 U	**12**	**150**	--		
Dichlorodifluoromethane	1520	5,067	**2.9**	**2.9**	**2.9**	< 0.74 U	--	45.7	152
Ethanol			**280 E**	**140**	**450 E**	**250 E**	--		
Ethylbenzene	15200	50,667	**5.6**	**5**	**6.7**	**11**	--	457	1,523
Heptane			**11**	**17**	**32**	**140**	--		
Isopropyl Alcohol			**66**	**64**	**70**	**79**	--		
Isopropylbenzene	6100	20,333	< 3.4 U	< 3.7 U	< 3.7 U	**8.8**	--	183	610
m,p-Xylenes			**20**	**18**	**20**	**24**	--	46	152
Naphthalene	2.45	8.2	< 0.73 U	< 0.79 U	< 0.79 U	**1.2**	--	0.074	0.25
n-Hexane	10700	35,667	**13**	**18**	**29**	**290 E**	--	320	1067
Nonane			< 7.3 U	< 7.9 U	< 7.9 U	**52 J**	--		
o-Xylene	1520	5,067	**7**	**6.2**	**7.1**	**18**	--	46	152
Pentane			**12**	**16**	**32**	**850 E**	--		
Styrene	15200	50,667	< 1.2 U	< 1.3 U	**1.5**	< 1.3 U	--	457	1,523
Tetrahydrofuran			**21 J**	**21 J**	**16 J**	**16 J**	--		
Toluene	76200	254,000	**25**	**25**	**39**	**260**	--	2,290	7,633
trans-1,2-Dichloroethene			< 0.56 U	< 0.59 U	< 0.59 U	**43**	--	27.4	91
Trichloroethene (TCE)	12.3	41	**26**	< 0.4 U	**14**	**43**	0.10	0.37	1.23
Vinyl Chloride	9.33	31	< 0.36 U	< 0.38 U	< 0.38 U	**320 E**	1.3	0.28	0.93

Notes

[a] Screening levels are from Table B-1 of Ecology's Guidance for Evaluating Soil Vapor Intrusion in Washington State (Guidance), revised in 2015. Commercial levels based on an exposure scenario of 10 hrs per day, 5 days per week.

[b] Indoor air concentrations modeled using the Johnson and Ettinger Model (JEM) for analytes that exceeded the MTCA Method B screening levels for sub-slab soil gas.

$\mu g/m^3$ - micrograms per cubic meter
Bold - detected
J - estimated
U - non-detect
E - result exceeded calibration range and is therefore considered estimated.

Blue - analyte was detected at a concentration greater than the MTCA Method B Cleanup Level for Sub-Slab Soil Gas adjusted for commercial exposure scenario.

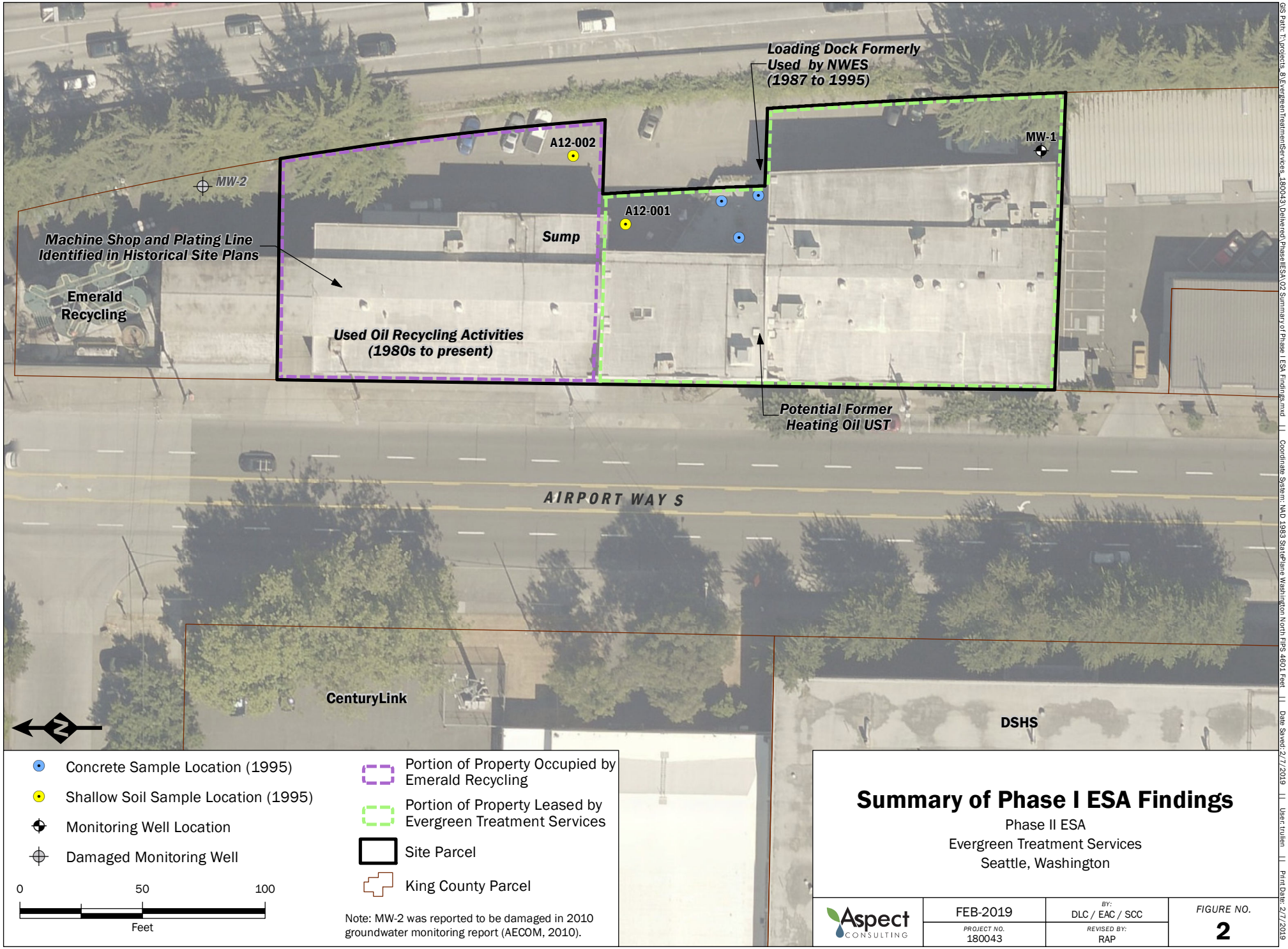
FIGURES

Site Location Map

Phase II ESA
Evergreen Treatment Services
Seattle, Washington

Aspect CONSULTING	JAN-2019	BY: DLC / SCC	FIGURE NO. 1
	PROJECT NO. 180043	REVISED BY: RAP	

GIS Path: T:\projects_91\EvergreenTreatmentServices_180043\Delivered\PhaseIIESA\01 Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 1/8/2019 || User: rpepin || Print Date: 1/8/2019

