Ultra Custom Care Cleaners Site

Data Gaps Investigation Work Plan

Prepared for

City of Bothell
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Bothell, WA 98011

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
AO	Agreed Order
AOPC	Area of potential concern
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
City	City of Bothell
COC	Chemical of concern
COPC	Chemical of potential concern
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
CSCSL	Confirmed and Suspected Contaminated Sites List
CSM	Conceptual site model
cVOC	Chlorinated volatile organic compound
DCE	Dichloroethene
DGI	Data gaps investigation
DPT	Direct push drill technology
DRO	Diesel-range organics
EC	Electrical conductivity
ECD	Electron capture detector
Ecology	Washington State Department of Ecology
f_{oc}	Fraction organic carbon
FOE	Frequency of exceedance
GRO	Gasoline-range organics
HCID	Hydrocarbon identification
HSA	Hollow stem auger
HPT	Hydraulic profiling tool

Acronym/ Abbreviation	**Definition**
IDW	Investigation-derived waste
LCS	Laboratory control sample
MIP	Membrane interface probe
MS	Matrix spike
MSD	Matrix spike duplicate
MTCA	Model Toxics Control Act
NAVD 88	North American Vertical Datum of 1988
NTU	Nephelometric turbidity units
ORO	Oil-range organics
ORP	Oxidation-reduction potential
PCE	Tetrachloroethene
PID	Photoionization detector
PPE	Personal protective equipment
PVC	Polyvinyl chloride
QA	Quality assurance
QC	Quality control
RI/FS	Remedial investigation/feasibility study
ROW	Right-of-way
RPD	Relative percent difference
Site	Ultra Custom Care Cleaners Site
SL	Screening level
SPT	Standard penetration test
SVOC	Semivolatile organic compound
TCE	Trichloroethene
TEE	Terrestrial Ecological Evaluation
TPH	Total petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound
WAC	Washington Administrative Code
Work Plan	Data Gaps Investigation Work Plan

1.0 Introduction

This document presents a work plan for the data gaps investigation (DGI) of the City of Bothell (City) Ultra Custom Care Cleaners Site (Site) located in Bothell, Washington (Figure 1.1). The DGI Work Plan (Work Plan) was prepared by Floyd|Snider at the request of the City to further delineate chlorinated solvent contamination in soil and groundwater at the Site associated with former dry-cleaning operations. This Work Plan is identified as deliverable No. 1 in the Agreed Order Schedule of Deliverables, Exhibit C (Appendix A).

This Work Plan details environmental media management, site control, and health and safety practices during the DGI field investigation. The Work Plan also includes a DGI Sampling Plan that describes the methods, sampling approach, and areas of potential concern (AOPCs) for field and laboratory activities associated with sample collection proposed for the DGI field investigation and groundwater monitoring.

1.1 BACKGROUND

The property containing the source of contamination is owned by the City and located at 18304 Bothell Way NE, directly southwest of the Bothell City Hall. The extent of soil and or groundwater impacted by the Ultra Custom Care Cleaners facility will be confirmed by the data collection activities proposed in this Work Plan but are assumed based on historical data to cover approximately three city blocks and potentially more than 4.5 acres of land located in the central downtown area of Bothell. The Site currently includes multiple properties owned by the City, multiple privately-owned parcels, and City-owned rights-of-way (ROWs).

The Site is listed as facility number 379891 on the Washington State Department of Ecology's (Ecology's) Confirmed and Suspected Contaminated Sites List (CSCSL) due to contamination in soil and groundwater. Several reports associated with independent remedial actions document the release of hazardous substances at the Site and, as a result, the City and Ecology entered into an Agreed Order (AO) No. 9704 in April 2013. This AO required the City to conduct a remedial investigation/feasibility study (RI/FS), perform an interim action, and submit a draft cleanup action plan for the Site. The DGI field investigation associated with this Work Plan will supplement prior investigation work and allow for development of an agency-approved RI/FS as required by the AO.

2.0 Site Description

2.1 PROPERTY LOCATION, DESCRIPTION, AND ZONING

The approximate three-block, 4.5-acre Site is within Bothell's Downtown Core District Zone. Current land use within the Downtown Core in the vicinity of the Site includes both commercial and residential use. The City anticipates future development at the Site will include commercial and residential use, consistent with its long-term development plans. The City owns the source property and two additional blocks downgradient of the source property, as shown on Figure 2.1. Buildings and businesses in the vicinity of the Site are also identified on Figure 2.1.

To the west of the source property, across Bothell Way NE, is a recently constructed apartment building. South of the source property, across NE 183rd Street, are commercial properties occupied by Ranch Drive-In restaurant, Washington Federal (bank), Speedy Glass, and Hillcrest Bakery. Further south, past Main Street, lies an empty City-owned lot and additional commercial properties including Baskin-Robbins. The DGI will confirm the extent of the Site and determine what, if any, private properties are located within the Site extent. It is possible that privately owned parcels within the city block between NE 183rd Street and Main Street are included within the Site extent.

The Sammamish River is located approximately 1,145 feet south of the source property.

2.2 SITE HISTORY AND OPERATIONS

Contamination at the Site originated from historical dry-cleaning operations on the source property, a parcel approximately 0.25 acres in size at the north end of the Site. The original building at the source property was located on the southwestern portion of the parcel and was built in 1948. Raincheck Cleaners and Laundry occupied this building from the 1950s through 1967 at the southwest corner of the source property.

In 1967, the Raincheck Cleaners and Laundry building was demolished, and a new building was constructed. The new building was occupied by NuLife Cleaners, followed by Ultra Custom Care Cleaners. Concurrent with Ultra Custom Care Cleaners, two other businesses conducted operations in the new building: Franks Hair Design, a hair salon, and the Laundry Basket, a laundromat.

The City acquired property within the Site in February 2012 as part of the Downtown Redevelopment Plan, in order to accommodate expansion of the City Hall municipal campus. The former building housing Ultra Custom Care Cleaners was demolished in June 2013. Additional redevelopment work, including road realignment, within the Site boundary took place in 2016. Figure 2.2 shows the footprint of historical dry-cleaning buildings on the source property on an aerial from 2005, prior to the completion of City redevelopment in the downtown core.

The source property remains vacant at the southwest corner of the City Hall campus. It is almost entirely covered by concrete or pavement. Adjacent parcels north and east of the source property are vegetated.

2.3 ADJACENT CLEANUP SITES

The Site is located upgradient of several other cleanup sites listed in Ecology's CSCSL, as shown on Figure 2.3. These include the Bothell Hertz site, Bothell Landing site, and Bothell Riverside total petroleum hydrocarbons (TPH) and halogenated volatile organic compound sites directly south and downgradient of the Site. The properties that these adjacent sites lie on are predominantly City owned. Data collected as part of this DGI will determine the extents of the groundwater plume associated with the Site and the Site's location compared to the surrounding Washington Model Toxics Control Act (MTCA) cleanup sites.

2.4 PHYSICAL SETTING, GEOLOGY, AND HYDROGEOLOGY

The source property lies at approximately 46 feet North American Vertical Datum of 1988 (NAVD 88), and the Site slopes gently downward from north to south toward the Sammamish River. Chlorinated solvents suspected to be migrating from the source area have been found in groundwater beneath the public ROWs, City-owned parcels, and private parcels further south between Main Street and Woodinville Drive/SR-522.

Bothell lies within the central portion of the Puget Lowland, an elongated topographic and structural depression bordered to the east by the Cascade Mountains and to the west by the Olympic Mountains. This lowland is characterized by a series of north and south-trending ridges separated by deeply cut ravines, broad valleys, and elongated water bodies. These ridges, valleys, and deep water bodies are the result of glacial scouring and subglacial erosion.

According to the Washington State Department of Natural Resources Geologic Information Portal, the downtown corridor where the Site lies is underlain by glacial recessional and advance outwash, glacial till, and alluvium. Glacial outwash consists of varying stratified deposits of silt sand and gravels. These recessional and advance outwash deposits were also identified in geotechnical borings associated with the SR-522 Bothell Crossroads Project (HWA 2009). Glacial till is a compact mixture of silt, sand, and gravel with a diamict-like texture. The alluvium predominantly consists of sands and silts deposited by running water associated with the deposition caused by the nearby Sammamish River. Alluvium also includes localized peat lenses that have been identified in several borings (HWA 2017).

Groundwater at the Site is generally encountered between 5 to 13 feet below ground surface (bgs) and generally becomes shallower toward the Sammamish River. Based on groundwater level data in the 2018 RI/FS, the groundwater flow direction is understood to flow south-southwest (HWA 2018). A synoptic water level event was performed on January 9, 2020, as described in Section 4.1.1, with groundwater contours and estimated flow direction (south-southeast) presented in Figure 2.4. Based on existing Site monitoring well intervals and boring logs and for the purposes of this Work Plan, the first water bearing unit below the Site has been split into two zones:

- Shallow: Between approximately 5 and 25 feet bgs
- Deep: Approximately 25 feet bgs and deeper

Monitoring wells screened in the deep aquifer zone are identified by a "D" suffix appended to the monitoring well ID.

2.5 PROJECT BACKGROUND AND REGULATORY FRAMEWORK

Following an investigation completed in 2002, Farallon Consulting LLC notified Ecology of the presence of tetrachloroethene (PCE) and its breakdown products trichloroethene (TCE) and *cis*-1,2-dichloroethene (DCE) in groundwater in the vicinity of the source property. Ecology listed the Site on its CSCSL and sent an Early Notice letter to the owners of the Site to advise them of the listing on November 1, 2002. Subsequently, various environmental investigations took place between 2002 and 2012, when the City acquired the property.

In 2013, the City entered an AO with Ecology to perform cleanup at the Site. The City has performed several subsurface investigations and prepared several Interim Action Work Plans to delineate the Site. In 2016 and 2018, the City prepared a draft and revised draft RI/FS to summarize Site data and support cleanup goals.

Ecology subsequently requested that the City perform additional Site characterization to confirm the nature and extent of contamination in groundwater downgradient of the source property. The DGI field investigation associated with this Work Plan is intended to collect the necessary information requested by Ecology to supplement and finalize the RI/FS required by the AO for Ecology approval.

3.0 Summary of Existing Site Data

3.1 PREVIOUS INVESTIGATIONS AND INTERIM ACTIONS

The Site and the surrounding area have been well studied as a result of development activities and following Ecology's initial listing of the Site on the CSCSL. More than 25 reports summarizing the results of prior environmental investigations were referenced to compile the existing soil and groundwater environmental dataset. Reference information for each of these reports is listed in Appendix B. Data were also gathered from electronic data deliverables provided by HWA GeoSciences, Inc., for more recent soil and groundwater monitoring events.

Historical sampling locations from previous investigations that will be used in the revised RI/FS to characterize the Site are shown on Figure 3.1. Sampling locations that represent soil and groundwater quality at adjacent cleanup sites that are outside the area of interest for this Site or that do not provide data that assist with determination of the Site extent are omitted from this figure. Information about each historical sampling event—including the event year, number of Site locations sampled, and media sampled during the event—is summarized in Figure 3.2. The analytical schedule associated with groundwater and soil samples collected during each event are summarized in Figures 3.3 and 3.4, respectively.

Following previous Site investigations to characterize subsurface conditions, multiple interim actions were completed to improve soil and groundwater quality at the Site. Many soil removal actions were completed as part of redevelopment actions, including realignment of roadways in the downtown core including encountering an underground storage tank (UST) with associated TPH contamination during a utility excavation adjacent to the Speedy Glass property (PSI 1998). Additionally, targeted excavations to remove TPH sources (e.g., underground storage tank removal) have taken place within the current footprint of the Site, including TPH cleanup actions performed for the Bothell Landing Site (HWA 2014) and removal of a former home heating oil tank and its contents (HWA 2016). Figure 3.1 presents soil sampling locations where results are believed to be representative of soil remaining in place at the Site.

Four groundwater interim actions targeting chlorinated solvents were completed between May 22, 2014, and March 30, 2016. All four of these groundwater interim actions consisted of subsurface injections to facilitate chlorinated solvent decomposition. The first two groundwater interim actions consisted of chemical oxidation injections; the second two interim actions consisted of biological injections. The injection site locations are shown on Figure 3.5, along with more recent (post-2016) groundwater sampling locations and chlorinated volatile organic compound (cVOC) results. More than 3,000 pounds of Oxygen Release Compound targeting residual TPH in groundwater was applied in 2010 and 2013–2014 within the Bothell Landing Site TPH cleanup excavation footprint overlapping with the southern portion of the Ultra Site (HWA 2014).

More information about the soil removal actions and groundwater interim actions can be found in the HWA GeoSciences, Inc., reports referenced in Appendix B.

3.2 DATA QUALITY OBJECTIVES AND DATA USABILITY DETERMINATION

Floyd|Snider performed a number of quality control (QC) and quality assurance (QA) checks on the historical dataset to ensure its completeness and accuracy relative to the results reported in the original data source. As part of these efforts, Floyd|Snider renamed soil and groundwater sampling locations with duplicative naming conventions to ensure that each location had a unique and descriptive name to eliminate confusion when referencing the data. This was necessary because the existing soil and groundwater dataset compiles data from several different investigations, where soil borings and monitoring wells installed in different events by different consultants were given identical names—for example, MW-1 or B-1. Table 3.1 summarizes information about wells that were reassigned with new names to streamline identification and referencing. Similarly, Table 3.2 provides naming information for direct push, temporary well, and other non-permanent soil and groundwater sample locations.

All data retained for inclusion in the development of this sampling plan were deemed of acceptable quality for the purposes of this report; that is, to support the collection of additional data to fill gaps in the current dataset, which can be used to define the extent of the Site.

Limitations associated with the historical dataset, along with their implications for data usability, are summarized below.

- **Missing Information.** Several samples collected on the former Safeway property (shown on Figure 2.1) in 2008 and 2010 were reported as non-detect, without associated detection limits. These data were considered when defining the western extent of the soil and groundwater dataset but are neither shown on figures nor used to inform soil or groundwater quality within the Site. Other data included in this report may be missing sample date or sample depth information as a result of incomplete data in the source report and lack of associated field or laboratory documentation about the sample. The nature of the missing information is considered in this Work Plan. For example, soil sample results collected from an unknown depth interval may be used to indicate that contamination is present or absent in that geographic area, but additional samples may be required to define the vertical extent of any contamination.
- **Incomplete Sample Information.** Some source reports did not list coordinates for sampled locations. In these cases, location coordinates were digitized from figures showing the sample locations. In some cases, discrepancies in the mapped location were noted between different reports. Floyd|Snider performed field verification of all existing monitoring wells to increase confidence in the accuracy of groundwater well locations in this report but cannot verify locations for historical soil boring locations. Floyd|Snider will recommend the collection of additional data if there is insufficient nearby soil data that could be used to bound the extent of the contamination at a location whose coordinates are uncertain.
- **Age of Data.** The age of data should be considered when evaluating gaps in the current dataset. For example, the entire dataset, including data that are more than 10 years old, can be reliably used to confirm that the Site has not been contaminated

with particular chemicals. However, older data, particularly groundwater data analyzed for volatile chemicals, are less representative of current groundwater quality than more recent data. When historical data may be of insufficient quality to make a determination regarding the current nature and extent of contamination in a future RI/FS report, Floyd|Snider will recommend the collection of additional data.

- **Result Qualifiers.** Result qualifiers associated with historical sampling events are retained in the compiled dataset as received, without additional interpretation. That is, Floyd|Snider did not perform independent data validation on the historical dataset. Field documentation is also not available for many sampling events. As such, Floyd|Snider is generally unable to determine when tentative detections or estimated concentrations (J-flagged results) are caused by sampling artifacts, interferences, or other forms of bias rather than indicative of subsurface conditions. Historical data will be used as-is in this Work Plan. Result qualifiers and associated data quality may be investigated further prior to use in a future RI/FS report.

3.3 SOIL AND GROUNDWATER SCREENING LEVELS

3.3.1 Groundwater Screening Levels

Screening levels (SLs) have been developed for the purpose of contaminant selection for investigation samples and for identification of appropriate laboratory detection limits to ensure that data are of sufficient quality to be usable during future chemical of concern (COC) screening and SL determination in the RI/FS. Previous Site assessments, including Ecology's Hazard Ranking Index, have found that the discharge to surface water pathway is not active at the Site. Therefore, groundwater SLs are proposed at the lowest level that will accomplish the following:

- Protect human health from contaminated drinking water[1]
- Protect indoor air quality via the vapor intrusion pathway

Consistent with Washington Administrative Code (WAC) 173-340-720(3), the following criteria were considered when developing groundwater SLs:

- Washington MTCA Method A groundwater criteria (WAC Table 720-1)
- State and federal maximum contaminant levels established in 40 CFR 141 and WAC 326-290-310
- MTCA Method B vapor intrusion SLs (Ecology 2009)

[1] Groundwater at the Site is not a current or future drinking water resource, nor are there any nearby downgradient wells that may be affected by the Site. Groundwater is considered potable in accordance with WAC 173-340-720, because Ecology has not issued a non-potability determination.

When previous investigations indicated that a chemical may be present at levels of concern, and no MTCA Method A criteria were available, MTCA Method B groundwater criteria were considered. The lowest value of the three SL criterion listed above was used as the groundwater SL.

Groundwater SLs are presented in Table 3.3.

3.3.2 Soil Screening Levels

Soil SLs are proposed at the lowest level that will accomplish the following:

- Protect residents from direct contact with soil in the upper 15 feet bgs
- Protect indoor air quality via the vapor intrusion pathway
- Protect wildlife ecological receptors

Consistent with WAC 173-340-745(2), the following criteria were considered when developing soil SLs:

- MTCA Method A soil criteria for unrestricted land use (WAC Table 740-1)
- Simplified Terrestrial Ecological Evaluation (TEE) soil SLs (WAC Table 749-2)

The lowest value between MTCA Method A and simplified TEE soil SLs was used as the SL. Soil SLs are presented in Table 3.4.

3.4 CHEMICALS OF POTENTIAL CONCERN IN SITE MEDIA

Historical groundwater and soil data were screened relative to the SLs, which resulted in the identification of chemicals of potential concern (COPCs) for each medium. To screen the data, frequency of exceedance (FOE) tables were developed, which summarize representative data for each analyte of interest. Preliminary COPCs in groundwater and soil are identified based on the exceedance information provided in Tables 3.5 and 3.6.

3.4.1 Groundwater Chemicals of Potential Concern

Table 3.5 screens the complete historical dataset for the analytes of interest against the groundwater SLs described in Section 3.3.1.

The primary COPCs in Site groundwater are cVOCs including PCE and its daughter products TCE, *cis*-1,2-DCE, *trans*-1,2-DCE, and vinyl chloride. The greatest detected concentrations of these cVOCs were measured on the source property. Results exceed the groundwater SLs as far downgradient as the north side of Woodinville Drive/SR-522. Recent (post-bioremediation) cVOC groundwater concentrations relative to SLs are depicted on Figure 3.5. At wells that were sampled more than once following the completion of groundwater interim measures, data from the most recent sampling event are compared to the SLs.

Additional volatile organic compounds (VOCs), including methylene chloride and carbon tetrachloride, have been detected at concentrations exceeding the SLs developed for the Site. The maximum detected result for these other VOCs was generally measured from sample locations within the source property. VOCs as an analyte class are retained as COPCs for the Site.

Five metals were detected at concentrations exceeding groundwater SLs; however, only three metals were detected in wells at concentrations exceeding groundwater SLs. Because elevated metals results may be caused by sampling artifacts like elevated turbidity in the sample, metals results from groundwater wells are considered more representative of Site groundwater quality than results from direct push probes. Of the metals whose results exceed SLs, only arsenic exceeds in more than one sample collected from a groundwater well. Arsenic is retained as a COPC for the Site.

TPH and its volatile components—gasoline-range organics (GRO), diesel-range organics (DRO), and oil-range organics (ORO); and benzene, toluene, ethylbenzene, and xylenes (BTEX)—have been detected at concentrations greater than groundwater SLs at neighboring cleanup sites. Recent groundwater samples do not exceed SLs. TPH and associated volatile components are retained as COPCs for the Site and will be analyzed in select samples collected nearby and immediately downgradient of Speedy Glass to confirm TPH is not present in Site groundwater at concentrations exceeding SLs.

The following analyte class was not retained as groundwater COPCs:

- Semivolatile organic compounds (SVOCs), including carcinogenic polycyclic aromatic hydrocarbons (cPAHs)

3.4.2 Soil Chemicals of Potential Concern

Table 3.6 screens the complete historical dataset for the analytes of interest against the soil SLs described in Section 3.3.2.

The primary COPCs in Site soil are cVOCs, including PCE and its daughter products. The greatest detected concentrations of these cVOCs were measured on the source property as shown on Figure 3.6. Soil results generally do not exceed the soil SLs outside of the source property.

Additional VOCs have been detected at concentrations exceeding the soil SLs in a few samples. VOCs as an analyte class are retained as COPCs for this investigation.

TPH and its volatile components have been detected at concentrations greater than soil SLs at neighboring cleanup sites. One soil result with elevated concentrations of TPH is located downgradient of the source property, near Speedy Glass. Few other samples in this area were analyzed for TPH. TPH and its associated volatile components—GRO, DRO, ORO, and BTEX—are retained as soil COPCs. Select samples collected nearby and immediately downgradient of Speedy Glass will be analyzed for these chemicals to delineate the extent of any soil impacts. The source of any TPH impacts is currently unknown and will be evaluated with these new data in the RI/FS.

The following analyte classes are not retained as soil COPCs:

- Metals
- Polychlorinated biphenyls
- SVOCs, including cPAHs

3.5 PRELIMINARY CONCEPTUAL SITE MODEL

The preliminary conceptual site model (CSM) is presented based on Site history, the physical conditions at the Site, and findings from previous environmental reports. The CSM tells the story of when and where the Site was contaminated, what media were affected, where the contamination migrated (pathways), and who and what is or can be potentially harmed from the contamination (receptors). Development of the preliminary CSM is based on currently available information and is an evolving process that is subject to refinement as more is learned about the Site. There are several data gaps that currently exist in the vertical and lateral extent of the groundwater contamination plume presented in the RI/FS (HWA 2018) that are explained in Section 4.4. This preliminary CSM includes the current understanding of the distribution of contamination, probable location of the contaminant mass, and migration pathways to receptors.

3.5.1 Contaminant Source and Release Mechanisms

As indicated in Section 3.4, cVOCs have been identified as the primary COPCs at the Site for both groundwater and soil. Although there are several exceedances in screening levels for cVOCs in soil within the source property, a typical “hot spot” has not been encountered. However, the highest FOE and concentrations for COPCs in groundwater have been found within the source property. Secondary COPCs for the same media include VOCs and TPH and its associated volatile components. Additionally, arsenic is a secondary COPC because of SL exceedances at multiple groundwater locations.

Environmental Site Assessment reports by EHS International from 2001 indicated that the existing cVOCs impacts are from historical releases associated with previous dry-cleaning operations, which occurred at the source property between the 1950s and 2012. The source property continued to house dry-cleaning businesses until as recent as 2012, after which buildings were demolished for redevelopment activities associated with the construction of the Bothell City Hall municipal campus. Previous environmental reports have not been able to confirm the method of release of cVOCs but have determined that the releases were not recent and were likely caused by leaks in equipment or discharges (accidental or intentional) to storm drains, catch basins, side sewers, or the ground surface. Other VOCs (secondary COPC), like methylene chloride, are industrial solvents that may have been released as a result of the historical dry-cleaning operations. There are currently no continuing sources of chlorinated solvents or other known hazardous substances stored or used at the source property.

The remaining secondary COPCs including arsenic in groundwater and TPH and TPH-associated volatiles (BTEX compounds) in both media are not typically related to dry-cleaning operations. Arsenic in soil has been detected at concentrations greater than SLs in only one location a considerable distance downgradient from the source property and in three locations far from the source property south of Main Street. TPH and other associated compounds impacts are generally minor and also found south of Main Street. The source of these secondary COPCs is currently unknown and will be considered in the RI/FS.

3.5.2 Transport Mechanisms and Potential Exposure Pathways

Based on the current understanding of the Site, current land use, and previous environmental studies, there are three transport mechanisms for the primary COPCs:

- Volatilization of VOCs in the vadose zone and water table
- Sinking of PCE and daughter products that are denser than groundwater
- Flow of water downgradient, generally south, of the source property within groundwater

For impacted soil found in previous investigations, a potential exposure pathway consists of direct contact with shallow impacted soil in unpaved areas by future workers or within future excavations related to redevelopment activities.

Where concentrations of cVOCs such as PCE and its daughter products in soil and groundwater exceed SLs, a potential exposure pathway consists of inhalation of vapors within potential future buildings that may be constructed over these areas. Currently, there are no sample locations that underlie any occupied buildings with result concentrations greater than SLs; however, there are also no data beneath the buildings currently occupied by the Ranch Drive-In, Washington Federal, Speedy Glass, or Hillcrest Bakery. This data gap and AOPC are discussed in Section 4.4.3.

Terrestrial ecological receptors are not expected to be affected because of the limited habitat on the Site and adjacent parcels. However, plants and burrowing or ground-dwelling invertebrates are exposed directly to soil. Based on the Site configuration of paved surfaces and discontinued dry-cleaning operations, there is no potential for erosion and transport of contaminants from soil by stormwater.

There are no known drinking water wells in the immediate vicinity of the Site, and the use of Site groundwater as a drinking water source is unlikely given the Downtown Core zoning classification of the Site. The potential but incomplete exposure pathway exists for drinking water at the Site.

4.0 Data Gaps Investigation Sampling Plan

As described in Section 3.0, more than 25 previous reports and associated investigations have been referenced to compile the existing dataset and four interim actions involving remedial injections have occurred at the Site. The primary COPCs were identified as cVOCs with secondary COPCs including select VOCs, TPH, and BTEX. There are, however, gaps in the understanding of the vertical and lateral distribution of cVOCs. Additional data collection will support a more complete depiction of the cVOCs plume. The scope, methods, AOPCs, and additional data collection are described in this section. Refer to the Health and Safety Plan (Appendix C) for details regarding the health and safety procedures associated with these data collection activities.

4.1 DATA COLLECTION METHODS

4.1.1 Monitoring Well Reconnaissance and Water Level Measurements

In preparation of the limited subsurface investigation and to inform the availability of monitoring wells for water level measurement and groundwater sampling, all existing monitoring wells within the area of interest were located and inspected on January 9, 2020. The condition of each monitoring well (e.g., presence and condition of cap, monument, and bolts) were documented. If present, the unique Ecology identification tag numbers were recorded. During this time, all available wells were also gauged with a water level meter to measure depths to groundwater and total depth of each well. The water level meter was decontaminated between measurements. These activities were performed prior to the finalization of this Work Plan because the subsurface investigation activities proposed in this Work Plan are affected by the accessibility and location of existing monitoring wells. A list of all existing wells and their condition are presented in Table 4.1. Many of the wells gauged do not have survey data, so a subset of the existing wells with converted water elevation data are presented in Table 4.2. All wells confirmed to exist at the Site in usable condition are presented on Figure 4.1.

4.1.2 Utility Locate

All boring locations will be marked in advance for public utility locate in order to avoid underground utilities during the investigation. Additionally, a private utility survey will be conducted using maps and a conductible survey. For the conductible survey, a subcontracted private utility locator will attach an electrical signal generator to conductible lines, to trace them at the ground surface.

4.1.3 Membrane Interface Probe Borings

The main COPCs associated with the Site are cVOCs, and to further delineate the cVOC plume in soil and groundwater, a membrane interface probe (MIP) will be used. A MIP is a semiquantitative field-screening tool that can detect VOCs in soil and groundwater. It is used in conjunction with a direct push drill technology (DPT) rig or cone penetrometer testing rig to drive the MIP to the depth of interest and collect VOC vapor. The MIP generates high-resolution logs that describe the relative concentrations of VOCs in vertical profiles throughout the subsurface of a site. The MIP consists of a heated probe with a semipermeable membrane (permeable to gas but impermeable to liquid). As the heated probe is advanced, VOCs in the subsurface diffuse across the membrane and are transported up a trunk line via an inert carrier gas to a gas chromatograph equipped with several sensors at the surface. These sensors include an electron capture detector (ECD) for low level detection and a halogen-specific detector for higher level detections when the ECD sensor becomes saturated. The instrumentation at the surface also include a photoionization detector (PID) and flame ionization detector that measure total VOCs in soil gas. These instruments continuously log data from the probe, which is designed to be pushed down at a rate of approximately 1 foot per minute. The MIP also measures electrical conductivity (EC) of soil, which can provide qualitative lithologic logging. In general, finer grained soils (silts, clays) exhibit higher EC values than more permeable soils (sand, gravel). The gas chromatograph responses can be plotted over or adjacent to the EC data, making it possible to compare contaminant distribution to lithology. The MIP is also equipped with a hydraulic profiling tool (HPT) that introduces water to the formation through a side orifice during boring advancement that logs the pressure decay to establish a measurement of the soil hydraulic conductivity. Proposed MIP borings are shown on Figure 4.2; however, boring locations are expected to be modified in the field based on the real-time data collected by the MIP. An estimated 16 MIP borings will be advanced to approximately 50 feet bgs to inform the placement of traditional soil borings for laboratory sample collection and groundwater monitoring wells. During the MIP investigation, several of these borings may be advanced by the DPT rig with cores to collect soil instead of using the MIP tool. Field screening data and soil sampling procedures are discussed in Section 4.1.5.

4.1.4 Monitoring Well Installation

After the completion of the MIP investigation, drilling, installation, and development of approximately six monitoring wells in the deep aquifer zones up to 50 feet bgs and three monitoring wells in the shallow interval aquifer zone up to 25 feet bgs will be installed. Locations will be selected based on the results of the initial MIP investigation; however, approximate locations of proposed monitoring wells are shown on Figure 4.3. A hollow stem auger (HSA) drill rig will be mobilized to the Site for the drilling and installation of these monitoring wells.

Wells will be installed in accordance to WAC 173-160-420 using new, 2-inch-diameter flush threaded schedule 40 polyvinyl chloride (PVC) riser pipe and 0.010-slot schedule 40 PVC screens. Screened interval depths and lengths will be determined by the Floyd|Snider geologist in the field based on field observations and previously collected MIP data. Filter packs surrounding the screened interval consist of 10-20 silica sand or equivalent. A bentonite seal shall be installed atop of the filter pack sand up to a flush-mounted surface monument constructed of steel and concrete. A unique Ecology well tag will be permanently affixed to the standpipe or within the monument, and a watertight well plug shall be placed atop the standpipe. Surface monuments will be constructed in a manner intended to prevent pooling of surface water atop of the monitoring well.

At the completion of monitoring well installation, the wells shall be developed to remove turbidity and sediments from the bottom of the well and within the sand filter pack. Well development shall be performed by a combination of surging and over-pumping with a submersible pump. For low-yield monitoring wells (wells that go dry when pumping), a bailer may be used to evacuate water from the well. If the submersible pump used has sufficient weight and is close in diameter to the inside diameter of the monitoring well, it may be used to surge in place of a surge block at the direction of the Floyd|Snider geologist. Turbidity will be recorded at regular intervals as water is discharged from the monitoring well. If possible, water will be purged from the well until turbidity is less than 50 nephelometric turbidity units (NTU) and stabilized to within 5 percent of each reading for three consecutive readings. Generally, a minimum of 10 well casing volumes shall be removed from each well during development. For low-yield wells and wells screened in silty or clayey formations where turbidity less than 50 NTU and stabilization is not feasible, smaller volume quantities maybe removed at the direction of the geologist.

