Annual Groundwater Performance Monitoring Report

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington
FSID # 33215922

Prepared For:

City of Bothell
18415 101st Avenue NE
Bothell, WA 98011

July 14, 2020

Project Number: 82302

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1.0 INTRODUCTION

This Annual Groundwater Performance Monitoring Report was prepared by Kane Environmental, Inc. on behalf of the City of Bothell (the City) to satisfy the requirements of Consent Decree No. 18-2-02852-3 SEA for the Bothell Service Center Simon & Sons (BSCSS) Site located in Bothell, Washington (the Site). This report is identified as deliverable "D3" in the BSCSS Consent Decree's amended schedule of deliverables (Attachment A), which became effective on October 31, 2019. A vicinity map and Site location are shown on Figure 1. A Remedial Investigation/Feasibility Study (RIFS) was prepared on December 19, 2017 to characterize the Site and evaluate proposed remedial actions to address the contamination and based on that evaluation, propose the most appropriate remedial alternative to clean up the Site. A Cleanup Action Plan (CAP) was prepared for Ecology in December 2017 to describe the proposed cleanup action and to set forth the requirements that the cleanup must meet. The CAP was subsequently revised in 2019. Kane Environmental and Dailey Engineering, LLC prepared an Engineering and Remedial Design Report (ERDR) for the Site dated March 12, 2018 in which the selected remedial strategies were described in detail (Kane Environmental, 2018). Following the competition of several of the selected remedial strategies, Kane Environmental began to conduct groundwater performance monitoring on the Site.

1.1 Background

The property containing the source of contamination was previously owned by Bothell Service Center Associates (BSCA) and managed by NLO Property Management. The City of Bothell is the current owner of the BSCSS property and the City owns roadways and the adjacent Wexler property which is now part of the Site, due to commingling of contaminants. The Site is listed in Ecology's database as Bothell Service Center Simon & Sons (BSCSS). The Site is assigned Facility Site ID number 33215922 for dry cleaning solvent contamination in soil and groundwater. The Cleanup Site ID number is 427. The City has a Consent Decree to implement a Cleanup Action Plan for the Site with Ecology and the Washington State Attorney General's Office. The Consent Decree was executed in February 2018, and later amended in October 2019.

The BSCSS property address is 18107 Bothell Way NE, Bothell, WA 98011, located at 47.760 degrees north and -122.209 degrees west in Section 7 of Township 26 north, Range 5 east. The BSCSS property previously included a one-story, masonry, commercial building approximately 8,410 square feet in area, containing five tenant suites. The former building on the BSCSS property and associated aboveground features were demolished in August 2016.

According to available information, the former building on the BSCSS property was constructed in 1988, and Simon and Son Drycleaning, a dry cleaning facility, operated in the westernmost tenant suite from approximately 1989 through 1999. In 1999, a release of the dry cleaning solvent tetrachloroethylene (PCE) was detected in subsurface soils beneath the former building on the BSCSS property. The detected release of PCE was reported to Ecology by NLO Property Management in a letter dated August 22, 2000. The corresponding and subsequent subsurface investigations and remedial activities conducted on the BSCSS property and vicinity are discussed in Section 1.5 of the RI/FS (Kane Environmental, 2017).

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Kane Environmental was approved by the City of Bothell (the Client) to complete a Quarterly Groundwater Monitoring scope of work to comply with the requirements outlined in the Consent Decree 18-2-02852-3 SEA.

Kane Environmental performed the following tasks to complete this scope of work:

- **Sample Collection:** Groundwater samples were collected from select monitoring wells at the Site. Groundwater monitoring wells at each site are associated with previous remedial operations and current activities being conducted by Kane Environmental.
- **Chemical Analysis:** Groundwater samples collected from the Paint, Hertz, and Landing sites were analyzed for one or more of the following chemical constituents by an analytical laboratory accredited by the Washington State Department of Ecology (Ecology):

- Volatile Organics by EPA 8260D;
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- Dissolved Iron by EPA 6010D;
- Chloride by SM 4500-CL E;
- Sulfate by ASTM D516-11;
- Ammonia (as Nitrogen) by SM 4500-NH_3 D; and
- Dissolved gases by RSK 175;

2.0 SUBSURFACE CONDITIONS

2.1 Geologic Setting

The Site is located within the Puget Sound Lowland, a north-south trending structural and topographic depression bordered on the west by the Olympic Mountains and on the east by the Cascade Mountains. The area is characterized by gently rolling glacial drift plains covered with small ridges, hills, and depressions formed by the continental ice sheet that covered the area during the Pleistocene Epoch and retreated approximately 12,500 years ago. Most of northwestern King County is mantled by glacial deposits (including gravel, sand, silt, clay, boulders), which are commonly up to and over 150 feet thick (Liesch and others, 1963).

Generally, the geology can be described as glacio-fluvial deposits overlain by varying depths of fill material. Additionally, a consistent glacial till unit was present throughout the Site at depths ranging from 46 to 55 feet bgs. The maximum thickness of the till unit was not determined at the Site, but is at least 50 feet thick based on Site borings.

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The Site is characterized as being underlain by three groundwater zones – Shallow (5-25 feet bgs), Intermediate (25-35 feet bgs), and Deep (35-55 feet bgs). However, the strata containing these zones are discontinuous over short distances and are not separated by confining units; thus, on a local scale, groundwater occurs as a single aquifer flowing southeasterly to discharge points along the Sammamish River.

Shallow groundwater is encountered at the Site between 5 to 25 feet bgs in fill and sandy glacial outwash deposits. Intermediate groundwater occurs from approximately 25 to 35 feet bgs at the Site in medium dense interbedded sand and silty sand glacial outwash. Deep groundwater occurs from approximately 35 to 55 feet bgs at the Site in dense interbedded sand, silty sand, and silty glacial till.

Groundwater measurements conducted by Kane during the 2019 groundwater monitoring events indicated that groundwater at the Site varied from 4.92 to 10.61 feet bgs.

3.0 FIELD METHODOLOGY

3.1 Sampling Locations

Groundwater monitoring and sampling activities were conducted by Kane Environmental at the Site between February 2019 and October 2019. Several groundwater sampling events were conducted in 2019 at the request of Ecology following the termination of the heating element of the ERH system. Select wells were sampled in February and March 2019 to assess ERH performance. During May and June of 2019 all monitoring wells on the Site were sampled. Following the results of the May and June 2019 sampling event performance monitoring wells were selected for the three groundwater zones on the Site through correspondence with Ecology (Attachment B). Quarterly performance monitoring was conducted at these select wells in July 2019 and October 2019.

During the February and March 2019 sampling event, the following monitoring wells were sampled:

- **Shallow:** MW-3, MW-4, MW-6, MW-23, MW-40, and MW-43.
- **Intermediate:** MW-11, MW-20, MW-28, and MW-42.
- **Deep:** MW-8, MW-33, MW-34, and MW-39.

During the May and June 2019 sampling event, the following monitoring wells were sampled:

- **Shallow:** MW-3, MW-4, MW-5, MW-6, MW-7, MW-21, MW-23, MW-27, MW-40, MW-41, MW-43, MW-45, HZ-MW-1, HZ-MW-4, HZ-MW-14S, HZ-MW-15S, HZ-MW-16, HZ-MW-17, HZ-MW-19, HZ-MW-21, HZ-MW-22, HZ-MW-31, HZ-MW-32, HZ-MW-34, S-MW-1, S-MW-2, S-MW-5, and S-MW-6.
- **Intermediate:** MW-11, MW-12, MW-20, MW-28, MW-42, MW-44, HZ-MW-14D, HZ-MW-15D, HZ-MW-23, HZ-MW-24, HZ-MW-26, HZ-MW-28, HZ-MW-29, HZ-MW-33, and S-MW-3.
- **Deep:** MW-8, MW-22, MW-29, MW-33, MW-34, MW-35, MW-39, HZ-MW-25, HZ-MW-27, HZ-MW-30, and S-MW-4.

During the July 2019 and October 2019 sampling events, the following monitoring wells were sampled:

- **Shallow:** MW-6, MW-27, MW-40, MW-43, MW-45, HZ-MW-1, HZ-MW-14S, HZ-MW-15S, HZ-MW-31, HZ-MW-34, S-MW-1, S-MW-2, and S-MW-5.
- **Intermediate:** MW-11, MW-12, MW-20, MW-42, MW-44, HZ-MW-14D, HZ-MW-15D, HZ-MW-23, HZ-MW-24, HZ-MW-26, HZ-MW-29, and S-MW-3.
- **Deep:** MW-8, MW-29, MW-35, and MW-39.

See Figure 3 for a depiction of the monitoring well locations.

3.2 Monitoring Well Sampling Methods

Prior to collecting groundwater samples, the depth to groundwater at each well was measured with a decontaminated electric water interface probe. Groundwater collected from the well was sampled using a peristaltic pump with new polyethylene tubing that was inserted and extended to the bottom of each well. Field parameters, including pH, temperature, conductivity, oxidation reduction potential (ORP), and dissolved oxygen (DO) were recorded and allowed to stabilize for three consecutive readings prior to collecting each groundwater sample. Groundwater was placed into appropriate laboratory-supplied, pre-cleaned and preserved containers for analysis. Samples were labeled and placed into an ice-filled cooler. Groundwater samples were transported under standard chain-of-custody procedures to an Ecology-accredited analytical laboratory.

Groundwater monitoring well sampling nomenclature identified each sample with the well identification number, followed by a “W”. For example, sample “MW-4:W” was a groundwater sample collected from monitoring well MW-4.

4.0 ANALYTICAL METHODS

Following collection, groundwater samples were placed in a cooler and submitted to the OnSite Environmental laboratory in Redmond, Washington or Fremont Analytical in Seattle, Washington. The following analyses were conducted on selected samples:

- Halogenated Volatile Organics (HVOCs) by EPA 8260D;
- Total Organic Carbon by SM 5310B;
- Dissolved Iron by EPA 6010D;
- Chloride by SM 4500-CL E;
- Sulfate by ASTM D516-11;
- Ammonia (as Nitrogen) by SM 4500-NH_3 D; and,
- Dissolved gases by RSK 175;

All analyses were performed in accordance with the analytical laboratories' in-house Quality Assurance/Quality Control Plans. Sample analyses were performed in compliance with EPA analytical methods and Ecology guidelines. Samples were analyzed within specified holding times. All detection limits were within method requirements and no factors appeared to adversely affect data quality.

4.1 Laboratory QA/QC Procedures

Internal test methods run by the laboratory to ensure data accuracy and reproducibility include method blanks, laboratory control standards, sample duplicates, matrix spikes, and matrix spike duplicates.

5.0 RESULTS

Detailed below is a summary of data from groundwater samples collected from the BSCSS Site during groundwater sampling events conducted in February-March 2019, May-June 2019, July 2019, and October 2019. The type of analysis performed at each well, along with contaminant concentrations have been described. These results are also summarized in Tables 1 through 3. Isopleth figures which depict the analytical results are included as Attachment C. Additionally, laboratory analytical reports containing results for the groundwater samples discussed below are included in Attachment D.

5.1 Shallow Groundwater

HVOCs, including PCE, TCE, (cis) 1,2,-DCE, and vinyl chloride, were analyzed in all groundwater samples collected at the Site. See Table 1 for the shallow groundwater analytical results. In the shallow aquifer (approximately 0 to 25 feet bgs) PCE was detected at concentrations exceeding the MTCA Method A Cleanup Level of 5.0 µg/L at fourteen of the twenty-eight shallow wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, PCE was detected at concentrations above the MTCA Method A cleanup level at MW-4, MW-6, MW-27, MW-40, HZ-MW-1, HZ-MW-14S, HZ-MW-15S, S-MW-1, S-MW-2, and S-MW-5. MW-4 has consistently reported the highest concentrations of PCE detected during each sampling event, with concentrations ranging between 5,500 µg/L in May 2019 to 1,900 µg/L in October 2019.

TCE was detected at concentrations greater than the MTCA Method A Cleanup Level (5.0 µg/L) at seven of the twenty-eight shallow wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, TCE was detected at concentrations above the MTCA Method A Cleanup Level at MW-4, MW-6, MW-40, and HZ-MW-14S. MW-6 contained the highest concentration of TCE detected (1,100 µg/L) during the July 2019 sampling event and MW-4 reported the highest concentration (1,900 µg/L) during the October 2019 sampling event.

(cis) 1,2-DCE was detected at concentrations greater than the MTCA Method B Cleanup Level (16 µg/L) at seven of the twenty-eight shallow wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, (cis) 1,2-DCE was detected at concentrations above the MTCA Method B Cleanup Level at MW-4, MW-6, MW-40, and HZ-MW-34, and during the October 2019 sampling event, at MW-43. MW-40 contained the highest concentrations of (cis) 1,2-DCE during both the July 2019 and October 2019 sampling events, with concentrations of 4,700 µg/L and 1,500 µg/L, respectively.