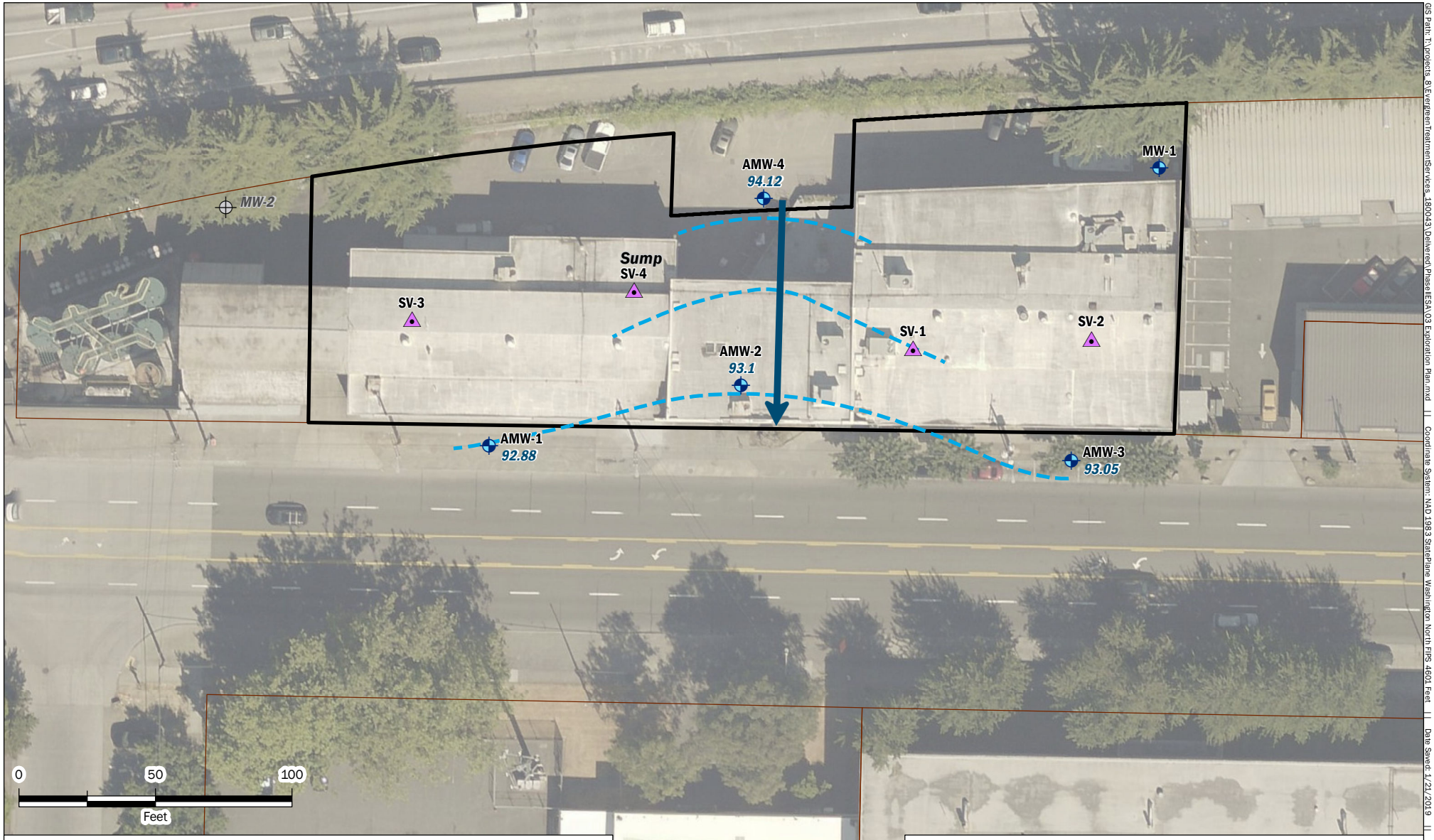


Summary of Phase I ESA Findings

Phase II ESA
Evergreen Treatment Services
Seattle, Washington

Aspect Consulting	FEB-2019	BY: DLC / EAC / SCC	FIGURE NO. 2
	PROJECT NO. 180043	REVISED BY: RAP	

Basemap Layer Credits || Pictometry, King County



Soil Gas Sampling Location

Monitoring Well

AMW-2 ← Exploration Number

93.1 ← Groundwater Elevation (ft)

Damaged Monitoring Well

Groundwater Contour Line

Groundwater Flow Direcction

Site Parcel

King County Parcel

Note: MW-2 was reported to be damaged in 2010 groundwater monitoring report (AECOM, 2010).

Exploration Plan

Phase II ESA

Evergreen Treatment Services

Seattle, Washington

Aspect Consulting	JAN-2019	BY: DLC / RAP	FIGURE NO. 3
	PROJECT NO. 180043	REVISED BY: TDR	

Basemap Layer Credits || King County

GIS Path: T:\projects_8\Evergreen Treatment Services_180043\Delivered\Phase II ESA\03 Exploration Plan.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 1/21/2019 || User: trullen || Print Date: 1/21/2019

Soil Gas Sampling Location

Monitoring Well

Damaged Monitoring Well

One or More Analytes Exceed Screening Level

One or More Analytes Detected, No Screening Level Exceedance

No Analytes Detected

Site Parcel

King County Parcel

N

0 50 100

Feet

Note: MW-2 was reported to be damaged in 2010 groundwater monitoring report (AECOM, 2010). Only analytical results which exceed the screening level are displayed.

Summary of Soil Chemical Analytical Results

Phase II ESA

Evergreen Treatment Services

Seattle, Washington

Aspect Consulting	JAN-2019	BY: DLC / RAP	FIGURE NO. 4
	PROJECT NO. 180043	REVISED BY: ---	

Basemap Layer Credits || Pictometry, King County

Soil Gas Sampling Location

Monitoring Well

Damaged Monitoring Well

One or More Analytes Exceed Screening Level

One or More Analytes Detected, No Screening Level Exceedance

No Analytes Detected

Site Parcel

King County Parcel

N

0 50 100

Feet

Note: MW-2 was reported to be damaged in 2010 groundwater monitoring report (AECOM, 2010). Only analytical results which exceed the screening level are displayed.