4.1.5 Soil Sampling: Physical and Chemical Parameters

4.1.5.1 MIP Investigation Soil Sampling

Soil samples may be collected during the MIP investigation by advancing cores with the DPT rig instead of the MIP tool at the discretion of the Floyd|Snider Field Lead. This drilling method operates with a pneumatic hammer that pushes a plastic-lined, stainless steel core barrel to provide a continuous soil core. These soil cores will be field screened with a PID, and visual and olfactory observations will be documented. Soil will be logged by the Floyd|Snider geologist using the United Soil Classification System visual manual procedure. Information recorded will include constituents' classification, color, grain size, moisture content, and estimation of relative density or cohesiveness. Soil samples from select intervals will be collected for laboratory analysis as discussed in Section 4.2.1. Field screening, observations, and results from soil samples sent for laboratory analysis may be used to correlate with MIP data.

4.1.5.2 Soil Sampling During Monitoring Well Installation

Monitoring wells will be drilled and installed with an HSA rig. HSA drill rigs operate by spinning auger flights down into the ground with soil cuttings mounding to the surface from the spinning action of the augers. During drilling, the hollow stem within the auger allows a stainless steel, split spoon sampler to be driven ahead of the auger by a 140-pound hammer or weight. This sampler is driven for 18 inches to perform a standard penetration test (SPT) for relative density of soil at regular intervals determined by the Floyd|Snider geologist (typically once every 5 feet). Soil collected in the split spoon sampler will be field screened and logged in the same manner described in the section above with density or cohesiveness recorded based on the blow counts from SPT tests performed. Field personnel may collect grab samples of the soil cuttings moving up to the surface for field screening and to supplement observations between split spoon samples. Soil samples from select intervals will be collected and submitted to a laboratory for analysis as discussed above.

4.1.6 Survey

To confirm existing well elevation information, and to provide well elevation data for newly installed wells, a licensed surveyor will locate all monitoring wells. At each monitoring well, the top of the well casing and ground surface will be surveyed to the nearest 0.01 feet in the horizontal and vertical directions. Monitoring well coordinates will be reported relative to the North American Datum of 1983 Washington State Plane South. Elevations will be reported relative to the NAVD 88. Well logs will be generated for all new wells and will include the Washington State Plane South coordinates of the well and the top of well casing elevation. The coordinate and elevation reference systems will be noted on the well logs. MIP boring locations will be surveyed for horizontal location by field personnel using a hand-held sub-meter global positioning system.

4.1.7 Groundwater Monitoring and Post-Well Installation Water Level Measurements

All proposed groundwater monitoring and sampling in this Work Plan will be performed via low-flow sampling. Low-flow sampling consists of purging water from a monitoring well at rates slow enough to minimize draw-down of the water column, to minimize purge volume, and to minimize the impact that purging has on groundwater chemistry. This is achieved by using a peristaltic pump, bladder pump, or equivalent pump that is capable of discharging at rates equal to or less than the flow rate of the surrounding aquifer into the well screen. For monitoring wells capable of producing high yield, low-flow rates are typically limited to between 150 and 500 milliliters per minute to prevent volatilization during sample collection. The pump or inlet tubing is placed within the screened interval of the well ensuring that water being drawn to the surface is representative of the target water-bearing formation and not from stagnant water within the well. During purging, the water level is measured and recorded with the purge rate lowered as necessary to ensure that steady flow is maintained with minimal drawdown (less than 0.33 feet; USEPA 2002). Water quality parameters including pH, specific conductivity, dissolved oxygen, temperature, turbidity, and oxidation-reduction potential (ORP) are also measured and recorded at regular intervals. Purging continues until these parameters are approximately stable (when measurements are within 10 percent) for three consecutive readings, or at least 30 minutes have elapsed. Because these field parameters (particularly dissolved oxygen and ORP) may not reach stabilization criteria, collection of groundwater samples will be based on the professional judgment of the field personnel at the time of sampling.

Prior to the MIP investigation described in Section 4.1.3, approximately 15 existing monitoring wells at the Site will be sampled using low-flow sampling techniques. These monitoring wells will be located within and just beyond the currently assumed cVOC plume boundary. The purpose of sampling these wells is to obtain current groundwater data to inform the current extents of the plume. Proposed monitoring wells to be sampled are shown on Figure 4.3.

After the installation of new monitoring wells described in Section 4.1.4, these newly installed wells will also be sampled using low-flow techniques. These wells will be sampled a minimum of 1 week after they have been installed and developed to allow for the target water-bearing zones to equilibrate prior to sample collection. Additionally, these newly installed wells and all existing wells will be gauged to measure depths to water following the protocols described in Section 4.1.1. These water level data will provide a higher resolution of contours of the potentiometric surface at the Site to confirm groundwater flow direction.

4.1.8 Sample Nomenclature

Soil samples will be named according to their boring location, top depth in feet bgs, and bottom depth in feet bgs, separated by dashes. For example, the soil sample collected from boring location 31 from 8 to 8.5 feet bgs would be named "SB-31-8-8.5."

Monitoring well groundwater samples will be named according to the well location and date; for example, the sample collected from UCCMW-21 on March 1, 2020, would be named "UCCMW-21-030120."

4.1.9 Equipment Decontamination

Non-disposable field sampling equipment, such as stainless-steel bowls and the water level indicator, will be cleaned between uses at each sampling location. Equipment for reuse will be decontaminated according to the procedure below, before each sample interval:

1. Water will be sprayed over equipment to dislodge and remove any remaining soil.
2. Surfaces of equipment contacting sample material will be scrubbed with brushes using an Alconox solution.
3. Scrubbed equipment will be rinsed and scrubbed with clean water.
4. Equipment will undergo a final spray rinse of deionized water.

4.1.10 Investigation-Derived Waste

Generated waste will be managed and disposed of in accordance with applicable waste management regulations. Investigation-derived waste (IDW) includes the following liquids and solids:

- Purge water and well development water
- Decontamination wash water
- Soil drill cuttings, including non-soil debris that may be removed from the subsurface during drilling
- Disposable materials used during field work that may be impacted by contaminated media (e.g., disposable personal protective equipment [PPE], used filters, plastic sheeting, paper towels, and tubing)

IDW will be separated into liquids and solids and placed in 55-gallon drums and appropriately labeled. The IDW will be stored on the source property pending waste profiling and proper disposal, which will be coordinated with the City. Material that is designated for offsite disposal will be transported to an offsite facility permitted to accept the waste. Manifests will be used as appropriate for disposal.

All disposable sampling material and PPE (e.g., paper towels, disposable coveralls, and gloves) used in sample processing will be placed in heavyweight garbage bags or other appropriate containers. Disposable supplies will be removed from the Site by sampling personnel and placed in a municipal solid waste refuse container for disposal at a solid waste landfill.

4.2 LABORATORY ANALYSIS

4.2.1 Soil

Up to two soil samples from each DPT boring that is completed during the MIP investigation will be collected for laboratory analysis. Two soil samples per monitoring well location will also be collected from split spoons for laboratory analysis. Sample intervals will be chosen based on evidence of contamination including MIP logs, visual staining, olfactory observations, and PID screening results. These soil samples will be analyzed for the following:

- VOCs by U.S. Environmental Protection Agency (USEPA) Method 8260D or USEPA Method 8270E as listed in Table 4.3
- Fraction organic carbon (f_{oc}) by ASTM D2974-87 for samples deeper than 3 feet bgs
- Hydrocarbon identification (HCID) by NWTPH-HCID

Analyzing soil for VOCs will indicate the presence of and concentrations of the primary COPCs (cVOCs). f_{oc} analysis will provide data on Site-specific soil properties for use in determining leaching pathway SLs during the RI/FS process. If the value of the HCID screening analysis for diesel or gasoline exceeds the reporting limits, then the appropriate analytical method will be analyzed for the product type detected, including the following:

- DRO and ORO by NWTPH-Dx (if diesel or heavy oil is detected by HCID)
- GRO by NWTPH-Gx (if gasoline is detected by HCID)
- BTEX by USEPA Method 8260D or USEPA Method 8021B (if gasoline is detected by HCID)

4.2.2 Groundwater

Of the water quality parameters presented in Section 4.1.7, ORP and dissolved oxygen field parameters are to be documented for monitoring the current status of natural attenuation and the effectiveness of prior remedial injections. All groundwater samples collected from wells at the Site will be analyzed for the following:

- VOCs by USEPA Method 8260D or USEPA Method 8270E as listed in Table 4.3
- Arsenic by USEPA Method 200.8
- Dissolved gases (methane, ethene, ethane) by RSK 175

The laboratory may conduct analysis for particular VOCs by USEPA 8260D with Selected Ion Monitoring to achieve reporting limits less than groundwater SLs.

Groundwater samples collected from wells in the vicinity and downgradient of Speedy Glass will be analyzed for the presence of GRO, DRO, and ORO by NWTPH-HCID.

If the value of the HCID screening analysis for diesel or gasoline exceeds the reporting limits, then the appropriate analytical method will be analyzed for the product type detected, including the following:

- DRO and ORO by NWTPH-Dx (if diesel or heavy oil is detected by HCID)
- GRO by NWTPH-Gx (if gasoline is detected by HCID)
- BTEX by USEPA Method 8260D or USEPA Method 8021B (if gasoline is detected by HCID)

Analysis of VOCs, arsenic, and HCID (or TPH/BTEX) will characterize the presence and current concentrations of COPCs in groundwater. Dissolved gases are geochemical parameters that can give a qualitative indication of reductive dechlorination through biodegradation, informing the evaluation of in situ treatment methodologies in the RI/FS.

4.3 QUALITY ASSURANCE

The overall QA objective for this DGI is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide technically and legally defensible results. This section discusses QA objectives and procedures for this project.

4.3.1 Reporting Limits

The analytical methods identified Section 4.2 result in method detection limits and practical quantitation limits (or reporting limits) that are less than the SLs, which represent the lowest possible cleanup levels to be developed in the RI/FS. These reporting limits are presented in Table 4.3 for each soil and groundwater analytical method. These reporting limits are goals only, insofar as instances may arise where high sample concentrations, non-homogeneity of samples, or matrix interferences preclude achieving the desired reporting limit and associated QA/QC criteria. In such instances, the laboratory will report the reason for any deviation from these reporting limits.

4.3.2 Laboratory Quality Assurance/Quality Control Objectives

Laboratory QA/QC objectives include obtaining data that are technically sound and properly documented, having been evaluated against established criteria for the principal data quality indicators (i.e., precision, accuracy, representativeness, completeness, and comparability) as defined in Ecology and USEPA guidance (Ecology 2004 and USEPA 2002) and of sufficient quality and quantity for their intended purpose. Laboratory results will be evaluated against data quality objectives and project-specific decision criteria by reviewing results for analysis of method blanks, matrix spike (MS), duplicate samples, laboratory control samples (LCSs), calibrations, performance evaluation samples, and interference checks as specified by the specific analytical methods. Data QA criteria are presented in Table 4.4.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, precision is a quantitative measure of the variability of a group of measurements compared to their average values. Precision, defined as the relative percent difference (RPD) between results, will be evaluated for both laboratory MS/MS duplicate (MSD) and field duplicate samples. Duplicate samples will be collected at a minimum frequency of 1 per laboratory analysis group and 1 per 20 field samples. Performance criteria have not been established for field duplicates. Field duplicate precision will, therefore, be screened against an RPD of 75 percent for all samples. However, no data will be qualified based solely on field duplicate precision. As shown in Table 4.4, data that meet the accuracy and precision requirements listed will be usable for decision-making.

Accuracy is an expression of the degree to which a measured or computed value represents the true value. Analytical accuracy may be assessed by analyzing "spiked" samples with known concentrations (surrogates, LCSs, and/or MSs) and measuring the percent recovery. Accuracy measurements on MS samples will be carried out at a minimum frequency of one per laboratory analysis group per matrix analyzed.

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Care has been taken in the design of the sampling program to ensure that sample locations are properly selected, sufficient numbers of samples are collected to accurately reflect conditions at the locations, and samples are representative of the sampling locations. Sufficient volume of samples will be collected at each sampling location to minimize bias or errors associated with sample particle size and heterogeneity.

Completeness, defined as the number of acceptable data points relative to the total number of data points, will be assessed for all samples within a given medium (e.g., soil). The QA/QC objective for completeness for all components of this project is 95 percent. Data that were qualified as estimated because the QA/QC criteria were not met will be considered valid for the purpose of assessing completeness. Data that have been qualified as estimated will be further reviewed for usability. Data that were qualified as rejected will not be considered valid for the purpose of assessing completeness. If a sample medium has an unacceptable completeness percentage after comparison to the individual data quality objectives described above, original samples will be re-analyzed if sufficient sample volume is available, archived samples will be analyzed if appropriate, or additional samples will be obtained during construction (if feasible).

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared to another. In order to ensure that results are comparable, samples will be analyzed using standard USEPA or Ecology methods and protocols. Calibration and reference standards will be traceable to certified standards, and standard data reporting formats will be employed.

Data will also be reviewed to verify that precision and accuracy criteria were achieved and, if not, that data were appropriately qualified.

4.3.3 Laboratory and Field Quality Assurance/Quality Control Procedures

The quality of analytical data generated is assessed by both the implementation of field QC procedures and by the frequency and type of internal laboratory QA/QC checks developed for analysis type and method. Field QC is evaluated through the analysis of blind field duplicates. Blind field duplicates will be collected at a rate of 1 per 20 samples and are used to evaluate the efficiency of field decontamination procedures, variability from sample handling, and sample heterogeneity. Laboratory results will be evaluated by reviewing analytical results of method blanks, MSs/MSDs, field duplicate samples, LCSs, calibrations, performance evaluation samples, and interference checks as specified by the specific analytical methods.

4.4 VERTICAL AND LATERAL SAMPLE LOCATIONS TO BOUND EXTENT OF CVOC PLUME

4.4.1 Vertical Depth

Of the borings and former and existing monitoring wells completed at the Site and reviewed by Floyd|Snider, approximately 24 were advanced to beyond 30 feet bgs with only 3 completed as monitoring wells. The main COPCs described in Section 3.4 are PCE and its daughter products, which are denser than water with the exception of vinyl chloride. PCE has been detected at levels greater than SLs in past groundwater data from the monitoring well UCCMW-4D, which is located in the source area and screened from 35 to 40 feet bgs. Although concentrations from this well have been less than SLs since 2015, it is possible that cVOCs have migrated deeper into the groundwater aquifer or further downgradient from this location. There are no wells completed deeper than UCCMW-4D and there are no wells or borings advanced or completed beyond 30 feet bgs immediately downgradient of the source area. A data gap for the vertical extent of the cVOC plume exists within the entire collective of private parcels between NE 183rd Street and Main Street (includes Ranch Drive-In, Washington Federal, Hillcrest Bakery, and Speedy Glass properties). Shallow monitoring wells UCCMW-21 and BB-2 are located within this downgradient area; both have detections of PCE and daughter products at concentrations greater than SLs. No monitoring wells completed within the deep zone currently exist between NE 183rd Street and Main Street. Further downgradient and on the north side of Woodinville Drive/SR-522, the deep monitoring well RMW-4D has detections of PCE that meet the SL; however, the concentrations were trending upward when data from August 2015 to present are considered. There are no wells deeper than 30 feet in the vicinity of RMW-4D, and this well was unable to be located during the well reconnaissance event in January 2020. Chlorinated solvents sink in groundwater due to their relative density, and it is currently unknown how deep the extent of contamination reaches. The MIP borings and installation of up to seven deep monitoring wells described in Sections 4.1.3 and 4.1.4 will assist with the definition of the vertical (and horizontal) extent of contamination in soil and groundwater.

4.4.2 AOPC 1: Northern Plume Boundary (Source Area)

The source property is located at 18304 Bothell Way NE, in Bothell, Washington, which is situated at the southwest corner of the Bothell City Hall municipal campus. This parcel and a portion of the parcel immediately north contain the highest density of borings and monitoring wells throughout the Site. AOPC 1 includes the southern portion of the source property and the NE 183rd Street ROW south of the source property, which encompass the northern cVOC plume boundary. Data from monitoring wells UCCMW-17, UCCMW-18, and INJ-2, located on the source property, show increasing concentrations of PCE after interim action injections in 2016. The latest data from shallow monitoring wells UCCMW-5 and UCCMW-21, located on the NE 183rd Street ROW just south of the source property, show concentrations of PCE greater than 2 times the respective SLs with daughter product concentrations trending upward. There are no monitoring wells located downgradient of these ROW wells. The monitoring wells UCCMW-4, UCCMW-5, UCCMW-17, UCCMW-18, and UCCMW-21 will be sampled during the implementation of this Work Plan to evaluate current conditions in AOPC 1. To also better understand the nature and extent of contamination within AOPC 1, up to four MIP borings on the south side of NE 183rd Street are proposed. The data from the MIP borings will inform the installation of one deep monitoring well within the vicinity of the south sidewalk of NE 183rd Street and the installation of two monitoring wells (deep and shallow) immediately south and east of monitoring wells UCCMW-21 and UCCMW-5 respectively, as shown in Figure 4.3.

4.4.3 AOPC 2: Eastern Plume Boundary (Ranch Drive-In, Speedy Glass, Hillcrest Bakery, and Washington Federal Parcels)

Downgradient of the source property lie several private properties that include the Ranch Drive-In, Speedy Glass, Washington Federal (bank), and Hillcrest Bakery businesses. These parcels and the eastern portion of the Bothell Way NE ROW collectively contain the central limits of the cVOC plume and are AOPC 2. The latest groundwater data from monitoring well UCCMW-7, located in the vicinity of the Ranch Drive-In building, show exceedances of PCE and daughter products compared to SLs. Additionally, the most recent concentration of PCE in the shallow monitoring well BB-2 located immediately south of Speedy Glass in the Main Street ROW is greater than 10 times the SL; however, there are no existing monitoring wells to bound these detections to the north or east. BB-2 is located southeast and downgradient of UCCMW-7, but there is no monitoring well between these two points. To confirm current COC concentrations in the central portion of the plume and to refine the eastern plume boundary within AOPC 2, wells BB-2 and UCCMW-7 will be sampled during the groundwater monitoring phase of this DGI. Up to two MIP borings will be advanced at the approximate locations shown in Figure 4.2. Based on MIP data results, a deep monitoring well is expected to be installed between the parcel boundary of the Ranch Drive-In and Speedy Glass properties.

4.4.4 AOPC 3: Western Plume Boundary (Bothell Way NE)

Current data bound a portion of the western edge of the Site along of the eastern frontage road to Bothell Way NE, which is AOPC 3. The most recent concentrations of PCE and daughter products at the monitoring well UCCMW-25 are greater than SLs, with some concentrations trending upward. Currently there are no monitoring wells that exist southwest of this monitoring well to fully delineate the western edge of the groundwater plume. There is also an exceedance of greater than 2 times the SL for vinyl chloride in the most recent groundwater sample data collected from monitoring well BI-3, which is located within the Bothell Way NE ROW. Monitoring well UCCMW-9, which is downgradient of BI-3, has had an exceedance of PCE in a past sample. The latest groundwater sample collected from UCCMW-9 does not exceed the SL for PCE; however, it is possible for daughter products to be migrating to this well given the presence of vinyl chloride in BI-3. AOPC 3 also includes the location of a UST encountered during a manhole installation excavation where TPH contamination, including gasoline- and heavy oil-range organics were observed in the field and confirmed in sidewall samples (PSI 1998). Because this UST is associated with TPH contamination, it is not considered as a secondary source for the cVOC impacts found in this AOPC and downgradient. Two MIP borings downgradient of UCCMW-25 will be advanced and groundwater samples will be collected at BI-3, UCCMW-8, UCCMW-9, UCCMW-24, and UCCMW-25 to help to refine the western plume boundary. These wells in the vicinity of Speedy Glass will also be sampled for TPH compounds as described in Section 4.2.2.

4.4.5 AOPC 4: Southern Plume Boundary

The current extent of the known groundwater plume lies immediately north of the shallow monitoring well BLMW-10. The latest data collected from the shallow monitoring well UCCMW-27 from a sampling event in March 30, 2016, had results of PCE greater than 2 times its respective SL; however, the downgradient well BLMW-10 was not sampled during this same event. Additionally, recent data from the shallow monitoring well UCCMW-26 show detections of PCE daughter products at concentrations significantly greater than their respective SLs. This well was not located during the well reconnaissance in January 2020 and there are currently no monitoring wells south or southwest of UCCMW-26. There are also two borings (UCCB-4 and FB-9) completed within the vicinity of the plume boundary that had detections of cVOCs at concentrations greater than SLs deeper than 30 feet bgs as depicted in Figure 3.5.

There are currently no existing deep monitoring wells within this AOPC. To confirm that the plume has not migrated farther south, BLMW-10 and UCCMW-27 will be sampled during the groundwater monitoring event prior to the MIP investigation described in Section 4.1. Due to its downgradient proximity to BB-2, UCCMW-10 will also be sampled to assess any migration from BB-2. The existing monitoring wells proposed for sampling in this AOPC will also be sampled for TPH compounds as described in Section 4.2.2 due to being downgradient of the UST located in AOPC 3. Eight MIP borings will be advanced within AOPC 4 due to this area containing the furthest downgradient cVOC impacts. These data from the MIP borings and the samples collected at BLMW-10 and UCCMW-27 will be used to inform the location of up to six new monitoring wells (four deep and two shallow) beyond the southern plume boundary at the approximate locations shown on Figure 4.3.

5.0 Data Gaps Investigation Tasks and Schedule

Below are the dates of performance or completion for significant DGI tasks. Actual dates below are subject to change depending on Ecology review periods, site access constraints, and subcontractor/field personnel availability.

Task	**Expected Duration**	**Anticipated Date**
Submit Final Work Plan to Ecology	--	March 6, 2020
Implement DGI Field Work		
Well Reconnaissance and Water Levels	1 day	January 9, 2020
Groundwater Sampling of Existing Wells	3 days	March 9, 2020
MIP Borings	1 week	March 12, 2020
Review MIP and HPT Data	2 weeks	March 20, 2020
Drill and Install New Monitoring Wells	1 week	April 6, 2020
Groundwater Sampling of New Wells	3 days	April 20, 2020
Reporting		
Receive Data Reports from Laboratories, Complete Data Validation	--	April to May 2020
Prepare DGI Technical Memorandum	--	May 28, 2020

6.0 Project Team and Responsibilities

6.1 WASHINGTON STATE DEPARTMENT OF ECOLOGY

Ecology is responsible for participation in reviewing and approving the Work Plan. Sunny Becker is the Site Project Manager for Ecology. She will review and approve all work plans and reports for the DGI and RI/FS and will determine if all requirements of the AO have been met.

Ecology will have lead responsibility for all public involvement activities during the RI process. Ecology will be responsible for public relations and outreach in coordination with the City during the project, which may include participation at public meetings, project fact sheets, and direct community involvement.

6.2 CITY OF BOTHELL

The City's responsibilities include overall project direction and oversight, site access, public coordination, permit approvals, and all tasks to support the planning performance of the work. The City is the landowner for the source property and many of the impacted parcels. Nduta Mbuthia is the City's Senior Capital Project Engineer and Manager for the project. The City's executive office will lead coordination with property owners for parcels potentially located within the Site and will keep Ecology appraised of interactions with the downgradient property owners and operators.

6.3 FLOYD|SNIDER

Floyd|Snider is the City's technical consultant responsible for project planning, technical analysis, authorship, and Ecology coordination to produce the Work Plan in a manner consistent with Ecology requirements. Megan King, PE, is the Floyd|Snider Project Manager. Mark Jusayan, LG, is the Field Lead for the DGI.

6.4 LABORATORY

An Ecology-accredited laboratory will conduct chemical testing of soil and groundwater samples. The laboratory will be responsible for calculating reporting limits for each COPC and meeting laboratory QC requirements as specified in Section 4.3.

6.5 OTHER SUBCONTRACTORS—SPECIALTY GEOPHYSICAL, DRILLER, AND SURVEYOR

Floyd|Snider will hire and contract with the following outside firms for the completion of specialty work required for completion of this Work Plan:

- A professional utility locator will perform private utility locate work including underground pipeline location.
- A specialty geophysical and geochemical contractor will operate the specialty MIP and HPT instrumentation under supervision of a licensed geologist and will interpret the in situ data collected.

- Geoprobe soil boring and monitoring well installation will be performed by licensed drillers with oversight by Floyd|Snider.
- Professional surveying of site features and monitoring well locations will be performed by licensed surveyors.

7.0 References

HWA GeoSciences, Inc. (HWA). 2009. SR 522 Preload Recommendations, Bothell Crossroads Project, Bothell, Washington. 28 September.

_____. 2014. *Soil Cleanup Report Bothell Landing Brownfields Site, Bothell, Washington.* 8 December.

_____. 2016. UST Site Assessment Report Ultra Custom Care Cleaners Site 18125 Bothell Way NE Bothell, Washington. 4 January.

_____. 2017. *Further Delineation of Site Boundary for Ultra and Riverside HVOC Sites Reconnaissance Ground Water Sampling Letter Report, Bothell, WA.* 12 May.

_____. 2018. *Draft Remedial Investigation/Feasibility Study Report, Ultra Custom Care Cleaners Site, Bothell, WA.* 12 April.

Professional Services, Inc. (PSI). 1998. *Contaminated Soil and Water Removal, and Sampling and Analysis Results Storm Sewer Installation Immediately West of Speedy Auto Glass Facility.* 4 September.

Washington State Department of Ecology (Ecology). 2004. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies.* Publication No. 01-03-003. June. Revised Publication No. 04-03-030, December 2016.

_____. 2009. *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action.* Publication No. 09-09-047. October. Revised February 2016 and April 2018.

U.S. Environmental Protection Agency (USEPA). 2002. *Groundwater Sampling Guidelines for Superfund and RCRA Project Managers.* Office of Solid Waste and Emergency Response. EPA 542.S-02-001. May.

Ultra Custom Care Cleaners Site

Data Gaps Investigation Work Plan

Tables

Table 3.1
Well Information

Floyd|Snider Well Location Name	Well Location Name in Source Report [(1)]	Earliest Associated Data Collection Event	Event Start	Event End	Location Type
BB-2		Bothell Landing-2009 RI	9/4/2009	9/24/2009	Monitoring Well
BC-3		Riverside-Sept 2008 Phase II ESA	9/5/2008	9/5/2008	Monitoring Well
BC-5					Monitoring Well
BI-3		Ultra-June 2014 GWM	6/2/2014	6/6/2014	Monitoring Well
BLMW-1		Bothell Landing-2009 RI	9/4/2009	9/24/2009	Monitoring Well
BLMW-3					Monitoring Well
BLMW-4					Monitoring Well
BLMW-5					Monitoring Well
BLMW-5R		Ultra-Sept 2014 Qrtly GWM	9/9/2014	12/19/2014	Monitoring Well
BLMW-7		Bothell Landing-2009 RI	9/4/2009	9/24/2009	Monitoring Well
BLMW-8					Monitoring Well
BLMW-9		Area Wide-June 2014 Qrtly GWM	6/11/2014	6/13/2014	Monitoring Well
BLMW-10					Monitoring Well
EAIa-Geotech Well	Geotech Well	Ultra-May 2016 SubSurf Inv	5/3/2016	5/4/2016	Well
INJ-2		Ultra-Dec 2014 Qrtly GWM	12/8/2014	12/19/2014	Well
INJ-4		Bothell Landing-Feb 2015 Phase II ESA	2/24/2015	2/24/2015	Well
INJ-6					Well
INJ-9		Ultra-Oct 2015 Qrtly GWM	10/20/2015	10/26/2015	Well
RMW-4		Riverside-2009 RI	9/14/2009	9/15/2009	Monitoring Well
RMW-11D	RMW-11	Riverside-2009 RI	9/14/2009	9/15/2009	Monitoring Well
UCCMW-1	MW-1	Ultra-2001-2002 SubSurf Inv	7/19/2001	2/25/2002	Monitoring Well
UCCMW-2	MW-2				Monitoring Well
UCCMW-3	MW-3				Monitoring Well
UCCMW-3R	MW-3R	Ultra-May 2014 GWM	5/11/2014	5/15/2014	Well
UCCMW-4D	MW-4	Ultra-Jan 2014 GWM	1/8/2014	1/9/2014	Monitoring Well
UCCMW-5		Ultra-May 2014 GWM	5/11/2014	5/15/2014	Monitoring Well
UCCMW-6		Ultra-Jan 2014 GWM	1/8/2014	1/9/2014	Monitoring Well
UCCMW-7		Ultra-May 2014 GWM	5/11/2014	5/15/2014	Monitoring Well
UCCMW-8		Ultra-May 2014 Baseline Qrtly GWM	5/28/2014	5/29/2014	Monitoring Well
UCCMW-9		Ultra-Jan 2014 GWM	1/8/2014	1/9/2014	Monitoring Well
UCCMW-10		Area Wide-June 2014 Qrtly GWM	6/11/2014	6/13/2014	Monitoring Well
UCCMW-11	UCCMW-11D	Ultra-May 2014 GWM	5/11/2014	5/15/2014	Monitoring Well
UCCMW-11S					Monitoring Well
UCCMW-12D					Monitoring Well
UCCMW-12S					Monitoring Well
UCCMW-13D		Ultra-June 2014 GWM	6/2/2014	6/6/2014	Monitoring Well
UCCMW-13S		Ultra-May 2014 GWM	5/11/2014	5/15/2014	Monitoring Well
UCCMW-14D					Monitoring Well
UCCMW-14S					Monitoring Well
UCCMW-15					Well
UCCMW-16					Monitoring Well
UCCMW-17					Monitoring Well
UCCMW-18		Ultra-August 2014 GWM	8/13/2014	8/20/2014	Monitoring Well
UCCMW-19		Ultra-May 2014 GWM	5/11/2014	5/15/2014	Monitoring Well
UCCMW-20					Monitoring Well
UCCMW-21					Monitoring Well
UCCMW-22		Ultra-June 2014 GWM	6/2/2014	6/6/2014	Well
UCCMW-23		Ultra-May 2014 GWM	5/11/2014	5/15/2014	Monitoring Well
UCCMW-24					Monitoring Well
UCCMW-25					Monitoring Well
UCCMW-26		Ultra-Mar 2015 Qrtly GWM	3/23/2015	4/2/2015	Monitoring Well
UCCMW-27					Monitoring Well

Note:

1 Blank cells indicate that the location name presented in the source report matches the name in use by Floyd|Snider. The Location ID and Study Specific Location ID fields in EIM generally match the prefixes in use by Floyd|Snider, but may not exactly match either location ID in this table. For example, Floyd|Snider location UCCMW-4D is assigned location ID and Study Specific location ID of "ULTRAUCCMW-4" and "BOTHELL ULTRA UCC MW-4", respectively, in EIM. The naming convention used by Floyd|Snider retains the unique "UCC" identifier and contains a "D" suffix to indicate that the well's screened depth is deeper than 30 feet below ground surface.