Vinyl chloride was detected at concentrations greater than the MTCA Method A Cleanup Level (0.2 µg/L) at six of the twenty-eight shallow wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, vinyl chloride was detected at concentrations above the MTCA Method A Cleanup Level at MW-4, MW-6, MW-40, and HZ-MW-34, and during the October 2019 sampling event, at MW-43. MW-40 contained the highest concentrations of vinyl chloride during the July 2019 sampling event (11 µg/L) and MW-4 contained the highest concentration during the October 2019 sampling event (7.5 µg/L). It should be noted that due to elevated concentrations of PCE, several samples were diluted so that the reporting limit for vinyl chloride was greater than the MTCA Method A Cleanup Level.

5.2 Intermediate Groundwater

Analytical results for the groundwater samples collected from the intermediate wells is included in Table 2. In the intermediate aquifer (approximately 25 to 35 feet bgs) PCE was detected at concentrations exceeding the MTCA Method A Cleanup Level of 5.0 µg/L at five of the fifteen intermediate wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, PCE was detected at concentrations above the MTCA Method A cleanup level at MW-12, HZ-MW-14D, and HZ-MW-15D. MW-11 and HZ-MW-26 reported concentrations of PCE in exceedance of the MTCA Method A Cleanup Level during the July sampling event, but by the October sampling event, reported concentrations below the cleanup level. HZ-MW-15D has consistently reported the highest concentrations of PCE detected during each sampling event, with concentrations ranging between 10,000 µg/L in May 2019 to 7,700 µg/L in October 2019.

TCE was detected at concentrations greater than the MTCA Method A Cleanup Level (5.0 µg/L) at five of the fifteen intermediate wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, TCE was detected at concentrations above the MTCA Method A Cleanup Level at MW-12, MW-20, and HZ-MW-15D. MW-11 reported a concentration of TCE in exceedance of the cleanup level during the July sampling event, but the concentration was below the cleanup level during the October sampling event. Conversely, HZ-MW-14D reported a concentration of TCE below the cleanup level during the July sampling event, but above the cleanup level during the October sampling event. HZ-MW-15D contained the highest concentration of TCE detected during both the July and October 2019 sampling events, reporting concentrations of 390 µg/L and 410 µg/L, respectively.

(cis) 1,2-DCE was detected at concentrations greater than the MTCA Method B Cleanup Level (16 µg/L) at eight of the fifteen intermediate wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, (cis) 1,2-DCE was detected at concentrations above the MTCA Method B Cleanup Level at MW-12, MW-20, HZ-MW-15D, HZ-MW-24, and HZ-MW-29, and during the October 2019 sampling event, at MW-11. MW-12 contained the highest concentrations of (cis) 1,2-DCE during the July 2019 sampling event (630 µg/L) and HZ-MW-15D contained the highest concentration during the October 2019 sampling event (360 µg/L).

Vinyl chloride was detected at concentrations greater than the MTCA Method A Cleanup Level (0.2 µg/L) at six of the fifteen intermediate wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, vinyl chloride was detected at concentrations above the MTCA Method A Cleanup Level at MW-11, MW-12, HZ-MW-14D, HZ-MW-24, and HZ-MW-29, and during the October 2019 sampling event, at MW-44. MW-12 contained the highest concentrations of vinyl chloride during the July 2019 sampling event (6.2 µg/L) and MW-12 contained the highest concentration during the October 2019 sampling event (1.5 µg/L). It should be noted that due to elevated concentrations of PCE, several samples were diluted so that the reporting limit for vinyl chloride was greater than the MTCA Method A Cleanup Level.

5.3 Deep Groundwater

Analytical results for the groundwater samples collected from the deep wells is included in Table 3. In the deep aquifer (approximately 35 to 55 feet bgs) PCE was not detected at concentrations above the MTCA Method A Cleanup Level of 5.0 µg/L in any of the eleven deep wells sampled in 2019. Detectable concentrations of PCE have ranged between 4.98 µg/L at MW-8 in February 2019 and 0.33 µg/L at MW-39 in May 2019.

TCE was not detected at concentrations greater than the MTCA Method A Cleanup Level (5.0 µg/L) in any of the eleven deep wells sampled in 2019. Detectable concentrations of TCE ranged between 2.9 µg/Lat MW-8 in February 2019 and 0.41 µg/L at MW-39 in May 2019.

(cis) 1,2-DCE was not detected at concentrations greater than the MTCA Method B Cleanup Level (16 µg/L) in any of the eleven deep wells sampled in 2019. Detectable concentrations of (cis) 1,2-DCE ranged between 7.33 µg/L at MW-8 in February 2019 and 0.34 µg/L at MW-8 in October 2019.

Vinyl chloride was not detected at concentrations greater than the laboratory reporting limit in any of the eleven deep wells sampled in 2019.

6.0 DISCUSSION

Analytical results from the 2019 sampling events indicate that PCE concentrations in groundwater remain greater than the MTCA Method A Cleanup Level in both the shallow and intermediate aquifers. No HVOCs were detected above their respective cleanup levels in the deep aquifer during the 2019 sampling. PCE concentrations are generally decreasing across the Site. Decreasing concentrations of PCE are frequently accompanied by increases in the concentrations of (cis) 1,2-DCE or vinyl chloride. This is most apparent at wells MW-4 and MW-6 in the shallow aquifer, and wells MW-11, MW-12, HZ-MW-15D, and HZ-MW-29 in the intermediate aquifer. These results, coupled with increasing total organic carbon (TOC) concentrations and negative ORP readings, suggest that reductive dechlorination is effectively breaking down the PCE in large portions of the Site. There are, however, several wells where concentrations of PCE are not consistently decreasing and (cis) 1,2-DCE and vinyl chloride are not being produced. These wells also generally contain low or non-detectable concentrations of TOC and contain positive ORP readings. In the shallow aquifer this is primarily seen in wells located in the eastern portion of the Site, where injection of Carbstrate enhanced water has been limited, such as MW-27, S-MW-1, and S-MW-5, and is also seen in the intermediate aquifer at HZ-MW-14D. It should also be noted that full scale injection at the Site was not initiated until July and August of 2019. It may be necessary to supplement the bioremediation and groundwater recirculation system with either temporary or permanent injection points in the eastern and northeastern portions of the Site. In general, it appears as though the ERH system and subsequent vadose zone excavation effectively remediated the original source area as well as the deep aquifer on the Site. Initial groundwater results from 2019 indicate that the bioremediation and groundwater recirculation system is stimulating reductive dechlorination in large scale at the Site, effectively reducing PCE concentrations in Site groundwater. Kane Environmental will continue groundwater performance monitoring at the Site to assess the effectiveness of bioremediation and groundwater recirculation system.

7.0 LIMITATIONS

Kane Environmental has performed this work in general accordance with generally accepted professional practices using the standard of the industry today, for the nature and conditions of the work completed in the same locality and at the same time as the work was performed, and with the terms and conditions as set forth in our proposal.

Kane Environmental shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed at the time the report was prepared. Facts and conditions referenced in this report may change over time and the conclusions and recommendations set forth herein are applicable only to the facts and conditions as described at the time the work was performed. This Annual Groundwater Performance Monitoring Report does not include other services not specifically described in the scope of work in Section 1.2 of this report. Conclusions were made within the operative constraints of the scope of work, budget, and schedule for this project.

Our assessment of the property may change as new data become available, either from persons familiar with the site or during additional site studies, exploration or sampling. This report is intended for the exclusive use of the City of Bothell, and its designated assignees, for specific application to the referenced property. It is not meant to represent a legal opinion. No other warranty, express or implied, is made.

8.0 REFERENCES

Kane Environmental, 2017, *Remedial Investigation & Feasibility Study*, *Bothell Service Center Simon & Son, 18107 Bothell Way NE Bothell, Washington*, December 19, 2017.

Kane Environmental, 2018, *Engineering and Remedial Design Report*, Bothell Service Center Simon & Son, Bothell, Washington, March 12, 2018.

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Kane Environmental, 2019b, *Memorandum: Bothell Service Center Simon & Son – May 2019 Vadose Zone Soil Sampling*, June 5, 2019.

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Liesch, B.A., C.E. Price, and K. Walters. 1963. *Geology and Ground-Water Resources of Northwestern King County, Washington.* US Geological Survey.

Washington State Department of Ecology (Ecology), 2019, *Cleanup Action Plan*, *Bothell Service Center Simon & Son, 18107 Bothell Way NE Bothell, Washington*, revised July 19, 2019.

FIGURES

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ATTACHMENT A
CONSENT DECREE EXHIBIT D – SCHEDULE OF DELIVERABLES

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KANE
ENVIRONMENTAL INC

ATTACHMENT C
GROUNDWATER ISOPLETH FIGURES

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LABORATORY ANALYTICAL REPORTS

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3.0 FIELD METHODOLOGY

3.1 Sampling Locations

Groundwater monitoring and sampling activities were conducted by Kane Environmental at the Site between February 2019 and October 2019. Several groundwater sampling events were conducted in 2019 at the request of Ecology following the termination of the heating element of the ERH system. Select wells were sampled in February and March 2019 to assess ERH performance. During May and June of 2019 all monitoring wells on the Site were sampled. Following the results of the May and June 2019 sampling event performance monitoring wells were selected for the three groundwater zones on the Site through correspondence with Ecology (Attachment B). Quarterly performance monitoring was conducted at these select wells in July 2019 and October 2019.

During the February and March 2019 sampling event, the following monitoring wells were sampled:

- **Shallow:** MW-3, MW-4, MW-6, MW-23, MW-40, and MW-43.
- **Intermediate:** MW-11, MW-20, MW-28, and MW-42.
- **Deep:** MW-8, MW-33, MW-34, and MW-39.

During the May and June 2019 sampling event, the following monitoring wells were sampled:

- **Shallow:** MW-3, MW-4, MW-5, MW-6, MW-7, MW-21, MW-23, MW-27, MW-40, MW-41, MW-43, MW-45, HZ-MW-1, HZ-MW-4, HZ-MW-14S, HZ-MW-15S, HZ-MW-16, HZ-MW-17, HZ-MW-19, HZ-MW-21, HZ-MW-22, HZ-MW-31, HZ-MW-32, HZ-MW-34, S-MW-1, S-MW-2, S-MW-5, and S-MW-6.
- **Intermediate:** MW-11, MW-12, MW-20, MW-28, MW-42, MW-44, HZ-MW-14D, HZ-MW-15D, HZ-MW-23, HZ-MW-24, HZ-MW-26, HZ-MW-28, HZ-MW-29, HZ-MW-33, and S-MW-3.
- **Deep:** MW-8, MW-22, MW-29, MW-33, MW-34, MW-35, MW-39, HZ-MW-25, HZ-MW-27, HZ-MW-30, and S-MW-4.

During the July 2019 and October 2019 sampling events, the following monitoring wells were sampled:

- **Shallow:** MW-6, MW-27, MW-40, MW-43, MW-45, HZ-MW-1, HZ-MW-14S, HZ-MW-15S, HZ-MW-31, HZ-MW-34, S-MW-1, S-MW-2, and S-MW-5.
- **Intermediate:** MW-11, MW-12, MW-20, MW-42, MW-44, HZ-MW-14D, HZ-MW-15D, HZ-MW-23, HZ-MW-24, HZ-MW-26, HZ-MW-29, and S-MW-3.
- **Deep:** MW-8, MW-29, MW-35, and MW-39.

See Figure 3 for a depiction of the monitoring well locations.

3.2 Monitoring Well Sampling Methods

Prior to collecting groundwater samples, the depth to groundwater at each well was measured with a decontaminated electric water interface probe. Groundwater collected from the well was sampled using a peristaltic pump with new polyethylene tubing that was inserted and extended to the bottom of each well. Field parameters, including pH, temperature, conductivity, oxidation reduction potential (ORP), and dissolved oxygen (DO) were recorded and allowed to stabilize for three consecutive readings prior to collecting each groundwater sample. Groundwater was placed into appropriate laboratory-supplied, pre-cleaned and preserved containers for analysis. Samples were labeled and placed into an ice-filled cooler. Groundwater samples were transported under standard chain-of-custody procedures to an Ecology-accredited analytical laboratory.

Groundwater monitoring well sampling nomenclature identified each sample with the well identification number, followed by a “W”. For example, sample “MW-4:W” was a groundwater sample collected from monitoring well MW-4.