Summary of Groundwater Chemical Analytical Results

Phase II ESA

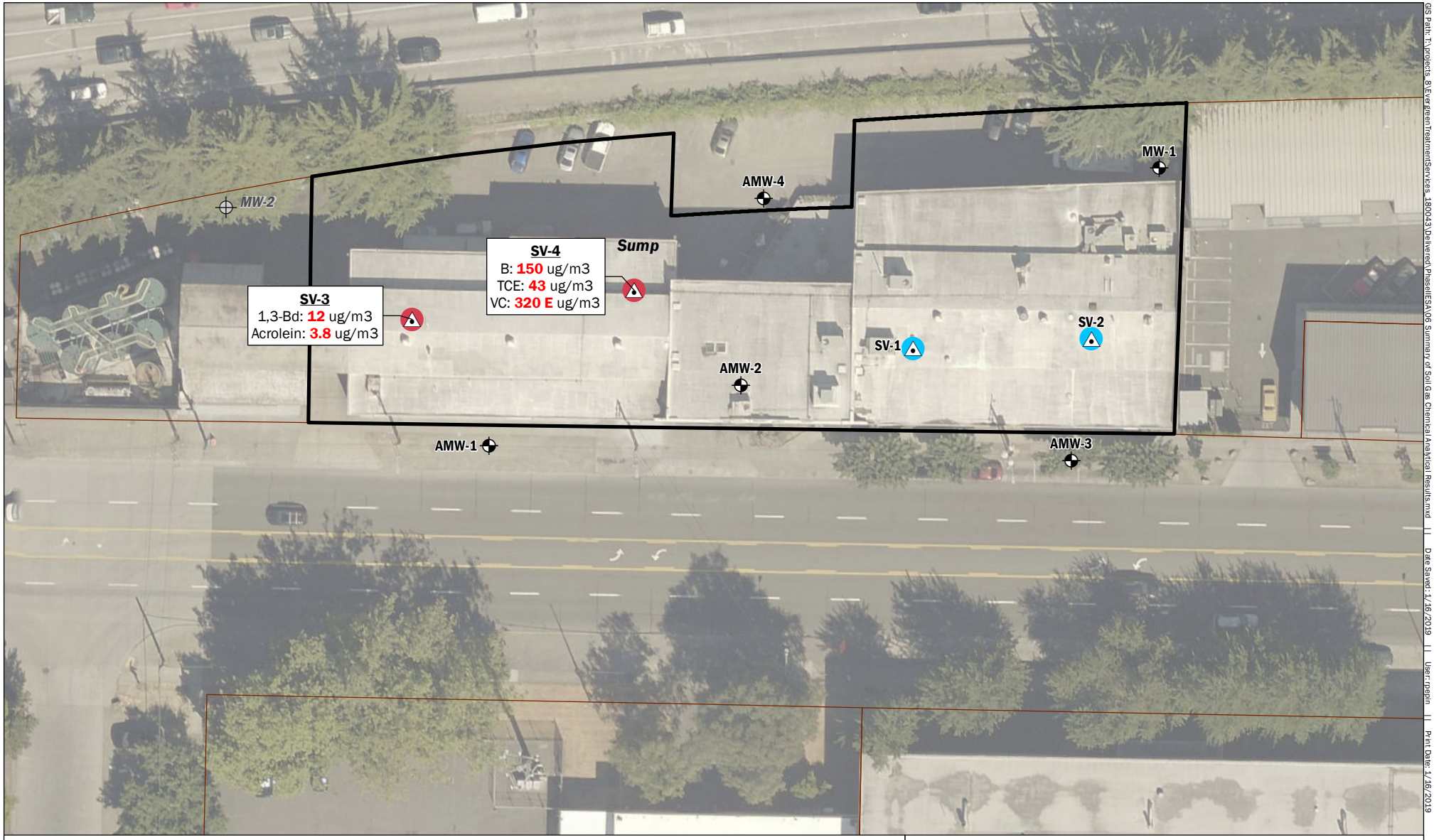
Evergreen Treatment Services

Seattle, Washington

Aspect Consulting	JAN-2019	BY: DLC / RAP	FIGURE NO. 5
	PROJECT NO. 180043	REVISED BY: ---	

Basemap Layer Credits || Pictometry, King County

GIS Path: T:\projects_8\Evergreen Treatment Services_180043\Deliverect\Phase II ESA\05 Summary of Groundwater Chemical Analytical Results.mxd || Date Saved: 1/16/2019 || User: rpepin || Print Date: 1/16/2019



Soil Gas Sampling Location

Monitoring Well

Damaged Monitoring Well

One or More Analytes Exceed Screening Level

One or More Analytes Detected, No Screening Level Exceedance

No Analytes Detected

Site Parcel

King County Parcel

N

0 50 100

Feet

Note: MW-2 was reported to be damaged in 2010 groundwater monitoring report (AECOM, 2010). Only analytical results which exceed the screening level are displayed.

Summary of Soil Gas Chemical Analytical Results

Phase II ESA

Evergreen Treatment Services

Seattle, Washington

Aspect Consulting	JAN-2019	BY: DLC / RAP	FIGURE NO. 6
	PROJECT NO. 180043	REVISED BY: ---	

Basemap Layer Credits || Pictometry, King County

GIS Path: T:\projects_8\Evergreen Treatment Services_180043\Deliverect\Phase II ESA\06 Summary of Soil Gas Chemical Analytical Results.mxd || Date Saved: 1/16/2019 || User: rpepin || Print Date: 1/16/2019

MEMORANDUM

Project No. 180043

October 1, 2020

To: Linda Kruger, Evergreen Treatment Services

cc: Ray Liaw, Van Ness Feldman, LLP

From:

State of Washington 346 Licensed Geologist
David A. Cook
October 1, 2020

Dave Cook, LG, CPG
Principal Geologist
dcook@aspectconsulting.com

Andrew Yonkofski, LHG
Project Hydrogeologist
ayonkofski@aspectconsulting.com

Re: **Sump Cleanout and Soil Gas Sampling Memorandum**
1700 Airport Way South, Seattle, Washington

This memorandum presents the results of a soil gas and vapor intrusion investigation completed by Aspect Consulting, LLC (Aspect) for Evergreen Treatment Services (ETS) at the Subject Property located at 1700 Airport Way South, in Seattle, Washington (Subject Property). This characterization was conducted to re-evaluate the results of a vapor intrusion assessment performed for the Subject Property in December 2018. Aspect's Phase II Environmental Site Assessment (ESA; Aspect, 2019) for the Subject Property identified elevated chlorinated solvent and benzene concentrations in soil gas beneath the north warehouse portion of the Subject Property (Aspect, 2019). Sediment contained in a sump in the north warehouse portion of the building, which historically was used as a discharge point for wastewater from a washing machine, was suspected as a potential source of these elevated concentrations of the chlorinated solvents. Therefore, Aspect recommended cleanout of the sump and then re-evaluation of soil gas in the north warehouse portion of the building. The following provides the results of the sump cleanout and re-evaluation of subslab soil gas at the Subject Property.