Table 3.2
Temporary Soil and Groundwater Sample Location Information

Event Nickname	Event Start	Event End	Floyd|Snider Location Name	Location Name in Source Report	Location Type
Bothell Landing-2007 Phase II ESA	7/9/2007	8/9/2007	HWA-BH-13	BH-13	Core
			HWA-BH-19	BH-19	Core
			HWA-BH-2	BH-2	Core
			HWA-BH-20	BH-20	Core
			HWA-BH-21	BH-21	Core
			HWA-BH-3	BH-3	Core
			HWA-BH-4	BH-4	Core
			HWA-BH-5	BH-5	Core
			HWA-BH-6	BH-6	Core
			HWA-BH-11	BH-11	Core
			HWA-BH-17	BH-17	Core
			HWA-BH-8	BH-8	Core
			HWA-BH-9	BH-9	Core
Bothell Landing-2009 RI	9/4/2009	9/24/2009	BLBH-23		Core
			BLSS-1		Core
			BLSS-2		Core
Crossroads-2009 Phase II ESA	4/1/2009	4/7/2009	CDM-B1	B1	Geoprobe
			CDM-B10	B10	Geoprobe
			CDM-B11	B11	Geoprobe
			CDM-B12	B12	Geoprobe
			CDM-B13	B13	Geoprobe
			CDM-B18	B18	Geoprobe
			CDM-B2	B2	Geoprobe
			CDM-B3	B3	Geoprobe
			CDM-B7	B7	Geoprobe
			CDM-B8	B8	Geoprobe
Crossroads-2013 SubSurf Inv	5/9/2013	5/10/2013	CDM-B30	B30	Geoprobe
			CDM-B31	B31	Geoprobe
			CDM-B32	B32	Geoprobe
			CDM-B33	B33	Geoprobe
			CDM-B34	B34	Geoprobe
Grease Monkey-2009 Phase II ESA	5/19/2009	5/19/2009	GM-1		Geoprobe
			GM-2		Geoprobe
			GM-3		Geoprobe
			GM-4		Geoprobe
			GM-5		Geoprobe
			GM-6		Geoprobe
			BB-1		Core
			BC-6		Core
Safeway-2008+2010 Phase II	7/1/2008	7/1/2008	Swy-B1	B1	Geoprobe
			Swy-B2	B2	Geoprobe
			Swy-B3	B3	Geoprobe
			Swy-B4	B4	Geoprobe
			Swy-SB-5	SB-5	Geoprobe
			Swy-SB-6	SB-6	Geoprobe
Ultra-2001-2002 SubSurf Inv	7/19/2001	2/25/2002	F-SB-1	SB-1	Core
			F-SB-2	SB-2	Core
			F-SB-3	SB-3	Core
			F-SB-4	SB-4	Core
			F-SB-5	SB-5	Core
			F-SB-6	SB-6	Core
			F-SB-7	SB-7	Core
Ultra-2004 Subsurf Inv	7/22/2004	10/26/2004	EPI-B-1	B-1	Geoprobe
			EPI-B-10	B-10	Geoprobe
			EPI-B-11	B-11	Geoprobe
			EPI-B-12	B-12	Geoprobe
			EPI-B-13	B-13	Geoprobe
			EPI-B-14	B-14	Geoprobe
			EPI-B-15	B-15	Geoprobe
			EPI-B-16	B-16	Geoprobe
			EPI-B-2	B-2	Geoprobe
			EPI-B-3	B-3	Geoprobe
			EPI-B-4	B-4	Geoprobe
			EPI-B-5	B-5	Geoprobe
			EPI-B-6	B-6	Geoprobe
			EPI-B-7	B-7	Geoprobe
			EPI-B-8	B-8	Geoprobe
			EPI-B-9	B-9	Geoprobe
Ultra-2010 Phase II ESA	3/31/2010	4/1/2010	Px-SB01		Core
			Px-SB02		Core
			Px-SB03		Core
			Px-SB04		Core
			Px-SB05		Core

Table 3.2
Temporary Soil and Groundwater Sample Location Information

Event Nickname	Event Start	Event End	Floyd|Snider Location Name	Location Name in Source Report	Location Type
Ultra-2011 Phase II ESA	6/27/2011	6/28/2011	CDM-B20	B20	Core
			CDM-B29	B29	Core
			CDM-B19	B19	Core
			CDM-B21	B21	Core
			CDM-B24	B24	Core
			CDM-B25	B25	Core
			CDM-B26	B26	Core
			CDM-B27	B27	Core
			CDM-B28	B28	Core
Ultra-2013 SubSurf Inv	10/14/2013	10/18/2013	PP-1		Core
			PP-10		Core
			PP-11		Core
			PP-12		Core
			PP-13		Core
			PP-14		Core
			PP-15		Core
			PP-16		Core
			PP-17		Core
			PP-18		Core
			PP-19		Core
			PP-2		Core
			PP-20		Core
			PP-21		Core
			PP-22		Core
			PP-23		Core
			PP-24		Core
			PP-25		Core
			PP-26		Core
			PP-27		Core
			PP-28		Core
			PP-29		Core
			PP-3		Core
			PP-30		Core
			PP-4		Core
			PP-5		Core
			PP-6		Core
			PP-7		Core
			PP-8		Core
			PP-9		Core
Ultra-2015 UST Removal	11/17/2015	11/17/2015	UST-B-7.5		Point
			UST-ES-5		Point
			UST-SS-5		Point
			UST-WS-5		Point
			UST-NS-5		Point
Ultra-2016 GW Inv	6/22/2016	6/22/2016	FB-9		Core
Ultra-2016 SubSurf Inv	5/10/2016	5/12/2016	EAlb-B1	B1	Core
			EAlb-B2	B2	Core
			EAlb-B3	B3	Core
			EAlb-B4	B4	Core
			EAlb-B5	B5	Core
			EAlb-B6	B6	Core
			EAlb-B7	B7	Core
			EAlb-B8	B8	Core
			EAlb-B9	B9	Core
			EAlb-B10	B10	Core
			EAlb-B11	B11	Core
			EAlb-B12	B12	Core
			EAlb-B13	B13	Core
			EAlb-B14	B14	Core
			EAlb-B15	B15	Core
			EAlb-B16	B16	Core
			EAlb-B17	B17	Core
			EAlb-B18	B18	Core
			EAlb-B19	B19	Core
			EAlb-B20	B20	Core
			EAlb-B21	B21	Core
			EAlb-B22	B22	Core
Ultra-2017 Site Delineation	3/20/2017	4/5/2017	UCCB-1	B-1	Core
			UCCB-10	B-10	Core
			UCCB-2	B-2	Core
			UCCB-3	B-3	Core
			UCCB-4	B-4	Core
			UCCB-5	B-5	Core
			UCCB-8	B-8	Core
			UCCB-9	B-9	Core

Table 3.2
Temporary Soil and Groundwater Sample Location Information

Event Nickname	Event Start	Event End	Floyd|Snider Location Name	Location Name in Source Report	Location Type
Ultra-Aug 2015 SubSurf Inv	8/3/2015	8/4/2015	Lot5-1		Geoprobe
			Lot5-2		Geoprobe
			Lot5-3		Geoprobe
			Lot5-4		Geoprobe
			Lot5-5		Geoprobe
			Lot5-6		Geoprobe
			Lot8-1		Geoprobe
			Lot8-3		Geoprobe
			Lot8-4		Geoprobe
Ultra-Dec 2011 SubSurf Inv	12/14/2011	12/16/2011	ESS-B1		Geoprobe
			ESS-B2		Geoprobe
			ESD-B1		Geoprobe
			ESD-B2		Geoprobe
			PSD-B1		Geoprobe
			PSD-B2		Geoprobe
			PSD-B3		Geoprobe
			PSD-B4		Geoprobe
			PSD-B5		Geoprobe
			PSD-B6		Geoprobe
Ultra-Feb. 2018 HWA Recon GW Inv	2/13/2018	2/14/2018	UCCB-11	B-11	Well-Temp
			UCCB-12	B-12	Well-Temp
			UCCB-13	B-13	Well-Temp
			UCCB-14	B-14	Well-Temp
			UCCB-15	B-15	Well-Temp
			UCCB-16	B-16	Well-Temp
			UCCB-17	B-17	Well-Temp
			UCCB-18	B-18	Well-Temp
Ultra-May 2016 SubSurf Inv	5/3/2016	5/4/2016	EAIa-B1	B1	Geoprobe
			EAIa-B2	B2	Geoprobe
			EAIa-B3	B3	Geoprobe
			EAIa-B4	B4	Geoprobe
			EAIa-B5	B5	Geoprobe
			EAIa-B6	B6	Geoprobe
			EAIa-B7	B7	Geoprobe
			EAIa-B8	B8	Geoprobe
			EAIa-B9	B9	Geoprobe
			EAIa-B10	B10	Geoprobe
			EAIa-B11	B11	Geoprobe
Ultra-Nov 2011 SubSurf Inv	11/10/2011	11/21/2011	HWA-HH-1	HH-1	Core
			HWA-SB-N	SB-N	SubSlab
			HWA-SB-S	SB-S	SubSlab
			HWA-CH-B1	CH-B1	Core
			HWA-CH-B2	CH-B2	Core
			HWA-CH-B3	CH-B3	Core
			HWA-CH-B4	CH-B4	Core
			HWA-CH-B8	CH-B8	Core
			HWA-CH-B9	CH-B9	Core
			HWA-CH-B11	CH-B11	Core
			HWA-CH-B12	CH-B12	Core
			HWA-CH-B13	CH-B13	Core

Note:
Blanks indicate location name presented in the source report matches the name assigned by Floyd|Snider.

Table 3.3
Groundwater Screening Levels

Chemical (1)	CAS No.	MTCA A Criteria (µg/L) (2)	Minimum Groundwater State and Federal MCLs (µg/L) (3)	Select Groundwater Vapor Intrusion SL (ug/L) (4)	Groundwater Screening Level (ug/L) (5)
Conventionals					
Nitrate	14797-55-8		10,000		10,000
Sulfate	14808-79-8				
Total Metals					
Arsenic	7440-38-2	5	10		5.0
Barium	7440-39-3		2,000		2,000
Cadmium	7440-43-9	5	5		5.0
Chromium	7440-47-3	50	100		50
Lead	7439-92-1	15	15		15
Mercury	7439-97-6	2	2	0.29	0.29
Selenium	7782-49-2		50		50
Silver	7440-22-4				
Iron	7439-89-6				
Manganese	7439-96-5				
Chlorinated Volatile Organic Compounds					
cis-1,2-Dichloroethene	156-59-2	16	70		16
Tetrachloroethene	127-18-4	5	5	24	5.0
trans-1,2-Dichloroethene	156-60-5	160	100		100
Trichloroethene	79-01-6	5	5	1.5	1.5
Vinyl chloride	75-01-4	0.2	2	0.35	0.20
Volatile Organic Compounds					
1,1,1,2-Tetrachloroethane	630-20-6			7.4	7.4
1,1,1-Trichloroethane	71-55-6	200	200	5,500	200
1,1,2,2-Tetrachloroethane	79-34-5			6.2	6.2
1,1,2-Trichloroethane	79-00-5		5	4.6	4.6
1,1-Dichloroethane	75-34-3			11	11
1,1-Dichloroethene	75-35-4		7	130	7.0
1,2,3-Trichloropropane	96-18-4				
1,2,4-Trichlorobenzene	120-82-1		70	39	39
1,2,4-Trimethylbenzene	95-63-6			240	240
1,2-Dibromo-3-chloropropane	96-12-8		0.2		0.20
1,2-Dibromoethane	106-93-4	0.01	0.05	0.27	0.010
1,2-Dichlorobenzene	95-50-1		600	2,600	600
1,2-Dichloroethane	107-06-2	5	5	4.2	4.2
1,2-Dichloropropane	78-87-5		5	10	5.0
1,3,5-Trimethylbenzene	108-67-8				
1,3-Dichlorobenzene	541-73-1				
1,4-Dichlorobenzene	106-46-7		75	4.9	4.9
2,4-Dinitrotoluene	121-14-2				
2,6-Dinitrotoluene	606-20-2				
2-Chlorotoluene	95-49-8				
2-Hexanone	591-78-6				
2-Nitroaniline	88-74-4				
3,3'-Dichlorobenzidine	91-94-1				
4-Chloroaniline	106-47-8				
4-Nitroaniline	100-01-6				
Acetone	67-64-1				
bis(2-chloroethyl)ether	111-44-4				
bis(2-chloroisopropyl)ether	39638-32-9				
Bromobenzene	108-86-1				
Bromodichloromethane	75-27-4		80	1.8	1.8
Bromoform	75-25-2		80	200	80
Bromomethane	74-83-9			13	13
Carbon disulfide	75-15-0			400	400
Carbon tetrachloride	56-23-5		5	0.56	0.56
Chlorobenzene	108-90-7		100	290	100
Chloroethane	75-00-3			18,000	18,000
Chloroform	67-66-3		80	1.2	1.2
Chloromethane	74-87-3			150	150
Dibromochloromethane	124-48-1		80		80
Dibromomethane	74-95-3				
Dichlorodifluoromethane	75-71-8			5.6	5.6
Hexachlorobenzene	118-74-1		1		1.0
Hexachlorobutadiene (6)	87-68-3			0.81	0.81
Hexachloroethane	67-72-1			3.1	3.1
iso-Propylbenzene	98-82-8			720	720
m-Dinitrobenzene	99-65-0				
Methyl ethyl ketone	78-93-3			1,700,000	1,700,000
Methyl iso butyl ketone	108-10-1			470,000	470,000
Methylene chloride	75-09-2	5	5	4,400	5.0
Methyl-Tert-Butyl Ether	1634-04-4	20		600	20
n-Butylbenzene	104-51-8				
Nitrobenzene	98-95-3			160	160
n-Propylbenzene	103-65-1				
Pyridine	110-86-1				
sec-Butylbenzene	135-98-8				
Styrene	100-42-5		100	8,200	100
tert-Butylbenzene	98-06-6				
Trichlorofluoromethane	75-69-4			120	120
Vinyl acetate	108-05-4			7,800	7,800
Total Petroleum Hydrocarbons					
Diesel Range Organics	DRO	500			500
Gasoline Range Organics	GRO	800			800
Oil Range Organics	ORO	500			500

Table 3.3
Groundwater Screening Levels

Chemical [(1)]	CAS No.	MTCA A Criteria (μg/L) [(2)]	Minimum Groundwater State and Federal MCLs (μg/L) [(3)]	Select Groundwater Vapor Intrusion SL (ug/L) [(4)]	Groundwater Screening Level (ug/L) [(5)]
Benzene, Toluene, Ethylbenzene, and Xylenes					
Benzene	71-43-2	5	5	2.4	2.4
Ethylbenzene	100-41-4	700	700	2,800	700
Toluene	108-88-3	1,000	1,000	15,000	1,000
Xylene (meta & para)	108-38-3/106-42-3				
Xylene (ortho)	95-47-6				
Xylene (total)	1330-20-7	1,000	10,000	330	330
Carcinogenic Polycyclic Aromatic Hydrocarbon (cPAHs)					
cPAHs (MTCA TEQ-HalfND)	BaPEq (U=0)	0.1	0.2		0.10
cPAHs (MTCA TEQ-ZeroND)	BaPEq (U=1/2)	0.1	0.2		0.10
Benzo(a)anthracene	56-55-3				
Chrysene	218-01-9				
Benzo(b)fluoranthene	205-99-2				
Benzo(k)fluoranthene	207-08-9				
Benzo(a)pyrene	50-32-8	0.1	0.2		0.10
Indeno(1,2,3-cd)pyrene	193-39-5				
Dibenzo(a,h)anthracene	53-70-3				
Semivolatile Organic Compound					
1,2-Diphenylhydrazine	122-66-7				
1-Methylnaphthalene	90-12-0				
2,3,4,6-Tetrachlorophenol	58-90-2				
2,4,5-Trichlorophenol	95-95-4				
2,4,6-Trichlorophenol	88-06-2				
2,4-Dichlorophenol	120-83-2				
2,4-Dimethylphenol	105-67-9				
2,4-Dinitrophenol	51-28-5				
2-Chloronaphthalene	91-58-7				
2-Chlorophenol	95-57-8				
2-Methylphenol	95-48-7				
3- & 4-Methylphenol	MEPH3_4				
4,6-Dinitro-o-cresol	534-52-1				
4-Chloro-3-methylphenol	59-50-7				
Acrylonitrile	107-13-1			16	16
Aniline	62-53-3				
Benzidine	92-87-5				
Benzyl alcohol	100-51-6				
bis(2-ethylhexyl)phthalate	117-81-7		6		6.0
Butyl benzyl phthalate	85-68-7				
Carbazole	86-74-8				
Dibenzofuran	132-64-9				
Diethylphthalate	84-66-2				
Dimethyl phthalate	131-11-3				
Di-n-butyl phthalate	84-74-2				
Di-n-octyl phthalate	117-84-0				
Hexachlorocyclopentadiene	77-47-4		50		50
Isophorone	78-59-1				
N-Nitrosodimethylamine	62-75-9				
N-Nitroso-di-n-propylamine	621-64-7				
N-Nitrosodiphenylamine	86-30-6				
o-Dinitrobenzene	528-29-0				
p-Dinitrobenzene	100-25-4				
Pentachlorophenol	87-86-5		1		1.0
Phenol	108-95-2				
Naphthalene	91-20-3	160		8.9	8.9
Acenaphthylene	208-96-8				
Acenaphthene	83-32-9				
Fluorene	86-73-7				
Phenanthrene	85-01-8				
Anthracene	120-12-7				
2-Methylnaphthalene	91-57-6				
Fluoranthene	206-44-0				
Pyrene	129-00-0				
Benzo(g,h,i)perylene	191-24-2				

Notes:

All screening levels presented in this table are rounded to two significant figures.

Blanks are intentional; no criteria exist.

1 Groundwater screening levels were developed for all chemicals analyzed in groundwater during historical environmental investigations.

2 MTCA Method A groundwater criteria are from WAC Table 720-1 for all chemicals. When MTCA Method A criteria are not available for any chemical previously identified as a COPC for the Site (i.e., cis- and trans-dichloroethene), the criterion in this table is the lowest of MTCA Method B groundwater criteria protective of cancer and noncancer endpoints. MTCA Method B groundwater criteria are consistent with Ecology's May 2019 CLARC data tables.

3 Criteria listed in this table are the lowest of the Federal and State Maximum Contaminant Levels established in 40 CFR 141 and WAC 326-290-310, respectively, for each chemical.

4 Criteria in this table are the lowest of the MTCA Method B vapor intrusion screening levels protective of cancer and noncancer endpoints for each chemical. Development and guidance for use of criteria protective of this pathway are described in Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, as revised in 2019.

5 The groundwater screening level is the lowest of the criteria presented in this table, after adjusting for natural background. Groundwater screening levels are protective of direct contact and vapor intrusion pathways.

6 Hexachlorobutadiene is listed as a volatile organic compound in this table because it has historically been analyzed for at the Site using a volatile organic compound method.

Abbreviations:

CAS Chemical Abstracts Service
CFR Code of Federal Regulations
CLARC Cleanup Levels and Risk Calculation
COPC Chemical of potential concern
Ecology Washington State Department of Ecology
μg/L Micrograms per liter
MCL Maximum contaminant level
MTCA Model Toxics Control Act
ND Non-detect
Site Ultra Custom Care Cleaners Site
SL Screening level
TEQ Toxic equivalent
WAC Washington Administrative Code

Table 3.4
Soil Screening Levels

Chemical [(1)]	CAS No.	MTCA Method A Unrestricted Land Use (mg/kg) [(2)]	Minimum Soil Simple Unrestricted Land Use Site TEE (mg/kg) [(3)]	Soil Screening Level (mg/kg) [(4)]
Metals				
Arsenic	7440-38-2	20		20
Barium	7440-39-3		1,250	1,300
Cadmium	7440-43-9	2	25	2.0
Chromium	7440-47-3	2,000		2,000
Lead	7439-92-1	250	220	220
Mercury	7439-97-6	2	0.7	0.70
Selenium	7782-49-2		0.8	0.80
Silver	7440-22-4			
Chlorinated Volatile Organic Compounds				
cis-1,2-Dichloroethene	156-59-2	160		160
Tetrachloroethene	127-18-4	0.05		0.050
trans-1,2-Dichloroethene	156-60-5	1,600		1,600
Trichloroethene	79-01-6	0.03		0.030
Vinyl chloride	75-01-4	0.67		0.67
Volatile Organic Compounds				
1,1,1,2-Tetrachloroethane	630-20-6			
1,1,1-Trichloroethane	71-55-6	2		2.0
1,1,2,2-Tetrachloroethane	79-34-5			
1,1,2-Trichloroethane	79-00-5			
1,1-Dichloroethane	75-34-3			
1,1-Dichloroethene	75-35-4			
1,2,3-Trichloropropane	96-18-4			
1,2,4-Trichlorobenzene	120-82-1			
1,2,4-Trimethylbenzene	95-63-6			
1,2-Dibromo-3-chloropropane	96-12-8			
1,2-Dibromoethane	106-93-4	0.005		0.0050
1,2-Dichlorobenzene	95-50-1			
1,2-Dichloroethane	107-06-2			
1,2-Dichloropropane	78-87-5			
1,3,5-Trimethylbenzene	108-67-8			
1,3-Dichlorobenzene	541-73-1			
1,4-Dichlorobenzene	106-46-7			
2-Chlorotoluene	95-49-8			
2-Hexanone	591-78-6			
Acetone	67-64-1			
Bromobenzene	108-86-1			
Bromodichloromethane	75-27-4			
Bromoform	75-25-2			
Bromomethane	74-83-9			
Carbon disulfide	75-15-0			
Carbon tetrachloride	56-23-5			
Chlorobenzene	108-90-7			
Chloroethane	75-00-3			
Chloroform	67-66-3			
Chloromethane	74-87-3			
Dibromochloromethane	124-48-1			
Dibromomethane	74-95-3			
Dichlorodifluoromethane	75-71-8			
Hexachlorobutadiene [(5)]	87-68-3			
iso-Propylbenzene	98-82-8			
Methyl ethyl ketone	78-93-3			
Methyl iso butyl ketone	108-10-1			
Methylene chloride	75-09-2	0.02		0.020
Methyl-Tert-Butyl Ether	1634-04-4	0.1		0.10
n-Butylbenzene	104-51-8			
n-Propylbenzene	103-65-1			
sec-Butylbenzene	135-98-8			
Styrene	100-42-5			
tert-Butylbenzene	98-06-6			
Trichlorofluoromethane	75-69-4			
Vinyl acetate	108-05-4			
Benzene, Toluene, Ethylbenzene, and Xylenes				
Benzene	71-43-2	0.03		0.030
Ethylbenzene	100-41-4	6		6.0
Toluene	108-88-3	7		7.0
Xylene (meta & para)	108-38-3/106-42-3			
Xylene (ortho)	95-47-6			
Xylene (total)	1330-20-7	9		9.0

Table 3.4
Soil Screening Levels

Chemical [1]	CAS No.	MTCA Method A Unrestricted Land Use (mg/kg) [2]	Minimum Soil Simple Unrestricted Land Use Site TEE (mg/kg) [3]	Soil Screening Level (mg/kg) [4]
Total Petroleum Hydrocarbons				
Diesel Range Organics	DRO	2,000	460	460
Gasoline Range Organics	GRO	30	200	30
Oil Range Organics	ORO	2,000		2,000
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)				
cPAHs (MTCA TEQ-HalfND)	BaPEq (U=0)	0.1	30	0.10
cPAHs (MTCA TEQ-ZeroND)	BaPEq (U=1/2)	0.1	30	0.10
Benzo(a)anthracene	56-55-3			
Chrysene	218-01-9			
Benzo(b)fluoranthene	205-99-2			
Benzo(k)fluoranthene	207-08-9			
Benzo(a)pyrene	50-32-8	0.1	30	0.10
Indeno(1,2,3-cd)pyrene	193-39-5			
Dibenzo(a,h)anthracene	53-70-3			
Polychlorinated Biphenyls (PCBs)				
Total PCBs	T_PCB (U=0)	1	2	1.0
PCB Aroclor 1016	12674-11-2			
PCB Aroclor 1254	11097-69-1			
PCB Aroclor 1260	11096-82-5			
Semivolatile Organic Compounds				
1-Methylnaphthalene	90-12-0			
Naphthalene	91-20-3	5		5.0
Acenaphthylene	208-96-8			
Acenaphthene	83-32-9			
Fluorene	86-73-7			
Phenanthrene	85-01-8			
Anthracene	120-12-7			
2-Methylnaphthalene	91-57-6			
Fluoranthene	206-44-0			
Pyrene	129-00-0			
Benzo(g,h,i)perylene	191-24-2			

Notes:

All screening levels presented in this table are rounded to two significant figures.
Blanks are intentional; no criteria exist.

1 Soil screening levels were developed for all chemicals analyzed in soil during historical environmental investigations.
2 MTCA Method A Soil Criteria for unrestricted land use are from WAC Table 740-1. When MTCA Method A criteria are not available for any chemical previously identified as a COPC for the Site, the criterion in this table is the lowest of MTCA Method B soil criteria protective of cancer and noncancer endpoints for that chemical. MTCA Method B soil criteria are consistent with Ecology's May 2019 CLARC data tables.
3 Simplified TEE soil screening levels are from WAC Table 749-2.
4 The soil screening level is the lowest of the criteria presented in this table, after adjusting for natural background. Soil screening levels are protective of human health and ecological receptors via the direct contact pathway.
5 Hexachlorobutadiene is listed as a volatile organic compound in this table because it has historically been analyzed for at the site using a volatile organic compound method.

Abbreviations:

CAS Chemical Abstracts Service
CLARC Cleanup Levels and Risk Calculation
COPC Chemical of potential concern
mg/kg Milligrams per kilogram
MTCA Model Toxics Control Act
ND Non-detect
Site Ultra Custom Care Cleaners Site
TEE Terrestrial Ecological Evaluation
TEQ Toxic equivalent
WAC Washington Administrative Code

Table 3.5
Summary of Groundwater Results Compared to Screening Levels

Chemical (1)	CAS No.	Units	Information About Dataset (2,3) Number of Results	Percent of Detected Results	Maximum Detected Result	Location of Maximum Detect	Date of Maximum Detect	Information about Criteria and Detected Exceedances Groundwater Screening Level (3,4)	Number of Results That Exceed Criteria	Percent of Results That Exceed Criteria	Maximum Exceedance Factor (5)	Information about Non-Detect Results Minimum Non-Detect Result	Maximum Non-Detect Result	Percent of Results that Exceed Criteria
Conventionals														
Nitrate	14797-55-8	µg/L	136	95%	9,200	UCCMW-3R	5/10/2014	10,000	None	None	None	50	50	None
Metals, Total (6)														
Arsenic	7440-38-2	µg/L	30	33%	180	BB-1	5/19/2009	5.0	3	10%	**36**	3.0	3.3	None
Barium	7440-39-3	µg/L	5	40%	2,400	BB-1	5/19/2009	2,000	1	20%	**1.2**	28	28	None
Cadmium	7440-43-9	µg/L	11	None	--	--	--	5.0	--	--	--	4.0	4.4	None
Chromium	7440-47-3	µg/L	11	36%	930	BB-1	5/19/2009	50	2	18%	**19**	10	11	None
Lead	7439-92-1	µg/L	11	36%	380	BB-1	5/19/2009	15	1	9%	**25**	1.0	1.1	None
Mercury	7439-97-6	µg/L	6	17%	0.59	BB-1	5/19/2009	0.29	1	17%	**2.0**	**0.50**	**0.50**	83%
Selenium	7782-49-2	µg/L	5	20%	11	BB-1	5/19/2009	50	None	None	None	5.6	5.6	None
Chlorinated Volatile Organic Compounds (cVOCs)														
cis-1,2-Dichloroethene	156-59-2	µg/L	577	42%	1,600	UCCMW-1D	10/21/2015	16	46	8.0%	**100**	0.20	4.0	None
Tetrachloroethene	127-18-4	µg/L	586	77%	1,700	PP-14	10/16/2013	5.0	181	31%	**340**	0.20	5.0	None
trans-1,2-Dichloroethene	156-60-5	µg/L	570	27%	11	UCCMW-19	8/19/2014	100	None	None	None	0.20	10	None
Trichloroethene	79-01-6	µg/L	577	44%	190	PP-8	10/15/2013	1.5	66	11%	**127**	0.20	**5.0**	0.5%
Vinyl chloride	75-01-4	µg/L	577	31%	280	UCCMW-18	1/28/2016	0.20	69	12%	**1,400**	0.20	**10**	7%
Volatile Organic Compounds (VOCs)														
1,1,1,2-Tetrachloroethane	630-20-6	µg/L	539	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	7.4	3	0.6%	**1.4**	0.20	**10**	0.2%
1,1,1-Trichloroethane	71-55-6	µg/L	570	27%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	200	None	None	None	0.20	10	None
1,1,2,2-Tetrachloroethane	79-34-5	µg/L	539	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	6.2	3	0.6%	**1.6**	0.20	**10**	0.2%
1,1,2-Trichloroethane	79-00-5	µg/L	539	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	4.6	3	0.6%	**2.2**	0.20	**10**	0.6%
1,1-Dichloroethane	75-34-3	µg/L	570	27%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	11	None	None	None	0.20	10	None
1,1-Dichloroethene	75-35-4	µg/L	570	27%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	7.0	3	0.5%	**1.4**	0.20	**10**	0.2%
1,2,4-Trichlorobenzene	120-82-1	µg/L	542	28%	13	UCCMW-1D	10/21/2015	39	None	None	None	0.20	10	None
1,2,4-Trimethylbenzene	95-63-6	µg/L	13	None	--	--	--	240	--	--	--	0.20	0.20	None

Table 3.5
Summary of Groundwater Results Compared to Screening Levels

			Information About Dataset [2,3]					Information about Criteria and Detected Exceedances				Information about Non-Detect Results		
Chemical [1]	**CAS No.**	**Units**	**Number of Results**	**Percent of Detected Results**	**Maximum Detected Result**	**Location of Maximum Detect**	**Date of Maximum Detect**	**Groundwater Screening Level [3,4]**	**Number of Results That Exceed Criteria**	**Percent of Results That Exceed Criteria**	**Maximum Exceedance Factor [5]**	**Minimum Non-Detect Result**	**Maximum Non-Detect Result**	**Percent of Results that Exceed Criteria**
Volatile Organic Compounds (VOCs) (cont.)														
1,2-Dibromo-3-chloropropane	96-12-8	µg/L	539	28%	65	INJ-2 UCCMW-1D	5/3/2016 10/21/2015	0.20	153	28%	**325**	**1.0**	**50**	72%
1,2-Dibromoethane	106-93-4	µg/L	539	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	0.010	153	28%	**1,000**	**0.20**	**10**	72%
1,2-Dichlorobenzene	95-50-1	µg/L	542	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	600	None	None	None	0.20	10	None
1,2-Dichloroethane	107-06-2	µg/L	570	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	4.2	3	0.5%	**2.4**	0.20	**10**	0.5%
1,2-Dichloropropane	78-87-5	µg/L	539	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	5.0	3	0.6%	**2.0**	0.20	**10**	0.2%
1,4-Dichlorobenzene	106-46-7	µg/L	542	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	4.9	3	0.6%	**2.0**	0.20	**10**	0.6%
Bromodichloromethane	75-27-4	µg/L	539	29%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	1.8	9	1.7%	**5.6**	0.20	**10**	2.8%
Bromoform	75-25-2	µg/L	539	28%	50	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	80	None	None	None	1.0	50	None
Bromomethane	74-83-9	µg/L	539	28%	19	INJ-2	5/3/2016	13	1	0.2%	**1.5**	0.20	10	None
Carbon disulfide	75-15-0	µg/L	13	None	--	--	--	400	--	--	--	0.20	0.20	None
Carbon tetrachloride	56-23-5	µg/L	539	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	0.56	14	2.6%	**18**	0.20	**10**	3.7%
Chlorobenzene	108-90-7	µg/L	539	29%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	100	None	None	None	0.20	10	None
Chloroethane	75-00-3	µg/L	570	27%	50	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	18,000	None	None	None	1.0	50	None