4.0 ANALYTICAL METHODS

Following collection, groundwater samples were placed in a cooler and submitted to the OnSite Environmental laboratory in Redmond, Washington or Fremont Analytical in Seattle, Washington. The following analyses were conducted on selected samples:

- Halogenated Volatile Organics (HVOCs) by EPA 8260D;
- Total Organic Carbon by SM 5310B;
- Dissolved Iron by EPA 6010D;
- Chloride by SM 4500-CL E;
- Sulfate by ASTM D516-11;
- Ammonia (as Nitrogen) by SM 4500-NH3 D; and,
- Dissolved gases by RSK 175;

All analyses were performed in accordance with the analytical laboratories' in-house Quality Assurance/Quality Control Plans. Sample analyses were performed in compliance with EPA analytical methods and Ecology guidelines. Samples were analyzed within specified holding times. All detection limits were within method requirements and no factors appeared to adversely affect data quality.

4.1 Laboratory QA/QC Procedures

Internal test methods run by the laboratory to ensure data accuracy and reproducibility include method blanks, laboratory control standards, sample duplicates, matrix spikes, and matrix spike duplicates.

5.0 RESULTS

Detailed below is a summary of data from groundwater samples collected from the BSCSS Site during groundwater sampling events conducted in February-March 2019, May-June 2019, July 2019, and October 2019. The type of analysis performed at each well, along with contaminant concentrations have been described. These results are also summarized in Tables 1 through 3. Isopleth figures which depict the analytical results are included as Attachment C. Additionally, laboratory analytical reports containing results for the groundwater samples discussed below are included in Attachment D.

5.1 Shallow Groundwater

HVOCs, including PCE, TCE, (cis) 1,2,-DCE, and vinyl chloride, were analyzed in all groundwater samples collected at the Site. See Table 1 for the shallow groundwater analytical results. In the shallow aquifer (approximately 0 to 25 feet bgs) PCE was detected at concentrations exceeding the MTCA Method A Cleanup Level of 5.0 µg/L at fourteen of the twenty-eight shallow wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, PCE was detected at concentrations above the MTCA Method A cleanup level at MW-4, MW-6, MW-27, MW-40, HZ-MW-1, HZ-MW-14S, HZ-MW-15S, S-MW-1, S-MW-2, and S-MW-5. MW-4 has consistently reported the highest concentrations of PCE detected during each sampling event, with concentrations ranging between 5,500 µg/L in May 2019 to 1,900 µg/L in October 2019.

TCE was detected at concentrations greater than the MTCA Method A Cleanup Level (5.0 µg/L) at seven of the twenty-eight shallow wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, TCE was detected at concentrations above the MTCA Method A Cleanup Level at MW-4, MW-6, MW-40, and HZ-MW-14S. MW-6 contained the highest concentration of TCE detected (1,100 µg/L) during the July 2019 sampling event and MW-4 reported the highest concentration (1,900 µg/L) during the October 2019 sampling event.

(cis) 1,2-DCE was detected at concentrations greater than the MTCA Method B Cleanup Level (16 µg/L) at seven of the twenty-eight shallow wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, (cis) 1,2-DCE was detected at concentrations above the MTCA Method B Cleanup Level at MW-4, MW-6, MW-40, and HZ-MW-34, and during the October 2019 sampling event, at MW-43. MW-40 contained the highest concentrations of (cis) 1,2-DCE during both the July 2019 and October 2019 sampling events, with concentrations of 4,700 µg/L and 1,500 µg/L, respectively.

Vinyl chloride was detected at concentrations greater than the MTCA Method A Cleanup Level (0.2 µg/L) at six of the twenty-eight shallow wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, vinyl chloride was detected at concentrations above the MTCA Method A Cleanup Level at MW-4, MW-6, MW-40, and HZ-MW-34, and during the October 2019 sampling event, at MW-43. MW-40 contained the highest concentrations of vinyl chloride during the July 2019 sampling event (11 µg/L) and MW-4 contained the highest concentration during the October 2019 sampling event (7.5 µg/L). It should be noted that due to elevated concentrations of PCE, several samples were diluted so that the reporting limit for vinyl chloride was greater than the MTCA Method A Cleanup Level.

5.2 Intermediate Groundwater

Analytical results for the groundwater samples collected from the intermediate wells is included in Table 2. In the intermediate aquifer (approximately 25 to 35 feet bgs) PCE was detected at concentrations exceeding the MTCA Method A Cleanup Level of 5.0 µg/L at five of the fifteen intermediate wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, PCE was detected at concentrations above the MTCA Method A cleanup level at MW-12, HZ-MW-14D, and HZ-MW-15D. MW-11 and HZ-MW-26 reported concentrations of PCE in exceedance of the MTCA Method A Cleanup Level during the July sampling event, but by the October sampling event, reported concentrations below the cleanup level. HZ-MW-15D has consistently reported the highest concentrations of PCE detected during each sampling event, with concentrations ranging between 10,000 µg/L in May 2019 to 7,700 µg/L in October 2019.

TCE was detected at concentrations greater than the MTCA Method A Cleanup Level (5.0 µg/L) at five of the fifteen intermediate wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, TCE was detected at concentrations above the MTCA Method A Cleanup Level at MW-12, MW-20, and HZ-MW-15D. MW-11 reported a concentration of TCE in exceedance of the cleanup level during the July sampling event, but the concentration was below the cleanup level during the October sampling event. Conversely, HZ-MW-14D reported a concentration of TCE below the cleanup level during the July sampling event, but above the cleanup level during the October sampling event. HZ-MW-15D contained the highest concentration of TCE detected during both the July and October 2019 sampling events, reporting concentrations of 390 µg/L and 410 µg/L, respectively.

(cis) 1,2-DCE was detected at concentrations greater than the MTCA Method B Cleanup Level (16 µg/L) at eight of the fifteen intermediate wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, (cis) 1,2-DCE was detected at concentrations above the MTCA Method B Cleanup Level at MW-12, MW-20, HZ-MW-15D, HZ-MW-24, and HZ-MW-29, and during the October 2019 sampling event, at MW-11. MW-12 contained the highest concentrations of (cis) 1,2-DCE during the July 2019 sampling event (630 µg/L) and HZ-MW-15D contained the highest concentration during the October 2019 sampling event (360 µg/L).

Vinyl chloride was detected at concentrations greater than the MTCA Method A Cleanup Level (0.2 µg/L) at six of the fifteen intermediate wells sampled in 2019. During the performance monitoring events in July 2019 and October 2019, vinyl chloride was detected at concentrations above the MTCA Method A Cleanup Level at MW-11, MW-12, HZ-MW-14D, HZ-MW-24, and HZ-MW-29, and during the October 2019 sampling event, at MW-44. MW-12 contained the highest concentrations of vinyl chloride during the July 2019 sampling event (6.2 µg/L) and MW-12 contained the highest concentration during the October 2019 sampling event (1.5 µg/L). It should be noted that due to elevated concentrations of PCE, several samples were diluted so that the reporting limit for vinyl chloride was greater than the MTCA Method A Cleanup Level.

5.3 Deep Groundwater

Analytical results for the groundwater samples collected from the deep wells is included in Table 3. In the deep aquifer (approximately 35 to 55 feet bgs) PCE was not detected at concentrations above the MTCA Method A Cleanup Level of 5.0 µg/L in any of the eleven deep wells sampled in 2019. Detectable concentrations of PCE have ranged between 4.98 µg/L at MW-8 in February 2019 and 0.33 µg/L at MW-39 in May 2019.

TCE was not detected at concentrations greater than the MTCA Method A Cleanup Level (5.0 µg/L) in any of the eleven deep wells sampled in 2019. Detectable concentrations of TCE ranged between 2.9 µg/Lat MW-8 in February 2019 and 0.41 µg/L at MW-39 in May 2019.

(cis) 1,2-DCE was not detected at concentrations greater than the MTCA Method B Cleanup Level (16 µg/L) in any of the eleven deep wells sampled in 2019. Detectable concentrations of (cis) 1,2-DCE ranged between 7.33 µg/L at MW-8 in February 2019 and 0.34 µg/L at MW-8 in October 2019.

Vinyl chloride was not detected at concentrations greater than the laboratory reporting limit in any of the eleven deep wells sampled in 2019.

6.0 DISCUSSION

Analytical results from the 2019 sampling events indicate that PCE concentrations in groundwater remain greater than the MTCA Method A Cleanup Level in both the shallow and intermediate aquifers. No HVOCs were detected above their respective cleanup levels in the deep aquifer during the 2019 sampling. PCE concentrations are generally decreasing across the Site. Decreasing concentrations of PCE are frequently accompanied by increases in the concentrations of (cis) 1,2-DCE or vinyl chloride. This is most apparent at wells MW-4 and MW-6 in the shallow aquifer, and wells MW-11, MW-12, HZ-MW-15D, and HZ-MW-29 in the intermediate aquifer. These results, coupled with increasing total organic carbon (TOC) concentrations and negative ORP readings, suggest that reductive dechlorination is effectively breaking down the PCE in large portions of the Site. There are, however, several wells where concentrations of PCE are not consistently decreasing and (cis) 1,2-DCE and vinyl chloride are not being produced. These wells also generally contain low or non-detectable concentrations of TOC and contain positive ORP readings. In the shallow aquifer this is primarily seen in wells located in the eastern portion of the Site, where injection of Carbstrate enhanced water has been limited, such as MW-27, S-MW-1, and S-MW-5, and is also seen in the intermediate aquifer at HZ-MW-14D. It should also be noted that full scale injection at the Site was not initiated until July and August of 2019. It may be necessary to supplement the bioremediation and groundwater recirculation system with either temporary or permanent injection points in the eastern and northeastern portions of the Site. In general, it appears as though the ERH system and subsequent vadose zone excavation effectively remediated the original source area as well as the deep aquifer on the Site. Initial groundwater results from 2019 indicate that the bioremediation and groundwater recirculation system is stimulating reductive dechlorination in large scale at the Site, effectively reducing PCE concentrations in Site groundwater. Kane Environmental will continue groundwater performance monitoring at the Site to assess the effectiveness of bioremediation and groundwater recirculation system.

7.0 LIMITATIONS

Kane Environmental has performed this work in general accordance with generally accepted professional practices using the standard of the industry today, for the nature and conditions of the work completed in the same locality and at the same time as the work was performed, and with the terms and conditions as set forth in our proposal.

Kane Environmental shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed at the time the report was prepared. Facts and conditions referenced in this report may change over time and the conclusions and recommendations set forth herein are applicable only to the facts and conditions as described at the time the work was performed. This Annual Groundwater Performance Monitoring Report does not include other services not specifically described in the scope of work in Section 1.2 of this report. Conclusions were made within the operative constraints of the scope of work, budget, and schedule for this project.

Our assessment of the property may change as new data become available, either from persons familiar with the site or during additional site studies, exploration or sampling. This report is intended for the exclusive use of the City of Bothell, and its designated assignees, for specific application to the referenced property. It is not meant to represent a legal opinion. No other warranty, express or implied, is made.

8.0 REFERENCES

Kane Environmental, 2017, *Remedial Investigation & Feasibility Study*, *Bothell Service Center Simon & Son, 18107 Bothell Way NE Bothell, Washington*, December 19, 2017.