Sump and Drain Cleanout

On August 18, 2020, Aspect oversaw a subcontractor clean the onsite stormwater system and basement sump. Approximately 17 inches of oily sediment, which contained a heavy petroleum-like odor and iridescent sheen, were present in the sump prior to cleaning. The subcontractor used a vacuum truck to drain all free liquid from the sump, and the sump was then triple rinsed with high pressure water to clean out the remaining sludge and oily residues. Additionally, four of the five

stormwater catch basins (A1 through A4) and the two stormwater vaults (A6 and A7) along the east side of the Subject Property were rinsed and water and sediment removed using the vacuum removal process (Figure 1). In total, approximately 350 gallons of rinsate was generated and removed during the cleaning process from the sump and five catch basins. Of this amount, the sump held approximately 175 gallons of oily wastewater and sediments prior to cleaning. Pictures of the cleaning operation are included in Appendix A.

Subslab Soil Gas Sampling

Previous soil gas sampling, as summarized in the Phase II ESA (Aspect, 2019), indicated that benzene, trichloroethene (TCE), vinyl chloride (VC), 1,3-butadiene, and acrolein were detected in soil gas above the MTCA Method B screening level for both unrestricted use and commercial use scenarios. Those results are summarized in Table 1. Given the detections of benzene, TCE, and VC, further assessment for the vapor intrusion pathway was warranted under the Washington State Department of Ecology's (Ecology's) *Guidance for Evaluating Soil Vapor Intrusion in Washington State* (Ecology, 2018a). The sump was the suspected source of these contaminants in soil gas and, after the sump was cleaned out, soil gas was allowed to equilibrate for two weeks prior to sampling.

Subslab soil gas sampling was performed on September 10 and 17, 2020 – after the cleanout of the sump and catch basins at the Subject Property. The subslab soil gas sampling locations were based on historical sampling locations as outlined in Aspect's 2019 Phase II ESA (Figure 2). Temporary vapor sampling locations (aka "vapor pins") were installed by drilling a 5/8-inch-diameter hole through the concrete slab, cleaning the hole using a brush and vacuum, and utilizing a silicon seal between the vapor pin and the clean hole. On September 10, 2020, multiple attempts were made to install a temporary subslab soil vapor pin at location SV-4; however, the soil underneath the basement slab was saturated and a sample could not be obtained from this location. Aspect returned on September 17, 2020, and collected a sample from SV-5, which is located approximately 12 feet south of SV-4, as shown on Figure 1. Following sample collection, the vapor pin was removed, and the hole patched with rapid set concrete.

The subslab soil gas samples were collected using a laboratory-supplied, evacuated, 1-liter (L) SUMMA canister with 150 milliliter per minute (mL/min) flow controller, according to the following procedure:

- A shut-in test was performed by inducing a vacuum to the sampling train (including Teflon tubing up to the vapor pin, fittings, and connections to the SUMMA canister). A vacuum of 15 inches of mercury was applied for a period of 5 minutes. No change in vacuum was observed during the shut-in tests.
- The vapor pin was then enclosed in a leak-testing shroud and helium tracer gas was applied until a minimum 60 percent helium was measured inside the shroud. The sampling point and tubing were purged to ensure any remaining ambient indoor air inside the sampling train was removed and facilitate field screening of subslab soil gas for helium to verify integrity of the silicon seal between the vapor pin and concrete slab.
- After confirming that no significant leakage was present in the sampling train or around the vapor pin seal, the SUMMA canister was opened and allowed to fill at 150 mL/min over approximately 6 to 7 minutes until the canister vacuum reached -5 inches of mercury.

Samples were transferred under appropriate chain-of-custody documentation to the analytical laboratory, Friedman and Bruya, Inc., in Seattle, Washington. Samples were analyzed using MDEP Method for APHs, EPA Method TO-15 for volatile organic compounds (VOCs), and ASTM Method D1946 for helium.

Analytical Results and Vapor Intrusion Assessment

The laboratory reports for the subslab soil gas samples is provided for reference as Appendix B. Subslab soil gas results are summarized in Table 1. The MTCA Method B subslab soil gas screening levels for unrestricted use were adjusted for a commercial exposure scenario[1] and included in Table 1 for comparison purposes. The following summarizes results relative to the commercial exposure scenario:

- At SV-3, benzene and TCE were detected but at concentrations less than the commercial exposure scenario. These results are consistent with the December 2018 sampling event. Additionally, 1,3-butadiene and acrolein, which had historically exceeded the commercial screening levels at this location, were not detected.
- At SV-5, concentrations of benzene, total petroleum hydrocarbons (TPH), TCE, and VC exceeded the MTCA Method B screening levels for the commercial exposure scenario. These results are consistent with the December 2018 sampling event (SV-4 location, within about 10 feet of SV-5).
- No other VOCs were detected above their respective MTCA Method B screening levels for commercial use.
- Subslab soil gas impacts exceeding the MTCA Method B screening levels for a commercial exposure scenario appear to be limited to the southeast area of the north wing of the building where a zone of contamination may be present in soil and groundwater underneath the building. These results are consistent with the December 2018 soil gas investigation documented in the Phase II ESA (Aspect, 2019).

The MTCA Method B subslab soil gas screening levels are used as indicators for the potential of vapor intrusion. The screening levels are designed to provide a conservative evaluation of whether vapor intrusion is a possibility (in this case, in a commercial setting). Based on the exceedances of the MTCA Method B screening levels at SV-4 and SV-5 (near the sump), the next step in the vapor intrusion assessment would typically be to sample indoor air to determine if vapor intrusion into the southern part of the north warehouse is actually occurring. However, the northern warehouse space is filled with possible sources of cross-contamination left by previous tenants, including such items as used oil processing equipment; gloves, coveralls, and floor mats used by workers in used oil recycling operations; and obvious indications of staining along the floors and walls of the basement space.

[1] Commercial screening levels calculated by adjusting exposure frequency for both noncarcinogens and carcinogens from 1.0 for a residential scenario to 0.30, and average body weight and breathing rate for noncarcinogens to 70 kg and 20 m^3/day, respectively, versus 16 kg and 10 m^3/day (equivalent of an adult versus a child). These adjustments are in accordance with MTCA Equations 750-1 and 750-2 and Ecology's Implementation Memorandum No. 21 (Ecology, 2018b).

Due to the materials left behind by the previous tenants it is not prudent to sample indoor air under current building conditions. Therefore, the potential for vapor intrusion was evaluated by modeling predicted indoor air concentrations based on the subslab soil gas concentrations. Aspect used the results from the September 2020 subslab soil gas sampling event to perform a site-specific evaluation for the risk of vapor intrusion by estimating indoor air concentrations for each of the above contaminants using the Johnson and Ettinger Model (JEM) for the highest detected concentration of each. This site-specific modeling effort considered the effects of the building design. Specifically, the building slab in the north warehouse has been observed to be between 12 and 15 inches thick, which is up to three to four times thicker than what was used to develop the MTCA Method B subslab soil gas screening levels. Additionally, the slab was observed to be in excellent condition with limited cracking throughout the basement floor. The JEM predicts the indoor air concentration of each contaminant and provides a range of indoor air concentrations. The results of the JEM are presented in Table 2, and model outputs are attached in Appendix C.