Table 3.5
Summary of Groundwater Results Compared to Screening Levels

Chemical [1]	CAS No.	Units	Information About Dataset [2,3]					Information about Criteria and Detected Exceedances				Information about Non-Detect Results		
			Number of Results	Percent of Detected Results	Maximum Detected Result	Location of Maximum Detect	Date of Maximum Detect	Groundwater Screening Level [3,4]	Number of Results That Exceed Criteria	Percent of Results That Exceed Criteria	Maximum Exceedance Factor [5]	Minimum Non-Detect Result	Maximum Non-Detect Result	Percent of Results that Exceed Criteria
Volatile Organic Compounds (VOCs) (cont.)														
Chloroform	67-66-3	µg/L	539	40%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	1.2	20	3.7%	**8.3**	0.20	**10**	2.8%
Chloromethane	74-87-3	µg/L	539	29%	50	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	150	None	None	None	1.0	50	None
Dibromochloromethane	124-48-1	µg/L	539	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	80	None	None	None	0.20	10	None
Dichlorodifluoromethane	75-71-8	µg/L	539	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	5.6	3	0.6%	**1.8**	0.20	**13**	0.4%
Hexachlorobenzene	118-74-1	µg/L	3	None	--	--	--	1.0	--	--	--	0.94	1.0	None
Hexachlorobutadiene [7]	87-68-3	µg/L	542	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	0.81	14	2.6%	**12**	0.20	**10**	4.2%
Hexachloroethane	67-72-1	µg/L	3	None	--	--	--	3.1	--	--	--	0.94	1.0	None
iso-Propylbenzene	98-82-8	µg/L	13	None	--	--	--	720	--	--	--	0.20	0.20	None
Methyl ethyl ketone	78-93-3	µg/L	13	None	--	--	--	1,700,000	--	--	--	5.0	5.0	None
Methyl iso butyl ketone	108-10-1	µg/L	13	7.7%	4.5	BB-1	5/19/2009	470,000	None	None	None	2.0	2.0	None
Methylene chloride	75-09-2	µg/L	570	27%	100	INJ-2	5/3/2016	5.0	9	1.6%	**20**	1.0	**50**	3.2%
Methyl-Tert-Butyl Ether	1634-04-4	µg/L	13	7.7%	0.30	BB-1	5/19/2009	20	None	None	None	0.20	0.20	None
Nitrobenzene	98-95-3	µg/L	3	None	--	--	--	160	--	--	--	0.94	1.0	None
Styrene	100-42-5	µg/L	13	None	--	--	--	100	--	--	--	0.20	0.20	None
Trichlorofluoromethane	75-69-4	µg/L	539	28%	10	INJ-2 UCCMW-18 UCCMW-1D	5/3/2016 12/17/2014 10/21/2015	120	None	None	None	0.20	10	None
Vinyl acetate	108-05-4	µg/L	13	None	--	--	--	7,800	--	--	--	2.0	2.0	None
Total Petroleum Hydrocarbons (TPH)														
Diesel-Range Organics	DRO	µg/L	87	22%	510	EAIa-B8	5/4/2016	500	1	1.1%	**1.0**	50.0	320.0	None
Gasoline-Range Organics	GRO	µg/L	89	27%	380	CDM-B2	4/7/2009	800	None	None	None	100.0	400.0	None
Oil-Range Organics	ORO	µg/L	86	19%	630	BLMW-8D	12/16/2014	500	3	3.5%	**1.3**	250.0	**510.0**	1.2%
Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)														
Benzene	71-43-2	µg/L	93	20%	15	BLMW-3	9/17/2009	2.4	4	4.3%	**6.3**	0.20	1.0	None
Ethylbenzene	100-41-4	µg/L	93	17%	3.5	CDM-B3	4/2/2009	700	None	None	None	0.20	4.0	None

Table 3.5
Summary of Groundwater Results Compared to Screening Levels

Chemical [1]	CAS No.	Units	Information About Dataset [2,3]					Information about Criteria and Detected Exceedances				Information about Non-Detect Results		
			Number of Results	Percent of Detected Results	Maximum Detected Result	Location of Maximum Detect	Date of Maximum Detect	Groundwater Screening Level [3,4]	Number of Results That Exceed Criteria	Percent of Results That Exceed Criteria	Maximum Exceedance Factor [5]	Minimum Non-Detect Result	Maximum Non-Detect Result	Percent of Results that Exceed Criteria
Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) (cont.)														
Toluene	108-88-3	µg/L	93	16%	1.0	BLMW-1 BLMW-1 BLMW-10 BLMW-10 BLMW-5R BLMW-7 BLMW-9 BLMW-9 UCCMW-10 UCCMW-10 UCCMW-10 UCCMW-8 UCCMW-9 UCCMW-9 UCCMW-9	6/11/2014 12/8/2014 6/13/2014 12/8/2014 12/8/2014 12/8/2014 6/13/2014 12/8/2014 1/29/2015 6/13/2014 10/26/2015 5/29/2014 5/28/2014 9/13/2014 12/17/2014	1,000	None	None	None	1.0	5.0	None
Xylene (total)	1330-20-7	µg/L	92	21%	4.1	CDM-B3	4/2/2009	330	None	None	None	0.40	5.0	None
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)														
cPAHs (MTCA TEQ-HalfND)	BaPEq (U=1/2)	µg/L	6	17%	0.022	UCCMW-8	9/13/2014	0.10	None	None	None	0.0094	0.011	None
cPAHs (MTCA TEQ-ZeroND)	BaPEq (U=0)	µg/L	6	17%	0.022	UCCMW-8	9/13/2014	0.10	None	None	None	0.0094	0.011	None
Benzo(a)pyrene	50-32-8	µg/L	6	17%	0.014	UCCMW-8	9/13/2014	0.10	None	None	None	0.0094	0.011	None
Semivolatile Organic Compounds (sVOCs)														
bis(2-ethylhexyl)phthalate	117-81-7	µg/L	3	None	--	--	--	6.0	--	--	--	1.0	4.7	None
Hexachlorocyclopentadiene	77-47-4	µg/L	3	None	--	--	--	50	--	--	--	0.94	**1.0**	None
Pentachlorophenol	87-86-5	µg/L	3	None	--	--	--	1.0	--	--	--	**4.7**	**5.1**	100%
Naphthalene	91-20-3	µg/L	19	None	--	--	--	8.9	--	--	--	0.094	1.0	None

Notes:

All screening levels and results presented in this table are rounded to two significant figures.
-- Not applicable; chemical was not detected.
RED/BOLD Chemical whose maximum detected result exceeds screening level.
BOLD Non-detect result exceeds screening level.
1 This table includes only chemicals with groundwater screening levels.
2 The dataset includes all groundwater data collected after January 1, 2009, from the locations shown on Figure 3.1. This dataset may be further refined for use in the RI/FS. For example, metals results collected from direct-push borings are generally less reliable than metals results collected from properly developed monitoring wells.
3 Groundwater results and screening levels are rounded to two significant figures.
4 Groundwater screening levels were developed in Table 3.3 and are protective of direct contact and vapor intrusion pathways.
5 The exceedance factor is calculated by dividing the maximum detected result by the screening level. It is rounded to two significant figures.
6 Both total and dissolved metals data were collected during historical sampling events. Only total metals results are presented in this table; groundwater screening levels developed in Table 3.3 are applicable to the total metals fraction.
7 Hexachlorobutadiene is listed as a volatile organic compound in this table because it has historically been analyzed for at the site using a volatile organic compound method.

Abbreviations:

CAS Chemical Abstracts Service
CLARC Cleanup Levels and Risk Calculation
ug/L Micrograms per liter
MTCA Model Toxics Cleanup Act
ND Non-detect
RI/FS Remedial Investigation and Feasibility Study
TEQ Toxic equivalent

Table 3.6
Summary of Soil Results Compared to Screening Levels

Chemical [1]	CAS No.	Units	Information About Dataset [2]					Information about Criteria and Detected Exceedances				Information about Non-Detect Results		
			Number of Results	Percent of Detected Results	Maximum Detected Result	Location of Maximum Detect	Date of Maximum Detect	Soil Screening Level [3]	Number of Results That Exceed Criteria	Percent of Results That Exceed Criteria	Maximum Exceedance Factor [4]	Minimum Non-Detect Result	Maximum Non-Detect Result	Percent of Results that Exceed Criteria
Metals														
Arsenic	7440-38-2	mg/kg	12	33%	5.4	HWA-BH-13	7/9/2007	20	None	None	None	5.0	12	None
Barium	7440-39-3	mg/kg	7	100%	98	HWA-BH-13	7/9/2007	1,250	None	None	None	None	None	None
Cadmium	7440-43-9	mg/kg	12	None	--	--	--	2.0	--	--	--	0.54	**10**	8%
Chromium	7440-47-3	mg/kg	12	83%	31	HWA-BH-3	7/9/2007	42	None	None	None	10	**50**	8%
Lead	7439-92-1	mg/kg	13	69%	140	Px-SB04	3/31/2010	220	None	None	None	2.0	10	None
Mercury	7439-97-6	mg/kg	12	17%	0.060	HWA-BH-13	7/9/2007	0.70	None	None	None	0.27	**10**	33%
Selenium	7782-49-2	mg/kg	7	None	--	--	--	0.8	--	--	--	**5.0**	**12**	100%
Chlorinated Volatile Organic Compounds (cVOCs)														
cis-1,2-Dichloroethene	156-59-2	mg/kg	268	12%	0.015	PP-8	10/15/2013	160	None	None	None	0.00055	10	None
Tetrachloroethene	127-18-4	mg/kg	285	45%	20	EPI-B-1	7/22/2004	0.050	10	4%	**400**	0.00061	**10**	6%
trans-1,2-Dichloroethene	156-60-5	mg/kg	260	9%	0.0014	HWA-CH-B1	9/30/2011	1,600	None	None	None	0.00055	10	None
Trichloroethene	79-01-6	mg/kg	267	15%	0.013	PSD-B3	12/14/2011	0.030	10	4%	**400**	0.00057	**10**	7%
Vinyl chloride	75-01-4	mg/kg	260	9%	0.0024	ESS-B2	12/15/2011	0.67	None	None	None	0.00055	**10**	5%
Volatile Organic Compounds (VOCs)														
1,1,1-Trichloroethane	71-55-6	mg/kg	260	9%	0.0014	HWA-CH-B1	9/30/2011	2.0	None	None	None	0.00055	**10**	5%
1,2-Dibromoethane	106-93-4	mg/kg	166	14%	0.0014	HWA-CH-B1	9/30/2011	0.0050	None	None	None	0.00055	**5.0**	12%
Methylene chloride	75-09-2	mg/kg	268	11%	0.84	CDM-B2	4/2/2009	0.020	4	1%	**42**	0.0028	**10**	42%
Methyl-Tert-Butyl Ether	1634-04-4	mg/kg	24	None	--	--	--	0.10	--	--	--	0.00089	0.0015	None
Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)														
Benzene	71-43-2	mg/kg	65	14%	6.0	CDM-B3	4/2/2009	0.030	3	5%	**200**	0.00089	**0.30**	2%
Ethylbenzene	100-41-4	mg/kg	65	12%	12	CDM-B3	4/2/2009	6.0	1	2%	**2**	0.00089	0.073	None
Toluene	108-88-3	mg/kg	65	11%	1.2	HWA-BH-3	7/9/2007	7.0	None	None	None	0.0045	0.50	None
Xylene (total)	1330-20-7	mg/kg	65	12%	11.51	CDM-B3	4/2/2009	9.0	1	2%	**1.3**	0.0018	2.0	None
Total Petroleum Hydrocarbons (TPH)														
Diesel Range Organics	DRO	mg/kg	48	19%	9,300	HWA-BH-3	7/9/2007	460	4	8%	**20**	25	170	None
Gasoline Range Organics	GRO	mg/kg	55	18%	1,200	HWA-BH-3	7/9/2007	30	5	9%	**40**	1.5	**1,800**	5%
Oil Range Organics	ORO	mg/kg	48	40%	2,500	HWA-BH-21	8/9/2007	2,000	2	4%	**1.3**	50	1,000	None
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)														
cPAHs (MTCA TEQ-ZeroND)	BaPEq (U=0)	mg/kg	2	100%	0.0011	Px-SB04	3/31/2010	0.10	None	None	None	None	None	None
cPAHs (MTCA TEQ-HalfND)	BaPEq (U=1/2)	mg/kg	2	100%	0.031	HWA-BH-3	7/9/2007	0.10	None	None	None	None	None	None
Benzo(a)pyrene	50-32-8	mg/kg	2	None	--	--	--	0.10	--	--	--	0.0073	0.040	None
Polychlorinated Biphenols														
Total PCBs	T_PCB (U=0)	mg/kg	2	None	--	--	--	1.0	--	--	--	0.054	0.10	None
Semivolatile Organic Compounds (SVOCs)														
Naphthalene	91-20-3	mg/kg	28	7%	0.97	HWA-BH-3	7/9/2007	5.0	None	None	None	0.00089	0.11	None

Notes:

All screening levels and results presented in this table are rounded to two significant figures.

-- Not applicable; chemical was not detected.

RED/BOLD Chemical whose maximum detected result exceeds screening level.

BOLD Non-detect result exceeds soil screening level.

1 This table includes only chemicals that were analyzed for in soil during historical environmental investigations and that have soil screening levels.

2 The dataset includes all soil data collected from the locations shown on Figure 3.1. Soil results and screening levels are rounded to two significant figures.

3 Soil screening levels were developed in Table 3.4 and are protective of human health and ecological receptors via the direct contact pathway.

4 The exceedance factor is calculated by dividing the maximum detected result by the screening level. It is rounded to two significant figures.

Abbreviations:

CAS Chemical Abstracts Service

mg/kg Milligrams per kilogram

MTCA Model Toxics Cleanup Act

ND Non-detect

TEQ Toxic equivalent

Table 4.1
Summary of Well Status and Condition Verified During January 2020 Monitoring Well Reconnaissance Event

Well ID	Date of Measurement	Time of Measurement	Depth to Water (ft BTOC)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Total Depth (ft BTOC)	Total Depth (ft bgs)	TOC to Ground Surface (ft)	Casing Diameter (inches)	Damaged Monument?	Bolts Missing?	Flooded Monument?	Well Plug Missing?	Ecology Well ID	Comments
BB-2	1/9/2020	9:49	4.39	9	19	18.74	19.1	0.36	2	No	2/2	No	No	BAR 280	South of expected location. In driveway to Main St. Soft bottom.
BB-3	1/9/2020			10	20										Not found.
BC-5	1/9/2020	8:17	7.02	14	20	16.14	16.5	0.36	2	See comment	1/2	No	No	Missing	No Ecology tag. No concrete in monument around PVC (just, sand).
BI-3	1/9/2020	12:41	2.12	5	10	6.8	8.6	1.8	2	No	No	Yes	No	Missing	Well monument labeled as UCCMW-23 but much closer to BI-3 map location, slip cap near bottom of monument, soft bottom.
BLMW-1	1/9/2020	NM		5	15										Not found. Possibly in large stormwater puddle/pond.
BLMW-3	1/9/2020			5	15										Not found. New street/fresh asphalt.
BLMW-4	1/9/2020			5	15										Not found. New street and planters in area.
BLMW-5	1/9/2020			5	10										Not found. New concrete where well is supposed to be.
BLMW-5R	1/9/2020			5	15										Not found. New concrete where well is supposed to be.
BLMW-6	1/9/2020			5	15										Not part of area of concern/Site. Could not locate; new planter area where will is supposed to be.
BLMW-6R	1/9/2020	NM		5	15										Well exists, but not part of area of concern/Site.
BLMW-7	1/9/2020			5	10										Not found. New asphalt where well is supposed to be.
BLMW-9	1/9/2020			5	15										Not found. 10-inch diameter sewer monument within 15 feet.
BLMW-10	1/9/2020	8:45	4.78	5	10	14.61	14.75	0.14	2	No	No	Yes	No	BHZ 442	Well buried under 3-4" of gravel.
INJ-1	1/9/2020	10:27	7.7			22.29			4	No	No	No	No	BJA 503	
INJ-2	1/9/2020	10:41	8.43	8	23	21.9	22.2	0.3	4	No	No	No	No	BJA 504	Some sediment on probe tip upon retrieval.
Unknown	1/9/2020	14:35	9.58	8	13	12.29	12.5	0.21	1	No	All	Yes	No	BJA 560	No ID on well or monument. Located on source property.
INJ-?	1/9/2020	14:27	9.34	8	13	12.07	12.4	0.33	1	No	No	Yes	No	BJA 561	ID not legible on monument lid (looks like INJ-13 or INJ-18). Monument full of soapy water and thick/hard film covering everything (almost rusty looking).
INJ-4	1/9/2020	14:46	9.47			23.03	23.4	0.37	4	No	No	No	No	BJA 506	
INJ-5	1/9/2020	NM	NM								2/3				Cross-threaded bolt stuck. Unable to open monument lid.
INJ-6	1/9/2020	15:04	9.71			23.01	23.3	0.29	4	No	No	No	No	BJA 508	
INJ-7	1/9/2020	10:22	7.63			12.62			1	No	No	Yes	No	BJA 551	
INJ-8	1/9/2020	10:39	8.07			12.59			1	No	1	Yes	No	BJA 552	Soft bottom.
INJ-9	1/9/2020	10:21	8.35	8	23	12.85	13.1	0.25	1	No	No	Yes	No	BJA 553	Soft bottom.
INJ-10	1/9/2020	11:06	8.58			12.77			1	No	No	Yes	No	BJA 554	
INJ-11	1/9/2020	11:14	8.73			12.35			1	No	1/3	Yes	No	BJA 555	
INJ-12	1/9/2020	11:23	8.94			11.25			3/4	No	No	Yes	No	BJA 556	
INJ-13	1/9/2020	14:26	9.34			12.53	12.8	0.27	1	No	3/3	Yes	No	BJA 557	Torque cap doesn't fit (glued in?) but screw top acts as retrofitted slip cap.
INJ-14	1/9/2020	14:55	9.51			12.55	12.9	0.35	1	No	No	Yes	No	BJA 558	
INJ-15	1/9/2020	15:00	9.46			12.4	12.75	0.35	1	No	No	No	No	BJA 559	
RMW-4	1/9/2020			15	25										Not found. Nearby asphalt patch in concrete; possibly from well being decommissioned.
RMW-11D	1/9/2020			22	32										Not found. Cleanout nearby; new concrete and landscaping in area.
UCCMW-1	1/9/2020	11:27	9.14	4.5	14.5	14.55	14.8	0.25	2	No	2/3	No	No	Missing	Monument dirty; rusty, no ecology tag.
UCCMW-2	1/9/2020	11:29	7.71	3	13.5	13.38	13.55	0.17		Yes	3/3	No	No	Missing	Threaded cap; all bolts missing, but flanges are all stripped/too big.
UCCMW-3R	1/9/2020	13:45	8.83	3.5	13.5	15.9	14.9	-1	2	Yes	All	No	No	BHZ 439	Monument is fully exposed above ground surface (including PVC riser). Monument lid read "MW-3R". Updated ID in table from UCCMW-3 to UCCMW-3R.
UCCMW-4D	1/9/2020	10:10	8.2	35	40	39.57	39.8	0.23	2	No	No	Yes	No	BHZ 404	
UCCMW-5	1/9/2020	10:04	10.01	10	20	19.19	19.4	0.21		No	No	Yes	No	BHZ 436	Has threaded cap.
UCCMW-6	1/9/2020	12:30	4.33	5	15	13.2	14.25	1.05	2	No	No	No	No	BHZ 402	Well casing is sitting below base of monument.
UCCMW-7	1/9/2020	9:40	4.84	8	18	17.99	18.5	0.51		Yes	1/3	No	No	BHZ 438	Soft bottom; missing flange where bolt is missing; partially cemented lid took considerable effort to open.
UCCMW-8	1/9/2020	9:12	4.4	5	15	14.33	14.6	0.27	2	No	1/3	No	No	BHZ 441	Soft bottom.
UCCMW-9	1/9/2020	12:52	3.8	5	15	10.77	12.35	1.58	2	No	No	No	No	BHZ 403	Monument has been raised (sitting on cinder blocks) so well casing is below base of monument.
UCCMW-10	1/9/2020	13:17	4.36	5	15	10.6	10.8	0.2	2	Yes	No	No	No	BHZ 437	Monument in left turn lane (west bound) of Main St. Bolts were cemented in; required significant effort to open. Soft bottom. Monument lid cracked.
UCCMW-11S	1/9/2020	13:57	7.89	8	18	17.64	17.95	0.31	2	No	1/2	Yes	No		Threaded cap.
UCCMW-11	1/9/2020	13:47	8.00	18	23	22.35	22.5	0.15	1	Yes	No	Yes	No	BIE 899	Threaded cap; one flange broken so bolt is not functional; skirt is cracked; soft bottom.

Table 4.1
Summary of Well Status and Condition Verified During January 2020 Monitoring Well Reconnaissance Event

Well ID	Date of Measurement	Time of Measurement	Depth to Water (ft BTOC)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Total Depth (ft BTOC)	Total Depth (ft bgs)	TOC to Ground Surface (ft)	Casing Diameter (inches)	Damaged Monument?	Bolts Missing?	Flooded Monument?	Well Plug Missing?	Ecology Well ID	Comments
UCCMW-12S	1/9/2020	14:14	8.86	8	18	17.42	17.6	0.18	1	Yes	All	No	No	Missing	Well monument full of dirt and thorned plant; threaded cap; no lid.
UCCMW-12D	1/9/2020	14:20	8.81	25	30	29.36	29.5	0.14	2	Yes	2/2	No	No	BIE 861	Threaded cap, hole in lid. Location on map is 12S; needs to be switched.
UCCMW-13S	1/9/2020	14:00	8.74	9	19	18.4	18.9	0.5	1	No	All	No	Yes	BIE 816	1-inch PVC inside of a 2-inch PVC casing. Torque cap on 2-inch casing creates seal, however, 2-inch PVC does not have a slip cap. Standing water was observed in annular space between 1-inch and 2-inch PVC. Soft bottom.
UCCMW-13D	1/9/2020	NM	NM	19	24						All				Well exists, but cannot open because the lid is partially covered by an Ecology block.
UCCMW-14S	1/9/2020			10	20										Not found. Possibly buried/overgrown by grass or gone.
UCCMW-14D	1/9/2020			21	26										Not found. Possibly buried/overgrown by grass or gone.
UCCMW-15	1/9/2020	14:17	9.06			18.14	18.6	0.46	1	No	No	Yes	No	BIE 817	Screw cap.
UCCMW-16	1/9/2020	10:58	7.01	9	19	18.78	19	0.22	1	No	No	Yes	No	BIE 812	Threaded cap.
UCCMW-17	1/9/2020	11:08	8.69	10	20	19.55	19.85	0.3	1	Yes	1/2	No	No	BIE 811	Threaded cap; broken flange where bolt is missing; other flange is stripped so bolt is not functional.
UCCMW-18	1/9/2020	10:58	8.76	10	20	19.56	19.9	0.34	1	No	No	Yes	No	BIE 813	
UCCMW-19	1/9/2020	10:05	8.18	10	20	19.44	19.65	0.21	1	No	No	No	No	BIE 819	
UCCMW-20	1/9/2020	12:14	7.88	8	18	16.1	16.6	0.5	1	Yes	2	No	No	Illegible	Threaded cap. Ecology tag present, but cannot read.
UCCMW-21	1/9/2020	12:07	12.24	12	22	20.93	21.4	0.47	2	No	1/2	Yes	No	Illegible	Ecology tag present, but cannot read.
UCCMW-23	1/9/2020	13:30	3.47	8	18	15.2	16.8	1.6	1	No	No	Yes	No	BIE 862	Slip cap.
UCCMW-24	1/9/2020	9:36	4.5	8	18	16.82	16.9	0.08	1	No	No	No	No	BIE 863	1-inch SCH80 PVC inside of 2-inch SCH40 PVC. Slip cap over 2-inch casing. Both PVC casings cut at high angles. Water level measured from North high point. Soft bottom.
UCCMW-25	1/9/2020	9:25	4.32	8	18	17.04	17.1	0.06	1	No	No	No	No	BIE 975	Slip cap.
UCCMW-26	1/9/2020			5	15										Not found. Possibly buried/overgrown by grass or gone.
UCCMW-27	1/9/2020	8:57	4.53	5	15	14.3	14.7	0.4	2	No	No	Yes	No	BJA 501	Well located under ~3-inches of gravel. Soft bottom. Hydrocarbon-like odor observed during water level measurement.

Abbreviations:

bgs Below ground surface
BTOC Below top of casing
ft Feet
NAVD 88 North American Vertical Datum of 1988
NM Not measured
PVC Polyvinyl chloride
TOC Top of casing

Table 4.2
Groundwater Elevations at Currently Existing Monitoring Wells

Well ID	TOC Elevation (ft NAVD 88)	Date	Time of Water Level Measurement	Depth to Water (ft BTOC)	Water Elevation (ft NAVD 88)
BB-2	39.13	1/9/2020	9:49	4.39	34.74
BI-3	39.13	1/9/2020	12:41	2.12	37.01
UCCMW-1	47.01	1/9/2020	11:27	9.14	37.87
UCCMW-2	47.14	1/9/2020	11:29	7.71	39.43
UCCMW-3R	47.84	1/9/2020	13:45	8.83	39.01
UCCMW-4D	46.11	1/9/2020	10:10	8.20	37.91
UCCMW-5	47.64	1/9/2020	10:04	10.01	37.63
UCCMW-6	41.91	1/9/2020	12:30	4.33	37.58
UCCMW-7	41.46	1/9/2020	9:40	4.84	36.62
UCCMW-8	38.98	1/9/2020	9:12	4.40	34.58
UCCMW-9	39.47	1/9/2020	12:52	3.80	35.67
UCCMW-10	39.36	1/9/2020	13:17	4.36	35.00
UCCMW-11S	46.97	1/9/2020	13:57	7.89	39.08
UCCMW-11	47.08	1/9/2020	13:47	8.00	39.08
UCCMW-12S	47.76	1/9/2020	14:14	8.86	38.90
UCCMW-12D	47.72	1/9/2020	14:20	8.81	38.91
UCCMW-13S	47.62	1/9/2020	14:00	8.74	38.88
UCCMW-15	47.27	1/9/2020	14:17	9.06	38.21
UCCMW-16	45.07	1/9/2020	10:58	7.01	38.06
UCCMW-17	46.68	1/9/2020	11:08	8.69	37.99
UCCMW-18	46.56	1/9/2020	10:58	8.76	37.80
UCCMW-19	46.09	1/9/2020	10:05	8.18	37.91
UCCMW-20	45.52	1/9/2020	12:14	7.88	37.64
UCCMW-21	49.67	1/9/2020	12:07	12.24	37.43
UCCMW-23	41.62	1/9/2020	13:30	3.47	38.15
UCCMW-24	41.98	1/9/2020	9:36	4.50	37.48
UCCMW-25	41.25	1/9/2020	9:25	4.32	36.93
UCCMW-27	37.77	1/9/2020	8:57	4.53	33.24

Abbreviations:
BTOC Below top of casing
ft Feet
NAVD 88 North American Vertical Datum of 1988
TOC Top of casing

Table 4.3
Soil and Groundwater Reporting Limits

		Groundwater Analytical Information (4)				Soil Analytical Information (4)			
Chemical (1)	CAS No.	Groundwater Screening Level (2) (µg/L)	Analytical Method	Method Detection Limit (µg/L)	Practical Quantitation Limit (µg/L)	Soil Screening Level (3) (mg/kg)	Analytical Method	Method Detection Limit (mg/kg)	Practical Quantitation Limit (mg/kg)
Dissolved Gases									
Methane	74-82-8		RSK 175	0.58	1.0		NA	NA	NA
Ethane	74-84-0			0.24	0.50		NA	NA	NA
Ethene	74-85-1			0.30	0.50		NA	NA	NA
Conventionals									
Fraction of Organic Carbon			NA	NA	NA		ASTM D2974-87	NA	0.50%
Metals(5)									
Arsenic	7440-38-2	5.0	EPA 200.8	0.34	3.3	20	NA	NA	NA
Chlorinated Volatile Organic Compounds (cVOCs)									
cis-1,2-Dichloroethene	156-59-2	16	EPA 8260D	0.042	0.20	160	EPA 8260D	0.00031	0.001
Tetrachloroethene	127-18-4	5.0	EPA 8260D	0.087	0.20	0.050	EPA 8260D	0.00036	0.001
trans-1,2-Dichloroethene	156-60-5	100	EPA 8260D	0.048	0.20	1,600	EPA 8260D	0.00042	0.001
Trichloroethene	79-01-6	1.5	EPA 8260D	0.077	0.20	0.030	EPA 8260D	0.00038	0.001
Vinyl chloride	75-01-4	0.20	EPA 8260D/SIM	0.0010	0.020	0.67	EPA 8260D/SIM	0.000011	0.00005
Volatile Organic Compounds (VOCs)									
1,1,1,2-Tetrachloroethane	630-20-6	7.4	EPA 8260D	0.073	0.20		EPA 8260D	0.00041	0.001
1,1,1-Trichloroethane	71-55-6	200	EPA 8260D	0.047	0.20	2.0	EPA 8260D	0.00027	0.001
1,1,2,2-Tetrachloroethane	79-34-5	6.2	EPA 8260D	0.069	0.20		EPA 8260D	0.00031	0.001
1,1,2-Trichloroethane	79-00-5	4.6	EPA 8260D	0.079	0.20		EPA 8260D	0.00033	0.001
1,1-Dichloroethane	75-34-3	11	EPA 8260D	0.062	0.20		EPA 8260D	0.00033	0.001
1,1-Dichloroethene	75-35-4	7.0	EPA 8260D	0.049	0.20		EPA 8260D	0.00032	0.001
1,2,4-Trichlorobenzene	120-82-1	39	EPA 8260D	0.17	0.20		EPA 8260D	0.00028	0.001
1,2,4-Trimethylbenzene	95-63-6	240	EPA 8260D	0.063	0.20		EPA 8260D	0.00019	0.001
1,2-Dibromo-3-chloropropane	96-12-8	0.20	EPA 8260D	0.27	1.0		EPA 8260D	0.00094	0.005
1,2-Dibromoethane	106-93-4	0.010	EPA 8260D/SIM	0.0067	0.020	0.0050	EPA 8260D/SIM	0.0000091	0.00005
1,2-Dichlorobenzene	95-50-1	600	EPA 8260D	0.081	0.20		EPA 8260D	0.00018	0.001
1,2-Dichloroethane	107-06-2	4.2	EPA 8260D	0.048	0.20		EPA 8260D	0.00031	0.001
1,2-Dichloropropane	78-87-5	5.0	EPA 8260D	0.026	0.20		EPA 8260D	0.00050	0.001
1,4-Dichlorobenzene	106-46-7	4.9	EPA 8260D	0.058	0.20		EPA 8260D	0.00026	0.001
Bromodichloromethane	75-27-4	1.8	EPA 8260D	0.093	0.20		EPA 8260D	0.00063	0.001
Bromoform	75-25-2	80	EPA 8260D	0.24	1.0		EPA 8260D	0.00023	0.001
Bromomethane	74-83-9	13	EPA 8260D	0.11	0.20		EPA 8260D	0.00064	0.001
Carbon disulfide	75-15-0	400	EPA 8260D	0.062	0.20		EPA 8260D	0.00033	0.001
Carbon tetrachloride	56-23-5	0.56	EPA 8260D	0.072	0.20		EPA 8260D	0.00061	0.001
Chlorobenzene	108-90-7	100	EPA 8260D	0.051	0.20		EPA 8260D	0.00014	0.001
Chloroethane	75-00-3	18,000	EPA 8260D	0.076	1.0		EPA 8260D	0.00074	0.005
Chloroform	67-66-3	1.2	EPA 8260D	0.082	0.20		EPA 8260D	0.00039	0.001
Chloromethane	74-87-3	150	EPA 8260D	0.044	1.0		EPA 8260D	0.00059	0.005
Dibromochloromethane	124-48-1	80	EPA 8260D	0.073	0.20		EPA 8260D	0.00022	0.001
Dichlorodifluoromethane	75-71-8	5.6	EPA 8260D	0.066	0.20		EPA 8260D	0.00042	0.001
Hexachlorobenzene	118-74-1	1.0	EPA 8270E	0.12	1.0	31	EPA 8270E	0.0052	0.033
Hexachlorobutadiene	87-68-3	0.81	EPA 8270E	0.11	0.50		EPA 8270E	0.0031	0.005