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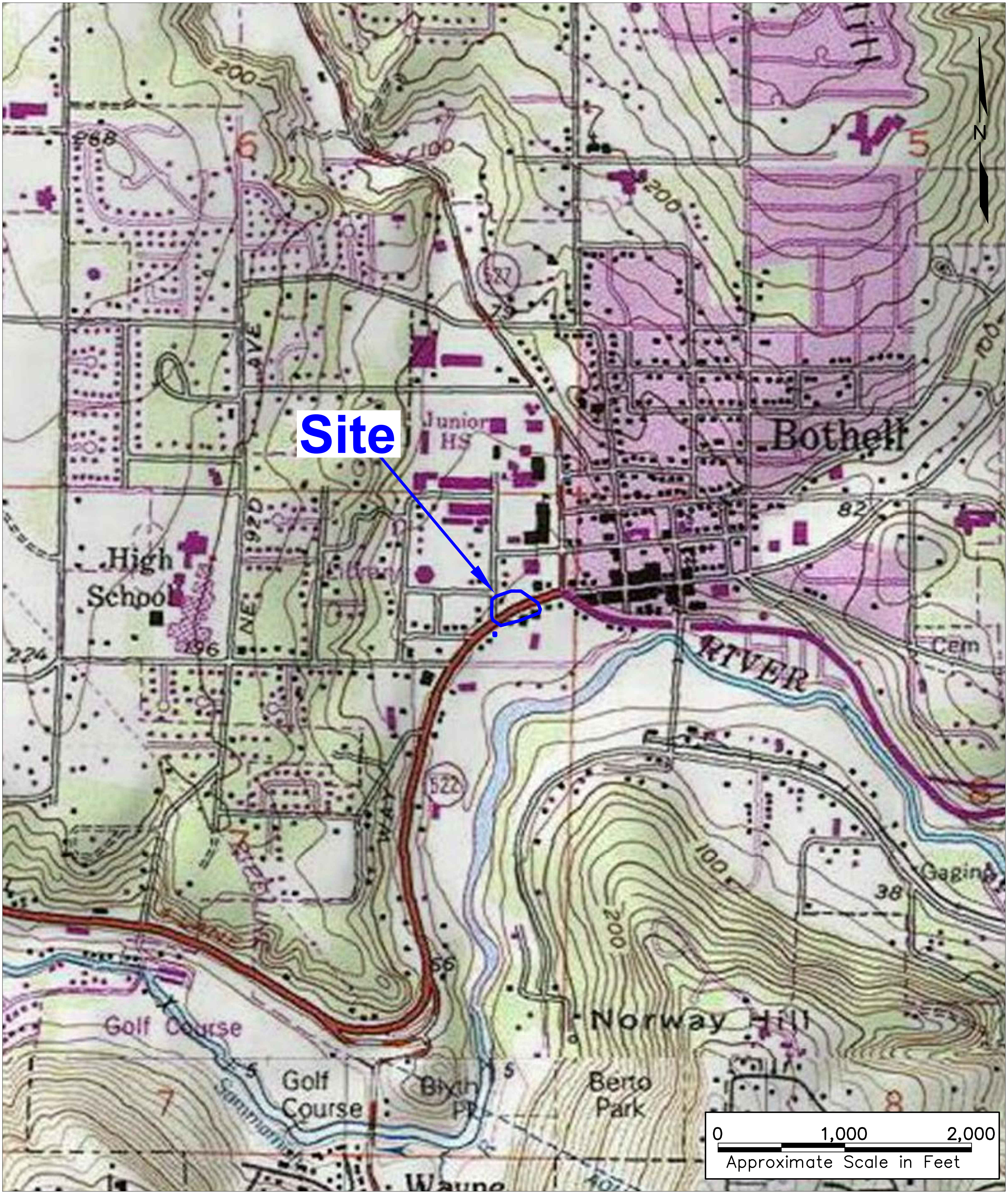
Liesch, B.A., C.E. Price, and K. Walters. 1963. *Geology and Ground-Water Resources of Northwestern King County, Washington.* US Geological Survey.

Washington State Department of Ecology (Ecology), 2019, *Cleanup Action Plan*, *Bothell Service Center Simon & Son, 18107 Bothell Way NE Bothell, Washington*, revised July 19, 2019.

FIGURES



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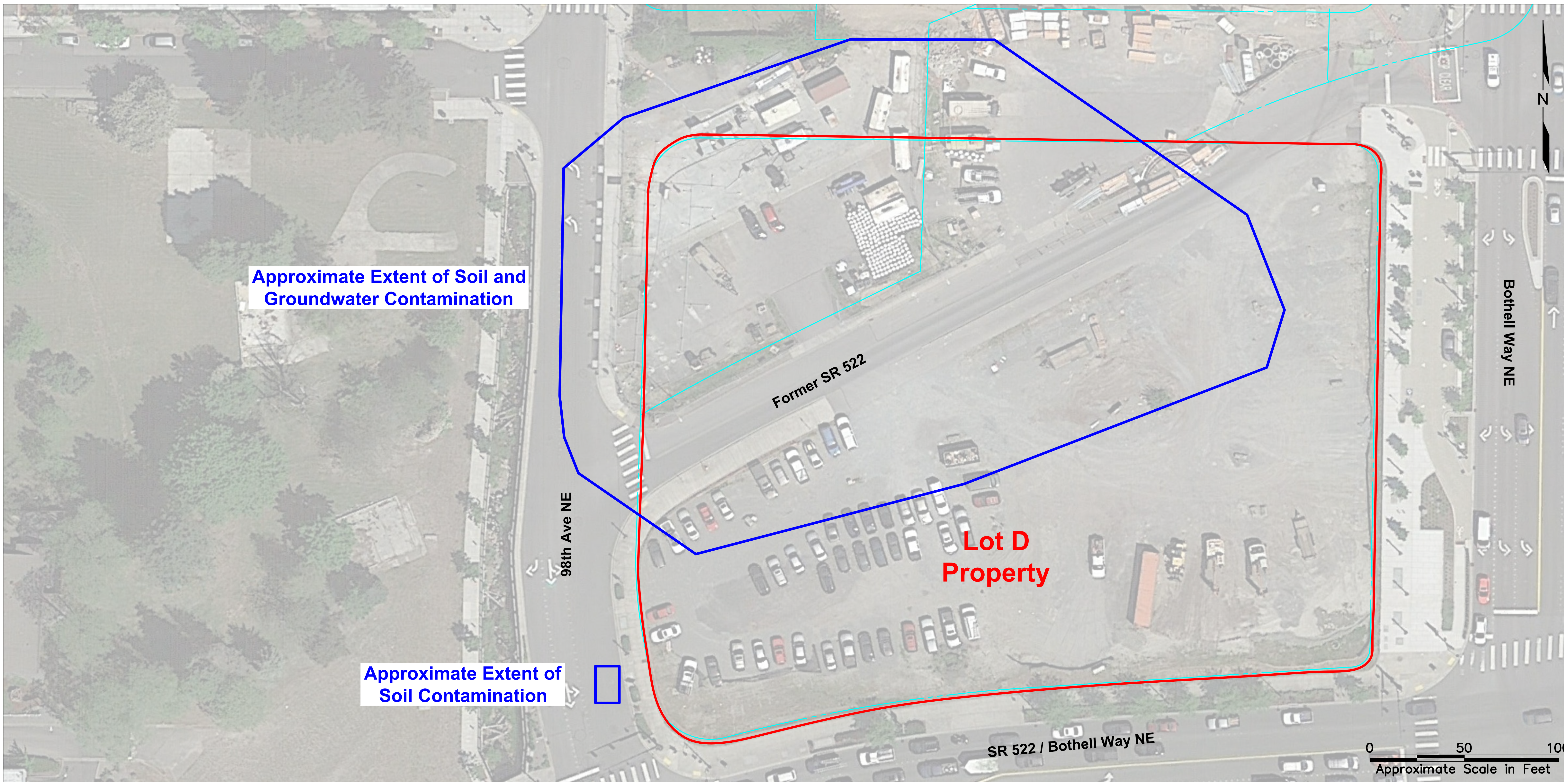
Annual Groundwater Performance Monitoring Report
Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure 1
Vicinity Map



LEGEND

- Location of BSCSS Site Boundary
- Location of parcel boundary
- Location of Lot D property boundary

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Bothell Service Center Simon & Son
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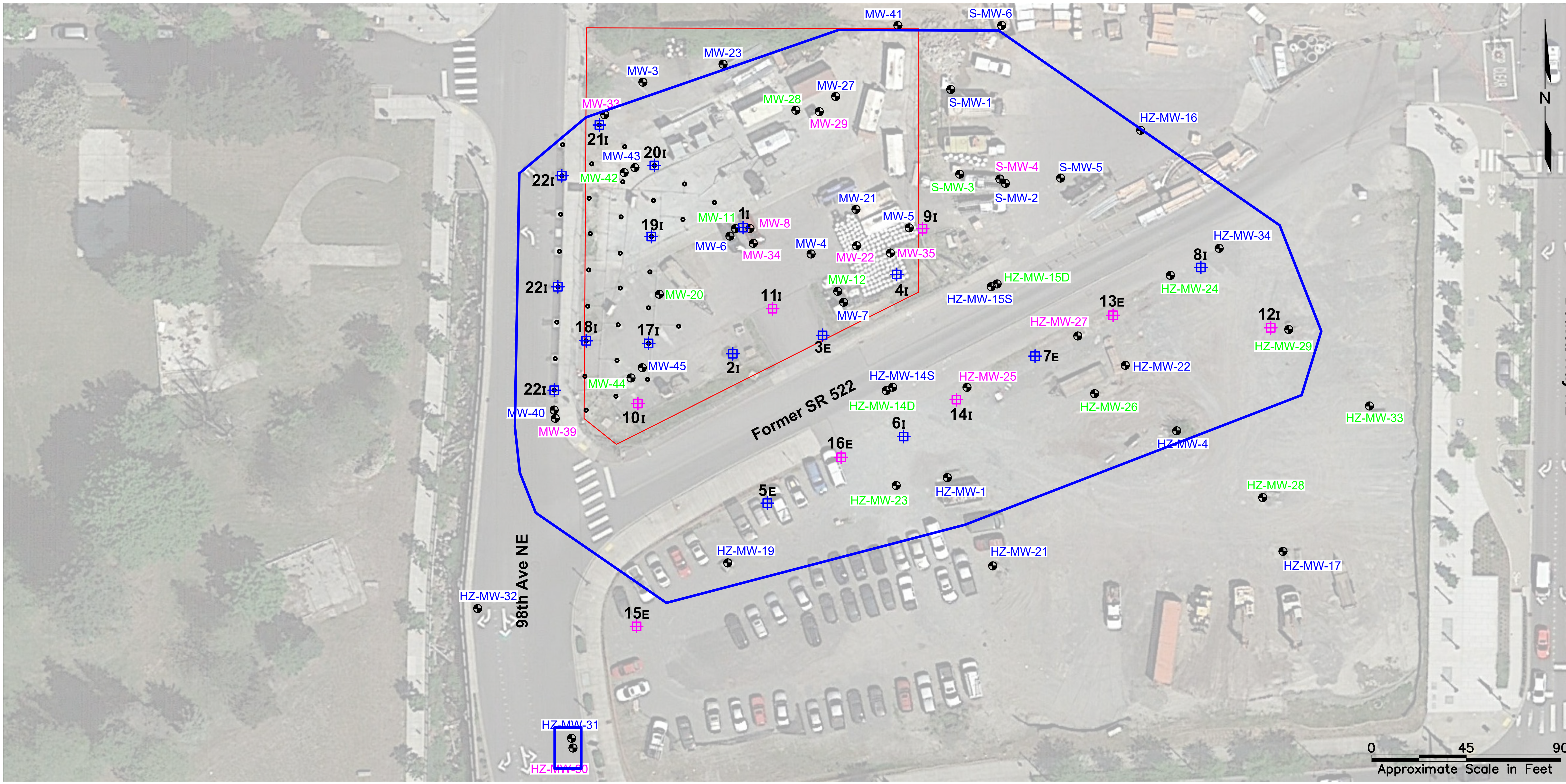
Figure 2
Site Plan



LEGEND

Location of BSCSS Site Boundary	
Approximate location of BSCSS property	
Location of shallow injection/extraction well (screened 5-25 ft bgs)	E Extraction well
Location of intermediate/deep injection/extraction well (screened 25-55 ft bgs)	I Injection well
Location of shallow monitoring well (screened 5-25 ft bgs)	
Location of intermediate monitoring well (screened 25-35 ft bgs)	
Location of deep monitoring well (screened 35-55 ft bgs)	
Location of ERH electrode	

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Bothell, Washington

Figure 3
Site Plan Detail

TABLES

Table 1
Summary of HVOCs in Groundwater - Shallow
Bothell Service Center Simon Son