Based on the results of JEM indoor air modeling for this building on this site, concentrations of benzene, TCE, and VC were predicted to be below MTCA Method B cleanup levels for indoor air under current Subject Property conditions (Table 2).

Conclusions and Recommendations

The 2020 soil gas and vapor intrusion study indicate that benzene, TPH, TCE and VC are present in soil gas at concentrations exceeding commercial screening levels in the south portion of the north warehouse building of the Subject Property (based on 2018 and 2020 soil gas testing results – SV-4 and SV-5). The concentrations of soil gas in the north portion of the north warehouse did not exceed the commercial use screening levels (SV-3 in 2020). Therefore, it appears even after the sump and drain cleanout completed in 2020, that sources of benzene, TPH, TCE and VC remain in what may be a localized area capped beneath the concrete slab of the south portion of the north warehouse part of the building.

We understand that the north warehouse is unoccupied and will remain so until remodeling/renovation occurs in the future. Therefore, no immediate action is warranted. However, because subslab soil gas exceeded the MTCA Method B screening levels, further evaluation of the vapor intrusion pathway is necessary. While the JEM indoor air predictive modeling results indicate that there may not be exceedances of the MTCA Method B cleanup levels for indoor air from vapor intrusion of subslab soil gas, indoor air sampling is recommended to demonstrate the vapor intrusion pathway is incomplete (and vapor mitigation would not be warranted). Therefore, it is prudent to complete the following prior to renovation and occupancy.

- Prior to any use of the north wing warehouse space, Aspect recommends a complete cleaning of the basement area to remove any potential background sources of indoor air contamination (we observed equipment, staining, and other materials that appeared to have been used by historic used oil recyclers in this part of the building). The basement cleaning should include removal of all equipment and materials related to the historical use of the building for used oil recycling and thoroughly decontaminating the walls and floor of the basement space using a combination of washing (such as with a steam-enhanced pressure washer) and the use of a volatile-free soap. Once the basement has been properly cleaned,

the vapor intrusion pathway should be further evaluated by completing indoor air sampling in accordance with Ecology's guidance (2018a).

- If indoor air sampling indicates that concentrations of potential contaminants of concern exceed the MTCA Method B cleanup levels for indoor air, adjusted for a commercial exposure, vapor mitigation will be necessary. The type of vapor mitigation will require further evaluation based on the indoor air results. There are a variety of methods for mitigating vapor such as installation of an active subslab depressurization system, application of chemically resistant floor and wall coatings to act as a vapor barrier, and/or engineering modifications to the airflow in the north wing of the warehouse.

  However, the need for such mitigation will depend on a variety of factors. For example, the use of the space will determine the exposure duration during a vapor intrusion assessment: ETS may elect to use the basement portion of the north wing as a parking garage, which in and of itself would require active ventilation. ETS may also elect to not occupy the basement of the northern portion of the warehouse. Likewise, the results of indoor air sampling will determine the magnitude of potential indoor air contamination, and the selection of one or more the technologies listed above will depend on those results.

References

Aspect Consulting, LLC (Aspect), 2019, Phase II Environmental Site Assessment (ESA), 1700 Airport Way South, Seattle, Washington, dated February 21, 2019.

Washington State Department of Ecology (Ecology), 2018a, Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Publication No. 09-09-047, dated April 2018.

Washington State Department of Ecology (Ecology), 2018b, Frequently Asked Questions (FAQs) Regarding Vapor Intrusion (VI) and Ecology's 2009 Draft VI Guidance, Implementation Memorandum No. 21, Publication No. 18-09-046, dated November 15, 2018.

Limitations

Work for this project was performed for Evergreen Treatment Services (Client), and this memorandum was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This memorandum does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix D titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

Attachments: Table 1 –Soil Gas Analytical Results
Table 2 – Predicted Indoor Air Concentrations
Figure 1 – Stormwater System Layout
Figure 2 – Summary of Soil Gas Chemical Analytical Results
Appendix A – Photograph Log
Appendix B – Laboratory Analytical Reports
Appendix C – Johnson-Ettinger Model Outputs
Appendix D – Report Limitations and Guidelines for Use

V:\180043 Evergreen Treatment Services\Deliverables\Sump Cleanout Memo\Sump Cleanout and Soil Gas Results_Oct12020.docx