Table 4.3
Soil and Groundwater Reporting Limits

Chemical [1]	CAS No.	Groundwater Analytical Information [4]				Soil Analytical Information [4]			
		Groundwater Screening Level [2] (µg/L)	Analytical Method	Method Detection Limit (µg/L)	Practical Quantitation Limit (µg/L)	Soil Screening Level [3] (mg/kg)	Analytical Method	Method Detection Limit (mg/kg)	Practical Quantitation Limit (mg/kg)
Volatile Organic Compounds (VOCs) (cont.)									
Hexachloroethane	67-72-1	3.1	EPA 8270E	0.14	1.0		EPA 8270E	0.0096	0.033
iso-Propylbenzene	98-82-8	720	EPA 8260D	0.089	0.20		EPA 8260D	0.00018	0.001
Methyl ethyl ketone	78-93-3	1,700,000	EPA 8260D	0.23	5.0		EPA 8260D	0.0012	0.005
Methyl iso butyl ketone	108-10-1	470,000	EPA 8260D	0.15	2.0		EPA 8260D	0.0016	0.005
Methylene chloride	75-09-2	5.0	EPA 8260D	0.27	1.0	0.020	EPA 8260D	0.0015	0.005
Methyl-Tert-Butyl Ether	1634-04-4	20	EPA 8260D	0.050	0.20	0.10	EPA 8260D	0.00025	0.001
Nitrobenzene	98-95-3	160	EPA 8270E	0.16	1.0		EPA 8270E	0.0099	0.033
Styrene	100-42-5	100	EPA 8260D	0.079	0.20		EPA 8260D	0.00023	0.001
Trichlorofluoromethane	75-69-4	120	EPA 8260D	0.058	0.20		EPA 8260D	0.00036	0.001
Vinyl acetate	108-05-4	7,800	EPA 8260D	0.26	1.0		EPA 8260D	0.0031	0.005
Total Petroleum Hydrocarbons (TPH) [6]									
Diesel-Range Organics	DRO	500	NWTPH-Dx	66	250	460	NWTPH-Dx	7.7	25
Gasoline-Range Organics	GRO	800	NWTPH-Gx	4.1	100	30	NWTPH-Gx	1.5	5
Oil-Range Organics	ORO	500	NWTPH-Dx	170	400	2,000	NWTPH-Dx	30	50
Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)									
Benzene	71-43-2	2.4	EPA 8260D	0.042	0.20	0.030	EPA 8260D	0.00022	0.001
Ethylbenzene	100-41-4	700	EPA 8021B	0.20	1.0	6.0	EPA 8021B	0.0043	0.05
Toluene	108-88-3	1,000	EPA 8021B	0.20	1.0	7.0	EPA 8021B	0.0089	0.05
Xylene (meta & para)	108-38-3/106-42-3		EPA 8021B	0.23	1.0		EPA 8021B	0.0064	0.05
Xylene (ortho)	95-47-6		EPA 8021B	0.24	1.0		EPA 8021B	0.0068	0.05
Xylene (total)	1330-20-7	330	Calculation	0.24	1.0	9.0	Calculation	0.0068	0.05
Semivolatile Organic Compounds (SVOCs)									
Acrylonitrile	107-13-1	16	EPA 8260D	0.19	0.50		NA	NA	NA
bis(2-ethylhexyl)phthalate	117-81-7	6.0	EPA 8270E	0.22	1.0		NA	NA	NA
Di-n-butyl phthalate	84-74-2		EPA 8270E	0.30	5.0	200	NA	NA	NA
Hexachlorocyclopentadiene	77-47-4	50	EPA 8270E	0.10	1.0		NA	NA	NA
Pentachlorophenol	87-86-5	1.0	EPA 8151A	0.0013	0.0095	11	NA	NA	NA
Naphthalene	91-20-3	8.9	EPA 8270E	0.14	1.0	5.0	NA	NA	NA

Notes:

All screening levels presented in this table are rounded to two significant figures.

Blank cells are intentional and mean no criteria were developed.

RED/BOLD Detected historical soil or groundwater results exceed the applicable screening level.

BOLD Historical soil or groundwater detection limits provide insufficient resolution to compare non-detect results to applicable screening level.

1 This table includes chemicals with soil or groundwater screening levels that were analyzed for in historical soil or groundwater sampling events in addition to chemicals and analytical parameters recommended for analysis to better understand partitioning and attenuation processes at the Site.

2 Groundwater screening levels were developed in Table 3.3 and are protective of drinking water and vapor intrusion pathways.

3 Soil screening levels were developed in Table 3.4 and are protective of human health and ecological receptors via the direct contact pathway.

4 Method detection limits and practical quantitation limits were provided to Floyd|Snider by the laboratory performing the analysis, and represent typical limits that the laboratory can achieve for the specified method and media.

5 In water, metals will be analyzed as total fraction.

6 Data will also be screened for TPH using the HCID method. Because it is a screening method, data analyzed by this method will not be compared to criteria and reporting limits were not provided for this method.

Abbreviations:

CAS Chemical Abstracts Service
CLARC Cleanup Levels and Risk Calcu
COPC Chemical of potential concerr
µg/L Microgram per liter
mg/kg Milligrams per kilogram
MTCA Model Toxics Cleanup Act
NA Not applicable; sampling plan does not propose analysis for this analyte class in this media.
ND Non-detect
Site Ultra Custom Care Cleaners Site
TEQ Toxic equivalent

Table 4.4
Data Quality Assurance and Quality Control Objectives

Chemical [1]	CAS No.	Groundwater Analytical Information: Groundwater Screening Level [2,3] (µg/L)	Analytical Method	Precision (%)	Accuracy (%)	Completeness (%)	Soil Analytical Information: Soil Screening Level [2,4] (mg/kg)	Analytical Method	Precision (%)	Accuracy (%)	Completeness (%)
Dissolved Gases											
Methane	74-82-8		RSK 175	25	75–125	95		NA	NA	NA	NA
Ethane	74-84-0		RSK 175	25	75–125	95		NA	NA	NA	NA
Ethene	74-85-1		RSK 175	25	75–125	95		NA	NA	NA	NA
Conventionals											
Fraction of Organic Carbon [5]			NA	NA	NA	NA		ASTM D2974-87	NA	NA	95
Metals [6]											
Arsenic	7440-38-2	5.0	EPA 200.8	20	75–125	95	20	NA	NA	NA	NA
Chlorinated Volatile Organic Compounds (cVOCs)											
cis-1,2-Dichloroethene	156-59-2	16	EPA 8260D	19	57–135	95	160	EPA 8260D	31	57–133	95
Tetrachloroethene	127-18-4	5.0	EPA 8260D	19	57–135	95	0.050	EPA 8260D	31	57–133	95
trans-1,2-Dichloroethene	156-60-5	100	EPA 8260D	19	57–135	95	1,600	EPA 8260D	31	57–133	95
Trichloroethene	79-01-6	1.5	EPA 8260D	17	75–124	95	0.030	EPA 8260D	24	61–124	95
Vinyl chloride	75-01-4	0.20	EPA 8260D/SIM	19	57–135	95	0.67	EPA 8260D/SIM	31	57–133	95
Volatile Organic Compounds (VOCs)											
1,1,1,2-Tetrachloroethane	630-20-6	7.4	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
1,1,1-Trichloroethane	71-55-6	200	EPA 8260D	19	57–135	95	2.0	EPA 8260D	31	57–133	95
1,1,2,2-Tetrachloroethane	79-34-5	6.2	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
1,1,2-Trichloroethane	79-00-5	4.6	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
1,1-Dichloroethane	75-34-3	11	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
1,1-Dichloroethene	75-35-4	7.0	EPA 8260D	15	57–135	95		EPA 8260D	25	65–131	95
1,2,4-Trichlorobenzene	120-82-1	39	EPA 8260D	35	34–95	95		EPA 8260D	31	57–133	95
1,2,4-Trimethylbenzene	95-63-6	240	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
1,2-Dibromo-3-chloropropane	96-12-8	0.20	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
1,2-Dibromoethane	106-93-4	0.010	EPA 8260D/SIM	19	57–135	95	0.0050	EPA 8260D/SIM	31	57–133	95
1,2-Dichlorobenzene	95-50-1	600	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
1,2-Dichloroethane	107-06-2	4.2	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
1,2-Dichloropropane	78-87-5	5.0	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
1,4-Dichlorobenzene	106-46-7	4.9	EPA 8260D	39	24–87	95		EPA 8260D	31	57–133	95
Bromodichloromethane	75-27-4	1.8	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Bromoform	75-25-2	80	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Bromomethane	74-83-9	13	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Carbon disulfide	75-15-0	400	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Carbon tetrachloride	56-23-5	0.56	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Chlorobenzene	108-90-7	100	EPA 8260D	16	78–122	95		EPA 8260D	31	56–117	95
Chloroethane	75-00-3	18,000	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Chloroform	67-66-3	1.2	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Chloromethane	74-87-3	150	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Dibromochloromethane	124-48-1	80	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Dichlorodifluoromethane	75-71-8	5.6	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Hexachlorobenzene	118-74-1	1.0	EPA 8270E	40	20–136	95	31	EPA 8270E	38	30–127	95
Hexachlorobutadiene	87-68-3	0.81	EPA 8270E	40	20–136	95		EPA 8270E	38	30–127	95
Hexachloroethane	67-72-1	3.1	EPA 8270E	40	20–136	95		EPA 8270E	38	30–127	95

Table 4.4
Data Quality Assurance and Quality Control Objectives

Chemical [1]	CAS No.	Groundwater Analytical Information: Groundwater Screening Level [2,3] (µg/L)	Analytical Method	Precision (%)	Accuracy (%)	Completeness (%)	Soil Analytical Information: Soil Screening Level [2,4] (mg/kg)	Analytical Method	Precision (%)	Accuracy (%)	Completeness (%)
Volatile Organic Compounds (VOCs) (cont.)											
iso-Propylbenzene	98-82-8	720	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Methyl ethyl ketone	78-93-3	1,700,000	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Methyl iso butyl ketone	108-10-1	470,000	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Methylene chloride	75-09-2	5.0	EPA 8260D	19	57–135	95	0.020	EPA 8260D	31	57–133	95
Methyl-Tert-Butyl Ether	1634-04-4	20	EPA 8260D	19	57–135	95	0.10	EPA 8260D	31	57–133	95
Nitrobenzene	98-95-3	160	EPA 8270E	40	20–136	95		EPA 8270E	38	30–127	95
Styrene	100-42-5	100	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Trichlorofluoromethane	75-69-4	120	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Vinyl acetate	108-05-4	7,800	EPA 8260D	19	57–135	95		EPA 8260D	31	57–133	95
Total Petroleum Hydrocarbons (TPH) [7,8]											
Diesel Range Organics	DRO	500	NWTPH-Dx	Report	64–123	95	460	NWTPH-Dx	Report	68–137	95
Gasoline Range Organics	GRO	800	NWTPH-Gx	30	NA	95	30	NWTPH-Gx	30	NA	95
Oil Range Organics	ORO	500	NWTPH-Dx	Report	NA	95	2,000	NWTPH-Dx	Report	NA	95
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)											
Benzene	71-43-2	2.4	EPA 8260D	19	73–131	95	0.030	EPA 8260D	28	65–127	95
Ethylbenzene	100-41-4	700	EPA 8021B	30	78–112	95	6.0	EPA 8021B	17	70–125	95
Toluene	108-88-3	1,000	EPA 8021B	30	78–111	95	7.0	EPA 8021B	18	68–128	95
Xylene (meta & para)	108-38-3/106-42-3	330	EPA 8021B	30	77–111	95	9.0	EPA 8021B	19	68–128	95
Xylene (ortho)	95-47-6	330	EPA 8021B	30	79–111	95	9.0	EPA 8021B	17	68–127	95
Xylene (total)	1330-20-7	330	Calculation	30	77–111	95	9.0	Calculation	19	68–128	95
Semivolatile Organic Compounds (SVOCs)											
Acrylonitrile	107-13-1	16	EPA 8260D	19	57–135	95		NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	117-81-7	6.0	EPA 8270E	40	20–136	95		NA	NA	NA	NA
Di-n-butyl phthalate	84-74-2		EPA 8270E	40	20–136	95	200	NA	NA	NA	NA
Hexachlorocyclopentadiene	77-47-4	50	EPA 8270E	40	20–136	95		NA	NA	NA	NA
Pentachlorophenol	87-86-5	1.0	EPA 8151A	25	40–140	95	11	NA	NA	NA	NA
Naphthalene	91-20-3	8.9	EPA 8270E	40	20–136	95	5.0	NA	NA	NA	NA

Notes:

All screening levels presented in this table are rounded to two significant figures.

RED/BOLD Detected historical soil or groundwater results exceed the applicable screening level.

BOLD Historical soil or groundwater detection limits provide insufficient resolution to compare non-detect results to applicable screening level.

1 This table includes chemicals with soil or groundwater screening levels that were analyzed for in historical soil or groundwater sampling events in addition to chemicals and analytical parameters recommended for analysis to better understand partitioning and attenuation processes at the Site.

2 Screening levels were developed for all chemicals analyzed in soil or groundwater during historical environmental investigations.

3 Groundwater screening levels were developed in Table 3.3 and are protective of direct contact and vapor intrusion pathways.

4 Soil screening levels were developed in Table 3.4 and are protective of human health and ecological receptors via the direct contact pathway.

5 Precision and accuracy standards are not applicable to this method.

6 In water, metals will be analyzed as total fraction.

7 The NWTPH-Dx and NWTPH-Gx standard method guidelines require reporting the relative percent difference, but do not specify control limits for duplicates.

8 Data will also be screened for TPH using the HCID method. Precision and accuracy standards are not applicable to the HCID method.

Abbreviations:

CAS Chemical Abstracts Service

HCID Hydrocarbon identification

µg/L Microgram per liter

mg/kg Milligrams per kilogram

NA Not applicable; sampling plan does not propose analysis for this analyte class in this media.

Site Ultra Custom Care Cleaners Site

Ultra Custom Care
Cleaners Site

Data Gaps Investigation Work Plan

Figures

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Ultra Custom Care Cleaners Site
Bothell, Washington

Figure 1.1
Vicinity Map

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2/6/2020

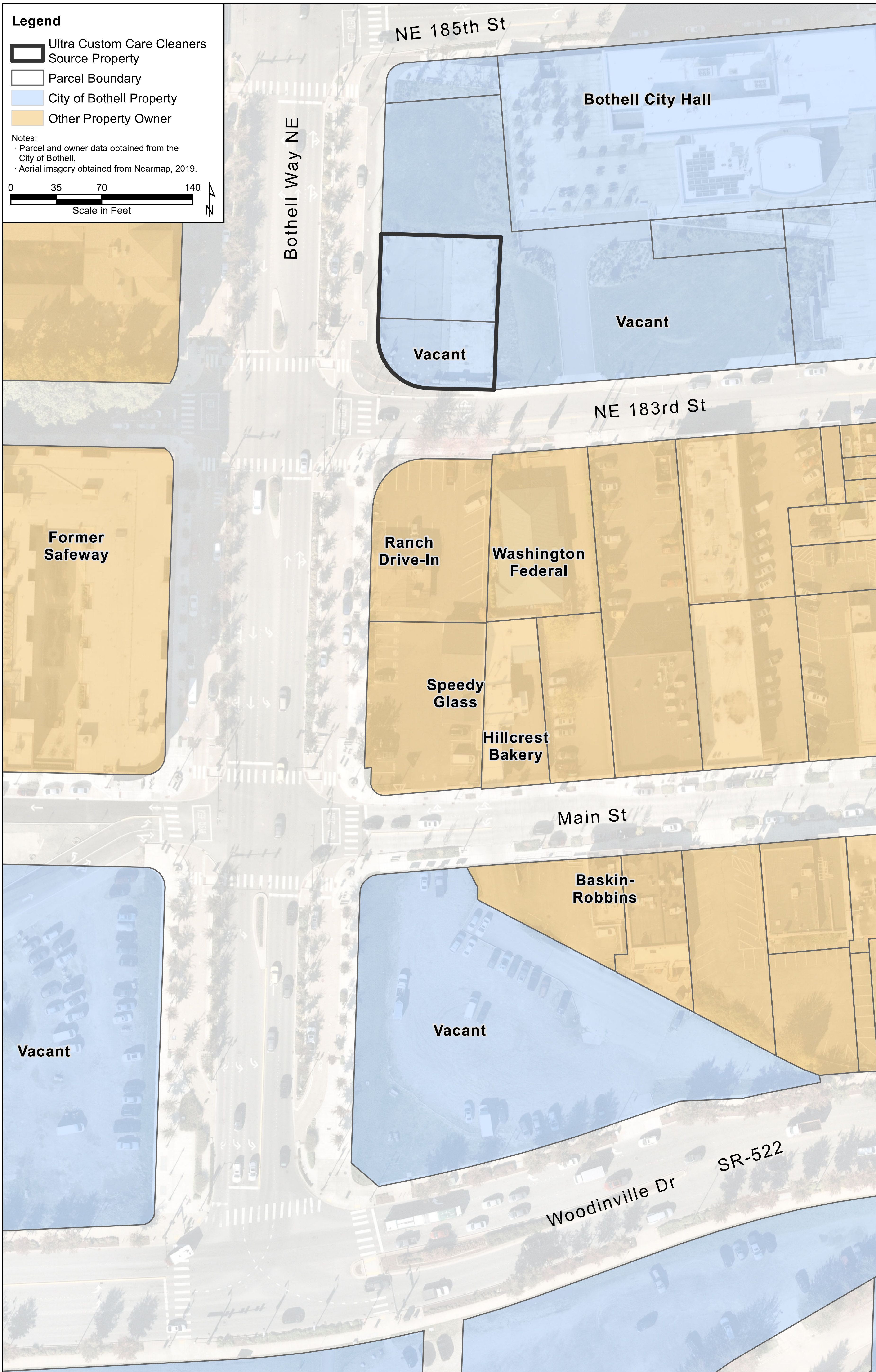

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Figure 2.1
Subject and Surrounding Property Owner-Operator Information

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2/6/2020

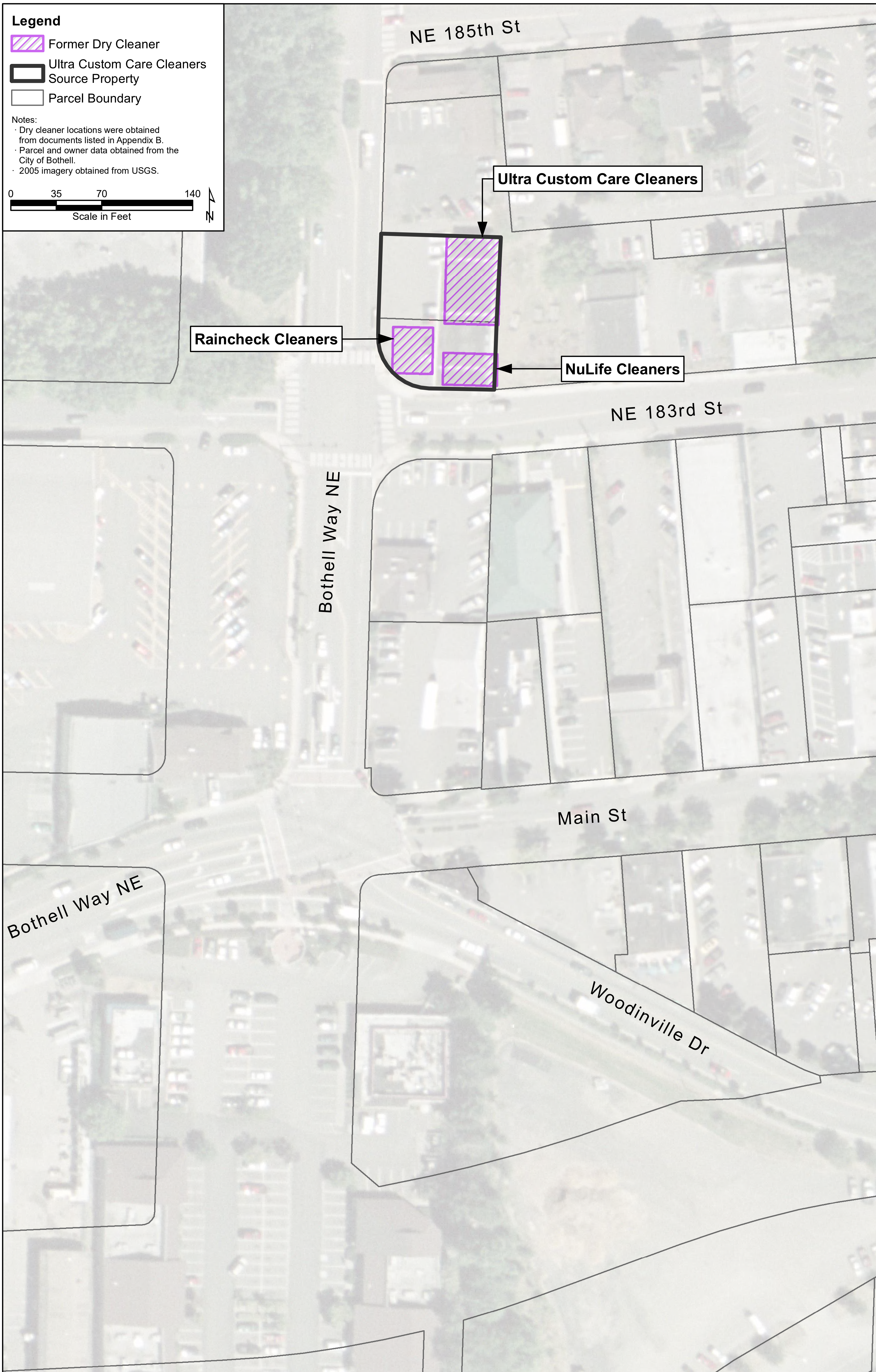

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Figure 2.2
Historical Site Features

I:\GIS\Projects\COBothell-Ultra\MXD\Data Gaps Investigation Work Plan\Figure 2.2 Historical Site Features.mxd
2/6/2020

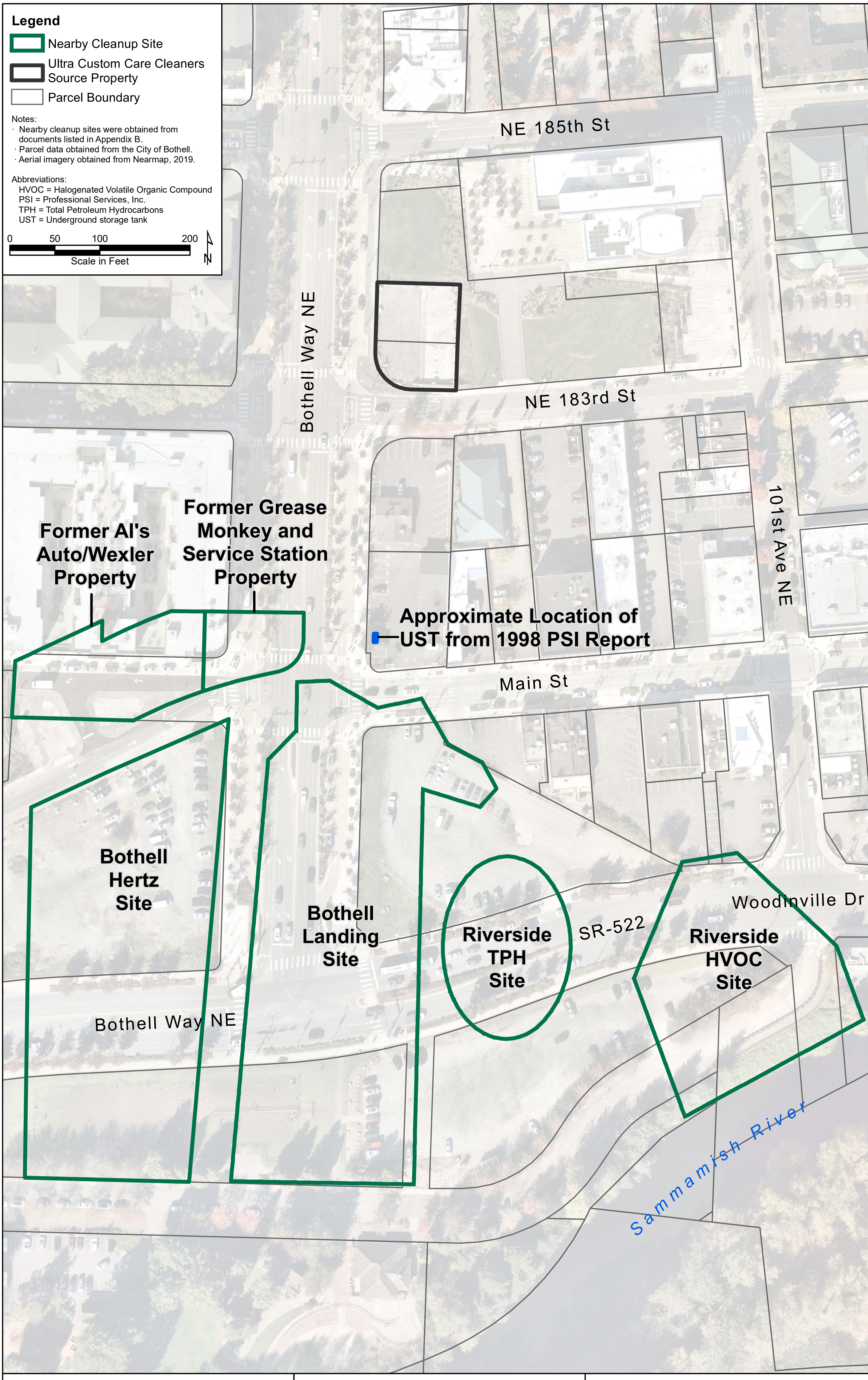

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Figure 2.3
Adjacent Properties and Cleanup Sites

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3/4/2020

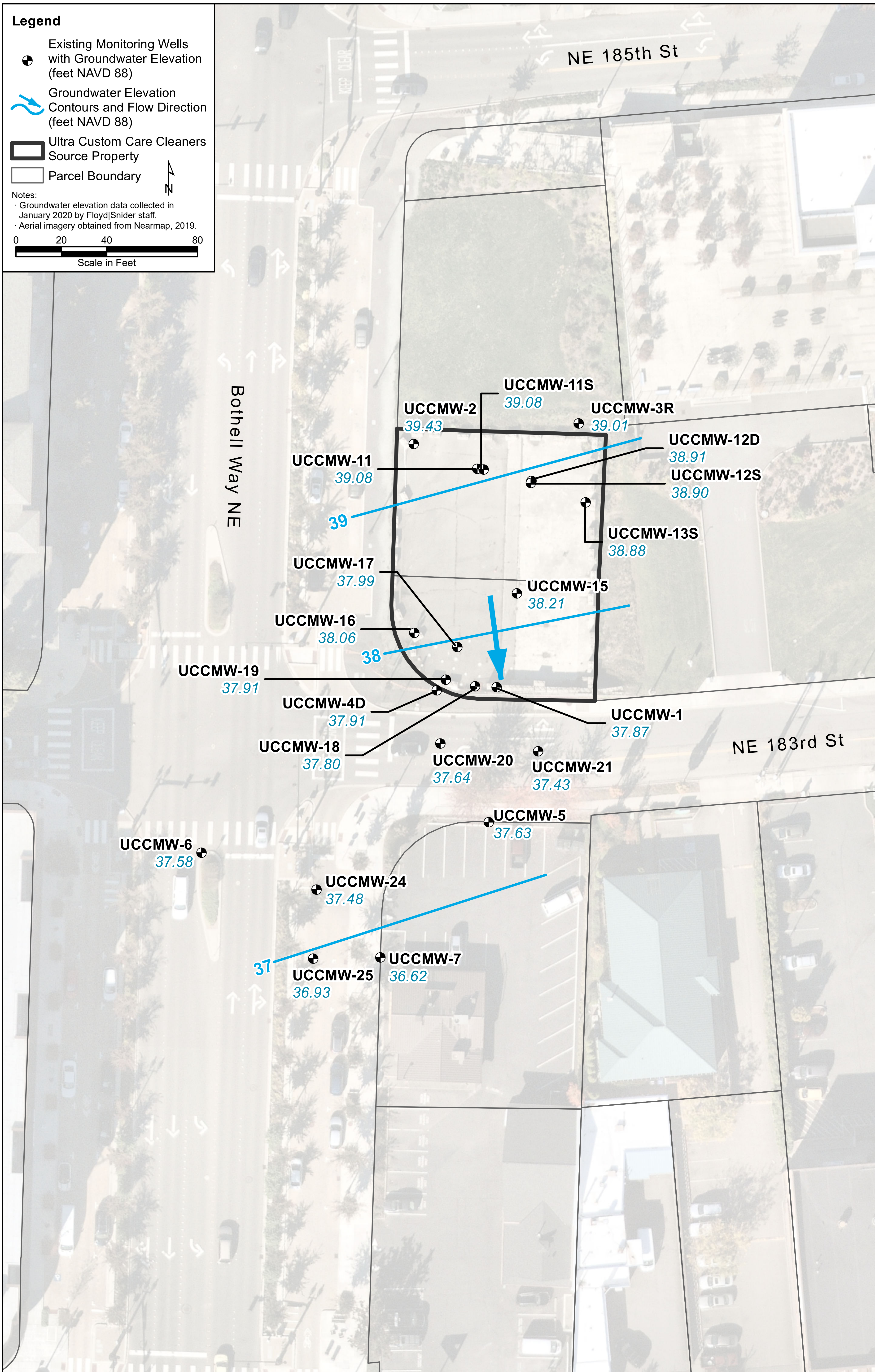

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Figure 2.4
Groundwater Elevation and Flow Direction