Well	Well Type and Water Bearing Zone	Screened Depth, (ft bgs)	Top of Casing (TOC) Elevation (feet)*	Date Sampled	Depth to Water (ft below TOC)	GW Elevation (feet)	Sampled By	PCE (µg/L)	TCE (µg/L)	(cis) 1,2-DCE (µg/L)	Vinyl Chloride (µg/L)	pH (units)	Temp (˚C)	Conductivity (µS)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	Dissolved Iron (ug/L)	Sulfate (mg/L)	Chloride (mg/L)	Ammonia as N (mg/L)	Methane (mg/L)	Ethane (mg/L)	Ethene (mg/L)	Total Organic Carbon (mg/L)
MW-3	Shallow	5 to 20	47.957	2/12/19	7.79	40.167	Kane	<1.00	<0.50	<1.00	<0.20	6.03	12	57.5	8.2	141.5	<100	4.16	3	<0.10	<0.00863	<0.0162	<0.0151	2.36
				6/4/19	7.96	39.997	Kane	**0.72**	<0.20	<0.20	<0.20	6.35	15.5	62.1	9.97	3.6	<56	<5.0	3.4	<0.05	<0.001	<0.0005	<0.0005	2.1
MW-4	Shallow	10 to 25	45.717	2/22/19	7.23	38.49	Kane	**4,080**	**343**	**1790**	**9.72**	6.49	13.9	311.5	0.22	19.9	<100	16.2	16.5	<0.10	4.12	<0.0162	<0.0151	1.94
				5/23/19	7.59	38.13	Kane	**5,500**	**370**	**1,100**	*<30*	6.57	19.5	353.5	0.12	27.4	2,100	17	16	<0.050	9.5	<0.50	<0.50	2.9
				7/16/19	8.13	37.59	Kane	**3,700**	**590**	**1,400**	**9.1**	6.26	20	354.3	0.06	-69	6,300	15	15	<0.050	5.2	<0.0005	<0.0005	2.3
				10/18/19	8.04	37.68	Kane	**1,900**	**390**	**940**	**7.5**	6.14	20.3	321.2	0.04	15.4	5,400	12	15	<0.050	11	<0.0005	<0.0005	3.7
MW-5	Shallow	10 to 25	44.297	6/10/19	6.93	37.37	Kane	**140**	**81**	**280**	**4.1**	6.53	16.4	548.0	0.22	-6.2	20,000	6.6	12.0	1.8	1.6	<0.250	<0.250	3.8
MW-6	Shallow	10 to 25	47.142	2/22/19	7.79	39.35	Kane	**1,820**	**568**	**1040**	**14**	6.16	42.6	295.1	0.15	-52	5,800	13	7.69	<0.10	0.706	<0.0162	<0.0151	13.2
				5/22/19	8.46	38.68	Kane	**3,800**	**1,800**	**750**	*<20*	6.14	43.7	407.0	0.04	-70.8	8,800	<5.0	14	0.16	1	0.0012	<0.0005	20
				7/25/19	9.06	38.08	Kane	**3,600**	**1,100**	**490**	**7.4**	6.16	41.5	401.0	0.04	-108.1	9,200	<5.0	14	0.18	0.73	<0.0005	0.019	22
				10/21/19	8.76	38.38	Kane	**74**	**38**	**1,200**	**3.2**	6.08	31.3	562.0	0.04	-74.6	13,000	<5.0	16	0.12	2.3	<0.0005	0.00094	19
MW-7	Shallow	10 to 25	45.527	5/24/19	7.96	37.57	Kane	**1,000**	**84**	**240**	*<10*	6.68	13.6	409.5	0.16	-9.2	3,900	37	6.1	<0.050	0.049	<0.003	<0.003	2.3
MW-21	Shallow	10 to 15	45.717	5/24/19	7.69	38.03	Kane	**82**	**1.40**	**0.5**	*<0.40*	6.08	14.3	248.0	3.51	2.7	<56	12	3.7	<0.050	0.0026	<0.0005	<0.0005	<1.0
MW-23	Shallow	6 to 16	48.027	2/12/19	8.18	39.85	Kane	**2.11**	<0.50	<1.0	<0.20	5.34	11.6	75.1	5.16	128.7	<100	6.02	1.46	<0.10	<0.00863	<0.0162	<0.0151	1.17
				6/4/19	8.57	39.46	Kane	**0.94**	<0.20	<0.20	<0.20	6.13	14.9	113.4	0.87	19.1	720	6.7	3.3	<0.050	0.14	<0.0075	<0.0075	1.6
MW-27	Shallow	6 to 16	48.177	5/24/19	9.65	38.53	Kane	**110**	<1.0	<1.0	*<1.0*	5.73	13.1	131.9	8.54	41.5	<56	24	4.7	<0.050	<0.001	<0.0005	<0.0005	<1.0
				7/16/19	10.39	37.79	Kane	**91**	<0.40	<0.40	<0.040	4.53	16.3	120.9	6.39	155.7	<56	23	3.6	<0.050	<0.001	<0.0005	<0.0005	<1.0
				10/18/19	10.05	38.13	Kane	**130**	<1.0	<1.0	<0.10	5.20	16	97.3	7.17	243.9	<56	24	4.5	<0.050	<0.001	<0.0005	<0.0005	8.7
MW-40	Shallow	15 to 25	44.521	3/13/19	6.29	38.23	Kane	**213**	**146**	**746**	<0.20	6.08	29.5	63.3	1.33	82.2	<100	0.819	2.08	<0.10	0.00959	<0.0162	<0.0151	2.03
				5/29/19	6.49	38.03	Kane	**560**	**600**	**4,300**	*<20*	6.41	30.7	268.1	0.23	3.8	7,600	<5.0	11	0.35	0.47	0.011	<0.025	11
				7/23/19	7	37.52	Kane	**530**	**380**	**4,700**	**11**	6.29	30.5	319.8	0.05	-112.4	19,000	<5.0	12	0.39	0.49	0.0082	<0.0005	12
				10/25/19	6.82	37.70	Kane	**65**	**84**	**1,500**	**1.6**	5.82	23.7	163.6	0.06	35.6	4,600	<5.0	4.9	0.14	0.51	<0.0005	0.0016	13
MW-41	Shallow	5 to 15	-	6/7/19	8.12		Kane	**1.30**	<0.20	<0.20	<0.20	6.31	15.1	84.9	5.26	43.2	<56	6.6	4.5	<0.050	<0.001	<0.0005	<0.0005	<1.0
MW-43	Shallow	10 to 25	-	3/18/19	8.42		Kane	**1.66**	<0.50	**1.20**	<0.20	6.61	33.3	183.6	0.10	-4.6	286	14.4	3.34	<0.10	0.0336	<0.0162	<0.0151	8.25
				6/5/19	8.68		Kane	**9.10**	**7.60**	**35.0**	<0.20	6.86	24.1	168.3	0.09	21.5	450	15	3.7	0.08	0.53	<0.038	<0.038	5.8
				7/30/19	9.17		Kane	<0.20	**0.23**	**2.0**	<0.020	6.32	26.0	711.0	0.09	-281	280	11	5.7	0.11	0.44	<0.0005	<0.0005	4.7
				10/22/19	9.67		Kane	**0.80**	<0.20	**24.0**	**0.29**	6.17	19.2	552.0	0.06	-40.2	18,000	9.3	10	0.43	0.32	<0.0005	<0.0005	110
MW-45	Shallow	7 to 17	-	6/6/19	7.29		Kane	<0.20	<0.20	**6.0**	<0.20	6.81	45.7	798.0	0.09	18.4	770	<5.0	38	0.36	0.11	<0.0075	<0.0075	120
				7/25/19	7.96		Kane	<0.20	<0.20	**0.75**	**0.043**	6.49	44.1	825.0	0.25	-67.4	2,000	<5.0	21	0.63	1.2	<0.0005	<0.0005	88
				10/22/19	7.44		Kane	<0.20	<0.20	**0.88**	<0.020	6.28	32.5	569.0	0.14	51.6	1,600	12	15	0.75	1.5	<0.0005	<0.0005	33
HZ-MW-1	Shallow	5 to 15	41.637	5/30/19	6.81	34.83	Kane	**11**	<0.20	<0.20	<0.20	6.55	14.0	190.5	7.81	15.2	<56	7.4	5.9	<0.050	0.0014	<0.0005	<0.0005	1.1
				7/30/19	7.2	34.44	Kane	**14**	<0.20	**1.1**	<0.020	6.17	17.3	189.6	4.08	-70.1	<56	6.6	4.4	<0.050	<0.001	<0.0005	<0.0005	1
				10/21/19	7.45	34.19	Kane	**15**	<0.20	**0.61**	<0.020	5.65	15.9	172.5	4.58	200	<56	6.5	5.1	<0.050	<0.001	<0.0005	<0.0005	1.1
HZ-MW-4	Shallow	8 to 18	40.177	5/30/19	6.37	33.81	Kane	**0.41**	<0.20	<0.20	<0.20	6.38	16.3	446.1	0.30	45.3	<56	45	21	<0.050	0.0016	<0.0005	<0.0005	2.6
HZ-MW-14S	Shallow	5 to 15	42.377	5/21/19	6.43	35.95	Kane	**240**	**7.0**	**3.2**	*<2.0*	6.47	14.7	339.2	0.11	-26.3	490	21	7.2	<0.050	0.053	<0.005	<0.005	1.7
				7/25/19	6.31	36.07	Kane	**160**	**6.8**	**7**	<0.10	6.15	20.8	303.6	0.23	-57.4	160	18	7.8	0.53	0.018	<0.0005	<0.0005	1.8
				10/16/19	6.99	35.39	Kane	**78**	**5.9**	**3.6**	<0.04	6.41	18.7	295.1	0.05	103.9	<56	17	8	<0.050	0.29	<0.0005	<0.0005	1.9
HZ-MW-15S	Shallow	10 to 15	41.747	6/4/19	4.92	36.83	Kane	**8.9**	**0.34**	<0.20	<0.20	6.32	15.9	256.6	0.33	-10.7	<56	16	3	<0.050	0.019	<0.001	<0.001	1.1
				7/24/19	5.66	36.09	Kane	**11**	**0.41**	<0.20	<0.02	6.06	18.7	227.5	0.38	-69.1	<56	13	3.6	<0.050	0.02	<0.0005	<0.0005	1
				10/17/19	5.87	35.88	Kane	**9.8**	**0.39**	<0.20	<0.02	6.01	16.3	202.4	0.23	189	<56	13	5.1	<0.050	0.0076	<0.0005	<0.0005	1.2
HZ-MW-16	Shallow	15 to 25	-	6/5/19	5.8		Kane	**2.00**	**0.30**	**0.61**	<0.20	6.46	15.0	222.3	0.29	26.7	<56	16	7.6	<0.050	<0.001	<0.0005	<0.0005	<1.0
HZ-MW-17	Shallow	10 to 20	38.567	5/31/19	7.08	31.49	Kane	<0.20	<0.20	<0.20	<0.20	6.91	15.2	312.3	0.11	-30.1	3,600	16	9	0.081	0.25	<0.015	<0.015	1.1
HZ-MW-19	Shallow	5 to 15	42.177	5/30/19	6.25	35.93	Kane	**0.21**	**0.25**	<0.20	<0.20	6.25	18.1	424.6	0.15	34.5	240	28	3.9	<0.050	0.019	<0.001	<0.001	3.5
HZ-MW-21	Shallow	6 to 16	39.517	5/23/19	6.55	32.97	Kane	<0.20	<0.20	<0.20	<0.20	6.60	15.3	500.7	0.11	-0.1	550	21	8.1	0.29	0.14	0.00093	<0.0005	14
HZ-MW-22	Shallow	5 to 15	40.827	5/21/19	5.72	35.11	Kane	**1.2**	**0.66**	**0.51**	<0.20	6.37	14.3	413.6	0.50	-19.1	<56	31	8.1	<0.050	0.004	<0.0005	<0.0005	2.3
HZ-MW-31	Shallow	15 to 25	-	5/29/19	9.34		Kane	**0.78**	<0.20	<0.20	<0.20	6.58	15.0	320.7	0.23	19.8	20,000	<5.0	8.7	0.26	0.34	<0.025	<0.025	4.6
				7/24/19	9.45		Kane	**2.5**	<0.20	**0.69**	**0.048**	6.33	16.9	295.9	0.21	-64	19,000	<5.0	8.3	0.27	0.62	<0.0005	<0.0005	4.4
				10/25/19	9.16		Kane	<0.20	<0.20	<0.20	**0.048**	6.22	15.1	232.9	0.10	23	19,000	<5.0	6.3	0.3	0.9	<0.0005	<0.0005	4.8
HZ-MW-32	Shallow	15 to 25	-	5/29/19	8.25		Kane	<0.20	<0.20	<0.20	<0.20	6.56		377.1	0.46	25.6	27,000	<5.0	13	0.39	0.27	<0.015	<0.015	5.9
HZ-MW-34	Shallow	15 to 25	-	5/31/19	5.88		Kane	**0.83**	**3.3**	**24**	**0.26**	6.46	14.7	550.0	0.16	-17.2	10,000	5.7	13	<0.050	1.1	<0.05	<0.05	42
				7/17/19	6.41		Kane	**1.4**	**3.3**	**20**	**0.28**	6.24	17.3	508.5	0.08	-158.7	11,000	5.2	13	<0.050	3.1	<0.00050	<0.0005	24
				10/23/19	6.60		Kane	<1.0	<1.0	**110**	**0.97**	6.25	16.2	258.4	0.07	24.7	4,900	17	9	0.69	7.7	<0.0005	<0.0005	5.8
S-MW-1	Shallow	5.5 to 15.5	43.527	6/6/19	6.00	37.53	Kane	**8.9**	<0.20	<0.20	<0.20	6.25	14.4	256.6	3.46	5	<56	50	4.6	<0.050	<0.001	<0.0005	<0.0005	1.4
				7/24/19	6.61	36.92	Kane	**6.5**	<0.20	<0.20	<0.020	6.01	18.8	200.8	3.10	-74.5	<56	26	4.8	0.15	<0.001	<0.0005	<0.0005	<1.0
				10/23/19	6.18	37.35	Kane	**7.3**	<0.20	<0.20	<0.020	5.92	15.4	162.8	3.82	164.3	<56	23	4.2	<0.050	<0.001	<0.0005	<0.0005	<1.0
S-MW-2	Shallow	5 to 15	42.297	6/6/19	5.14	37.16	Kane	**5.8**	**3.8**	**3.2**	<0.20	6.68	15.6	363.7	0.25	0.5	<56	35	6.6	<0.050	0.033	<0.0025	<0.0025	1.6
				7/24/19	5.34	36.96	Kane	**6.2**	**3.8**	**4.1**	**0.11**	6.18	18.5	338.0	0.14	-129.2	<56	21	7.4	<0.050	0.027	<0.0005	<0.0005	1.3
				10/17/19	5.26	37.04	Kane	**5.8**	**3.7**	**4.2**	**0.11**	6.34	17.6	245.9	0.10	193.1	<56	26	6.9	<0.050	0.023	<0.0005	<0.0005	1.6
S-MW-5	Shallow	15 to 25	41.357	6/5/19	5.20	36.16	Kane	**880**	*<10*	<10	*<10*	6.57	15.2	205.1	1.81	7.3	<56	19	5.9	<0.050	<0.001	<0.0005	<0.0005	<1.0
				7/24/19	5.72	35.64	Kane	**530**	<4.0	<4.0	*<0.40*	6.22	17.6	169.8	1.93	-76.1	<56	15	7.5	<0.050	<0.001	<0.0005	<0.0005	<1.0
				10/17/19	5.88	35.48	Kane	**820**	<4.0	<4.0	*<0.40*	6.05	15.8	159.8	1.78	198.6	<56	17	5.3	<0.050	<0.001	<0.0005	<0.0005	<1.0
S-MW-6	Shallow	4 to 14	-	6/7/19	7.57		Kane	<0.20	<0.20	<0.20	<0.20	6.1	13.5	182.8	4.90	8.7	<56	29	7.3	<0.050	0.0016	<0.0005	<0.0005	<1.0
MTCA Method A Cleanup Level[1]								5.0	5.0		0.2													
MTCA Method B Cleanup Level[2]										16														