TABLES

Table 1. Soil Gas Analytical Results

Project No. 180043, Evergreen Treatment Services, Seattle, Washington

				Location	SV-1	SV-2	SV-3		SV-4	SV-5
				Date	12/10/2018	12/10/2018	12/10/2018	09/10/2020	12/10/2018	09/17/2020
				Sample	SV-1-181210	SV-2-181210	SV-3-181210	SV-3-091020	SV-4-181210	SV-5-091720
Analyte	Unit	MTCA Method B Subslab Soil Gas Screening Levels - Unrestricted Use	MTCA Method B Subslab Soil Gas Screening Levels - Commercial Use							
Air Phase Hydrocarbons										
C5 - C8 Aliphatic Hydrocarbons	ug/m3				--	--	--	**3100**	--	**29000 E**
C9 - C12 Aliphatic Hydrocarbons	ug/m3				--	--	--	**860**	--	**22000**
C9 - C10 Aromatic Hydrocarbons	ug/m3				--	--	--	< 420 U	--	< 1000 U
Total Petroleum Hydrocarbons (ND = 1/2 RL)	ug/m3	4700	35000		--	--	--	**4,389**	--	**52,135 E**
Benzene, Toluene, Ethylbenzene, and Total Xylenes										
Benzene	ug/m3	11	37		**3.8**	**4.1**	**19**	**29**	**150**	**170**
Toluene	ug/m3	76000	560000		**25**	**25**	**39**	< 320 U	**260**	< 790 U
Ethylbenzene	ug/m3	15000	110000		**5.6**	**5**	**6.7**	< 7.4 U	**11**	< 18 U
Total Xylenes	ug/m3	1500	11000		**27**	**24.2**	**27.1**	**20**	**42**	**37**
Polycyclic Aromatic Hydrocarbons										
Naphthalene	ug/m3	2.5	8.4		< 0.73 U	< 0.79 U	< 0.79 U	< 4.5 U	**1.2**	< 11 U
Volatile Organic Compounds										
1,1,1-Trichloroethane	ug/m3	76000	560000		< 0.76 U	< 0.82 U	< 0.82 U	< 9.3 U	< 0.82 U	< 23 U
1,1,2,2-Tetrachloroethane	ug/m3	1.4	4.7		< 0.19 U	< 0.21 U	< 0.21 U	< 2.3 U	< 0.21 U	< 5.8 U
1,1,2-Trichloroethane	ug/m3	3	22		< 0.15 U	< 0.16 U	< 0.16 U	< 1.9 U	< 0.16 U	< 2.3 U
1,1,2-Trichlorotrifluoroethane	ug/m3	76000	560000		< 1.1 U	< 1.1 U	**2.1**	< 13 U	< 1.1 U	< 32 U
1,1-Dichloroethane	ug/m3	52	170		< 0.57 U	< 0.61 U	**1.7**	< 6.9 U	**0.91**	< 17 U
1,1-Dichloroethene	ug/m3	3000	22000		< 0.56 U	< 0.59 U	**0.62**	< 6.7 U	**5.1**	< 17 U
1,2,4-Trichlorobenzene	ug/m3	30	220		< 1 U	< 1.1 U	< 1.1 U	< 13 U	< 1.1 U	< 31 U
1,2,4-Trimethylbenzene	ug/m3	910	6700		< 3.4 U	< 3.7 U	< 3.7 U	< 42 U	**5.8**	< 100 U
1,2-Dibromoethane (EDB)	ug/m3	0.14	0.47		< 0.11 U	< 0.12 U	< 0.12 U	< 1.3 U	< 0.12 U	< 3.2 U
1,2-Dichlorobenzene	ug/m3	3000	22000		< 0.84 U	< 0.9 U	< 0.9 U	< 10 U	< 0.9 U	< 25 U
1,2-Dichloroethane (EDC)	ug/m3	3.2	11		< 0.057 U	< 0.061 U	< 0.061 U	< 0.69 U	< 0.061 U	< 1.7 U
1,2-Dichloropropane	ug/m3	23	77		**0.9**	**0.85**	**0.58**	< 3.9 U	**0.57**	< 9.7 U
1,3,5-Trimethylbenzene	ug/m3				< 3.4 U	< 3.7 U	< 3.7 U	< 42 U	**5.6**	< 100 U
1,3-Dichlorobenzene	ug/m3				< 0.84 U	< 0.9 U	< 0.9 U	< 10 U	< 0.9 U	< 25 U
1,4-Dichlorobenzene	ug/m3	7.6	26		< 0.34 U	< 0.36 U	< 0.36 U	< 3.9 U	< 0.36 U	< 9.7 U
1-Propene	ug/m3				< 1 U	< 1 U	**52**	**180**	**1700 E**	**2100 E**
2-Butanone	ug/m3	76000	560000		**17**	**13**	**30**	< 50 U	**24**	< 120 U
2-Chlorotoluene	ug/m3				< 7.2 U	< 7.8 U	< 7.8 U	< 88 U	< 7.8 U	< 220 U
2-Hexanone	ug/m3				< 5.7 U	< 6.1 U	< 6.1 U	< 70 U	< 6.1 U	< 170 U
4-Methyl-2-pentanone	ug/m3	46000	340000		< 5.7 U	< 6.1 U	< 6.1 U	< 70 U	< 6.1 U	< 170 U
Acetone	ug/m3				**130**	**160**	**430 E**	**640**	**780 E**	< 600 U
Acrolein	ug/m3	0.3	2.2		< 1.3 U	< 1.4 U	**3.8**	< 35 U	< 1.4 U	< 87 U
Allyl Chloride	ug/m3				< 1.8 U	< 1.9 U	< 1.9 U	< 27 U	< 1.9 U	< 66 U
Bromodichloromethane	ug/m3	2.3	7.7		< 0.094 U	< 0.1 U	< 0.1 U	< 1.1 U	< 0.1 U	< 2.8 U
Bromoform	ug/m3	76	260		< 2.9 U	< 3.1 U	< 3.1 U	< 35 U	< 3.1 U	< 87 U
Bromomethane	ug/m3	76	560		< 2.2 U	< 2.3 U	< 2.3 U	< 40 U	< 2.3 U	< 98 U
Butane	ug/m3				**15**	**19**	**44**	**400**	**2000 E**	**2000**
Carbon Disulfide	ug/m3	11000	81000		< 8.7 U	< 9.3 U	< 9.3 U	< 110 U	< 9.3 U	< 260 U
Carbon Tetrachloride	ug/m3	14	47		< 0.88 U	< 0.94 U	< 0.94 U	< 5.3 U	< 0.94 U	< 13 U
Chlorobenzene	ug/m3	760	5600		< 0.64 U	< 0.69 U	< 0.69 U	< 7.8 U	< 0.69 U	< 19 U
Chloroethane	ug/m3	150000	1100000		< 3.7 U	< 4 U	< 4 U	< 45 U	**7.9**	< 110 U
Chloroform	ug/m3	3.6	12		**0.46**	**0.61**	**0.7**	**1.7**	< 0.074 U	< 2.1 U
Chloromethane	ug/m3	1400	10000		< 2.9 U	< 3.1 U	< 3.1 U	< 63 U	< 3.1 U	< 160 U
cis-1,2-Dichloroethene (cDCE)	ug/m3				< 0.56 U	< 0.59 U	**2.9**	**35**	**220**	**70**
cis-1,3-Dichloropropene	ug/m3				< 0.64 U	< 0.68 U	< 0.68 U	< 7.7 U	< 0.68 U	< 19 U
Cyclohexane	ug/m3				< 9.6 U	< 10 U	**12**	< 120 U	**150**	< 290 U
Dibromochloromethane	ug/m3				< 0.12 U	< 0.13 U	< 0.13 U	< 1.4 U	< 0.13 U	< 3.6 U
Dichlorodifluoromethane	ug/m3	1500	11000		**2.9**	**2.9**	**2.9**	< 8.4 U	< 0.74 U	< 21 U
Ethanol	ug/m3				**280 E**	**140**	**450 E**	**570**	**250 E**	< 320 U
Ethyl acetate	ug/m3				< 10 U	< 11 U	< 11 U	< 120 U	< 11 U	< 300 U
Isopropyl Alcohol	ug/m3				**66**	**64**	**70**	< 150 U	**79**	< 360 U
Isopropylbenzene	ug/m3	6100	45000		< 3.4 U	< 3.7 U	< 3.7 U	< 42 U	**8.8**	< 100 U
m,p-Xylenes	ug/m3	1500	11000		**20**	**18**	**20**	**20**	**24**	< 36 U
Methyl Methacrylate	ug/m3	11000	81000		< 5.7 U	< 6.1 U	< 6.1 U	< 70 U	< 6.1 U	< 170 U
Methyl tert-butyl ether (MTBE)	ug/m3	320	1100		< 2.5 U	< 2.7 U	< 2.7 U	< 31 U	< 2.7 U	< 76 U
Methylene Chloride	ug/m3	8300	28000		< 120 U	< 130 U	< 130 U	< 590 UJ	< 130 U	< 1500 UJ
n-Hexane	ug/m3	11000	81000		**13**	**18**	**29**	**79**	**290 E**	**360**
Nonane	ug/m3				< 7.3 U	< 7.9 U	< 7.9 U	< 89 U	**52 J**	< 220 U
n-Propylbenzene	ug/m3				< 3.4 U	< 3.7 U	< 3.7 U	< 42 U	< 3.7 U	< 100 U
o-Xylene	ug/m3	1500	11000		**7**	**6.2**	**7.1**	< 7.4 U	**18**	**37**
Pentane	ug/m3				**12**	**16**	**32**	**190**	**850 E**	**870**
Styrene	ug/m3	15000	110000		< 1.2 U	< 1.3 U	**1.5**	< 14 U	< 1.3 U	< 36 U
t-Butyl alcohol (TBA)	ug/m3				< 17 U	< 18 U	< 18 U	< 210 U	< 18 U	< 510 U
Tetrachloroethene (PCE)	ug/m3	320	1100		< 9.5 U	< 10 U	< 10 U	< 120 U	< 10 U	< 280 U
Tetrahydrofuran	ug/m3				**21 J**	**21 J**	**16 J**	**28**	**16 J**	**18**
trans-1,2-Dichloroethene	ug/m3				< 0.56 U	< 0.59 U	< 0.59 U	< 6.7 U	**43**	**110**
trans-1,3-Dichloropropene	ug/m3				< 0.64 U	< 0.68 U	< 0.68 U	< 7.7 U	< 0.68 U	< 19 U
Trichloroethene (TCE)	ug/m3	12	40		**26**	< 0.4 U	**14**	**40**	**43**	**61**
Trichlorofluoromethane	ug/m3	11000	81000		< 3.1 U	< 3.4 U	< 3.4 U	< 38 U	< 3.4 U	< 94 U
Vinyl Acetate	ug/m3	3000	22000		< 9.9 U	< 11 U	< 11 U	< 120 U	< 11 U	< 300 U
Vinyl Bromide	ug/m3				< 0.61 U	< 0.66 U	< 0.66 U	< 7.4 U	< 0.66 U	< 18 U
Vinyl Chloride	ug/m3	9.4	32		< 0.36 U	< 0.38 U	< 0.38 U	< 4.3 U	**320 E**	**280**
1,3-Butadiene	ug/m3	2.8	9.4		< 0.03 U	< 0.03 U	**12**	< 0.75 U	< 0.03 U	< 1.9 U
2,2,4-Trimethylpentane	ug/m3				< 6.5 U	< 7 U	< 7 U	< 79 U	**380 E**	**460**
4-Ethyltoluene	ug/m3				< 3.4 U	< 3.7 U	< 3.7 U	< 42 U	< 3.7 U	< 100 U
alpha-Chlorotoluene	ug/m3	1.7	5.7		< 0.072 U	< 0.078 U	< 0.078 U	< 0.88 U	< 0.078 U	< 2.2 U
Freon 114	ug/m3				< 0.98 U	< 1 U	< 1 U	< 12 U	< 1 U	< 29 U
Heptane	ug/m3				**11**	**17**	**32**	< 70 U	**140**	< 170 U
Leak Testing Results										
Helium	%				< 0.6 U	< 0.6 U	< 0.6 U	< 0.6 U	< 0.6 U	< 0.6 U