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2/6/2020

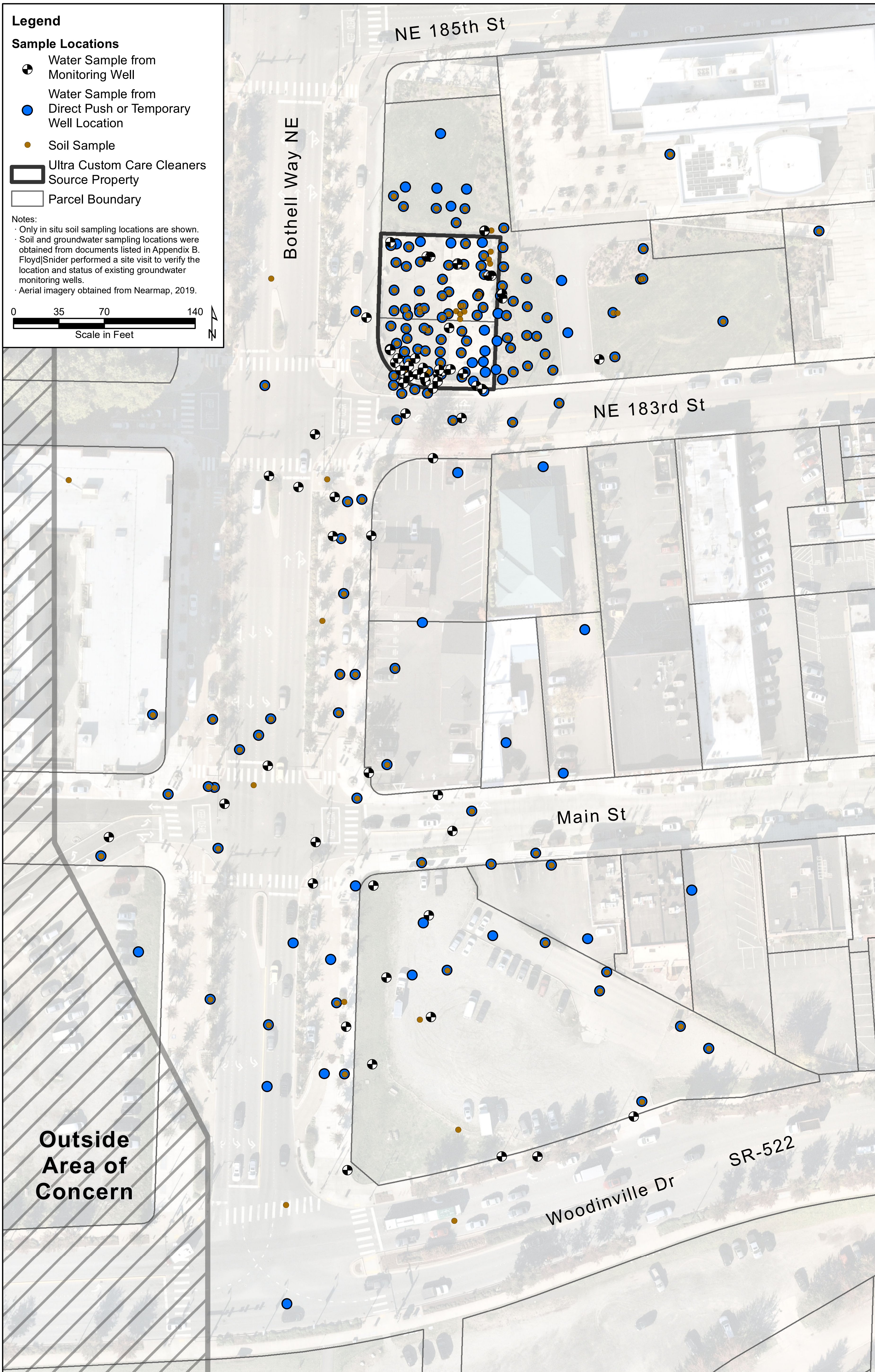

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Figure 3.1
Historical Soil and Groundwater Sampling Locations

I:\GIS\Projects\COBothell-Ultra\MXD\Data Gaps Investigation Work Plan\Figure 3.1 Historical Soil and Groundwater Sampling Locations.mxd
2/6/2020

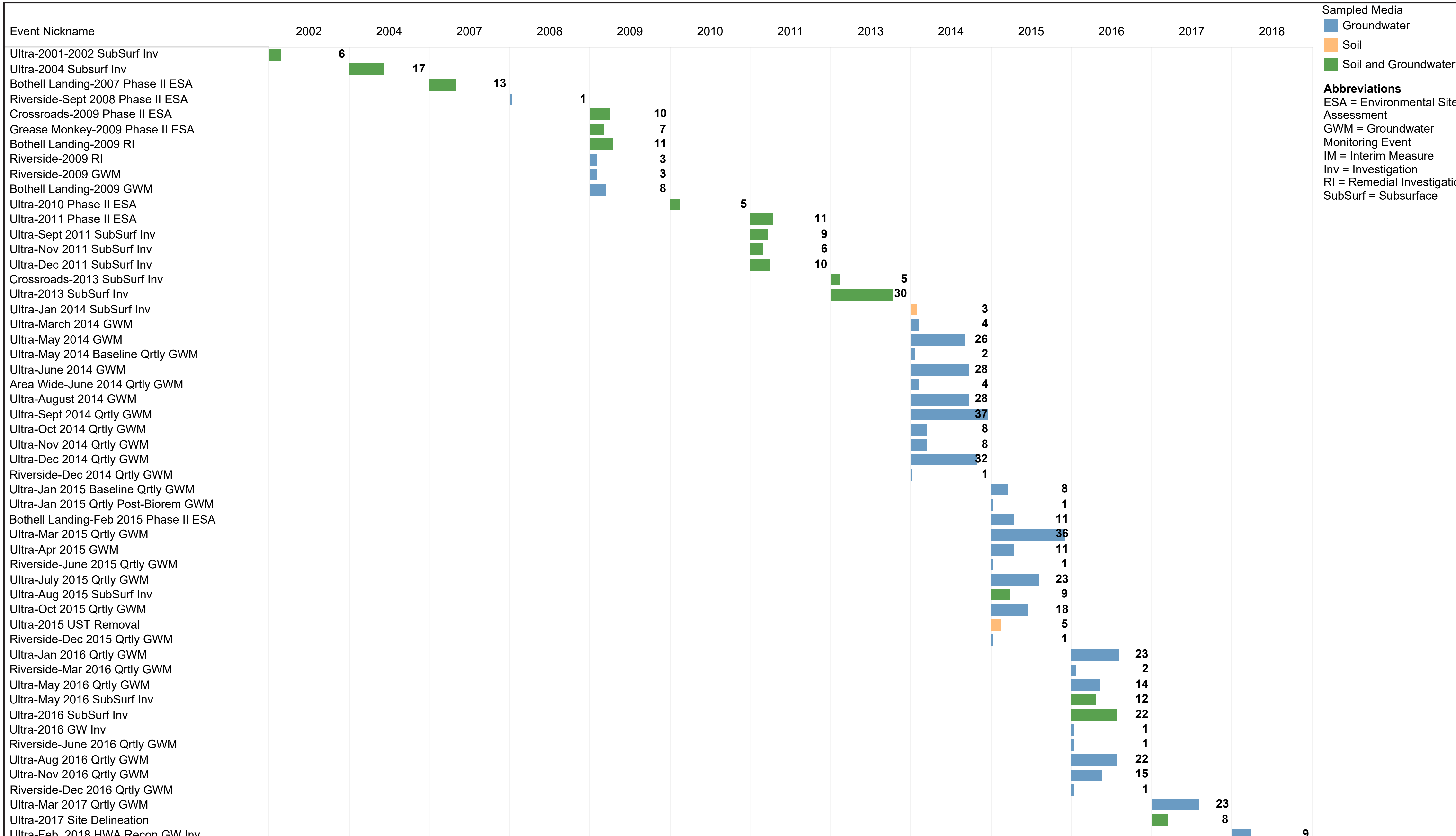

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Figure 3.2
Historical Sampling Event Summary

I:\GIS\Projects\COBothell-Ultra\AI\DGI Work Plan\Figure 3.2 Historical Sampling Event Summary.ai
01/30/2020

Event Nickname	VOCs	Metals	TPHs	SVOCs
Ultra-2001-2002 SubSurf Inv	3		1	3
Ultra-2004 Subsurf Inv	16	3		16
Bothell Landing-2007 Phase II ESA	9	1	9	8
Riverside-Sept 2008 Phase II ESA	1		1	1
Crossroads-2009 Phase II ESA	10		7	10
Grease Monkey-2009 Phase II ESA	7	5	7	5
Bothell Landing-2009 RI	9	7	7	9
Riverside-2009 RI	3	1	2	2
Riverside-2009 GWM	3	1	2	2
Bothell Landing-2009 GWM	8	6	6	8
Ultra-2010 Phase II ESA	4	1	3	2
Ultra-2011 Phase II ESA	11			11
Ultra-Sept 2011 SubSurf Inv	9			9
Ultra-Nov 2011 SubSurf Inv	3			3
Ultra-Dec 2011 SubSurf Inv	6			6
Crossroads-2013 SubSurf Inv	5		1	5
Ultra-2013 SubSurf Inv	30		2	30
Ultra-March 2014 GWM	4			4
Ultra-May 2014 GWM	26		2	26
Ultra-May 2014 Baseline Qrtly GWM	2		2	
Ultra-June 2014 GWM	28			28
Area Wide-June 2014 Qrtly GWM	4	3	4	4
Ultra-August 2014 GWM	28			27
Ultra-Sept 2014 Qrtly GWM	37	7	8	37
Ultra-Oct 2014 Qrtly GWM	8			8
Ultra-Nov 2014 Qrtly GWM	8			8
Ultra-Dec 2014 Qrtly GWM	32	6	6	29
Riverside-Dec 2014 Qrtly GWM	1			1
Ultra-Jan 2015 Baseline Qrtly GWM	8			8
Ultra-Jan 2015 Qrtly Post-Biorem GWM	1		1	
Bothell Landing-Feb 2015 Phase II ESA	11	3		11
Ultra-Mar 2015 Qrtly GWM	36	16	9	36
Ultra-Apr 2015 GWM	11	7	1	11
Riverside-June 2015 Qrtly GWM	1			1
Ultra-July 2015 Qrtly GWM	23	11	3	22
Ultra-Aug 2015 SubSurf Inv	9			
Ultra-Oct 2015 Qrtly GWM	18	10	1	18
Riverside-Dec 2015 Qrtly GWM	1			1
Ultra-Jan 2016 Qrtly GWM	23	12		23
Riverside-Mar 2016 Qrtly GWM	2	1		1
Ultra-May 2016 Qrtly GWM	14	11		14
Ultra-May 2016 SubSurf Inv	11	2	7	
Ultra-2016 SubSurf Inv	22		4	
Ultra-2016 GW Inv	1			1
Riverside-June 2016 Qrtly GWM	1			1
Ultra-Aug 2016 Qrtly GWM	22	12		22
Ultra-Nov 2016 Qrtly GWM	15	12		14
Riverside-Dec 2016 Qrtly GWM	1			1
Ultra-Mar 2017 Qrtly GWM	23	12		23
Ultra-2017 Site Delineation	8			8
Ultra-Feb. 2018 HWA Recon GW Inv	9			9

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Figure 3.3
Number of Groundwater Locations Sampled for Each Analyte Class, Summarized by Event

I:\GIS\Projects\COBothell-Ultra\AI\DGI Work Plan\Figure 3.3 Number of Groundwater Locations Sampled for Each Analyte Class, Summarized by Event.ai
01/30/2020

Event Nickname	VOCs	Metals	TPHs	SVOCs	PCBs
Ultra-2001-2002 SubSurf Inv	6		1	6	
Ultra-2004 Subsurf Inv	13			13	
Bothell Landing-2007 Phase II ESA	7	2	9	5	1
Crossroads-2009 Phase II ESA	10		4	10	
Grease Monkey-2009 Phase II ESA	7	5	7	5	
Bothell Landing-2009 RI	3		3	3	
Ultra-2010 Phase II ESA	5	1	4	2	1
Ultra-2011 Phase II ESA	1	1	2	1	
Ultra-Sept 2011 SubSurf Inv	5			5	
Ultra-Nov 2011 SubSurf Inv	3			3	
Ultra-Dec 2011 SubSurf Inv	10			10	
Crossroads-2013 SubSurf Inv	5		1	5	
Ultra-2013 SubSurf Inv	30		2	30	
Ultra-Jan 2014 SubSurf Inv	3		3	3	
Ultra-Aug 2015 SubSurf Inv	9				
Ultra-2015 UST Removal	5		5	5	
Ultra-May 2016 SubSurf Inv	11	2	6		
Ultra-2016 SubSurf Inv	22		4		
Ultra-2017 Site Delineation	8			8	

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Figure 3.4
Number of Soil Locations Sampled for Each Analyte Class, Summarized by Event

I:\GIS\Projects\COBothell-Ultra\AI\DGI Work Plan\Figure 3.4 Number of Soil Locations Sampled for Each Analyte Class, Summarized by Event.ai
01/30/2020

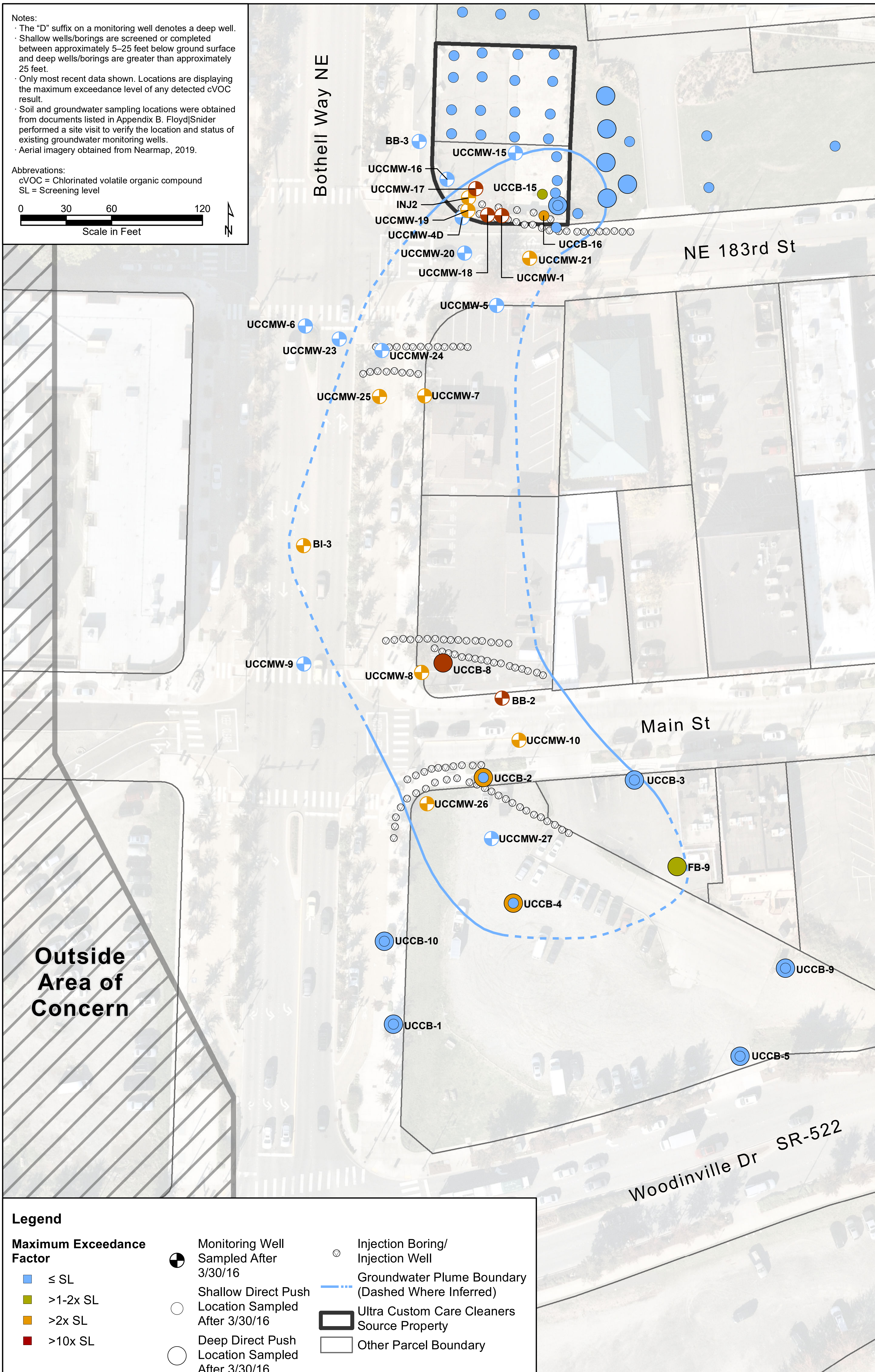

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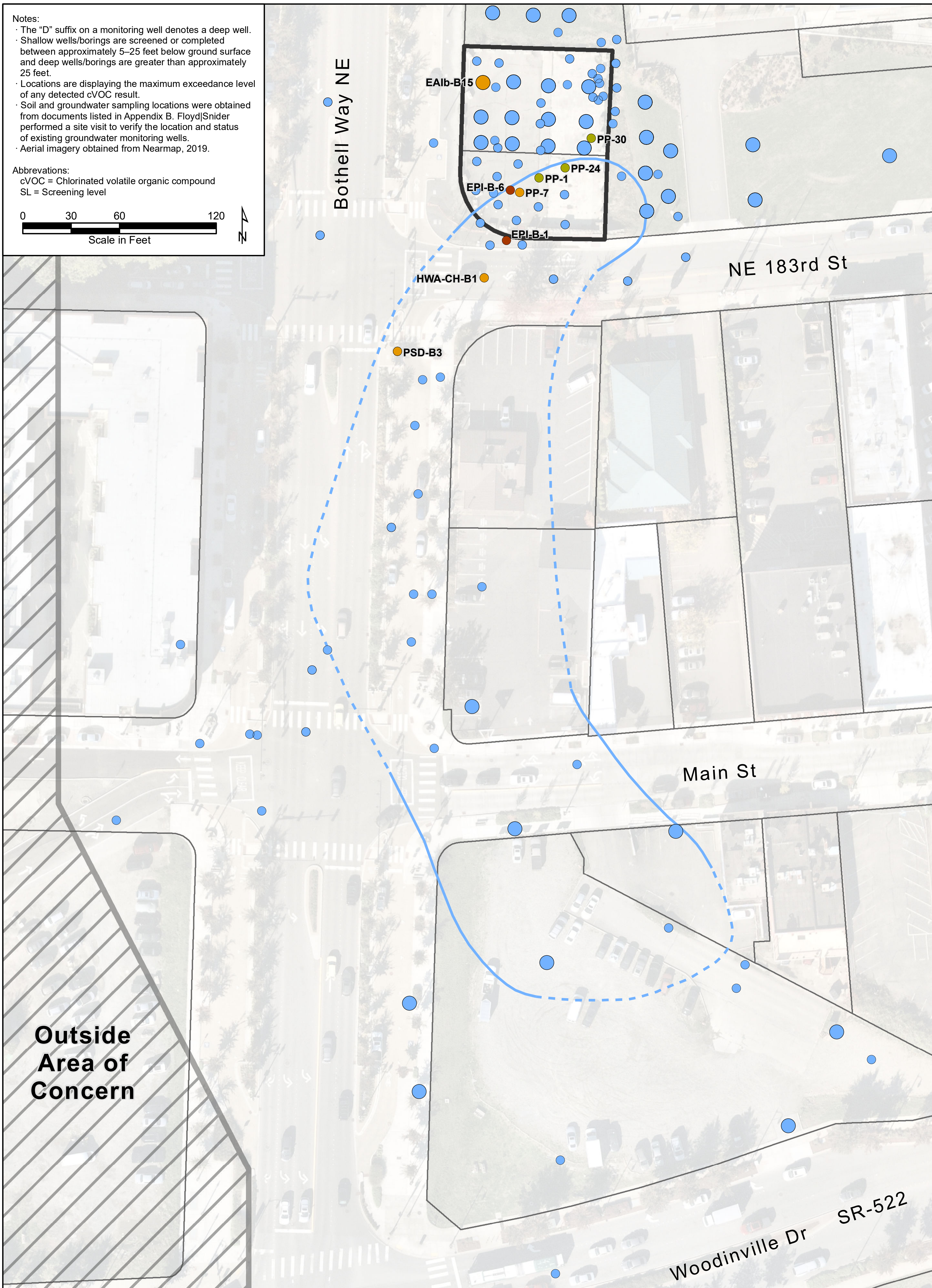
Figure 3.5
Injection Locations and Post-Injection Groundwater cVOC Concentrations

I:\GIS\Projects\COBothell-Ultra\MXD\Data Gaps Investigation Work Plan\Figure 3.5 Injection Locations and Post-Injection Groundwater cVOC Concentrations.mxd
3/5/2020



Legend

Maximum Exceedance Factor
- ≤ SL
- >1-2x SL
- >2x SL
- >10x SL

- Direct Push or SubSlab Location Sampled After 3/30/16
- Direct Push or SubSlab Location Sampled Before 3/30/16

- Groundwater Plume Boundary (Dashed Where Inferred)
- Ultra Custom Care Cleaners Source Property
- Parcel Boundary

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Data Gaps Investigation Work Plan
Ultra Custom Care Cleaners Site
Bothell, Washington

Figure 3.6
cVOC Concentrations in Soil

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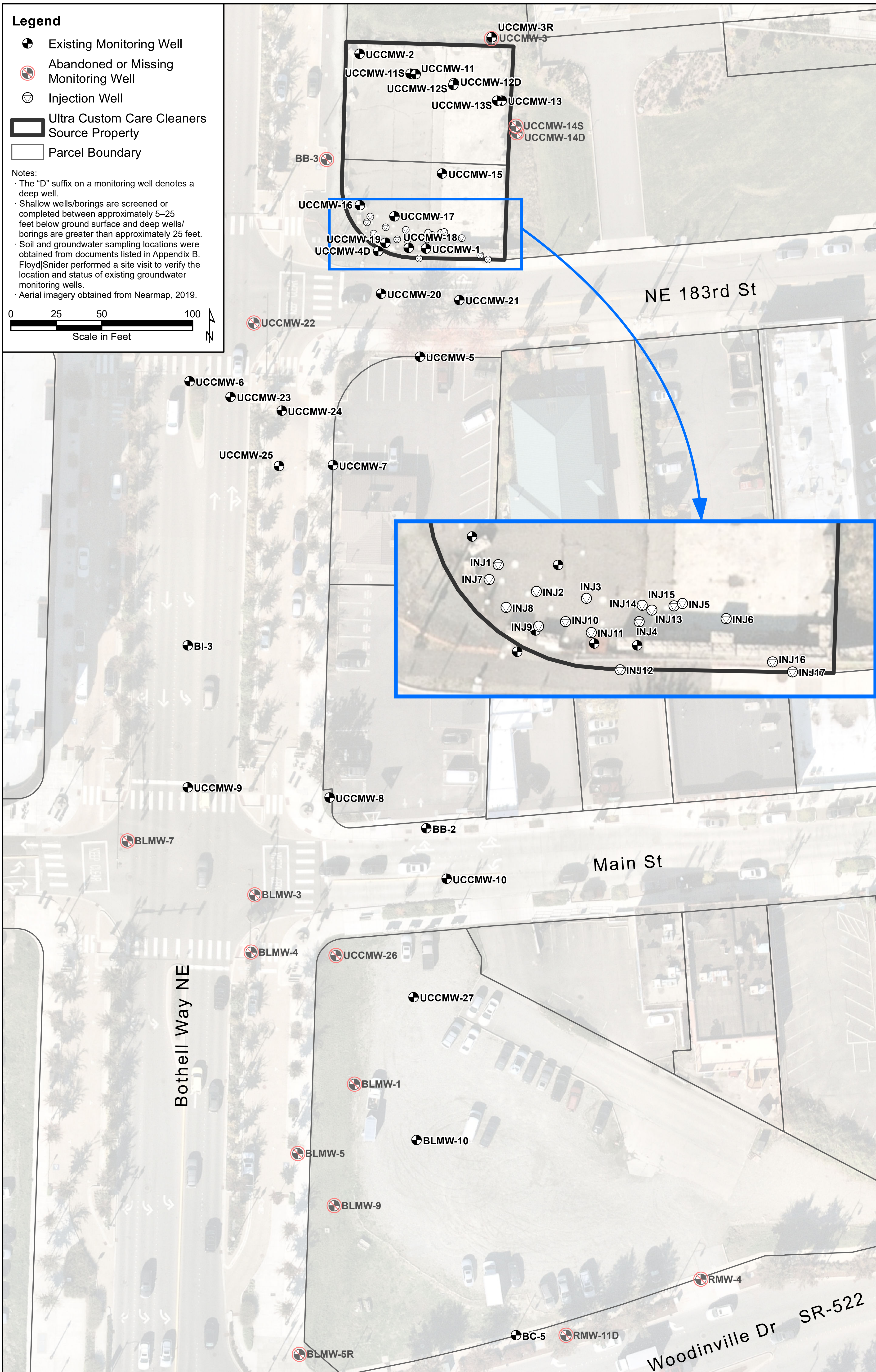
3/4/2020



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Ultra Custom Care Cleaners Site
Bothell, Washington

Figure 4.1
Existing Monitoring and Injection Well Locations

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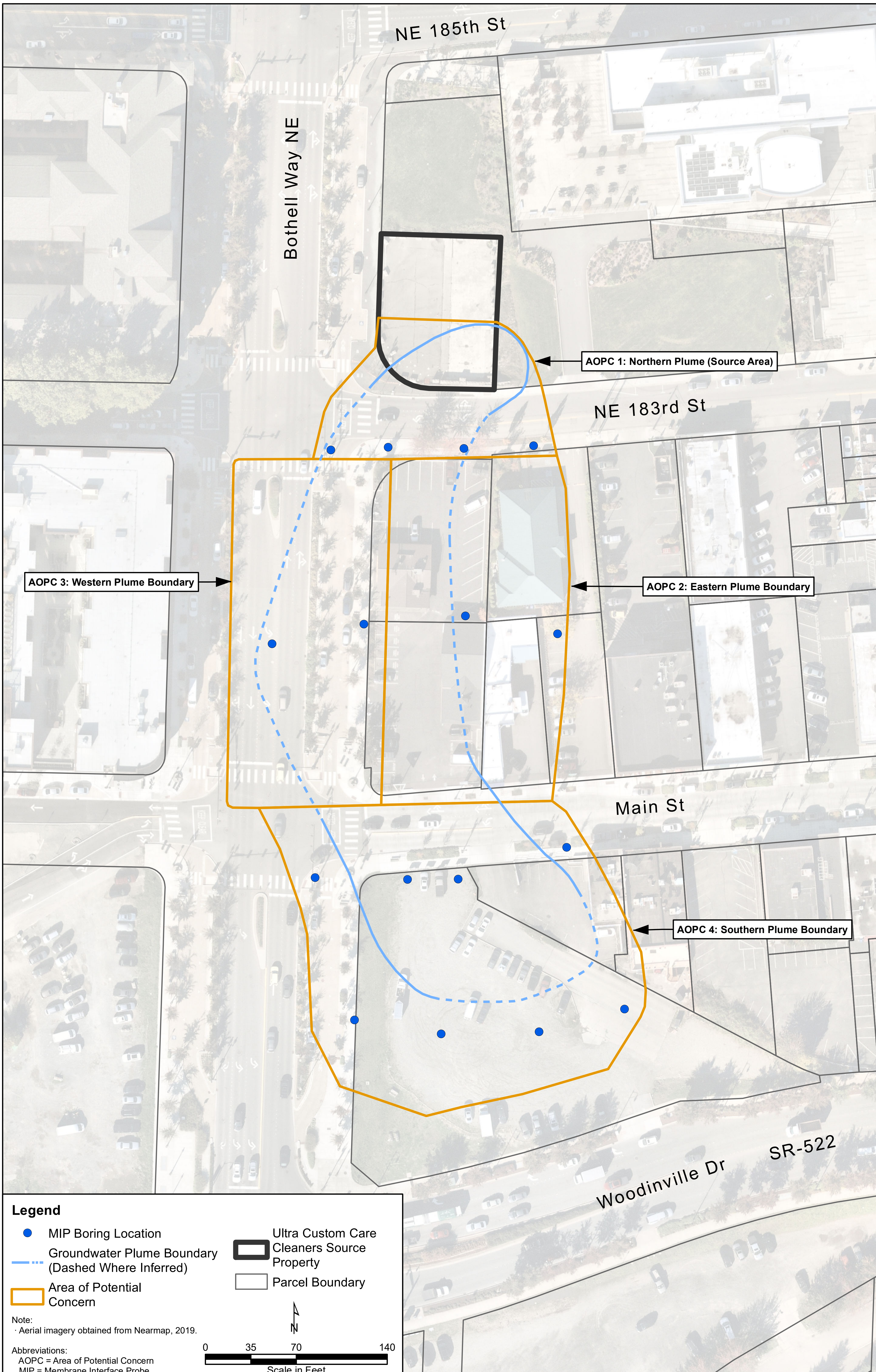
3/4/2020



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Data Gaps Investigation Work Plan
Ultra Custom Care Cleaners Site
Bothell, Washington

Figure 4.2
Proposed MIP Boring Locations

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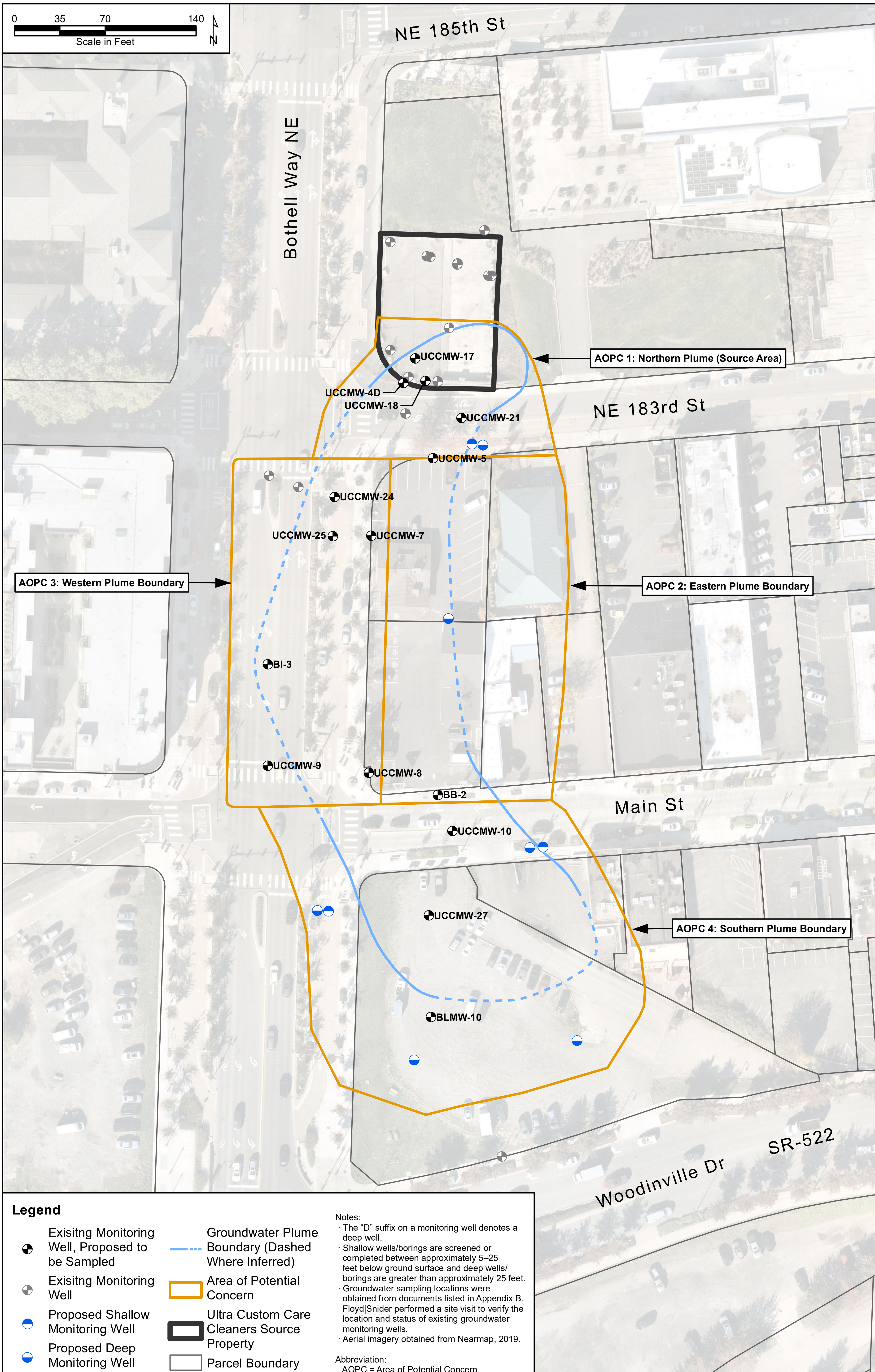
3/4/2020