Notes:

PCE – Tetrachloroethene
TCE – Trichloroethene
1,1-DCE - 1,1-Dichloroethene
(cis) 1,2-DCE - (cis) 1,2-Dichloroethene
(trans) 1,2-DCE - (trans) 1,2-Dichloroethene
Blank – Not analyzed or not available
Bold – Analyte detected
Bold / highlighted – Analyte exceeds MTCA A/B cleanup level
Italicized - Detection limit exceeds respective cleanup level
< – Analyte not detected at listed reporting limit
mg/L – micrograms per liter
MV – Millivolts
ES – Estimated concentration because analyte concentration was outside of lab instrument calibration range
DNAPL – Dense Non-Aqueous Phase Liquid
1 – Table 720-1, WAC 173-340-900
2 – WA Dept. of Ecology CLARC ground water data table (https://fortress.wa.gov/ecy/clarc/FocusSheets/Groundwater%20Methods%20B%20and%20A%20and%20ARARs.pdf)
NA – Not Applicable

Table 2
Summary of HVOCs in Groundwater - Intermediate
Bothell Service Center Simon Son

Well	Well Type and Water Bearing Zone	Screened Depth, (ft bgs)	Top of Casing (TOC) Elevation (feet)*	Date Sampled	Depth to Water (ft below TOC)	GW Elevation (feet)	Sampled By	PCE (µg/L)	TCE (µg/L)	(cis) 1,2-DCE (µg/L)	Vinyl Chloride (µg/L)	pH (units)	Temp (˚C)	Conductivity (µS)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	Dissolved Iron (ug/L)	Sulfate (mg/L)	Chloride (mg/L)	Ammonia as N (mg/L)	Methane (mg/L)	Ethane (mg/L)	Ethene (mg/L)	Total Organic Carbon (mg/L)
MW-11	Intermediate	25 to 33	47.207	2/21/19	7.9	39.31	Kane	**16.9**	**14.6**	**9.58**	<0.20	5.96	47.2	316.3	0.16	-70	1,240	10.3	14.4	<0.10	0.87	<0.0162	<0.0151	23.7
				5/22/19	8.48	38.73	Kane	**75**	**69**	**14**	*<0.40*	6.13	45.7	468.0	0.04	-18	810	13	13	<0.050	0.49	<0.0005	<0.0005	27
				7/25/19	9.12	38.09	Kane	**39**	**41**	**7.7**	**0.34**	6.2	40.8	407.0	0.04	-43.8	660	10	11	0.068	1.1	<0.0005	<0.0005	26
				10/21/19	8.92	38.29	Kane	**3.5**	**3.8**	**220**	**1.5**	6.33	27.8	522.0	0.08	-59.4	1,500	<5.0	15	<0.050	1	<0.0005	<0.0005	34
MW-12	Intermediate	25 to 33	45.467	5/24/19	7.92	37.55	Kane	**5,400**	**400**	**780**	*<30*	6.25	14.1	383.9	0.30	-89.5	530	24	9.5	<0.050	3.7	<0.250	<0.250	2.5
				7/22/19	8.4	37.07	Kane	**910**	**240**	**630**	**6.2**	6.12	18.6	672.0	0.05	-341	3,400	18	42	<0.050	3.2	<0.0005	<0.0005	2.8
				10/18/19	9.07	36.40	Kane	**360**	**68**	**240**	**0.84**	5.85	16.2	361.6	0.12	40	6,000	14	36	<0.050	3.3	<0.0005	<0.0005	2.1
MW-20	Intermediate	25 to 30	46.857	3/14/19	7.55	39.31	Kane	<0.841	**136**	**163**	*<2.0*	6	-	219.3	0.2	68.3	1,460	0.348	7.8	1.07	0.0463	<0.0162	<0.0151	45.3
				6/6/19	8.03	38.83	Kane	**0.43**	**51**	**31**	*<0.40*	6.45	55.6	218.1	0.08	4.4	950	<5.0	7.4	0.75	0.51	<0.05	<0.05	16
				7/25/19	8.64	38.22	Kane	**0.82**	**36**	**27**	**0.052**	6.36	52.5	210.2	0.13	-82	800	<5.0	6.4	0.89	0.67	<0.0005	<0.0005	8
				10/22/19	8.47	38.39	Kane	**0.46**	**19**	**68**	**0.15**	6.32	36.6	375.7	0.07	-47.2	1,200	<5.0	13	0.81	3.1	<0.0005	<0.0005	9.8
MW-28	Intermediate	25 to 35	48.187	2/19/19	9.07	39.12	Kane	<1.0	<0.50	<1.0	<0.20	5.73	13.0	108.6	2.56	202.9	<100	8.78	5.65	<0.10	<0.00863	<0.0162	<0.0151	0.618
				5/24/19	9.85	38.34	Kane	<0.20	<0.20	<0.20	<0.20	5.54	13.6	116.0	1.8	-74.6	<56	9.5	6.2	<0.050	0.0096	<0.0005	<0.0005	<1.0
MW-42	Int./Deep	30 to 45	-	3/18/19	8.79		Kane	<1.00	<0.50	<1.0	<0.20	6.63	32.8	155.4	0.06	76.4	821	1.99	3.57	0.266	0.177	<0.0162	<0.0151	1.9
				6/5/19	9.11		Kane	<0.20	<0.20	<0.20	<0.20	6.92	22.9	216.9	0.13	5	5,500	<5.0	6.3	0.2	4.1	<0.25	<0.25	2.3
				7/30/19	9.65		Kane	<0.20	<0.20	**0.72**	**0.053**	6.49	26.4	713.0	0.05	-321.9	5,300	8	8.1	0.27	2.5	<0.0005	<0.0005	1.7
				10/22/19	9.29		Kane	<0.20	**1.90**	**1.9**	**0.056**	6.04	18.3	254.0	0.10	-10.2	7,600	7.3	13	0.28	3.2	<0.0005	<0.0005	3.9
MW-44	Intermediate	25 to 35	-	6/6/19	7.49		Kane	<0.20	**1.70**	**28.0**	<0.20	6.35	51.4	229.6	0.18	-1.9	1,700	<5.0	7.6	0.49	0.24	<0.025	<0.025	19
				7/25/19	8.11		Kane	<0.20	**1.50**	**2.7**	**0.047**	6.15	47.4	254.1	0.34	-77	2,200	<5.0	6.6	0.71	0.13	<0.0005	0.0039	20
				10/22/19	9.85		Kane	<0.20	**0.77**	**14.0**	**0.29**	5.94	37.2	450.1	0.07	15.4	3,900	<5.0	12	0.73	1.4	<0.0005	0.0011	22
HZ-MW-14D	Intermediate	30 to 40	42.397	5/21/19	6.16	36.24	Kane	**65**	**2.9**	**12**	<0.20	6.09	14.7	500.3	0.06	-40.7	<56	10	87	<0.050	0.18	<0.01	<0.01	<1.0
				7/30/19	6.92	35.48	Kane	**100**	**4.7**	**28**	**0.30**	5.84	19.6	454.8	0.22	-86.5	<56	11	69	<0.050	0.92	<0.0005	<0.0005	1
				10/16/19	7.7	34.70	Kane	**190**	**7.9**	**48**	**0.51**	6.13	16.3	443.8	0.02	143.8	<56	9.3	75	<0.050	1.5	<0.0005	<0.0005	<1.0
HZ-MW-15D	Intermediate	20 to 30	41.787	6/4/19	6.11	35.68	Kane	**10,000**	**390**	**260**	*<100*	6.25	15.1	337.4	0.12	20.9	<56	23	14	<0.05	5	<0.25	<0.25	1.50
				7/24/19	6.83	34.96	Kane	**9,200**	**390**	**340**	*<5.0*	5.93	16.9	324.0	0.24	-56.6	<56	21	13	<0.050	5	<0.0005	<0.0005	1.60
				10/17/19	7.02	34.77	Kane	**7,700**	**410**	**360**	*<5.0*	5.83	15.1	292.1	0.12	173.5	100	18	13	<0.050	5	<0.0005	<0.0005	1.30
HZ-MW-23	Intermediate	28 to 38	41.677	5/30/19	7.17	34.51	Kane	<0.20	<0.20	<0.20	<0.20	6.74		358.2	0.20	11.5	7,500	13	11	<0.050	0.75	<0.05	<0.05	3.4
				7/30/19	7.98	33.70	Kane	<0.20	<0.20	<0.20	<0.020	6.65	18.6	281.2	0.22	-79.8	4,900	11	6.8	<0.050	0.21	<0.0005	<0.0005	3.4
				10/24/19	8.61	33.07	Kane	<0.20	<0.20	<0.20	<0.020	6.40	14.9	290.2	0.17	-5	8,700	8.1	7.1	<0.050	0.92	<0.0005	<0.0005	24
HZ-MW-24	Intermediate	25 to 35	40.997	5/31/19	6.06	34.94	Kane	**2.0**	**0.92**	**21**	**0.77**	6.61	15.3	533.7	0.13	-11.7	8,500	<5.0	13	0.19	5.4	<0.25	<0.25	3.5
				7/17/19	7.10	33.90	Kane	**2.7**	**1.1**	**16**	**0.58**	6.39	17.1	557.4	0.07	-167.7	15,000	7.8	13	0.39	6.3	<0.0005	<0.0005	3.8
				10/24/19	6.82	34.18	Kane	<0.40	<0.40	**93**	**0.76**	6.21	16.0	442.3	0.16	10	20,000	<5.0	14	1.1	9.7	<0.0005	<0.0005	4.7
HZ-MW-26	Intermediate	25 to 35	40.692	5/30/19	6.85	33.84	Kane	**9.7**	<0.20	**1.4**	<0.20	6.70	16.6	329.9	0.18	17	<56	28	9.3	<0.050	0.0042	<0.0005	<0.0005	<1.0
				7/30/19	7.34	33.35	Kane	**5.0**	<0.20	**1.0**	**0.053**	6.42	16.5	327.9	0.21	-96.7	<56	23	9.3	0.063	0.01	<0.0005	<0.0005	<1.0
				10/16/19	7.91	32.78	Kane	**2.8**	<0.20	**0.53**	**0.055**	6.61	15.1	322.7	0.03	152.3	<56	24	11	<0.050	0.022	<0.0005	<0.0005	<1.0
HZ-MW-28	Intermediate	25 to 35	38.744	5/31/19	6.35	32.39	Kane	<0.20	<0.20	<0.20	<0.20	6.75	14.6	416.1	0.14	-7.1	<56	45	16	<0.050	0.053	<0.003	<0.003	1.4
HZ-MW-29	Intermediate	25 to 35	40.309	5/31/19	6.29	34.02	Kane	**1.4**	**0.6**	**32**	**0.26**	6.52	15.8	705.0	0.35	-2.3	10,000	<5.0	18	0.65	3.9	<0.25	<0.25	52
				7/17/19	7.03	33.28	Kane	**1.2**	**0.58**	**32**	**0.47**	6.20	15.9	627.0	0.09	-93.7	9,300	<5.0	16	0.79	9.5	<0.0005	<0.0005	15
				10/24/19	7.98	32.33	Kane	<1.0	<1.0	**100**	**0.94**	6.15	15.2	466.6	0.14	-9.6	9,500	<5.0	13	1.6	9.9	<0.0005	<0.0005	2.1
HZ-MW-33	Intermediate	25 to 35	-	5/31/19	6.82		Kane	**0.51**	<0.20	**1.7**	<0.20	6.77	15.6	271.0	0.14	-12.5	<56	16	7.3	<0.050	0.0027	<0.0005	<0.0005	<1.0
S-MW-3	Intermediate	25 to 35	42.807	6/5/19	6.05	36.76	Kane	**2.2**	<0.20	<0.20	<0.20	5.88	14.5	113.8	0.19	-9.3	<56	13	3.6	<0.050	0.49	<0.025	<0.025	<1.0
				7/24/19	6.75	36.06	Kane	**2.8**	<0.20	<0.20	<0.020	5.31	16.5	108.6	0.14	-177.5	<56	12	3.9	<0.050	0.47	<0.0005	<0.0005	<1.0
				10/17/19	6.08	36.73	Kane	**3.7**	<0.20	<0.20	<0.020	5.20	15	84.7	0.14	218.6	<56	13	4.4	<0.050	0.51	<0.0005	<0.0005	<1.0
							MTCA Method A Cleanup Level[1]	5.0	5.0		0.2													
							MTCA Method B Cleanup Level[2]			16														