Notes:

Bold - detected

Blue Shaded - Detected result exceeded residential screening level

Red Shaded - Detected result exceeded commercial screening level

U - Analyte not detected at or above Reporting Limit (RL) shown

J - Result value estimated

UJ - Analyte not detected and the Reporting Limit (RL) is an estimate

E - Result exceeded calibration range. Result usable for qualitative analysis of analyte presence, but numeric value should not be included in quantitative analysis.

Table 2. Predicted Indoor Air Concentrations

Project No. 180043, Evergreen Treatment Services, Seattle, Washington

	Predicted Indoor Air Concentrations (ug/m^3)			MTCA Method B Indoor Air Cleanup Levels (ug/m^3)	
Analyte	Low	Best Estimate	High	Unrestricted Use	Commercial Use
Benzene	6.74E-02	7.77E-02	7.97E-02	3.20E-01	1.07E+00
Trichloroethylene	2.37E-02	2.78E-02	2.86E-02	3.30E-01	1.11E+00
Vinyl Chloride	1.14E-01	1.29E-01	1.32E-01	2.80E-01	9.40E-01

Notes:

Bold - detected

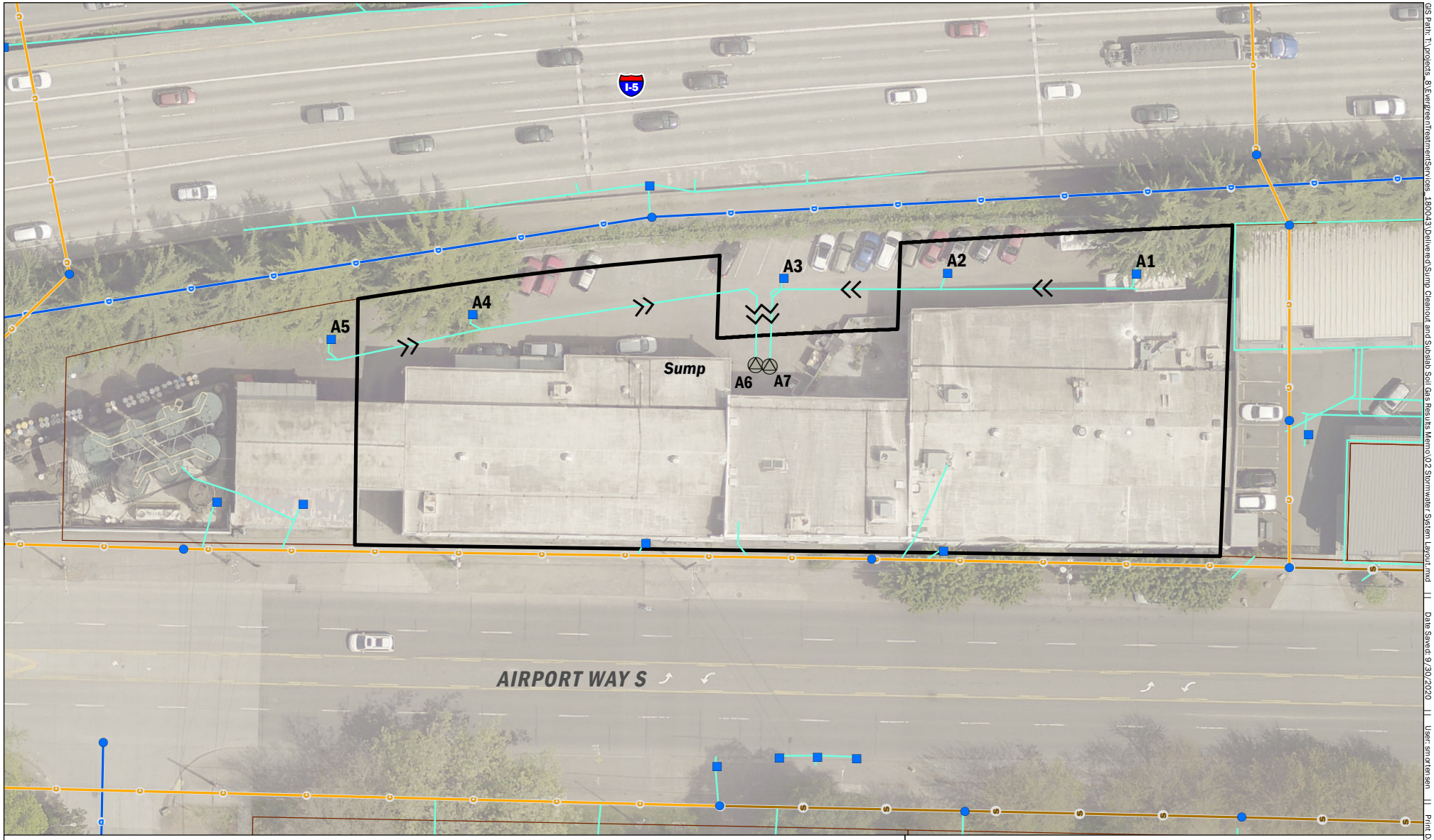
Blue Shaded - Detected result exceeded residential screening level