Notes:
- The "D" suffix on a monitoring well denotes a deep well.
- Shallow wells/borings are screened or completed between approximately 5–25 feet below ground surface and deep wells/borings are greater than approximately 25 feet.
- Groundwater sampling locations were obtained from documents listed in Appendix B. Floyd|Snider performed a site visit to verify the location and status of existing groundwater monitoring wells.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviation:
AOPC = Area of Potential Concern

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Data Gaps Investigation Work Plan
Ultra Custom Care Cleaners Site
Bothell, Washington

Figure 4.3
Proposed Monitoring Well and Sampling Locations

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3/6/2020

Ultra Custom Care
Cleaners Site

Data Gaps Investigation Work Plan

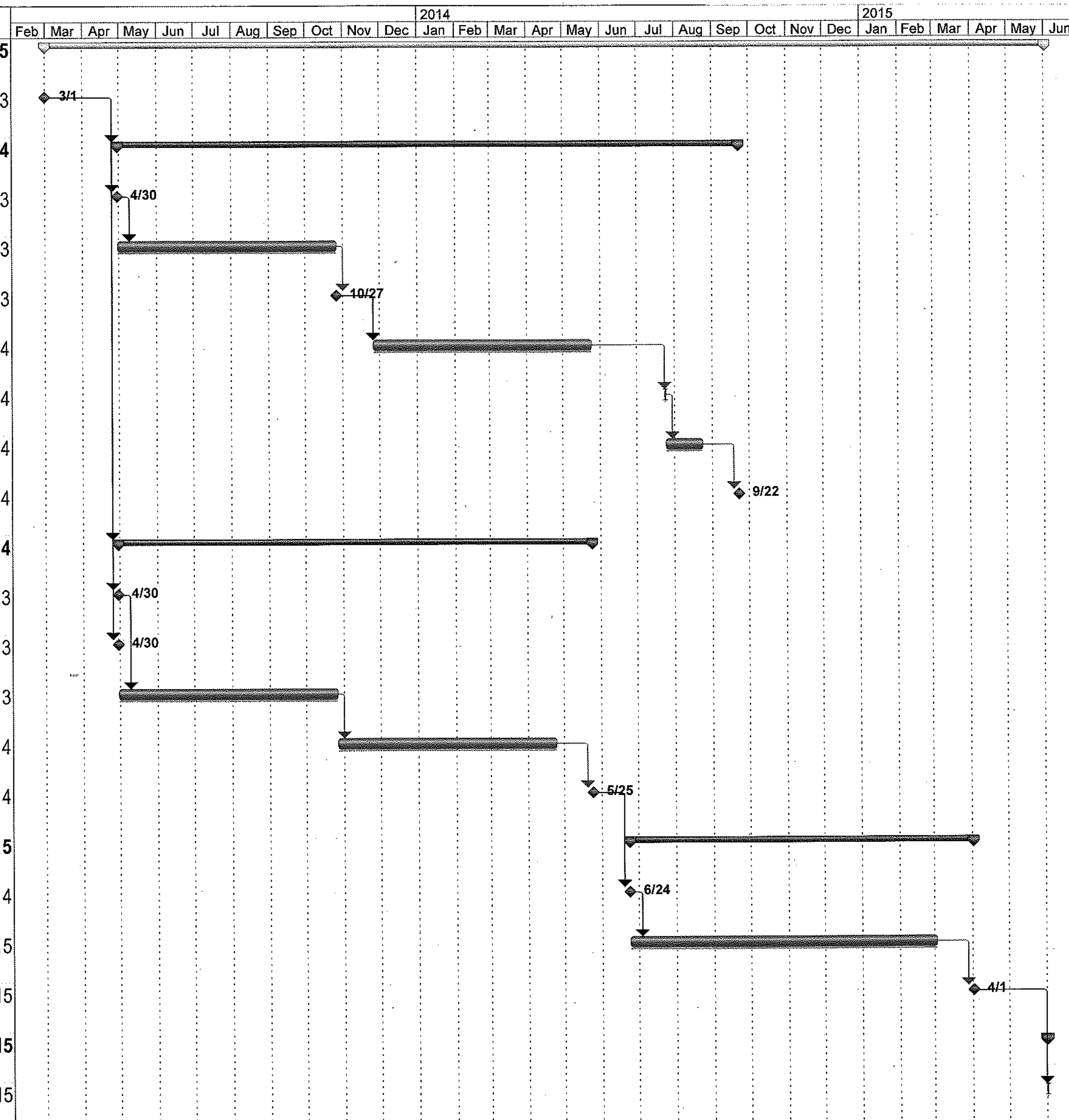
Appendix A
Agreed Order Schedule of Deliverables,
Exhibit C

EXHIBIT C:
Schedule of Deliverables

Deliverables	Due dates and details[1]
1. PLP submits draft remedial investigation (RI) report and RI data gaps work plan	60-days after effective date of Agreed Order.
2. PLP submits draft interim action work plan for source control	60-days after effective date of Agreed Order.
3. Ecology reviews	Ecology reviews draft RI report and RI data gaps workplan. Ecology reviews draft interim action work plan and determines if the interim actions are warranted, and if the interim action will not foreclose reasonable alternatives for the final cleanup action.
4. PLP implements RI data gaps work plan	Upon review, revisions, and approval of data gaps work plan by Ecology, PLP implements data gaps workplan within 30 days of Ecology's final approval.
5. PLP implements interim action work plan and public reviews	Interim action(s) to be implemented if Ecology determines interim action(s) are warranted for the site. PLP incorporates Ecology revisions to interim action work plan. Ecology conducts public comment for the draft interim action work plan. PLP implements interim action(s) within 30-days after completion of public comment and Ecology approval. PLP prepares interim action report within 60-days of completion of interim action(s). Ecology reviews and approves the interim action report.
6. PLP submits draft final RI report	Submit draft final RI report (including results of data gaps) 30 days after Ecology approves draft RI report and RI data gap results.
7. PLP submits draft feasibility study (FS) report and draft Cleanup Action Plan (DCAP)	Submit draft FS report and DCAP 30 days after Ecology approval of the draft final RI report. Conduct public comment on draft final RI report (including results of data gaps), draft FS report, and DCAP.

[1] A detailed schedule of deliverables is included below to provide additional clarification and guidance.

ID	Task Name	Start	Finish
0	**Ultra Custom Care Cleaners**	**Fri 3/1/13**	**Mon 6/1/15**
1	**Agreed Order Signed (estimated)**	Fri 3/1/13	Fri 3/1/13
2	**Interim Action**	**Tue 4/30/13**	**Mon 9/22/14**
3	Draft Interim Action Work Plan	Tue 4/30/13	Tue 4/30/13
4	Ecology Review and negotiation (estimated)	Tue 4/30/13	Sun 10/27/13
5	Final Interim Action Work Plan	Sun 10/27/13	Sun 10/27/13
6	Conduct Interim Action (estimated construction)	Tue 11/26/13	Sun 5/25/14
7	Submit Draft Interim Action Report	Thu 7/24/14	Thu 7/24/14
8	Ecology Review	Thu 7/24/14	Sat 8/23/14
9	Submit Final Interim Action Report	Mon 9/22/14	Mon 9/22/14
10	**Remedial Investigation (RI)**	**Tue 4/30/13**	**Sun 5/25/14**
11	Draft RI Data Gap Work Plan	Tue 4/30/13	Tue 4/30/13
12	Draft RI Report	Tue 4/30/13	Tue 4/30/13
13	Implement RI Data Gap Work Plan	Tue 4/30/13	Sun 10/27/13
14	Ecology Review and negotiation (estimated)	Sun 10/27/13	Fri 4/25/14
15	Draft Final RI Report	Sun 5/25/14	Sun 5/25/14
16	**Feasibility Study**	**Tue 6/24/14**	**Wed 4/1/15**
17	Submit Draft Feasibility Study Report	Tue 6/24/14	Tue 6/24/14
18	Ecology Review and negotiation (estimated)	Tue 6/24/14	Mon 3/2/15
19	Final Feasibility Study	Wed 4/1/15	Wed 4/1/15
20	**Draft Cleanup Action Plan**	**Mon 6/1/15**	**Mon 6/1/15**
21	Submit Draft Cleanup Action Plan	Mon 6/1/15	Mon 6/1/15



om Care Cleaners

Task	Progress	Summary	External Tasks
Split	Milestone	Project Summary	External Milestone
Deadline			

Ultra Custom Care
Cleaners Site

Data Gaps Investigation Work Plan

Appendix B
List of Previous Environmental Investigations

Appendix B
List of Previous Environmental Investigations

REPORTS REFERENCED TO COMPILE SUBSURFACE ENVIRONMENTAL DATA

CDM, 2009. Draft Phase II Environmental Site Assessment, City of Bothell Crossroads Redevelopment Project, Bothell, Washington, May

CDM, 2011. Supplemental Phase II Environmental Site Assessment, Former Raincheck Cleaners – Offsite Area, 18304 Bothell Way NE, Bothell, Washington, April 17, 2011.

CDM Smith, 2013. City of Bothell Crossroads Redevelopment Project, SR 527 and SR 522 Bothell, Washington, draft letter report dated May 30, 2013.

Environmental Associates, Inc., 2016. Limited Subsurface Sampling and Testing, Lot 6 & Proposed Lot 8, Northeast Corner of Bothell Way at Northeast 183rd Street, Bothell, Washington, prepared for 360 Hotel Group, June 2, 2016.

EHS International, 2001a. Phase I Environmental Site Assessment, June 12, 2001 report to Bothell Police Department.

EHS International, 2001b. Phase II Environmental Site Assessment and Limited hazardous Materials Survey, August 15, 2001 report to Bothell Police Department.

Environmental Partners Inc., 2004. Chlorinated VOC Nature and Extent Investigation Letter Report, Case Property 18300-18304 Bothell Way NE, Bothell, WA. EPI Project No. 46101.0, November 30, 2004.

Farallon Consulting, 2002. Subsurface Investigation Report, Ultra Custom Care Cleaners Property 18300 – 18304 Bothell Way Northeast, Bothell, Washington, Farallon PN: 733001, April 19, 2002.

Farallon Consulting, 2016. Limited Groundwater Investigation Report, 10005 And 10011 Main Street Bothell, Washington, August 18, 2016

HWA, 2011b. New City Hall Soil & Ground Water Sampling, Bothell, Washington, October 21, 2011.

HWA, 2011c. Case Property Inspection and Sampling, Bothell, Washington, November 29, 2011.

HWA, 2012. Bothell Way NE, Drainage Improvements, Soil & Ground Water Sampling, Bothell, Washington, January 9, 2012.

HWA, 2014a. Source Area Interim Action Work Plan Ultra Custom Care Cleaners Site Bothell, Washington, April 28, 2014.

HWA, 2014b. Ground Water Modeling- New City Hall Building, Bothell, Washington, July 14, 2014.

HWA, 2014c. Interim Action Work Plan No. 2 Ultra Custom Care Cleaners Site Bothell, Washington, November 7, 2014.

HWA, 2014d. Soil Cleanup Report Bothell Landing Brownfields Site, Bothell, Washington, December 8, 2014.

HWA, 2015a. Ultra Custom Care Second Interim Action Cleanup Design Revision and Status Report, February 7, 2015

HWA, 2015b. Ultra Custom Care Cleaners Soil and Groundwater Investigation Bothell, WA, August 20, 2015.

HWA, 2016a. UST Site Assessment Report Ultra Custom Care Cleaners Site 18125 Bothell Way NE Bothell, Washington, January 4, 2016.

HWA, 2016b. In Situ Bioremediation, Supplemental Injections, Second Round Plan Bothell, WA. January 26, 2016

HWA, 2017. Further Delineation of Site Boundary for Ultra and Riverside HVOC Sites Reconnaissance Ground Water Sampling Letter Report, Bothell, WA, May 12, 2017.

HWA, 2018a. Reconnaissance Ground Water Sampling Letter Report. Ultra Custom Care Cleaners Hotel Parcel Explorations, Bothell, WA, February 22, 2018.

HWA, 2018b. Draft Remedial Investigation/Feasibility Study Report, Ultra Custom Care Cleaners Site, Bothell, WA, April 12, 2018.

HWA, 2015 – 2017. Multiple Quarterly Ground Water Monitoring Reports, 2/9/15 to 4/14/17

Parametrix, 2010. Draft City Hall Site Environmental Site Assessment. Prepared for City of Bothell. May 2010.

Terra Associates, Inc., 2011. Geotechnical Report, Bothell City Hall, 18305 -101st Avenue NE Bothell, Washington, Project No. T -6542, Prepared for City Investors Development, LLC, Seattle, Washington, July 15, 2011.

Ultra Custom Care
Cleaners Site

Data Gaps Investigation Work Plan

Appendix C
Health and Safety Plan

Table of Contents

List of Figures

List of Attachments

List of Acronyms and Abbreviations

Acronym/ Abbreviation	**Definition**
ANSI	American National Standards Institute
cis-1,2-DCE	*cis*-1,2-dichloroethene
City	City of Bothell
COC	Contaminant of concern
CRZ	contamination reduction zone
EZ	Exclusion zone

Acronym/ Abbreviation	Definition
HASP	Health and Safety Plan
HSO/SS	Health and Safety Officer/Site Supervisor
PCE	Tetrachloroethylene
PID	Photoionization detector
PM	Project Manager
PPE	Personal protective equipment
ppm	Parts per million
ROW	Right-of-way
Site	City of Bothell Ultra Site
SSO	Site Safety Officer
SZ	Support zone
TCE	Trichloroethylene
VOC	Volatile organic compound
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

1.0 Plan Objectives and Applicability

This Health and Safety Plan (HASP) has been written to comply with the standards prescribed by the Occupational Safety and Health Act (OSHA) and the Washington Industrial Safety and Health Act (WISHA).

The purpose of this HASP is to establish protection standards and mandatory safe practices and procedures for all personnel involved with data gaps investigation activities including soil boings, monitoring well installation, water level measurements, utility location, survey, and soil and groundwater sampling at the City of Bothell Ultra Site (Site) located in downtown Bothell, Washington.

This HASP assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may be implemented during field work activities. This plan consists of site descriptions, a summary of work activities, the identification and evaluation of chemical and physical hazards, monitoring procedures, personnel responsibilities, a description of site zones, decontamination and disposal practices, emergency procedures, and administrative requirements.

The provisions and procedures outlined in this HASP apply to all Floyd|Snider personnel on-site. Contractors, subcontractors, other oversight personnel, and all other persons involved in the field work activities described herein are required to develop and comply with their own HASP. All Floyd|Snider staff conducting field activities are required to read this HASP and indicate that they understand its contents by signing the Health and Safety Officer/Site Supervisor's (HSO/SS's) copy of this plan.

It should be noted that this HASP is based on information that was available as of the date indicated on the title page. It is possible that additional hazards that are not specifically addressed by this HASP may exist at the work site or may be created as a result of on-site activities. It is the firm belief of Floyd|Snider that active participation in health and safety procedures and acute awareness of on-site conditions by all workers is crucial to the health and safety of everyone involved. Should project personnel identify a site condition that is not addressed by this HASP or have any questions or concerns about site conditions, they should immediately notify the HSO/SS, and work shall be paused to assess any new hazards. If any new hazards identified can be mitigated or controlled, work can proceed and the HASP will be revised if appropriate.

The HSO/SS has field responsibility for ensuring that the provisions outlined herein adequately protect worker health and safety and that the procedures outlined in this HASP are properly implemented. In this capacity, the HSO/SS will conduct regular site inspections to ensure that this HASP remains current in terms of its application to potentially changing site conditions. The HSO/SS has the authority to make health and safety decisions that may not be specifically outlined in this HASP, should site conditions warrant such actions. If the HSO/SS leaves the Site while work is in progress, an alternate Site Safety Officer (SSO) will be designated. Personnel responsibilities are further described in Section 4.0.

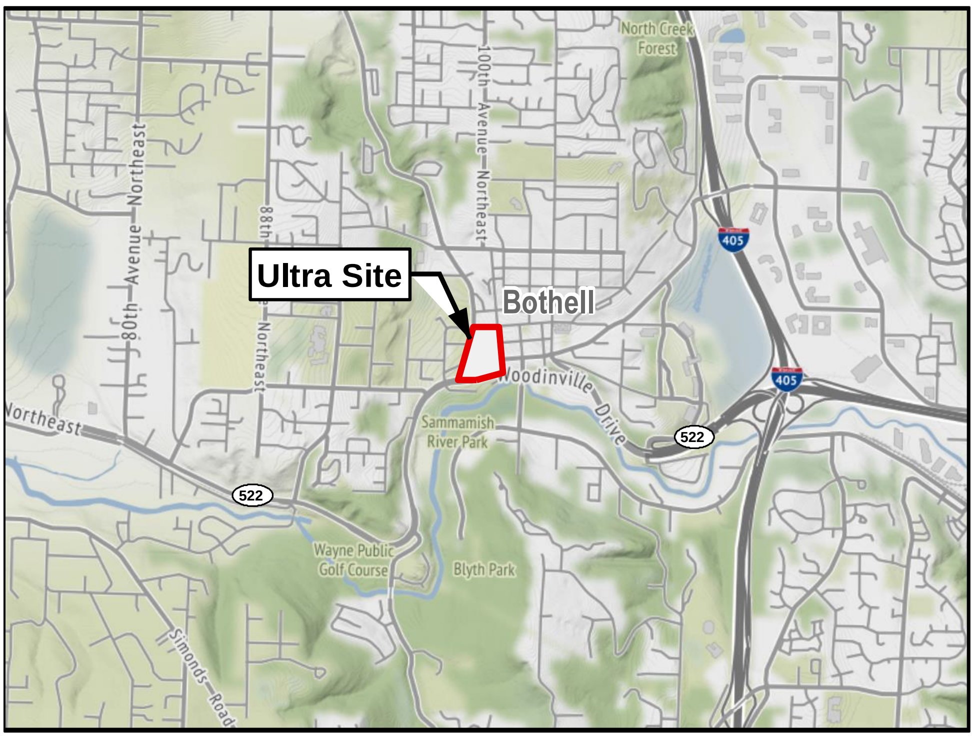
This HASP was reviewed by the Project Manager (PM) and the HSO/SS prior to commencement of work activities. All Floyd|Snider personnel shall review the plan and be familiar with on-site health and safety procedures. A copy of the HASP will be on-site at all times.

2.0 Background

2.1 SITE BACKGROUND

The Site is located in the central downtown area of Bothell, Washington. It comprises approximately three city blocks and totals over 9 acres, as shown in Figure 1. The Site currently includes multiple properties owned by the City of Bothell (City), multiple privately-owned parcels, and City-owned right-of-ways (ROWs). The property containing the source of contamination is owned by the City and located at 18304 Bothell Way NE, directly southwest of the Bothell City Hall.

Figure 1
Ultra Site Vicinity Location



The source property is approximately 0.25 acres in size and includes a vacant lot. Raincheck Cleaners and Laundry occupied a building from the 1950s through 1967 at the southwest corner of the source property. That building was demolished in 1967 and a new building was constructed and occupied by NuLife Cleaner, followed by Ultra Custom Care Cleaners. This building was demolished in June 2013.

To the west of the source property, across Bothell Way NE, is a recently constructed apartment building. South of the source property, across NE 183rd Street are commercial properties occupied by Ranch Drive-In, Washington Federal (bank), Speedy Glass, and Hillcrest Bakery. Further south, past Main Street, lies an empty City-owned lot and more commercial properties including Baskin-Robbins and Gallo de Oro Mexican Restaurant. The Sammamish River is located approximately 1,145 feet south of the source property.

The contaminants of concern (COCs) at the site consists predominantly of chlorinated solvents associated with dry cleaning activities including tetrachloroethylene (PCE) and its daughter products trichloroethylene (TCE), *cis*-1,2-dichloroethene (*cis*-1,2-DCE), and vinyl chloride. Total petroleum hydrocarbons, other volatile organic chemicals (VOCs) and metals have been detected at elevated concentrations in limited quantities in areas near the source and by State Route 522.

Floyd|Snider will be conducting data gaps investigation activities at the Site. The purpose of the investigation is to fill data gaps related to the extent of soil and groundwater contamination at the Site. This work is being performed to further define the vertical and lateral extents and the fate and transport of COCs prior to preparing a Remedial Investigation and Feasibility Study.

2.2 SCOPE OF WORK

The data gaps investigation will consist of the following:

- Conducting a public and private utility locate
- Monitoring well reconnaissance
- Measuring water level elevations from representative wells
- Collecting groundwater samples from Site and adjacent monitoring wells
- Advancing direct-push soil borings with and without membrane interface probe technology
- Advancing direct-push or hollow-stem auger borings to install monitoring wells
- Collecting and analyzing selected soil samples
- Collecting groundwater samples from direct-push locations
- Installing and developing monitoring wells
- Conducting a top-of-casing and surface elevation survey of new and existing monitoring wells
- Preparing a report documenting investigation results

Work may be completed in phases if appropriate given off-property access considerations and based on the results of the initial soil and groundwater sampling analysis.

3.0 Emergency Contacts and Information

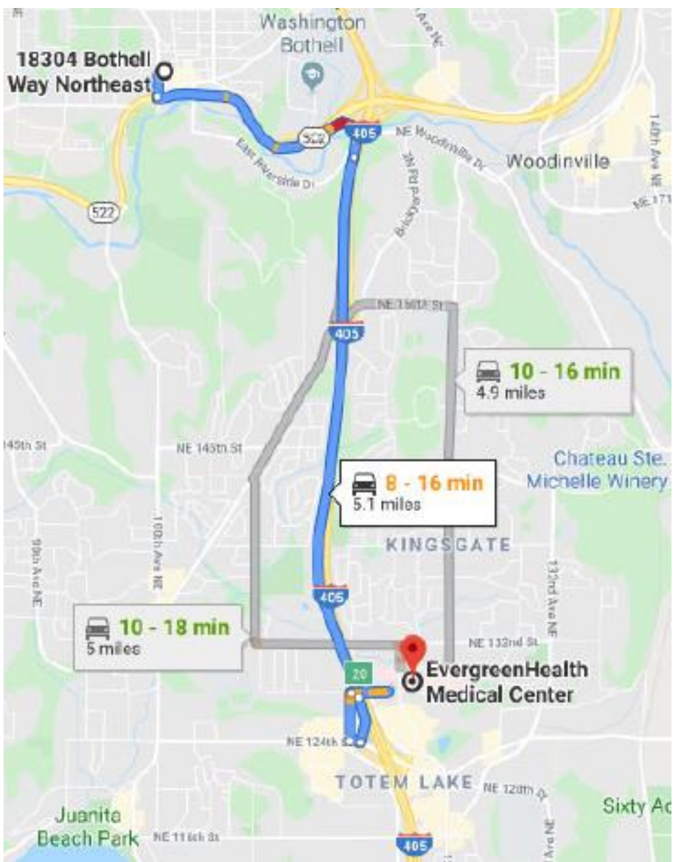
3.1 DIAL 911

In the event of an emergency, dial 911 to reach fire, police, and first aid.

3.2 HOSPITAL AND POISON CONTROL

Nearest Hospital Location and Telephone: Refer to Figure 2 below for map and directions to the hospital.	EvergreenHealth Medical Center 12040 NE 128th St Kirkland, Washington (425) 899-1700
Washington Poison Control Center:	(800) 222-1222

Figure 2
Hospital Directions



1. Head west on NE 183rd St/Fir St toward Bothell Way NE.
2. Turn LEFT onto Bothell Way NE.
3. Turn LEFT onto WA-522 E/Woodinville Dr.
4. Turn RIGHT onto I-405 S ramp to Bellevue.
5. Take exit 20 for NE 124th St.
6. Turn RIGHT onto NE 124th St.
7. Turn RIGHT onto 116th Ave NE.
8. Turn RIGHT onto NE 128th St.
9. EvergreenHealth Medical Center will be on the left.

3.3 PROVIDE INFORMATION TO EMERGENCY PERSONNEL

All Floyd|Snider project personnel should be prepared to give the following information:

Information to Give to Emergency Personnel	
Site Location: Refer to Figure 1	Ultra Site 18304 Bothell Way NE Bothell, Washington (immediately southwest of Bothell City Hall) **Site:** The Site is on several city blocks of both City-owned and private properties and includes the 18400, 18300, and 18200 city blocks. The Site also includes portions of the 10000 city block. There is no single entry point to the Site. Field personnel should give the nearest address to the emergency responders (e.g., Speedy Glass, Washington Federal, etc.).
Number You Are Calling from:	This information can be found on the phone you are calling from.
Type of Accident or Type(s) of Injuries:	Describe accident and/or incident and number of individuals needing assistance.

3.4 EMERGENCY CONTACTS

After contacting emergency response crews as necessary, contact the Floyd|Snider PM, or a Principal to report the emergency. The Floyd|Snider PM may then contact the City or direct the field staff to do so.

Floyd|Snider Emergency Contacts:

Contact	Office Phone Number	Cell Phone Number
Megan King, PM	(206) 292-2078	(206) 291-7713
Kate Snider, Principal		(206) 375-0762
Mark Jusayan, HSO/SS		(206) 659-7780

City of Bothell Emergency Contacts:

Contact	Office Phone Number	Cell Phone Number
Nduta Mbuthia	(425) 806-6829	(425) 471-4813
Ryan Roberts	(425) 806-6823	(425) 471-1837

4.0 Primary Responsibilities and Requirements

4.1 PROJECT MANAGERS

The PM will have overall responsibility for the completion of the project, including implementation and review of this HASP. The PM will review health and safety issues as needed and as consulted and will have authority to allocate resources and personnel to safely accomplish the field work.

The PM will direct all Floyd|Snider personnel involved in field work at the Site. If the project scope changes, the PM will notify the HSO/SS so that the appropriate addendum will be included in the HASP. The PM will ensure that all Floyd|Snider personnel on-site have received the required training, are familiar with the HASP, and understand the procedures to follow should an accident and/or incident occur on-site.

4.2 HEALTH AND SAFETY OFFICER AND SITE SUPERVISOR

The HSO/SS will approve this HASP and any amendments thereof and will ultimately be responsible for full implementation of all elements of the HASP.

The HSO/SS will advise the PM and project personnel on all potential health and safety issues associated with the field investigation activities to be conducted at the Site. The HSO/SS will specify required exposure monitoring to assess site health and safety conditions, modify this site HASP based on field assessment of health and safety accidents and/or incidents, and recommend corrective action if needed. The HSO/SS will report all accidents and/or incidents to the PM. If the HSO/SS observes unsafe working conditions for Floyd|Snider personnel or any contractor personnel, the HSO/SS will suspend all work until the hazard has been addressed.

4.3 SITE SAFETY OFFICERS

The SSO may be a person dedicated to the task of assisting the HSO/SS during field work activities. The SSO will ensure that all personnel have appropriate personal protective equipment (PPE) on-site and that PPE is properly used. The SSO will assist the HSO/SS in field observation of Floyd|Snider personnel safety. If a health or safety hazard is observed, the SSO shall suspend all work activity until the hazard has been addressed. The SSO will conduct on-site safety meetings daily before work commences and complete the Daily Tailgate Safety Meeting and Debrief Form (provided as Attachment 1) after the completion of field work at the end of the day. All health and safety equipment will be calibrated daily, and records will be kept in the daily field logbook. The SSO may perform exposure monitoring if needed and will ensure that equipment is properly maintained.

4.4 FLOYD|SNIDER PROJECT PERSONNEL

All Floyd|Snider project personnel involved in field work activities will take precautions to prevent accidents and/or incidents involving themselves and others in the work areas. Personnel will report all accidents and/or incidents or other unsafe working conditions to the HSO/SS or SSO immediately. Personnel will inform the HSO/SS or SSO of any physical conditions that could affect their ability to perform field work.

4.5 TRAINING REQUIREMENTS

All Floyd|Snider project personnel must comply with applicable regulations specified in Washington Administrative Code (WAC), Chapter 296-843, Hazardous Waste Operations, administered by the Washington State Department of Labor and Industries. Project personnel will be 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) trained and maintain their training with an annual 8-hour refresher. Personnel with limited tasks and minimal exposure potential will be required to have 24-hour training and a site hazard briefing and be escorted by a trained employee. Personnel with defined tasks that do not include potential contact with disturbed site soils or waste, potential contact with groundwater, or exposures to visible dust (e.g., surveying) are not required to have any level of hazardous waste training beyond a site emergency briefing and hazard orientation by the HSO/SS. Floyd|Snider project personnel will fulfill the medical surveillance program requirements.

At least one person on-site during field work will have current cardiopulmonary resuscitation (CPR)/first aid certification. All field personnel will have a minimum of 3 days of hazardous materials field experience under the direction of a skilled supervisor.

Additional site-specific training that covers on-site hazards; PPE requirements, use, and limitations; decontamination procedures; and emergency response information as outlined in this HASP will be provided by the HSO/SS before on-site work activities begin.

5.0 Hazard Evaluation and Risk Analysis

In general, there are three broad hazard categories that may be encountered during site work: chemical exposure hazards, fire/explosion hazards, and physical hazards. Sections 5.1 through 5.3 discuss the specific hazards that fall within each of these broad categories.

5.1 CHEMICAL EXPOSURE HAZARDS

This section describes potential chemical hazards associated with the field activities being conducted. Based on previous site data, elevated concentrations of the following chemicals may be encountered at the Site:

- Chlorinated solvents including PCE and its daughter products TCE, *cis*-1,2-DCE, and vinyl chloride in soil and groundwater.
- Other VOCs, including methylene chloride, 1,2-dibromoethane (EDB), and 1,2-dichloroethane (EDC) in groundwater.
- Gasoline-range and heavy oil-range organics in soil or groundwater.
- Benzene, toluene, ethylbenzene, and xylene compounds in soil or groundwater.
- Arsenic, barium, cadmium (one sample) chromium, and lead in groundwater.