Notes:
PCE – Tetrachloroethene
TCE – Trichloroethene
1,1-DCE - 1,1-Dichloroethene
(cis) 1,2-DCE - (cis) 1,2-Dichloroethene
(trans) 1,2-DCE - (trans) 1,2-Dichloroethene
Blank – Not analyzed or not available
Bold – Analyte detected
Bold / highlighted – Analyte exceeds MTCA A/B cleanup level
Italicized - Detection limit exceeds respective cleanup level
< – Analyte not detected at listed reporting limit
mg/L – micrograms per liter
MV – Millivolts
ES – Estimated concentration because analyte concentration was outside of lab instrument calibration range
DNAPL – Dense Non-Aqueous Phase Liquid
1 – Table 720-1, WAC 173-340-900
2 – WA Dept. of Ecology CLARC ground water data table (https://fortress.wa.gov/ecy/clarc/FocusSheets/Groundwater%20Methods%20B%20and%20A%20and%20ARARs.pdf)
NA – Not Applicable

Table 3
Summary of HVOCs in Groundwater - Deep
Bothell Service Center Simon Son

Well	Well Type and Water Bearing Zone	Screened Depth, (ft bgs)	Top of Casing (TOC) Elevation (feet)*	Date Sampled	Depth to Water (ft below TOC)	GW Elevation (feet)	Sampled By	PCE (µg/L)	TCE (µg/L)	(cis) 1,2-DCE (µg/L)	Vinyl Chloride (µg/L)	pH (units)	Temp (˚C)	Conductivity (µS)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	Dissolved Iron (ug/L)	Sulfate (mg/L)	Chloride (mg/L)	Ammonia as N (mg/L)	Methane (mg/L)	Ethane (mg/L)	Ethene (mg/L)	Total Organic Carbon (mg/L)
MW-8	Deep	45 to 50	47.387	2/22/19	8.75	38.64	Kane	**4.98**	**2.9**	**7.33**	<0.20	6.28	28.8	183.2	0.24	65	<100	4.95	7.14	<0.10	0.0173	<0.0162	<0.0151	1.82
				5/22/19	8.99	38.40	Kane	**3.1**	**1**	**1.3**	<0.20	6.3	32.9	212.0	0.16	-8.4	300	5.8	7.8	<0.050	0.036	<0.005	<0.005	2
				7/22/19	9.65	37.74	Kane	**1.9**	**0.48**	**0.53**	<0.020	6.04	34.4	221.5	0.11	54.2	450	7.5	8.4	<0.050	0.14	<0.0005	<0.0005	2.1
				10/21/19	9.54	37.85	Kane	**1.0**	**0.35**	**0.41**	<0.020	6.06	25.8	222.7	0.14	101.3	460	9.6	9.4	<0.050	0.49	<0.0005	<0.0005	2.6
MW-22	Deep	54 to 59	44.957	6/20/19	7.91	37.05	Kane	**0.43**	<0.20	**0.87**	<0.20	7.31	15.1	233.0	0.27	-106.6	250	<5.0	3.9	0.3	0.001	<0.0005	<0.0005	1.3
MW-29	Deep	45 to 55	48.242	6/4/19	10.08	38.16	Kane	**0.26**	<0.20	<0.20	<0.20	7.40	16.3	265.3	0.25	15	450	<5.0	26	0.25	0.32	<0.015	<0.015	2.2
				7/16/19	10.61	37.63	Kane	<0.20	<0.20	<0.20	<0.020	6.88	16.2	274.4	0.11	-106.2	460	<5.0	5.2	0.3	0.35	<0.0005	<0.00050	2.1
				10/18/19	10.48	37.76	Kane	<0.20	<0.20	<0.20	<0.020	6.99	14.5	207.7	0.11	7.4	610	<5.0	6.4	0.29	0.39	<0.0005	<0.0005	2.2
MW-33	Deep	40 to 50	49.547	2/19/19	9.17	40.38	Kane	<1.0	<0.50	<1.0	<0.20	6.35	15.1	164.3	0.18	204.8	<100	11.5	6.45	<0.10	<0.00863	<0.0162	<0.0151	1.44
				6/4/19	10.56	38.99	Kane	<0.20	<0.20	<0.20	<0.20	6.42	16.1	196.6	0.19	31.6	<56	13	6.6	<0.050	0.0012	<0.0005	<0.0005	1.5
MW-34	Deep	40 to 50	46.597	2/21/19	7.59	39.01	Kane	**1.29**	<0.50	**1.52**	<0.20	5.95	27.5	255.8	0.22	91.9	367	14.6	32.7	<0.10	0.0274	<0.0162	<0.0151	10.49
				6/3/19	8.28	38.32	Kane	**1.3**	<0.20	**3.2**	<0.20	6.16	32.4	263.9	0.19	18.6	440	15	29	<0.050	0.14	<0.0075	<0.0075	1.8
MW-35	Deep	48 to 58	44.247	6/3/19	7.41	36.84	Kane	**0.66**	<0.20	<0.20	<0.20	6.45	14.8	221.6	1.66	19.3	1,900	5.4	12	0.15	0.15	<0.0075	<0.0075	1.6
				7/25/19	7.92	36.33	Kane	<0.20	<0.20	<0.20	<0.020	6.31	18.2	590.0	0.08	-224	2,700	5.2	12	0.23	0.21	<0.0005	<0.0005	1.9
				10/18/19	7.97	36.28	Kane	**4.0**	<0.20	**0.44**	<0.020	5.76	15.1	166.7	0.15	83.2	<56	14	14	<0.050	0.0016	<0.0005	<0.0005	<1.0
MW-39	Deep	40 to 50	44.524	3/13/19	6.32	38.20	Kane	<1.00	<1.00	**1.99**	<0.20	6.08	26.6	63.3	1.33	82.2	4,380	<0.300	3.76	0.445	0.552	<0.0162	<0.0151	4.15
				5/29/19	6.49	38.03	Kane	**0.33**	**0.34**	<0.20	<0.20	6.61	28.4	219.2	0.14	1.8	4,500	<5.0	4.3	0.48	1.1	<0.10	<0.10	3.3
				7/23/19	7.02	37.50	Kane	**0.52**	**0.63**	**1.3**	<0.020	6.33	28.2	215.5	0.25	-96.6	4,300	<5.0	4.3	0.44	1	<0.0005	<0.0005	2.9
				10/24/19	6.94	37.58	Kane	**0.52**	**0.52**	**1.6**	<0.020	6.1	26.2	250.0	0.24	19.8	4,600	<5.0	4.5	0.48	0.91	<0.0005	<0.0005	3.1
HZ-MW-25	Deep	44.33 to 54.33	41.907	5/30/19	7.60	34.31	Kane	<0.20	<0.20	<0.20	<0.20	6.36		259.6	0.32	21.3	330	12	22	<0.050	0.056	<0.005	<0.005	<1.0
HZ-MW-27	Deep	45 to 55	41.597	5/30/19	7.30	34.30	Kane	<0.20	<0.20	<0.20	<0.20	6.51	15.8	223.5	0.22	18.6	1,200	18	8.7	<0.050	0.093	<0.005	<0.005	1.4
HZ-MW-30	Deep	40 to 50	-	5/19/19	7.88		Kane	<0.20	<0.20	<0.20	<0.20	7.68		260.5	0.17	22.8	170	<5.0	4.8	0.61	0.91	<0.05	<0.05	1.8
S-MW-4	Deep	40 to 50	42.367	6/5/19	6.04	36.33	Kane	**0.56**	<0.20	<0.20	<0.20	6.17	14.7	153.2	0.15	-4.6	410	15	4.5	<0.050	0.084	<0.005	<0.005	<1.0
MTCA Method A Cleanup Level[1]								5.0	5.0		0.2													
MTCA Method B Cleanup Level[2]										16														

Notes:
PCE – Tetrachloroethene
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2 – WA Dept. of Ecology CLARC ground water data table (https://fortress.wa.gov/ecy/clarc/FocusSheets/Groundwater%20Methods%20B%20and%20A%20and%20ARARs.pdf)
NA – Not Applicable

EXHIBIT D

Exhibit D

Site Schedule of Work and Deliverables

Deliverables		Due (Calendar Days)[1]
A. Administrative		
A.1	Consent Decree entered by the King County Superior Court (Effective Date of the CD)	Within 5 days of the execution by the Parties
A.2	Notification of selected contractor name and qualifications	Within 5 days of the effective date of Consent Decree (A.1)
A.3	Progress Reports	Quarterly on the 10th of the month beginning after the effective date of the Consent Decree (A.1)
A.4	Financial Assurances – submit cost estimate for Ecology review and approval	Within 60 days of the effective date of Consent Decree
A.5	Financial Assurances - provide proof of financial assurances	Within 60 days after Ecology approves cost estimate (A.4)
B. Design		
B.1	Draft Pre-Remedial Design (PRDI) Project Plans[2]	Within 5 days of the effective date of Consent Decree (A.1)
B.2	Draft PRDI Data Report and Draft Engineering Design Report (EDR)[3]	Within 5 days of Ecology approval of Final PRDI Project Plans (B.1)
B.3	Final PRDI Data Report and EDR Report	Within 5 days of receipt of Ecology's comments on the Draft PRDI Data and EDR Reports (B.2)
B.4	90 % Plans and Specs [per WAC 173-340-400(4)(b)]	Within 5 days of receipt of Ecology comments on Final EDR Report (B.3)
B.5	100 % Plans and Specs	Within 5 days of receipt of Ecology comments on 90 % plans and specifications (B.4)
C. Field Construction		
C.1	Complete Construction Procurement	Within 5 days of completion of the 100% plans and specifications (B.1)
C.2	ERH System installation	Within 2 months of the effective date of Consent Decree
	ERH Operation	Within 6 to 8 months of the effective date of Consent Decree
C.3	Start install and begin operation of bioremediation-groundwater recirculation/SVE systems	Within 2 months of the effective date of Consent Decree
C.4	Install compliance monitoring well network	Within 2 months of the effective date of Consent Decree
C.5	Complete Construction	Within 2 months of the effective date of Consent Decree
C.6	ERH soil performance sampling	Within 6 to 8 months of the effective date of Consent Decree
C.7	Contingent soil excavation in ERH treatment area	Within 6 to 9 months of the ERH system shutdown

C.8	Decommission ERH; install and operate SVE system	Within 4 to 6 weeks of ERH system final shutdown. SVE system operation beginning March 2019.
C.9	Cleanup Action Report and As-Built Drawings and Report; Draft Environmental Covenant(s); and an updated Title Report	Within 60 days of decommission of SVE systems
	D. Post Construction Work	
D.1	Final Environmental Covenant(s)	Within 30 days of receipt of Ecology comments on the Draft Environmental Covenant(s).
D.2	Record Final Environmental Covenant(s) with King County Auditor	Within 5 days after completion of the Final Environmental Covenant or Ecology's signature as grantee of the Final Environmental Covenant(s), whichever occurs last.
D.3	Performance Groundwater Monitoring Quarterly Performance Monitoring Biannual Performance Monitoring	Quarterly performance monitoring for one year starting Summer 2019; Biannual performance monitoring until PCE, and its breakdown products reach their applicable cleanup levels in the selected performance monitoring wells provided in CAP
D.4	Decommission Bioremediation/Groundwater Recirculation system	Upon attainment of cleanup levels in performance monitoring wells
D.5	Indoor Air Sampling (two rounds)	1st round - post-construction and pre-occupation of buildings 2nd round - upon completion of Groundwater Closure report per Section 7.0 of the BSCSS Final CAP
D.6	Groundwater Confirmation Monitoring Quarterly Compliance Monitoring	Quarterly for two years following completion of performance monitoring. As described in CAP, contingency of an additional year of quarterly sampling if cleanup levels not attained. After one additional year, if COC groundwater cleanup levels have not been reached, include a 5-year compliance sampling event for the duration of the environmental covenant.
D.7	As Built Drawings and Report of vapor intrusion mitigation measures (vapor barrier and passive venting systems), and other engineering and institutional controls (if any).	Within 30 days of the City's receipt from the developer
D.8	Five Year Compliance Monitoring and Periodic Review reports	To follow Groundwater compliance monitoring (D.6). Groundwater monitoring required once every five years for the duration of the institutional controls on groundwater (if present) under the environmental covenant.