Red Shaded - Detected result exceeded comercial screening level

Predicted indoor air concentrations from building-specific Johnson & Ettinger Model, see Appendix B.

MTCA = Model Toxics Control Act

FIGURES



Site Parcel
King County Parcel
Catch Basin
Maintenance Holes and Other Structures
Stormwater Vault
Note: Site features are approximate.

Flow Direction Indicator
DWW Side Sewers and Laterals
Combined Mainline
Drainage Mainline
Sanitry Mainline

0 50 100
Feet

Stormwater System Layout

Stormwater System Layout
Evergreen Treatment Services
Seattle, Washington

Aspect Consulting	SEP-2020	BY: DLC / RAP	FIGURE NO. 1
	PROJECT NO. 180043	REVISED BY: SBM	

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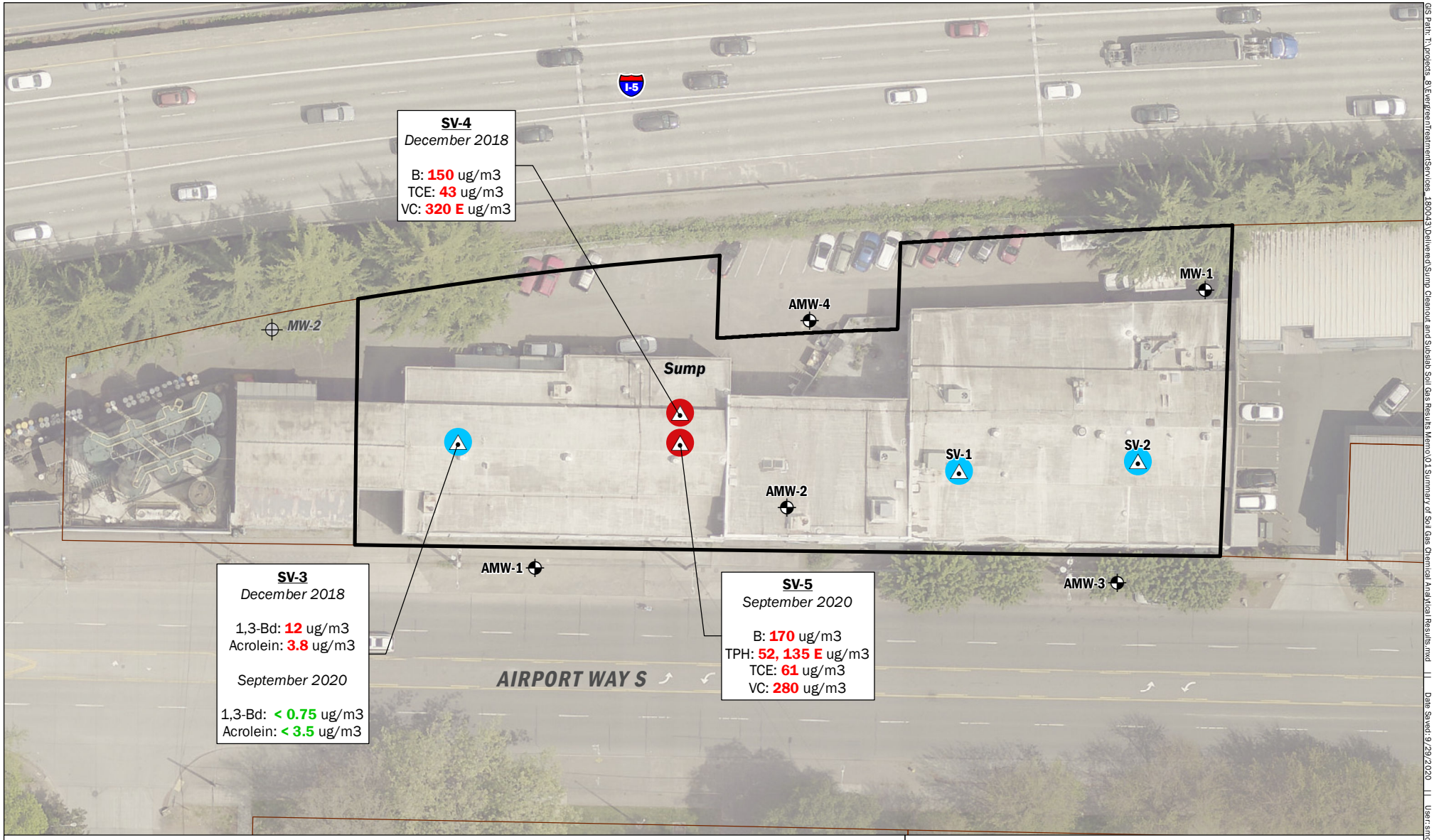
GIS Path: T:\projects_8\Evergreen Treatment Services_180043\Delivered\Sump Cleanout and Subslab Soil Gas Results Memo\02 Stormwater System Layout.mxd || Date Saved: 9/30/2020 || User: smortensen || Print Date: 9/30/2020



- Soil Gas Sampling Location
- Monitoring Well
- Damaged Monitoring Well
- Site Parcel
- King County Parcel

- One or More Analytes Exceed Screening Level
- One or More Analytes Detected, No Screening Level Exceedance
- No Analytes Detected

Notes:
- *B: Benzene*
- *TPH: Total Petroleum Hydrocarbons*
- *TCE: Trichloroethene*
- *VC: Vinyl Chloride*
- *1,3-Bd: 1,3-Butadiene*

0 50 100
Feet

Summary of Soil Gas Chemical Analytical Results

Sump Cleanout and Soil Gas Sampling Memorandum
Evergreen Treatment Services
Seattle, Washington

Aspect Consulting	SEP-2020	BY: DLC / RAP	FIGURE NO. 2
	PROJECT NO. 180043	REVISED BY: SBM	

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