Human health hazards associated with these chemicals are presented in the following table. This information covers potential toxic effects that might occur in the event of relatively significant acute and/or chronic exposure. This information does not mean that such effects will occur as a result of the planned site activities. Potential routes of exposure include inhalation, dermal contact, ingestion, and eye contact. The primary exposure route of concern during site work is ingestion of contaminated water, soil, or sediment, though such exposure is considered unlikely and highly preventable. In general, the chemicals that may be encountered at this Site are not expected to be present at concentrations that could result in significant exposures. The types of planned work activities and use of monitoring procedures and protective measures will limit potential exposures at this Site. The use of appropriate PPE and decontamination practices will assist in controlling exposure by means of all pathways to the contaminants listed in the following table.

Chemical Hazard	DOSH-Permissible Exposure Limits (8-hour TWA/STEL)	Highest Historical Concentration	Routes of Exposure	Potential Toxic Effects
PCE	25 ppm / 38 ppm	0.75 mg/kg in soil, 6400 µg/L in groundwater	Inhalation, skin absorption, ingestion, skin/eye contact	Eye irritation; allergic dermatitis; chloracne; GI distress; liver, kidney damage; breast and other cancers.
TCE	50 ppm / 200 ppm	0.034 mg/kg in soil, 300 µg/L in groundwater	Inhalation	Dermatitis; bronchitis; lung, skin, and stomach cancer.
cis-1,2-DCE	200 ppm / 250 ppm	1,800 µg/L in groundwater	Inhalation, skin absorption, ingestion, skin/eye contact	Ulceration of nasal septum; dermatitis; GI disturbance; respiratory irritation; hyperpigmentation of skin; skin and lung cancer.
Vinyl Chloride	1 ppm / 5 ppm	280 µg/L in groundwater	Inhalation, skin/eye contact	Lassitude; abdominal pain, GI bleeding; enlarged liver; pallor or cyanosis of extremities; carcinogenic.
EDB	20 ppm / 30 ppm	10 µg/L in groundwater	Inhalation, Skin absorption, ingestion, skin/eye contact	Irritation of eyes, skin, respiratory system; dermatitis with vesiculation; liver, heart, spleen, kidney damage; reproductive system effects; carcinogenic

Chemical Hazard	DOSH-Permissible Exposure Limits (8-hour TWA/STEL)	Highest Historical Concentration	Routes of Exposure	Potential Toxic Effects
EDC	50 ppm / 200 ppm	10 µg/L in groundwater	Inhalation, ingestion, skin absorption, skin/eye contact	Irritation of eyes, corneal opacity; central nervous system effects, depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; carcinogenic
Methylene Chloride	25 ppm / 125 ppm	100 µg/L in groundwater	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation of eyes, skin; lassitude, drowsiness, dizziness; numbing, tingling of limbs; nausea; carcinogenic
Arsenic	0.002 mg/m^3 / 0.010 mg/m^3	180 µg/L in groundwater	Inhalation, skin absorption, ingestion, skin/eye contact	Ulceration of nasal septum; dermatitis; GI disturbances; peripheral neuropathy; respiratory irritation; hyperpigmentation of skin; carcinogenic.
Barium	None / 0.5 mg/m^3	2,400 µg/L in groundwater	Inhalation, ingestion, skin/eye contact	Irritation of eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia.

Chemical Hazard	DOSH-Permissible Exposure Limits (8-hour TWA/STEL)	Highest Historical Concentration	Routes of Exposure	Potential Toxic Effects
Cadmium	0.005 mg / 0.5 mg/m^3	6 µg/L in groundwater	Inhalation, ingestion	Pulmonary edema, dyspnea, cough, chest tight, substernal pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia, emphysema, proteinuria, mild anemia; carcinogenic.
Chromium	None / 0.5 mg/m^3	930 µg/L in groundwater	Inhalation, ingestion, skin/eye contact	Irritation of eyes; sensitization dermatitis.
Lead	0.05 mg/m^3 / action level of 0.03 mg/m^3	380 µg/L in groundwater	Inhalation, ingestion, skin/eye contact	Weakness, insomnia, facial pallor, weight loss, constipation, abdominal pain, anemia, tremors, eye irritation, hypotension, central nervous system deficits, reproductive system effects.
Diesel-Range and Heavy Oil-Range Organics	None established	2,400 mg/kg in soil; 720 µg/L in groundwater	Inhalation, skin/eye contact	Irritation of eyes, reduction in pulmonary function, and effects to central nervous system.

Chemical Hazard	DOSH-Permissible Exposure Limits (8-hour TWA/STEL)	Highest Historical Concentration	Routes of Exposure	Potential Toxic Effects
Gasoline Range Hydrocarbons	300 ppm / 500 ppm	1,800 mg/kg in soil	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation of eyes, skin, mucus membranes; headache; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; liver, kidney damage.
Benzene	1 ppm / 5 ppm	6 mg/kg in soil; 13 µg/L in groundwater	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, skin, mucus membranes; headache; fatigue; blurred vision; dizziness; convulsions; liver, kidney damage; carcinogenic.
Toluene	100 ppm / 150 ppm	4.84 µg/L in groundwater	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation; anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.
Ethylbenzene	100 ppm / 125 ppm	12 mg/kg in soil	Inhalation, ingestion, skin/eye contact	Irritation to eyes, skin, mucus membranes; headache; dermatitis; narcosis, coma.

Chemical Hazard	DOSH-Permissible Exposure Limits (8-hour TWA/STEL)	Highest Historical Concentration	Routes of Exposure	Potential Toxic Effects
Xylenes	100 ppm / 150 ppm	11.51 mg/kg in soil	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
Laboratory Preservatives (hydrochloric acid, methanol, sodium bisulfate, nitric acid)	Not applicable	Not applicable	Dermal contact, eye contact	Irritation to skin or eyes. Avoid contact by proper use of PPE during sample handling and collection.

Abbreviations:

GI Gastrointestinal
mg/kg Milligrams per kilogram
µg/L Micrograms per liter
mg/m^3 Milligrams per cubic meter
ppm Parts per million
STEL Short-term exposure limit
TWA Time-weighted average

5.2 FIRE AND EXPLOSION HAZARDS

Hazards due to flammable and combustible liquids are associated with fuels and lubricants brought to the Site for excavation equipment. When on-site storage of such material is necessary, it will be stored in containers approved by the Washington State Department of Transportation (WSDOT) in a location not exposed to strike hazards and provided with secondary containment. A minimum 2-A:20-B fire extinguisher will be located within 25 feet of the storage location and where refueling occurs. Any subcontractors bringing flammable and combustible liquid hazards to the Site are responsible for providing appropriate material for containment and spill response and should address these containment and cleanup measures in their respective HASPs. Flammable liquids (e.g., gasoline) will be transferred only after a positive metal-to-metal connection has been made between the containers, which may be achieved by the use of a bonding strap. Ignitable and combustible materials will be stored away from fueling operations.

5.3 PHYSICAL HAZARDS

When working in or around any hazardous or potentially hazardous substances or situations, including an open excavation, in-water work, and vehicle traffic, all site personnel should plan all activities before starting any task. A tailgate safety meeting, in which personnel identify health and safety hazards associated with the planned work and consult with the HSO/SS as to how the task can be performed in the safest manner shall be conducted prior to the start of work.

All field personnel will adhere to general safety rules including wearing appropriate PPE—hard hats, steel-toed boots, high-visibility vests, safety glasses, gloves, and hearing protection, as appropriate. Eating, drinking, and the use of tobacco or cosmetics will be restricted in all work areas. Personnel will prevent splashing of liquids containing chemicals and minimize dust emissions.

The following table summarizes a variety of physical hazards that may be encountered on the Site during work activities. For convenience, these hazards have been categorized into general groupings with recommended preventive measures.

Hazard	Cause	Prevention
Head strike	Falling and/or sharp objects, bumping hazards, construction equipment.	All personnel will wear hard hats at all times when overhead hazards exist, such as during drilling activities and around heavy or large equipment.
Foot/ankle twist, crush, or slip/trip/fall	Sharp objects, dropped objects, uneven and/or slippery surfaces.	Steel-toed boots must be worn on-site at all times while heavy equipment is present. Pay attention to footing on uneven or wet terrain and do not run. Keep work areas organized and free from unmarked trip hazards.
Hand cuts, splinters, and/or chemical irritation/ burns	Hands or fingers pinched or crushed, chemical hazards. Cut or splinters from handling sharp/rough objects and tools.	Nitrile safety gloves will be worn to protect the hands from dust and chemicals. Leather or cotton outer gloves will be used when handling sharp-edged rough materials or equipment. Refer to preventive measures for mechanical hazards below.

Hazard	Cause	Prevention
Eye damage	Sharp objects, poor lighting, flying debris or splashes.	Wear safety glasses at all times while on-site. If a pressure washer is used to decontaminate heavy equipment, a face shield will be worn over safety glasses or goggles. Care will be taken during decontamination procedures and groundwater sampling to avoid splashing or dropping equipment into decontamination water.
Electrical hazards	Underground utilities, overhead utilities. Electrical cord hazards, such as well-development pumps.	Utility locator service will be used to locate all underground utilities prior to excavation. Visual inspection of work areas will be conducted prior to starting work. Whenever possible, avoid working under overhead high-voltage lines. Make sure that no damage to extension cords occurs. If an extension cord is used, make sure it is the proper size for the load that is being served and rated SJOW or STOW (an "-A" extension is acceptable for either) and inspected for defects prior to use. The plug connection on each end should be of good integrity. Insulation must be intact and extend to the plugs at either end of the cord. All portable power tools will be inspected for defects before use and must be either a double-insulated design or grounded with a ground-fault circuit interrupter (GFCI).
Mechanical hazards	Heavy equipment such as drill rigs, excavators, service trucks, telebelts, cranes, etc. Conducting work in road rights-of-way (on the road shoulder).	Ensure the use of competent operators, backup alarms, regular maintenance, daily mechanical checks, and proper guards. Subcontractors will supply their own HASP. All project personnel will make eye contact with the operator and obtain a clear "OK" before approaching or working within the swing radius of heavy equipment, staying clear of the swing radius.

Hazard	**Cause**	**Prevention**
Traffic hazards	Vehicle traffic and hazards when working near active operations.	When working in or near the ROW (sidewalks, roadway, and crosswalks), orange cones and/or flagging will be placed around the work area. Safety vests will be worn at all times while conducting outdoor work. Multiple field staff will work together (buddy system) and spot traffic for each other. Avoid working with your back to traffic whenever possible. Work within the roadway will be avoided whenever possible due to direct traffic hazards by moving drilling locations within planters, empty lots, or sidewalks. If work requires being within a roadway, efforts will be made to minimize the time within the roadway. Vehicles and equipment shall be positioned such that the equipment is between traffic and the personnel and never such that personnel are between traffic and equipment. If and when traffic control is required for ROW work or at all times while working within a ROW, an American National Standards Institute (ANSI) class 2 compliant safety vest or garment must be worn. Ensure that all personnel have reviewed and understand the traffic control plan if applicable. All work within the ROW will be coordinated with the City.
Noise/ hearing damage	Loud machinery	Wear earplugs or protective ear covers when heavy equipment is operating and when a conversational level of speech is difficult to hear at a distance of 3 feet; when in doubt, a sound level meter may be used on-site to document noise exposure.

Hazard	Cause	Prevention
Strains due to improper lifting	Injury due to improper lifting techniques, over-reaching/ overextending, lifting overly heavy objects.	Use proper lifting techniques and mechanical devices where appropriate. The proper lifting procedure first involves testing the weight of the load by tipping it. If in doubt, ask for help. Do not attempt to lift a heavy load alone. Take a good stance and plant your feet firmly with legs apart, one foot farther back than the other. Turn the forward foot and point it in the direction of the eventual movement. Make sure you stand on a level area with no slick spots or loose gravel. Use as much of your hands as possible, not just your fingers. Keep your back straight, almost vertical. Bend at the hips, holding load close to your body. Keep the weight of your body over your feet for good balance. Use large leg muscles to lift. Push up with one foot positioned in the rear as you start to lift. Avoid quick, jerky movements and twisting motions. Never try to lift more than you are accustomed to lifting.
Cold stress	Cold temperatures and related exposure.	Workers will wear appropriate clothing, stay dry, and take breaks in a heated environment when working in cold temperatures. **Further detail on cold stress is provided in Section 5.3.1.**
Accidents due to inadequate lighting	Improper illumination.	Work will proceed during daylight hours only or under sufficient artificial light.

5.3.1 Cold Stress

Exposure to moderate levels of cold can cause the body's internal temperature to decrease to a dangerously low level, resulting in hypothermia. Symptoms of hypothermia include slow, slurred speech; mental confusion; forgetfulness; memory lapses; lack of coordination; and drowsiness.

To prevent hypothermia, site personnel will stay dry and avoid exposure to cold. Site personnel will have access to a warm, dry area, such as a vehicle, to take breaks from the cold weather and warm up. Site personnel will be encouraged to wear sufficient clothing in layers such that outer clothing is wind- and waterproof and inner layers retain warmth (wool or polypropylene), if applicable. Site personnel will keep hands and feet well protected at all times. The signs and symptoms and treatment for hypothermia are summarized in the following text.

Signs and Symptoms

- Mild hypothermia (body temperature of 98–90 °F)
  - Shivering
  - Lack of coordination, stumbling, fumbling hands
  - Slow, slurred speech
  - Memory loss
  - Pale, purplish gray, or dusky cold skin
- Moderate hypothermia (body temperature of 90–86 °F)
  - Cessation of shivering
  - Inability to walk or stand
  - Confusion and irrationality
- Severe hypothermia (body temperature of 86–78 °F)
  - Severe muscle stiffness
  - Extreme sleepiness or unconsciousness
  - Ice cold skin
  - Death

Treatment of Hypothermia—Proper Treatment Depends on Severity of Hypothermia

- Mild hypothermia
  - Move to warm area.
  - Stay active.
  - Remove wet clothes and replace with dry clothes or blankets and cover the head.
  - Drink warm (not hot) sugary drinks.
- Moderate hypothermia
  - All of the above, plus:
    - Call 911 for an ambulance.
    - Cover all extremities completely.
    - Place very warm objects such as hot packs or water bottles on the victim's head, neck, chest, and groin.
- Severe hypothermia
  - Call 911 for an ambulance.
  - Treat the victim very gently.
  - Do not attempt to rewarm—the victim should receive treatment in a hospital.

Frostbite

Frostbite occurs when the skin actually freezes and loses water. In severe cases, amputation of the frostbitten area may be required. Although frostbite usually occurs when the temperatures are 30 °F or lower, frostbite can occur in above-freezing temperatures as a result of the wind-chill factor. Frostbite typically affects the extremities, particularly the feet and hands. Frostbite symptoms include a cold, tingling, stinging, or aching feeling in the frostbitten area, followed by numbness and skin discoloration: Paler skin may change from red to purple, then to white or very pale, and darker skin may become pale, dusky, or purplish. Frostbitten skin will be waxy and firm while still frozen and may redden, swell, or blister when thawed. Should any of these symptoms be observed, wrap the area in soft cloth, do not rub the affected area, and seek medical assistance. Call 911 if the condition is severe.

Protective Clothing

Wearing the appropriate clothing is the most important way to avoid cold stress. The type of fabric also makes a difference. For example, cotton loses its insulation value when it becomes wet, while wool retains its insulation even when wet. The following are recommendations for working in cold environments:

- Wear *at least three layers* of clothing:
  - An outer layer to break the wind and allow some ventilation (like Gortex or nylon)
  - A middle layer of down or wool to absorb sweat and provide insulation even when wet
  - An inner layer of cotton or synthetic weave to allow ventilation
- Wear a hat—up to 40 percent of body heat can be lost when the head is exposed.
- Wear insulated boots or other footwear.
- Keep a change of dry clothing available in case work clothes become wet.
- Do not wear tight clothing—loose clothing allows better ventilation.

Work Practices

- Drinking—Drink plenty of liquids, avoiding caffeine and alcohol. It is easy to become dehydrated in cold weather.
- Work Schedule—If possible, heavy work should be scheduled during the warmer parts of the day. Take breaks out of the cold in heated vehicles.
- Buddy System—Try to work in pairs to keep an eye on each other and watch for signs of cold stress.

5.3.2 Heat Stress

The data gaps investigation field work is anticipated to be completed within the winter months of late 2019 to early 2020. However if work is delayed or extended to spring of 2020, current regulations (WAC 296-62-095 through 296-62-09560) apply to any outdoor work environment from May 1 through September 30, when workers are exposed to temperatures greater than 89 °F when wearing breathable clothing, greater than 77 °F when wearing double-layered woven clothing (such as jackets or coveralls), or greater than 52 °F when wearing non-breathable clothing such as chemical-resistant suits or Tyvek.

5.3.3 Biohazards

Bees and other insects may be encountered during the field work tasks. Persons with allergies to bees will make the HSO/SS aware of their allergies and will avoid areas where bees are identified. Controls such as repellents, hoods, nettings, masks, or other personal protection may be used. Report any insect bites or stings to the HSO/SS and seek first aid, if necessary. Site personnel will maintain a safe distance from any urban wildlife encountered, including stray dogs, raccoons, and rodents, to avoid being bitten by a sick or injured animal. Personnel will wear gloves and use tools to lift covers from catch basins and monitoring wells.

5.3.4 Traffic Hazards

During work nearby or alongside a roadway, the use of signs, signals, and barricades is required. Because signs, signals, and barricades do not always provide appropriate protection, spotters will be used to monitor traffic during work activities along roadways. All workers will wear high-visibility, reflective neon/orange vests. Personnel working within any ROW are required to wear ANSI class 2 vests or garments. Traffic control plans and permits from the City of Bothell will be required for any lane closures. WSDOT-required signage, protection devices, and flagging will be used by the Contractor during lane closures.

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6.0 Site Monitoring

This section describes site monitoring techniques and equipment that are to be used during site field activities. The HSO/SS, or a designated alternate, is responsible for site control and monitoring activities.

All noise-generating activities will be conducted during the allowable noise-generating hours as stated by the City of Bothell. Construction Noise Hours for the City of Bothell are between 7:00 a.m. and 10:00 p.m., Monday through Friday, unless a variance is granted in writing by the City of Bothell where hours outside of the standard Construction Noise Hours will be prescribed.

Contaminant concentrations in soil and groundwater at the Site are present at concentrations that are not expected to result in vapor concentrations that exceed allowable OSHA levels. All work will be conducted outdoors in an open-air ventilated environment. A photoionization detector (PID) will be used on-site for screening of soil samples collected. This PID will also be used to monitor vapor concentrations in breathing air of total volatile chemicals in parts per million that can be detected using this method. Should the PID read a sustained concentration of total VOCs above 5 ppm for 5 minutes, the HSO/SS will stop work and evacuate the area until vapor concentrations return to background levels. As needed, actions may be taken to reduce exposure to vapor concentrations in the work area by covering exposed soil or drilling cuttings, and leaving the work area until odor dissipates.

Visual monitoring for dust will be conducted by the HSO/SS to ensure that inhalation of contaminated soil particles does not occur. If visible dust is present in the work area, work will cease, and the area will be cleared until the dust settles. Water may be used to suppress any dust clouds generated during work activities.

The HSO/SS will visually inspect the work site at least daily to identify any new potential hazards. If new potential hazards are identified, immediate measures will be taken to eliminate or reduce the risks associated with these hazards.

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7.0 Hazard Analysis by Task

This section identifies potential hazards associated with each task listed in Section 2.2 of this HASP. Tasks have been grouped according to the types of potential hazards associated with them.

Task	Potential Hazard
Water level measurements, utility location, and well reconnaissance activities	Slip, trip, or fall hazards; traffic hazards; heat and cold exposure hazards; biological hazards; and potential dermal or eye exposure to site contaminants in groundwater.
Installation of soil borings, soil sampling and groundwater sampling from direct-push activities (Geoprobe and membrane interface probe)	Exposure to loud noise; overhead hazards; head, foot, ankle, hand, and eye hazards; electrical and mechanical hazards; lifting hazards; dust inhalation hazards; potential dermal or eye exposure to site contaminants in groundwater and soil; fall hazards; traffic hazards; and heat and cold exposure hazards.
Well development and groundwater sampling from monitoring wells	Chemical hazards include potential dermal or eye exposure to site contaminants in groundwater. Physical hazards include slip, trip, or fall hazards; heat and cold exposure hazards; traffic hazards; and biological hazards.

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8.0 Personal Protective Equipment

All work involving heavy equipment will proceed in Level D PPE, which shall include a hard hat, steel-toed boots, hearing protection (if equipment generates noises that make conventional levels of speech difficult to hear from 3 feet), eye protection, gloves (when working with sharp tools), and sturdy and removable outer work clothing.

All personnel will be properly fitted and trained in the use of PPE. The level of protection will be upgraded by the HSO/SS whenever warranted by conditions in the work area. The HSO/SS will periodically inspect equipment such as gloves and hard hats for defects.

For all work involving potential exposure to soil or groundwater, workers will wear nitrile gloves and Level D PPE. High-visibility vests will be worn when working around heavy equipment and on road shoulders. ANSI class 2 high-visibility vests or garments are required for work within ROWs. Personnel will wear rain gear and/or insulated garments on windy, cold, and rainy days to prevent cold stress-related illness.

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9.0 Site Control and Communication

9.1 SITE CONTROL

The Site includes several city blocks within the downtown core of Bothell, Washington. Drilling, sampling, and water level measurement locations will vary between private, public, and City-owned property, all of which will be unsecured. Work areas will be delineated and controlled with the use of cones, caution tape, barricades, flagging, or other equivalent traffic control measures. Pedestrians and other unauthorized personnel will not be allowed in the work areas. Access to the work site will be restricted to designated personnel. The purpose of site control is to minimize the public's potential exposure to site hazards, to prevent vandalism in the work area and access by unauthorized persons, and to provide adequate facilities for workers. If members of the public enter the work area, field staff will stop work until the individuals have left the work area.

Work area controls and decontamination areas will be provided to limit the potential for chemical exposure associated with site activities and the transfer of contaminated media from one area of the Site to another. The support zone (SZ) for the Site includes all areas outside the work area and decontamination areas. An exclusion zone/contamination reduction zone (EZ/CRZ) will be set up for each boring and/or well location. Only authorized personnel shall be permitted access to the EZ/CRZs. Floyd|Snider staff will decontaminate all equipment and gear as necessary prior to exiting the CRZ. Decontamination areas will be constructed with plastic sheeting on the ground to reduce potential transport of contaminated soils from the EZ to the SZ.

9.2 COMMUNICATION

All site work will occur in teams and the primary means of communication on-site and with off-site contacts will be cell phones. An agreed-upon system of alert by means of air horns and/or vehicle horns may be used around heavy equipment to signal an emergency if shouting is ineffective.

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10.0 Decontamination and Waste Disposal

10.1 CONTAMINATION PREVENTION

To avoid personal contact with contaminants, personnel will adhere to the following guidelines:

- Do not directly handle or touch contaminated materials.
- Make sure all PPE is intact and in good working condition prior to donning.
- Take particular care to protect any skin injuries.
- Stay upwind of airborne contaminants.
- Do not eat, drink, apply cosmetics, or use tobacco products, gum, or similar items in contaminated areas.

To avoid spreading equipment and sample contamination, personnel will do the following:

- Take care to limit contact with heavy equipment and vehicles.
- If contaminated tools are to be placed on uncontaminated equipment/vehicles for transport to a decontamination area, use plastic to keep the uncontaminated equipment clean.
- Place sampling derived waste into clearly labeled receptacles in designated areas.
- Bag sample containers prior to emplacement of sample material.

10.2 DECONTAMINATION

A majority of field and sampling activities are expected to be conducted using Level D PPE. Decontamination procedures for both PPE and field equipment will be strictly followed to prevent off-site spread of contaminated soil or water. The HSO/SS will assess the effectiveness of decontamination procedures by visual inspection. Hands must be thoroughly washed before leaving the Site to eat, drink, or use tobacco.

Equipment and vehicle decontamination generally consists of pressure washing with detergent solution followed by a potable water rinse, requiring construction of a temporary decontamination station. Equipment decontamination will be designed and implemented by the driller, and the HSO/SS will monitor equipment decontamination to ensure that contaminated media and/or equipment do not leave the Site. Floyd|Snider staff will perform sampling equipment decontamination consistent with this plan and the contractor’s system set up in place.

10.3 WASTE DISPOSAL

Floyd|Snider and its subcontractors will use safe and prudent waste collection and housekeeping practices to minimize the spread of contamination beyond the work zone and the amount of investigation-derived wastes. The Floyd|Snider HSO/SS will work with site personnel to ensure the proper collection, packaging, and identification of waste materials so that waste materials will be properly disposed of.

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11.0 Emergency Response and Contingency Plan

This section defines the emergency action plan for the Site. It will be rehearsed with all Floyd|Snider field personnel and subcontractors directly overseen by Floyd|Snider, and it will be reviewed whenever the plan is modified or the HSO/SS believes that field personnel are unclear about the appropriate emergency actions.

A muster point of refuge (that is clear of adjacent hazards and not located downwind of site investigation activities) will be identified by the HSO/SS and communicated to the field team each day. In an emergency, all field personnel and visitors will evacuate to the muster point for roll call. It is important that all persons on-site understand their role in an emergency and that they remain calm and act efficiently to ensure everyone's safety.

After each emergency is resolved, the entire project team will meet and debrief on the incident—the purpose is not to fix blame but to improve the planning and response to future emergencies. The debriefing will review the sequence of events, what was done well, and what can be improved. The debriefing will be documented in a written format and communicated to the PM. Modifications to the emergency plan will be approved by the PM.

Reasonably foreseeable emergency situations include medical emergencies, accidental release of hazardous materials (such as gasoline or diesel) or hazardous waste, and general emergencies such as a vehicle accident, fire, thunderstorm, and earthquake. Expected actions for each potential incident are outlined in the following subsections.

11.1 MEDICAL EMERGENCIES

This section describes general emergency procedures that are applicable to almost every activity.

In the event of a medical emergency, the following procedures should be used:

- Stop any imminent hazard if you can safely do so.
- Remove ill, injured, or exposed person(s) from immediate danger if moving them will clearly not cause them harm and no hazards exist to the rescuers.
- Evacuate other on-site personnel to a safe place in an upwind or cross-wind direction until it is safe for work to resume.
- If serious injury or a life-threatening condition exists, call **911** for paramedics, fire department, and police. Clearly describe the location, injury, and conditions to the dispatcher. Designate a person to go to the site entrance and direct emergency equipment to the injured person(s). Provide the responders with a copy of this HASP to alert them to chemicals of potential concern.
- Trained personnel may provide cardiopulmonary resuscitation/first aid if it is necessary and safe to do so. Remove contaminated clothing and PPE only if this can be done without endangering the injured person.

- Call the PM and HSO/SS.
- Immediately implement steps to prevent recurrence of the accident.

In the event of a chemical exposure, use the following procedures:

- **Skin Contact.** Flush the area with copious quantities of cold water for at least 15 minutes. Do not let contamination spread to other personnel. Seek medical attention.
- **Eye Contact.** Wash/rinse affected area for at least 15 minutes. An emergency eye wash system will be present on-site. Seek medical attention.
- **Inhalation.** Remove the person from further exposure. Seek medical attention and be prepared to provide respiratory support if the person has difficulty breathing.
- **Ingestion.** Dilute the material with large quantities of water. Summon an ambulance and contact the hospital or poison control center immediately for further instructions.
- If exposure or injuries are severe, call **911** for paramedics, fire department, or other emergency responders as described previously in this section.

Refer to Section 3.2 for a map showing the nearest hospital location (Figure 2) as well as the hospital phone number and address.

11.2 ACCIDENTAL RELEASE OF CONTAMINATED MATERIALS OR WASTES

1. Evacuate all on-site personnel to a safe place in an upwind direction until the HSO/SS determines that it is safe for work to resume.
2. Instruct a designated person to contact the PM and confirm a response.
3. Contain the spill, if it is possible and can be done safely.
4. If the release is not stopped, contact 911 to alert the fire department.
5. Contact the Washington State Emergency Response Commission at 1-800-258-5990 to report the release.
6. Initiate cleanup.
7. The PM will submit a written report to the Washington State Department of Ecology in the event of a reportable release of hazardous materials or wastes.

11.3 GENERAL EMERGENCIES

In the case of fire, explosion, earthquake, or imminent hazards, work shall be halted and all on-site personnel will be immediately evacuated to a safe place. The local police/fire department shall be notified, by calling 911, if the emergency poses a continuing hazard.

In the event of a thunderstorm, outdoor work will be discontinued until the threat of lightning has abated. During the incipient phase of a fire, the available fire extinguisher(s) may be used by persons trained in putting out fires, if it is safe for them to do so. Contact the fire department as soon as feasible.

11.4 EMERGENCY COMMUNICATIONS

In the case of an emergency, an air horn will be used as needed to signal the emergency. One long (5-second) blast will be sounded as the emergency/stop work signal. If the air horn is not working or not available, a vehicle horn and/or overhead waving of arms will be used to signal the emergency. In any emergency, all personnel will evacuate to the designated refuge area and await further instruction.

11.5 EMERGENCY EQUIPMENT

The following minimum emergency equipment will be readily available on-site and functional at all times:

- First aid kit—contents approved by the HSO/SS, including two blood-borne pathogen barriers and an emergency eye wash station
- Spill kit
- Portable fire extinguisher (2-A:10 B/C min)
- A copy of the current HASP

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12.0 Administrative

12.1 MEDICAL SURVEILLANCE

Floyd|Snider personnel involved with field activities must be covered under Floyd|Snider's medical surveillance program that includes biennial physical examinations. These medical monitoring programs must be in compliance with all applicable worker health and safety regulations.

12.2 RECORDKEEPING

The HSO/SS, or a designated alternate, will be responsible for keeping documentation of site activities including attendance lists of personnel present at site health and safety meetings, accident reports, and signatures of all personnel who have read this HASP.

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13.0 Approvals

Project Manager		Date
Project Health & Safety Officer		Date

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14.0 Signature Page

I have read this Health and Safety Plan and understand its contents. I agree to abide by its provisions and will immediately notify the HSO/SS if site conditions or hazards not specifically designated herein are encountered.

Name (Print)	Signature	Date	Company/Affiliation

Ultra Custom Care Cleaners Site

Health and Safety Plan

Attachment 1
Daily Tailgate Safety Meeting and Debrief Form

DAILY TAILGATE SAFETY MEETING AND DEBRIEF FORM

To be completed by supervisor prior to beginning of work each day, when changes in work procedures occur, or when additional hazards are present. Please maintain a copy of this form with the site-specific HASP for the record.

PROJECT:_______________________________________ **DATE:** _____________________

DESCRIBE TODAY'S ACTIVITIES (task, location, personnel, tools, hazards)

Work to be Performed	Hazards Associated with Work	Safe Work Practices

TOPICS/HAZARDS DISCUSSED:

Chemical of concern:
Slip, trip, fall:
Heat or cold stress:
Required PPE:
Other Potential Hazards:
• Environmental:
• Physical:
• Biological:
• Task specific tools:
• Other :

INFORMAL TRAINING CONDUCTED (Name, topics):

SIGNATURES OF EMPLOYEES PRESENT FOR TAILGATE MEETING

ADDITIONAL HAZARDS IDENTIFIED DURING OR AT END OF WORKDAY:

Supervisor's Signature: ________________________________ **Date/Time:**____________

NEAR MISS AND INCIDENT REPORTING FORM

INCIDENTS:

INJURIES:

NEAR MISSES:

CORRECTIVE ACTIONS:

Supervisor's Signature: ___________________________________ Date/Time: ________________