1) *Schedule is in calendar days. Deliverable due date may be modified with Ecology concurrence without amendment to the Consent Decree.*
2) *Project Plans include the following: Work Plan, Sampling and Analysis Plan, Quality Assurance Project Plan, and Health and Safety Plan, to be submitted for Ecology review and approval. All plans will include a schedule for implementation as applicable.*
3) *The Engineering Design Report includes: a Construction Quality Assurance Project Plan, a Compliance Monitoring and Contingency Response Plan, Proposed Best Management Practices, Water Quality Monitoring Plan, and Substantive Requirements of Procedurally Exempt Permits. Ecology will not approve the Final EDR until the required permits have been obtained.*

ATTACHMENT A
CONSENT DECREE EXHIBIT D – SCHEDULE OF DELIVERABLES

ATTACHMENT B

ECOLOGY CORRESPONDENCE

Jeff Jensen

From: Cruz, Jerome (ECY) <JCRU461@ECY.WA.GOV>
Sent: Monday, July 8, 2019 3:23 PM
To: Jeff Jensen; John Kane
Cc: Tebeau, Kara J. (ATG); Nduta Mbuthia
Subject: RE: [EXTERNAL] Comments on Wexler DCAP

Hi Jeff and John,
I've reviewed the contaminant concentration maps and wells that you provided for me for your proposed compliance wells. I think I've arrived at a list of compliance wells based on the information provided.

I concur with your list* and would ask you add the following:
MW-6
MW-12
I propose that the following can be monitored on a limited basis:
HZ-MW-14S (limited duration only – you can decommission at an agreed upon time such as 4 quarters below cleanup levels)
HZ-MW-23 (limited duration only – you can decommission at an agreed upon time)
MW-45 (limited duration only – you can decommission at an agreed upon time)
MW-42 (limited duration only – you can decommission at an agreed upon time)
MW-44 (limited duration only – you can decommission at an agreed upon time)
MW-39 (limited duration only – you can decommission at an agreed upon time)

* Your list of compliance wells, based on maps provided are:
Shallow:
HZ-MW-1
HZ-MW-15S
HZ-MW-31
HZ-MW-34
S-MW-1
S-MW-2
S-MW-5
MW-4
MW-27
MW-40
MW-43
Intermediate:
HZ-MW-14D
HZ-MW-15D
HZ-MW-24
HZ-MW-26
HZ-MW-29
S-MW-3
MW-11
MW-20
MW-44
Deep:
MW-8
MW-29

MW-35

Let me know if you agree or not and would like to discuss further as I'm open to further discussion or negotiation. If you agree, we can add this to the BSCSS and Wexler DCAPs to prepare the documents for the comment period.

Thanks,

Jerome

DEPARTMENT OF ECOLOGY
State of Washington

Jerome B. Cruz, Ph.D.
Toxics Cleanup Program, Northwest Regional Office
3190 - 160th SE Bellevue, WA 98008
Tel: (425) 649-7094 Fax: (425) 649-7098
Jerome.Cruz@ecy.wa.gov
http://www.ecy.wa.gov/programs/tcp/cleanup.html

From: Jeff Jensen [mailto:Jeff@kane-environmental.com]
Sent: Wednesday, July 3, 2019 4:13 PM
To: Cruz, Jerome (ECY) <JCRU461@ECY.WA.GOV>
Cc: Tebeau, Kara J. (ATG) <kara.tebeau@atg.wa.gov>; John Kane <jkane@kane-environmental.com>; Nduta Mbuthia <Nduta.Mbuthia@bothellwa.gov>
Subject: RE: [EXTERNAL] Comments on Wexler DCAP

Jerome,

I have attached a figure which depicts all of the monitoring wells on the BSCSS Site which have reported concentrations of PCE and breakdown products less than their respective cleanup levels, for at least 4 quarters (surrounded by a green box). The figure also depicts monitoring wells which have reported less than 4 quarters below state cleanup levels (typically 3), due to a missed sampling event (surrounded by an orange box). Finally, I included a blue asterisk to denote the monitoring wells that are included within the Bothell Hertz compliance monitoring and cannot be decommissioned.

Please let me know if you have any questions or comments.
Thanks,

Jeff Jensen, Project Geologist
Kane Environmental, Inc. | Environmental Issues. Business Solutions.
PO Box 31936, Seattle WA 98103
Headquarters 4015 13th Avenue West, Seattle, WA 98119
Direct: 206-673-5731 Cell: 425-344-3707 Toll Free 1-844-529-KANE
Jeff@kane-environmental.com www.kane-environmental.com

Seattle, WA | Phoenix, AZ | Nationwide Services

ATTACHMENT C
GROUNDWATER ISOPLETH FIGURES

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
PCE - February 2019

LEGEND

Concentration Contours (ug/l)

○ Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
PCE - Spring 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
PCE - Summer 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
PCE - Fall 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
TCE - February 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
TCE - Spring 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
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0 50 100
Approximate Scale in Feet

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Figure
Groundwater Concentration Isopleths
in Shallow Wells
TCE - Summer 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
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0 50 100
Approximate Scale in Feet

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Figure
Groundwater Concentration Isopleths
in Shallow Wells
TCE - Fall 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

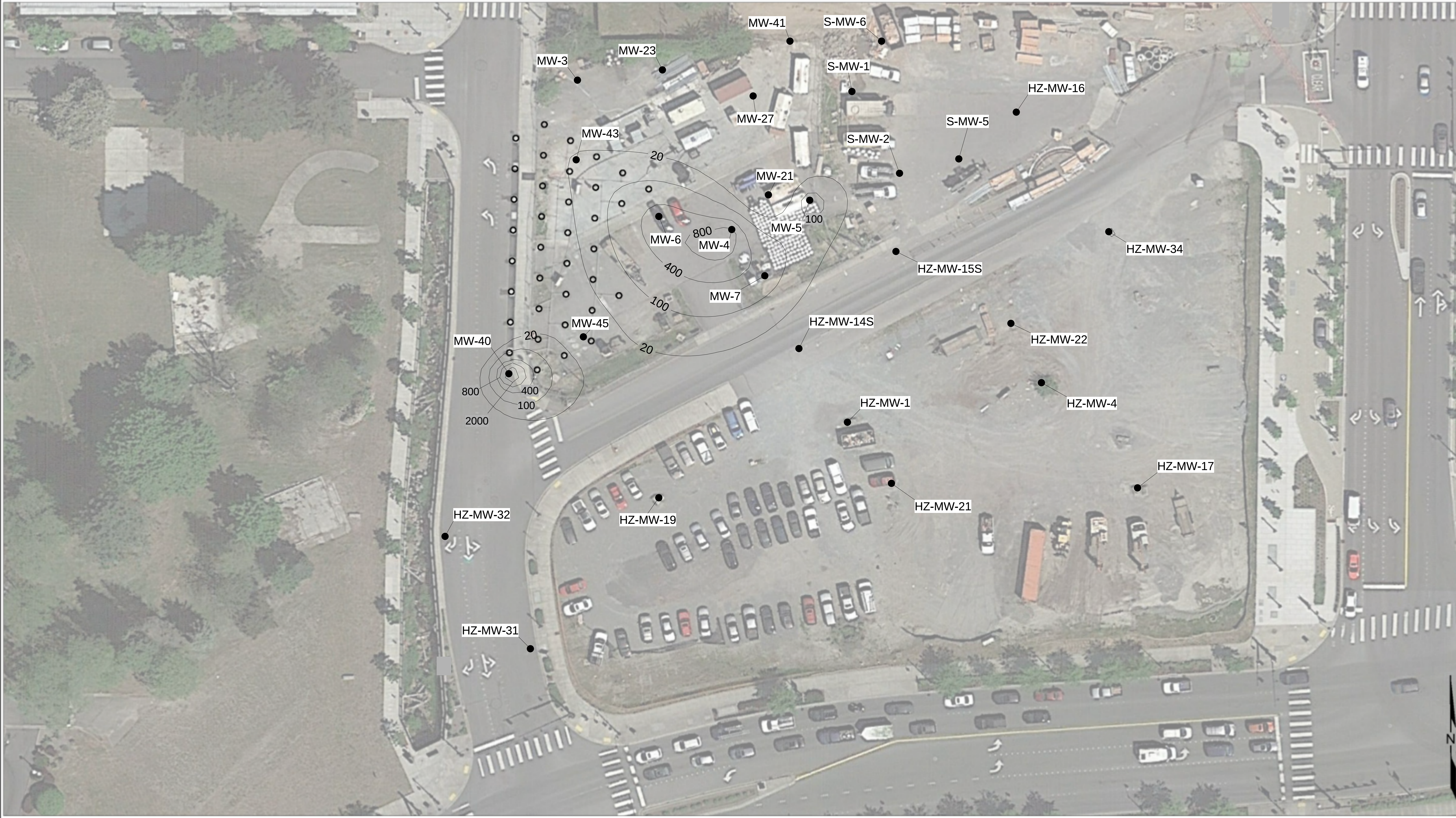
Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
cis-1,2-DCE - February 2019



LEGEND Concentration Contours (ug/l)

○ Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
cis-1,2-DCE - Spring 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
cis-1,2-DCE - Summer 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
cis-1,2-DCE - Fall 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
Vinyl Chloride - February 2019

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths in Shallow Wells
Vinyl Chloride - Spring 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths in Shallow Wells
Vinyl Chloride - Summer 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Shallow Wells
Vinyl Chloride - Fall 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
PCE - February 2019

LEGEND

Concentration Contours (ug/l)

○ Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
PCE - Spring 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

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Figure
Groundwater Concentration Isopleths
in Intermediate Wells
PCE - Summer 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths in Intermediate Wells
PCE - Fall 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
TCE - February 2019

LEGEND Concentration Contours (ug/l) ○ Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
TCE - Spring 2019

LEGEND — Concentration Contours (ug/l) — Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

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Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
TCE - Summer 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

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Figure
Groundwater Concentration Isopleths
in Intermediate Wells
TCE - Fall 2019

LEGEND — Concentration Contours (ug/l) — Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
cis-1,2-DCE - February 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
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Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
cis-1,2-DCE - Spring 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

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Figure
Groundwater Concentration Isopleths
in Intermediate Wells
cis-1,2-DCE - Summer 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

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Figure
Groundwater Concentration Isopleths
in Intermediate Wells
cis-1,2-DCE - Fall 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

All Concentrations Below
MTCA Method A CUL of 0.2 ug/l (ppb)
Except MW-20 Reported Below 2 ug/l

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
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Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
Vinyl Chloride - February 2019

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
Vinyl Chloride - Spring 2019

LEGEND

Concentration Contours (ug/l)

Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Bothell Service Center Simon & Son
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Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
Vinyl Chloride - Summer 2019

LEGEND — Concentration Contours (ug/l) — Approximate Locations of ERH Wells

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: May, 2018

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

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Bothell, Washington

Figure
Groundwater Concentration Isopleths
in Intermediate Wells
Vinyl Chloride - Fall 2019